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ENVIRONMENTAL IMPACT STATEMENT: RIVER ISLANDS AT LATHROP, PHASE 2B

October 2014

US Army Corps of Engineers

Draft Environmental Impact Statement: River Islands at Lathrop, Phase 2B

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Summary

This document is an environmental impact statement (EIS) analyzing the effects of issuing federal permits that would enable construction of additional homes and commercial properties, along with increased level of levee performance and habitat restoration features, as part of the River Islands at Lathrop planned community on Stewart Tract in the City of Lathrop (City). This EIS has been prepared in compliance with the National Environmental Policy Act (NEPA) to disclose potential environmental effects of the proposed development activities and enable the public and regulatory agencies to comment on the federal permit action, the proposed construction, and alternative approaches. The U.S. Army Corps of Engineers (Corps) is serving as the lead agency for NEPA compliance. California Environmental Quality Act (CEQA) compliance for the project was completed (2002) separately, with the City acting as the CEQA lead agency.

This Draft EIS will be circulated for a 45-day public review period, during which time a public hearing will be held to solicit comments on the Draft EIS. Following public review of this EIS, the Corps will use the information it contains, together with comments submitted by other agencies and the public, to evaluate how the proposed action should proceed.

S.1 Proposed Action

As proposed by the applicant, River Islands, the entire project called *River Islands at Lathrop* would provide 11,000 homes and 5 million square feet of commercial space; water-oriented recreational amenities; and preserved open space on Stewart Tract in the secondary zone of the Sacramento–San Joaquin River Delta (Delta). Stewart Tract is bounded by the San Joaquin River on the east, Old River on the north, and Paradise Cut on the southwest. Railroad tracks currently owned and maintained by the Union Pacific Railroad (UPRR) mark the southeast boundary. The River Islands site as a whole comprises 5,000+ acres of former and current agricultural and open space land, and is entirely within the Lathrop city limits.

Because of the project's large size and complexity, construction and occupancy would be sequenced over a period of approximately 20 years. Earlier phases of the project were designed to be independent of the proposed action and did not require federal permitting; accordingly, these activities have proceeded separately under local authorization. The proposed action would involve activities affecting jurisdictional waters of the United States along the San Joaquin River, Old River, and Paradise Cut, as well as within Stewart Tract, and thus would require permitting from the Corps under Section 404 of the federal Clean Water Act (CWA) and Section 10 of the Rivers and Harbors Act (RHA). Alterations to existing federal project levees under the proposed action would require authorization under the Rivers and Harbors Appropriations Act of 1899, Section 14, codified as 33 United States Code (USC), Section 408 (Section 408). Refer to Chapter 2, *Proposed Action and Alternatives*, for a more detailed discussion of activities analyzed in this EIS and the scope of the federal action.

The proposed action would entail reconstruction and expansion of approximately 29,500 linear feet (5.6 miles) of the existing Old River levee to extend levee protection around the proposed action area. The remainder of the cross levee along the UPRR berm would be constructed under the proposed action, along with the Paradise Cut flood risk reduction measure, habitat restoration, and conservation improvements. The proposed action also includes the remainder of the proposed private development: 6,716 single- and multifamily homes, commercial space, and public amenities such as boat docks and other recreational facilities.

S.2 Development Phasing

Project elements under each phase of the River Islands at Lathrop project and the status of these elements as of preparation of this EIS are summarized below. Phase 1 and a portion of Phase 2A were *earlier phases*; these earlier phases have been completed or are in progress and are not evaluated in this EIS. The *proposed action* is Phase 2B and the remainder of Phase 2A, evaluated in this EIS.

Phase 1, construction of which is currently in progress, includes several flood risk reduction measures as well as residential, and commercial components. The flood risk reduction measures include placement of fill to raise approximately 300 acres in the southeast portion of Stewart Tract above the 0.5% (200-year) flood elevation and construction of a new levee system to reduce the flood risk in the non-raised remainder of the Phase 1 area. Other elements include the development of 4,284 single- and multi-family residential units, commercial space (approximately 60% of the total proposed commercial space for River Islands at Lathrop), and public amenities. Fill placement and levee construction were completed in 2005, accredited to the 1% level by the Federal Emergency Management Agency (FEMA) in 2006 and identified by the California Department of Water Resources (DWR) as outside the 0.5% (200-year) floodplain in 2008.

Phase 2 comprises two subphases, *Phase 2A* and *Phase 2B*. Phase 2A involves additional flood risk reduction measures, which were completed in 2005 and 2006. These measures entailed filling approximately 13,600 linear feet (2.6 miles) of the setback area between the new Phase 1 interior levee and the existing levee along the San Joaquin River to create an extended levee (essentially a very wide levee) for reduced flood risk. Phase 2A fill placement was carried out in 2006 and the resulting levee was accredited at the 1% (100-year) level by FEMA in 2007 and identified by DWR as outside the 0.5% (200-year) floodplain in 2008. Additional components in the Phase 2A area have not yet been constructed due to the required federal approval under Section 408, as well as authorization under CWA Section 404 and RHA Section 10. These elements—breaching the federal levee along the San Joaquin River to fill the Lathrop Landing back bay and construction of boat docks along the San Joaquin River (discussed further in Chapter 2, *Proposed Action and Alternatives*)—are treated as part of Phase 2B and are evaluated in this EIS.

Phase 2B, the major focus of this EIS, involves additional flood risk reduction measures and the remainder of the proposed private development, including 6,716 single- and multifamily homes, commercial space, and public amenities. Specifically, Phase 2B proposes altering approximately 29,500 linear feet (approximately 5.6 miles) of the existing Old River levee to extend the area of flood risk reduction around the Phase 2B development area. The remainder of the cross levee along the UPRR berm (initiated in Phase 1) would be constructed under Phase 2B, along with the Paradise Cut flood risk reduction and conservation measures.

Phase 1 and the initial portion of Phase 2A were designed to avoid any discharge of dredged or fill material into or to have other effects on waters of the United States. Therefore, these phases did not require federal review or permitting under CWA. Accordingly, all Phase 1 and 2A flood risk reduction measures were outside direct Corps jurisdiction and were constructed under local and state agency permits. The additional residential, commercial, and recreational features of Phase 1 development were also outside federal jurisdiction and are proceeding under local authority.

S.3 Purpose and Need

The purpose of the River Islands at Lathrop project is to construct a large-scale, mixed-use project consisting of residential development and a commercial complex, which may include open space and recreational amenities, in San Joaquin County or the south Delta area.

River Islands at Lathrop is proposed to meet the following needs.

- **Employment**—fostering economic employment development in the City of Lathrop; offsetting the jobs deficit in San Joaquin County, which has experienced some of the state's highest unemployment rates in recent years; and offering a high-quality local employment nexus to relieve the current pressure to commute into the San Francisco Bay Area.
- **Housing**—satisfying the housing needs of workers employed in the Tri-Valley area of southern Alameda and Contra Costa Counties, while offering additional housing diversity not currently available in the City of Lathrop.

The federal action under review for authorization pursuant to CWA Section 404 and RHA Section 10 and permission under Section 408 is restricted to a portion of the proposed River Islands development. However, the general project purpose and statement of need identified for the project in its entirety also apply to the focused federal action.

S.4 Need for Flood Risk Reduction

Flood risk reduction measures are not specifically identified in the purpose and need, since these improvements are not required to offer employment and housing opportunities in this region. However, the proposed action and alternatives identified through the screening process would also include flood risk reduction measures for development that would occur on Stewart Tract. River Islands is seeking Section 408 permission and a level of performance relative to a 100-year flood event as accredited by FEMA and to a 200-year event as accredited by DWR. A *100-year flood* is defined as a flood event with a 1% chance of occurring in any given year; a *200-year flood* is a flood event with a 0.5% chance of occurring in any given year. Actual increases in floodflows resulting from a flood event vary from water body to water body. This document uses the *1%* nomenclature to refer to a 100-year flood (e.g., 0.5% for a 200-year flood, 0.2% for a 500-year flood).

For Section 408 purposes, the River Islands at Lathrop project falls under the San Joaquin River and Tributaries (SJRT) project. The Central Valley Flood Protection Board (originally the Reclamation Board of the State of California, later reauthorized as the Central Valley Flood Protection Board [CVFPB]) is the applicant for Section 408 permission. Levee changes proposed in this EIS would be an alteration to the SJRT project.

S.5 Alternatives Development

NEPA and its implementing regulations require that an EIS evaluate a reasonable range of feasible alternatives to the proposed action. Although the No Action Alternative is not the baseline for evaluating environmental effects,[1] the EIS must also evaluate the No Action Alternative to allow decision makers to compare the effects of approving the proposed action with the effects of not approving it. Alternatives must be evaluated at the same level of detail provided for the proposed action (40 Code of Federal Regulations [CFR] 1502.14).

The following sections present a brief overview of the alternatives development approach and describe the alternatives that are analyzed in this EIS, including the No Action Alternative. The alternatives development process is described in greater detail in Chapter 2, *Proposed Action and Alternatives*.

S.5.1 Alternatives Development and Screening Approach

A key purpose of this EIS is to support the Corps in evaluating River Islands' application for a CWA Section 404 permit. Review of Section 404 permit applications is governed by 40 CFR 230–233 (*Restrictions on Discharge*). To ensure that this EIS contains an appropriate range of alternatives to support Section 404 compliance, the alternatives development and screening approach was designed to satisfy both the Restrictions on Discharge and NEPA and its implementing regulations. Chapter 2, *Proposed Action and Alternatives*, provides a detailed description of the alternatives screening process and correlates the 404(b)(1) alternatives analysis process with that undertaken for NEPA compliance. The Alternatives Analysis presented in Appendix C was the basis for the development of the alternatives ultimately selected for evaluation in this EIS.

S.5.2 Alternatives Analyzed in this EIS

This EIS analyzes five alternatives to the proposed action, as shown in Table S-1 below. A more detailed description of the alternatives is provided in Chapter 2, *Proposed Action and Alternatives*.

[1] The baseline for analysis of environmental effects is defined as environmental conditions at the time the Notice of Intent (NOI) was published.

Table S-1. Alternatives Analyzed in the EIS

Alternative	Brief Description
Alternative 1—Proposed Action	This is the proposed action, described in detail in Chapter 2. Under Alternative 1, the project would construct 11,000 homes and 5 million square feet of commercial space; water-oriented recreational amenities; preserved open space in the secondary zone of the Delta; flood risk reduction and habitat restoration features as part of the River Islands at Lathrop planned community on Stewart Tract in the City of Lathrop. Residential, commercial and retail space and public services would be constructed in the River Islands Development (RID) area, along with an internal lake system, parks and a system of trails. A back bay water feature is proposed along the San Joaquin River, as well as boat docks accessible from the internal lake system, San Joaquin River and Old River. In the Paradise Cut Conservation (PCC) Area, new extended setback levees would be constructed landside of the existing levee along Paradise Cut. The existing levee would be breached in several locations, widening the floodway and increasing flood conveyance capacity. The remnants of the existing levee would be restored with riparian vegetation to provide fish and wildlife habitat and as a visual amenity. Portions of the setback levee could include a waterside bench area to accommodate additional riparian plantings suitable for riparian brush rabbit and other terrestrial and aquatic species. Revegetation in the PCC Area would be in compliance with the Corps' Engineering Technical Letter (ETL) 1110-2-583. The Paradise Cut Improvement Project (PCIP) Area, a portion of the Paradise Cut flood management bypass, would be expanded to provide additional flood conveyance capacity, increasing the level of levee performance for Stewart Tract and downstream areas. A setback levee would be constructed landside of the existing levee. The existing levee would be breached in likely two locations, and levee remnants would be revegetated much like the levee remnants created in the PCC Area. A 40-acre terrace near the existing Paradise Weir would be lowered to increase flood conveyance capacity.
Alternative 2—No Alteration of Paradise Cut	Under Alternative 2, no alterations in Paradise Cut would be undertaken. The existing Paradise Cut levee would be augmented and enhanced on the landside to achieve the 0.5% (200-year) level of performance. The internal pond would be filled. No habitat restoration or enhancement or flood conveyance improvements would be undertaken in Paradise Cut. The remainder of the proposed action would proceed as described for Alternative 1.
Alternative 3—Avoidance of Central Drainage Ditch	Under Alternative 3, the proposed action would be modified to avoid all construction affecting the central drainage ditch and 100-foot buffer on either side. The buffer could offer an opportunity for limited restoration of upland habitat, or it could be landscaped as a visual amenity. It could also be designed to incorporate stormwater treatment features.

Alternative	Brief Description
Alternative 4—Proposed Action with Expanded Flood Risk Reduction	Under Alternative 4, the residential and commercial components would be identical to those under the proposed action, but the flood risk reduction measures would be modified to include the following additional elements. • Constructing a new bypass channel or channels southwest of the existing Paradise Cut flood bypass. • Implementing more extensive widening in Paradise Cut. • Widening Paradise Weir and constructing an additional weir upstream of the existing weir. • Creating new flood storage areas. Salmon Slough and Doughty Cut could also be dredged to provide additional flood management capacity. All improvements would be designed to maximize their potential benefit to fisheries and wildlife. Because Alternative 4 would involve substantial additional acreage outside Stewart Tract, it could not be implemented without developing numerous landowner agreements.
Alternative 5—No Action	Under the No Action Alternative, a project would be implemented that does not require federal review and permitting under CWA Section 404 or federal review and approval under 33 USC Section 408 and RHA Section 10. The central drainage ditch would be avoided. The No Action Alternative is assumed to include completion of the Phase 1 and Phase 2A components of River Islands at Lathrop, along with a smaller (approximately 170 acres) developable area. The major differences between this alternative and the proposed action would be the lack of PCIP modifications (e.g., setback levees, lowered bench, high-ground refugia); an internal levee system rather than the use of extended levees; and the lack of waterside vegetation on benches outside project levees along the San Joaquin and Old Rivers. Regional flood risk reduction benefits, as well ecosystem restoration and enhancement activities associated with the PCIP and SRA habitat plantings, would not be realized under this alternative.

S.6 Anticipated Effects of the Proposed Action and Alternatives

Table S-2 summarizes the proposed action's potential for adverse effects, along with the mitigation measures identified for Corps' consideration during preparation of the Record of Decision (ROD), the point at which the preferable alternative is identified and mitigation measures are adopted. For a complete description of potential effects and recommended mitigation measures, please refer to the specific discussions in Chapters 3 through 25.

Table S-2. Summary of Effects and Mitigation Measures for River Islands at Lathrop, Phase 2B Proposed Action

Effect	Finding[a]	Mitigation Measure
Terrestrial Biological Resources		
Effects on common upland biological communities	LTS	–
Effects on special-status plant species	S	BIO-1. Implement measures required by SJMSCP for special-status plant species
Effects on waters of the United States	S	BIO-2. Minimize effects on waters of the United States and riparian habitat
Effects on riparian habitat	S	BIO-1. Implement measures required by SJMSCP for special-status plant species
		BIO-2. Minimize effects on waters of the United States and riparian habitat
Effects on valley elderberry longhorn beetle habitat	S	BIO-3. Implement avoidance measures for valley elderberry longhorn beetle
Effects on western pond turtle	LTS	BIO-4. Minimize potential loss of western pond turtles
Effects on giant garter snake	S	BIO-5. Implement avoidance and minimization measures for giant garter snake
		BIO-6. Implement an animal control and public education program
Effects on riparian brush rabbit	S	BIO-6. Implement an animal control and public education program
		BIO-7. Consult with regulatory agencies and implement avoidance and minimization measures for riparian brush rabbit
Effects on bats	LTS	–
Effects on tricolored blackbird	LTS	–
Effects on western burrowing owl	S	BIO-8. Implement avoidance and minimization measures for burrowing owl
Effects on Swainson's hawk	S	BIO-9. Implement minimization measures for Swainson's hawk
Effects on northern harrier	S	BIO-10. Implement avoidance and minimization measures for ground-nesting or streamside/lakeside–nesting birds
Effects on white-tailed kite	S	BIO-11. Implement avoidance and minimization measures for birds nesting along riparian corridors
Effects on greater sandhill crane	LTS	–
Effects on loggerhead shrike	S	BIO-12. Implement avoidance and minimization measures for birds nesting in isolated trees or shrubs outside riparian habitat
Effects on American white pelican	LTS	–
Effects on yellow-breasted chat, yellow warbler, and other migratory bird species	S	BIO-13. Conduct preconstruction surveys for nesting migratory bird species and establish buffer zones as necessary
Effects on wildlife corridors	S	BIO-14. Require coordination with appropriate entities to obtain minor revision to the SJMSCP

Effect	Finding[a]	Mitigation Measure
Fish Resources		
Temporary disturbance and possible mortality of fish, including special-status species, as a result of construction and operations activities	LTS	–
Effects of entrainment on fish, including special-status species, and other biota from entrainment during dredging	S	FISH-1. Incorporate best management practices and other minimization measures into the dredging sampling and analysis plan
Possible injury or mortality to special-status fish species due to pile driving	S	FISH-2. Reduce noise effects on special-status fish species
Potential for increased mortality of native fish from predation or entrainment at SWP/CVP pumps associated with diversion into Paradise Cut	LTS	–
Potential effects of entrainment on special-status fish species as a result of diversions into Stewart Tract	LTS	–
Water quality effects on fish in Paradise Cut, Old River, and the San Joaquin River associated with increased urban runoff	LTS	–
Disturbance and possible mortality of fish, including special-status species, associated with boat and marina operation	S	Addressed through Environmental Commitments
Predation and altered habitat function associated with overwater structures and modification of stream morphology	S	FISH-3. Develop and implement a detailed fishery resources mitigation and monitoring plan
		FISH-4. Minimize the extent of, and shading by, overwater structures
		FISH-5. Contribute to nearshore cover habitat in vicinity of marina
Potential for stranding of fish, including special-status species, in Paradise Cut	S	FISH-6. Fill or grade low-lying areas in Paradise Cut to reduce fish-stranding risks
		FISH-7. Monitor for and fill any scour pools formed following inundation of Paradise Cut by floodwaters
Effect on shaded riverine aquatic cover as a result of construction and compliance with the Corps' levee vegetation guidelines	S	FISH-8. Replace affected riparian and SRA cover length, area, and habitat value
Elimination of agricultural water diversion and discharges	NE	–

Effect	Finding[a]	Mitigation Measure
Geology, Soils, and Mineral Resources		
Effects on structures and personal safety as a result of seismic ground shaking, seismically induced liquefaction, and related types of ground failure	S	GEO-1. Implement geotechnical design recommendations to minimize or avoid damage from ground shaking
		GEO-2. Implement geotechnical design recommendations to minimize or avoid damage from liquefaction
		GEO-3. Implement geotechnical design recommendations to minimize or avoid effects on levee slope stability resulting from lateral spreading and landslides
Effects on structures and infrastructure as a result of construction on expansive or corrosive soils	S	GEO-4. Implement geotechnical design recommendations to minimize or avoid soil expansion effects
		GEO-5. Implement geotechnical design recommendations to minimize or avoid effects of corrosive soils
Effects due to failure of cut-and-fill slopes, including but not limited to levee slopes	S	GEO-2. Implement geotechnical design recommendations to minimize or avoid damage from liquefaction
		GEO-3. Implement geotechnical design recommendations to minimize or avoid effects on levee slope stability resulting from lateral spreading and landslides
Potential for seepage and associated detrimental effects	LTS	–
Potential for construction-related erosion	LTS	–
Water Resources and Flood Risk Management		
Changes in Delta flow as a result of modified diversions and drainage	LTS	–
Changes in Delta water quality associated with runoff	LTS	–
Decrease in water quality resulting from construction activities	LTS	–
Decrease in water quality resulting from construction adjacent to Delta waterways	S	HYD-1. Prepare and implement a SWPPP and an environmental monitoring and mitigation compliance and reporting plan
		HYD-2. Implement best management practices to avoid contamination of waterways
		HYD-3. Implement measures to reduce turbidity resulting from earth moving in or adjacent to water bodies
Decrease in water quality resulting from periodic dredging	S	HYD-4. Implement measures to reduce effects from periodic dredging
Effects on groundwater quality	LTS	–
Decreased water quality as a result of increased boat traffic	S	HYD-5. Minimize effects of increased boat traffic

Effect	Finding[a]	Mitigation Measure
Effects on federal project levees—Section 408 evaluation	LTS	–
Increased river elevations causing reduced level of performance of surrounding and downstream urban levees	LTS	–
Cultural Resources		
Effects on archaeological resources resulting from construction	S	CR-1. Protect archaeological resources if discovered during construction
Effects on historical resources	LTS	–
Paleontological Resources		
Potential to damage unknown, potentially unique paleontological resources	S	PALEO-1. Retain a qualified paleontologist for earthmoving activities at a depth of 15 feet or greater
		PALEO-2. Prepare a paleontological mitigation plan if paleontological resources are discovered during construction
Land Use		
Consistency with land use plans	NE	–
Agricultural Resources		
Conversion of Important Farmland to non-agricultural uses	S	AG-1. Compensate for conversion of important farmland
Adjacent landowner/user conflicts	S	AG-2. Require buffer distance to adjacent landowners
Recreation		
Availability of local land-based recreational facilities and opportunities	NE	–
Availability of regional land-based recreational facilities and opportunities	LTS	–
Access to water-based recreational activities	NE	–
Changes in character of existing water-based recreational activities	LTS	–

Effect	Finding[a]	Mitigation Measure
Transportation and Circulation		
Degradation of intersection LOS from operational traffic	S	TC-1: Widen the Harlan Road/Louise Avenue intersection
		TC-2: Reconfigure the Golden Valley Parkway/Towne Centre Drive intersection
		TC-3: Reconfigure the McKee Boulevard/River Islands Parkway intersection
		TC-4: Widen the MacArthur Drive/I-205 eastbound ramps intersection
		TC-5: Widen and modify the MacArthur Drive/I-205 westbound ramps intersection
		TC-6: Widen the Paradise Road/I-205 eastbound ramps intersection
		TC-7: Widen the Paradise Road/I-205 westbound ramps intersection
		TC-8: Widen the Paradise Road/Arbor Avenue intersection
Degradation of roadway LOS from operational traffic	S	TC-9. Widen Paradise Road between Arbor Avenue and I-205
Degradation of freeway mainline LOS from operational traffic	S	TC-10. Widen I-5 north of Louise Avenue interchange
		TC-11. Widen I-5 between SR 120 and Manthey/Mossdale Road interchange
		TC-12. Widen I-5 between Manthey/Mossdale Road interchange and I-205
		TC-13. Widen I-5 south of I-205
		TC-14. Widen I-205 between I-5 and Paradise Avenue interchanges
		TC-15. Widen I-205 between Paradise Avenue and MacArthur Drive interchanges
		TC-16. Widen I-205 west of MacArthur Drive interchange
		TC-17. Widen SR 120 east of I-5
Degradation of freeway ramp LOS from operational traffic	S	TC-10. Widen I-5 north of Louise Avenue interchange
		TC-18. Widen ramps at the I-205/MacArthur Drive interchange
		TC-19. Widen ramps at the I-205/Paradise Road interchange
Potential effects on internal vehicle circulation	S	TC-20. Require full onsite circulation environmental analysis for all subsequent tentative maps
Potential effects on onsite pedestrian circulation	S	TC-20. Require full onsite circulation environmental analysis for all subsequent tentative maps
Potential effects on onsite bicycle circulation	S	TC-20. Require full onsite circulation environmental analysis for all subsequent tentative maps
Provisions for public transit	LTS	–
Disruption of street operation by construction traffic	S	TC-21. Implement a traffic control plan

Effect	Finding[a]	Mitigation Measure
Noise		
Increases in short-term construction-generated noise	S	NOI-1. Minimize short-term construction-related noise
Stationary source noise generated by onsite land uses	S	NOI-2. Minimize stationary source noise generated by onsite land uses
Increases in traffic noise levels	LTS	–
Compatibility of proposed land uses with projected onsite noise levels	S	NOI-3. Minimize sensitive receptor exposure to exterior noise
Air Quality		
River Islands at Lathrop emissions in excess of federal *de minimis* thresholds	S	AQ-1. Reduce fugitive dust emissions resulting from construction
		AQ-2. Reduce construction-related exhaust emissions
		AQ-3. Reduce operational emissions
Potential for health risks from exposure of sensitive receptors to carbon monoxide	LTS	–
Potential health risks from exposure of sensitive receptors to diesel particulate matter from construction equipment	S	AQ-2. Reduce construction-related exhaust emissions
Corps action emissions in excess of federal *de minimis* thresholds	LTS	–
Climate Change		
Effects of GHG emissions	S	CC-1. Reduce emissions by 29% (64,634 MT CO_2e) compared to BAU
Effects of climate change	LTS	–
Public Health and Environmental Hazards		
Potential hazard associated with transport, use, storage, and disposal of hazardous materials	S	PH-1. Prepare and implement a long-term spill prevention, control, and countermeasures plan for marina operation
		PH-2. Encourage and enforce clean boating practices
Exposure of construction workers, residents, and others to existing hazardous materials contamination	S	PH-3. Require investigation and remediation of groundwater and onsite structures before construction
		PH-4. Stop work and implement hazardous materials investigations and remediation in the event that hazardous materials are encountered during construction
Potential to support breeding or harborage of disease-carrying mosquitoes	S	PH-5. Prepare and implement a mosquito control plan
		PH-6. Design the proposed water features to limit mosquito habitat
Potential for health effects associated with use of recycled water	LTS	–

Effect	Finding[a]	Mitigation Measure
Potential exposure to wildland fire hazards	LTS	–
Public Services and Utilities		
Effects on communication services	LTS	–
Effects on electrical services	LTS	–
Effects on natural gas services	LTS	–
Effects on educational services	S	PS-1. Require mitigation agreement with local school districts
Effects on fire protection services	S	PS-2. Require operation of interim fire station facility and equipment prior to occupancy
		PS-3. Require confirmation of adequate fire flows
		PS-4. Require development of an agreement with the Lathrop-Manteca Fire Protection District for water-related emergency services
Effects on police services	S	PS-5. Implement payment to the City of Lathrop for police protection services
Effects on animal control services	S	PS-6. Require development of an animal control services agreement
Effects on solid waste services	LTS	–
Effects on water supply	S	PS-7. Require multi–drought year water supply prior to occupancy
Effects on wastewater and sewer system	S	PS-8. Require adequate wastewater treatment capacity and treatment prior to occupancy
Effects related to recycled water storage and disposal capacity	S	PS-9. Require adequate storage and disposal capacity for recycled water prior to occupancy
Effects on storm drainage	LTS	–
Aesthetics		
Temporary visual effects caused by construction activities	LTS	–
Long-term changes in visual character	LTS	–
Increased light and glare	S	AES-1. Evaluate the design and function of walls and fences prior to approval
Visual changes associated with Corps levee vegetation guidelines	S	No mitigation has been identified

Effect	Finding[a]	Mitigation Measure
Socioeconomics		
Potential effects on population growth, employment, and housing demand during construction	LTS	–
Potential effects on the region’s economic base	NE	–
Potential effects on population growth and housing demand from project development	LTS	–
Potential housing displacement effects	LTS	–
Potential effects on employment from project development	NE	–
Environmental Justice		
Potential health effects on minority populations	LTS	–
Potential environmental effects on minority populations	LTS	–
Potential socioeconomic effects on minority populations	LTS	–
Growth Inducement and Related Effects		
Construction effects	LTS	–
Commercial employment and population effects	S	No mitigation has been identified
Infrastructure improvement effects	S	Addressed during local land use authority approval processes
Energy Resources and Environmental Sustainability		
Construction-related energy and resource use	LTS	–
Long-term energy use during occupancy and operation	LTS	–
Indian Trust Assets		
Change in the value, use, quantity, quality, or enjoyment of any ITAs	NE	–

[a] Finding definitions:
S = significant.
LTS = less than significant.
NE = no effect.

S.7 Public and Agency Involvement in EIS Development

The Corps published the Notice of Intent (NOI) for this EIS in the Federal Register on June 10, 2005 (see Appendix A for the full text of the NOI), and hosted two public scoping meetings later the same month. The meetings were held at the City's Lathrop Community Room, located at 15453 7th Street. To maximize public access to the meetings, one meeting was held in the early afternoon and the other in the early evening. The meetings were advertised in local newspapers and by direct mailing to potentially interested parties, including agencies with jurisdiction or advisory responsibilities; individuals and organizations who had commented on the *River Islands at Lathrop Project Subsequent Environmental Impact Report* (City's SEIR); and local residents near the site. A transcript of the scoping meeting and scoping comments received are presented in Appendix A.

The Corps is now circulating this Draft EIS for a 45-day public review and comment period, and will also hold a public meeting to present the results of the EIS and solicit comments in person. The purpose of public circulation and the public meeting is to provide agencies and interested individuals with opportunities to comment on the contents of the Draft EIS.

S.8 Areas of Known Concern and Controversy

S.8.1 Scoping Results

The EIS must identify any issues or public concerns identified during the scoping process. Appendix A includes a complete transcript of the question and answer sessions at the two scoping meetings, along with additional comments received during the scoping period. Areas of comment during project scoping are listed below.

- **Water quality and aquatic resources**
  - Potential for water quality degradation as a result of development, and effects of the River Islands at Lathrop project on designated beneficial uses of Delta water.
  - Concerns related to handling, treatment, and discharge of stormwater runoff from the new development.
  - Concerns about the ability of the proposed central lake system to sequester pollutants, provide adequate levels of performance, and prevent the spread of invasive nonnative plant species.
  - Potential degradation of aquatic habitat due to increases in recreational activity.
  - Effects of the proposed Paradise Cut improvements on nearby Delta islands and on water levels in the San Joaquin River.
  - The need to explore alternatives that would reduce effects on waters of the United States.
- **Levee stability and flood risks**
  - The ability of the proposed extended levees to provide adequate levels of performance.

- The extended levee's susceptibility to erosion and burrowing by animals.
- The potential that installing the proposed extended levee would increase flood risks to nearby levees, as well as the Wetherbee Lake Pumping Plant and Navigation Gate.
- The effects of potential levee failure on local water and sewage.
- Flooding problems related to potential increased siltation in the San Joaquin River.

- **Land use planning**
  - The potential effects of the proposed development on adjacent agricultural lands.
  - The need to site commercial and public recreation facilities such that access to Delta waterways is safe and supervised.
- **Economics effects**
  - The costs and benefits of the proposed development.
  - The effects of River Islands at Lathrop on low-income and minority populations in the Lathrop area.
- **Air quality effects** of constructing a large project in an area that is currently in nonattainment for three federal air quality standards (the National Ambient Air Quality Standards for ozone, carbon monoxide, and inhalable particulate materials).
- **Effects of increased traffic** on local roadways, including Interstate (I-) 5, I-205, and the State Route (SR) 120 Bypass.
- **Seismic safety** of the proposed development.
- The need to ensure adequate provision of **law enforcement resources**.

S.8.2 Legal Challenge to CVFPB Permit Process

Following the CVFPB's (at that time the Reclamation Board's) August 2006 decision to issue fill and encroachment permits enabling River Islands to proceed with Phase 2A and the then-proposed levee-top residential construction, the Natural Resources Defense Council, California Sportfishing Protection Alliance, Deltakeeper Chapter of Baykeeper, and Natural Heritage Institute filed a legal challenge arguing (1) that the Board had not adequately discharged its environmental review responsibilities under CEQA prior to its decision to approve the permits, and (2) that the Board's *de facto* approval of levee-top construction violated its own existing flood control regulations (*Natural Resources Defense Council, et al. v. The Reclamation Board of the Resources Agency of the State of California, et al.*, Sacramento County Superior Court Case No. 06CS01228).

The CEQA challenge did not withstand legal scrutiny, but negotiations following the court ruling resulted in a settlement agreement between River Islands and the groups that had filed the lawsuit. As one of the settlement outcomes, the parties agreed to work cooperatively in pursuing a Lower San Joaquin River Regional Flood Bypass (LSJB). Details of the LSJB are discussed further in Chapter 2 (see *Screening Approach to the EIS Analysis* and *Alternative 4—Proposed Action with Expanded Flood Risk Reduction*).

S.9 References

River Islands at Lathrop. 2008. Attachment "A": Lower San Joaquin River Regional Flood Bypass Project Description (Draft). August. Prepared for the U.S. Army Corps of Engineers, Sacramento District. Sacramento, CA.

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Chapter 1
Introduction

This document is an environmental impact statement (EIS) analyzing the effects of issuing federal permits that would enable construction of additional homes and commercial properties, along with increased levels of performance and habitat restoration features, as part of the River Islands at Lathrop planned community on Stewart Tract in the City of Lathrop (City). It has been prepared in compliance with the National Environmental Policy Act (NEPA) and is intended to disclose potential environmental effects of the proposed development activities and to enable the public and regulatory agencies to comment on the federal permit action, the proposed construction, and alternative approaches. The U.S. Army Corps of Engineers (Corps) is serving as the lead agency for NEPA compliance.

All portions of River Islands at Lathrop were also subject to review under the California Environmental Quality Act (CEQA). CEQA compliance was completed separately through documents prepared by the City of Lathrop, acting as lead agency (City of Lathrop 2002, 2003a, 2005, 2007).

The components of the River Islands at Lathrop project that comprise the federal permit action as well as those that would result from issuance of the permits are collectively referred to in this EIS as the *proposed action*. This is discussed in greater detail in Chapter 2, *Proposed Action and Alternatives*.

1.1 Purpose and Need

The purpose of the River Islands at Lathrop project is to construct a large-scale, mixed-use project consisting of residential development and a commercial complex, which may include open space and recreational amenities, in San Joaquin County or the south Sacramento–San Joaquin River Delta (Delta) area.

River Islands at Lathrop is proposed to meet the following needs.

- **Employment—**fostering economic employment development in the City of Lathrop; offsetting the jobs deficit in San Joaquin County, which has experienced some of the state's highest unemployment rates in recent years; and offering a high-quality local employment nexus to relieve the current pressure to commute into the San Francisco Bay Area.
- **Housing—**satisfying the housing needs of workers employed in the Tri-Valley area of southern Alameda and Contra Costa Counties, while offering additional housing diversity not currently available in the City.

The federal action under review for authorization pursuant to federal Clean Water Act (CWA) Section 404 and Rivers and Harbors Act (RHA) Section 10, and permission under Rivers and Harbors Appropriation Act of 1899, Section 14, codified as 33 United States Code (USC), Section 408 (Section 408) is restricted to a portion of the proposed River Islands at Lathrop development (discussed in greater detail in Chapter 2, *Proposed Action and Alternatives*). However, the general project purpose and statement of need identified for the project in its entirety also apply to the focused federal action.

1.2 Overview of River Islands at Lathrop

1.2.1 Background and Project History

The River Islands site encompasses approximately 4,900 acres of current and former agricultural land and open space on Stewart Tract (Figure 1-1) in the secondary zone of the Delta.[1] The site is bounded by the San Joaquin River on the east, the Old River on the north, and the Paradise Cut flood bypass on the southwest. Railroad tracks owned and maintained by the Union Pacific Railroad (UPRR) mark the southeast boundary of the site. The site is in the western portion of the City of Lathrop. As shown in Figure 1-2, the components of River Islands at Lathrop, discussed in Section 1.2.2, *Project Component Areas*, comprise most of Stewart Tract. The portion of Stewart Tract east of Interstate (I-) 5 (referred to in this EIS as the *remaining Stewart Tract*) is outside the area considered for development.

The site for River Islands at Lathrop was first planned for development in 1991, when the City adopted the *Comprehensive General Plan for the City of Lathrop, California* (General Plan) (City of Lathrop 1991). Several years later, the City's West Lathrop Specific Plan (WLSP) refined the original development vision to center on entertainment-oriented uses, including four theme parks, some 5,000 hotel rooms, and a regional retail mall, along with 8,500 housing units. The development proposed in the WLSP was known as Califia/Gold Rush City.

Shortly after approval of the WLSP and the Gold Rush City concept, economic conditions changed, and development of a major theme park–centered attraction in the Lathrop area no longer appeared economically viable. At the same time, the City experienced a growing need for high-quality employment opportunities and greater housing stock diversity to serve existing residents as well as San Francisco Bay Area (Bay Area) commuters. The *Bay Area* constitutes the urban region surrounding the San Francisco and San Pablo estuaries in Northern California, and encompasses nine counties: Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, Solano, and Sonoma. A citizen petition drive resulted in Measure D—eliminating the WLSP's "theme park first" phasing and allowing additional land uses in the West Lathrop area—being placed on the ballot in November 2000 (City of Lathrop 2005).

Following passage of Measure D, the developer, Califia LLC (hereafter referred to as River Islands), proposed the River Islands at Lathrop project as a more appropriate development approach given the economic climate. As discussed in more detail below, it would provide a range of residential and commercial uses, including single- and multifamily housing; town and employment center areas intended to attract high-tech employers to the Lathrop area; and water-based recreational opportunities. The River Islands at Lathrop proposal reflects the increased planning latitude allowed under Measure D, but because it differs substantially from the City's original vision for Stewart Tract, it nonetheless required amendments to the General Plan and WLSP; these amendments were approved in January 2003 (City of Lathrop 2003b, 2004). The River Islands at Lathrop development project, as envisioned at buildout, is shown in Figure 1-3.

[1] The Sacramento–San Joaquin River Delta is divided, for planning purposes, into two zones: the secondary zone, which is the part of the legally defined Delta that is subject strictly to authority of local government, and the primary zone, which is subject to land use and resource management policy established in the *Land Use and Resource Management Plan for the Primary Zone of the Delta* (Delta Protection Commission 2007).

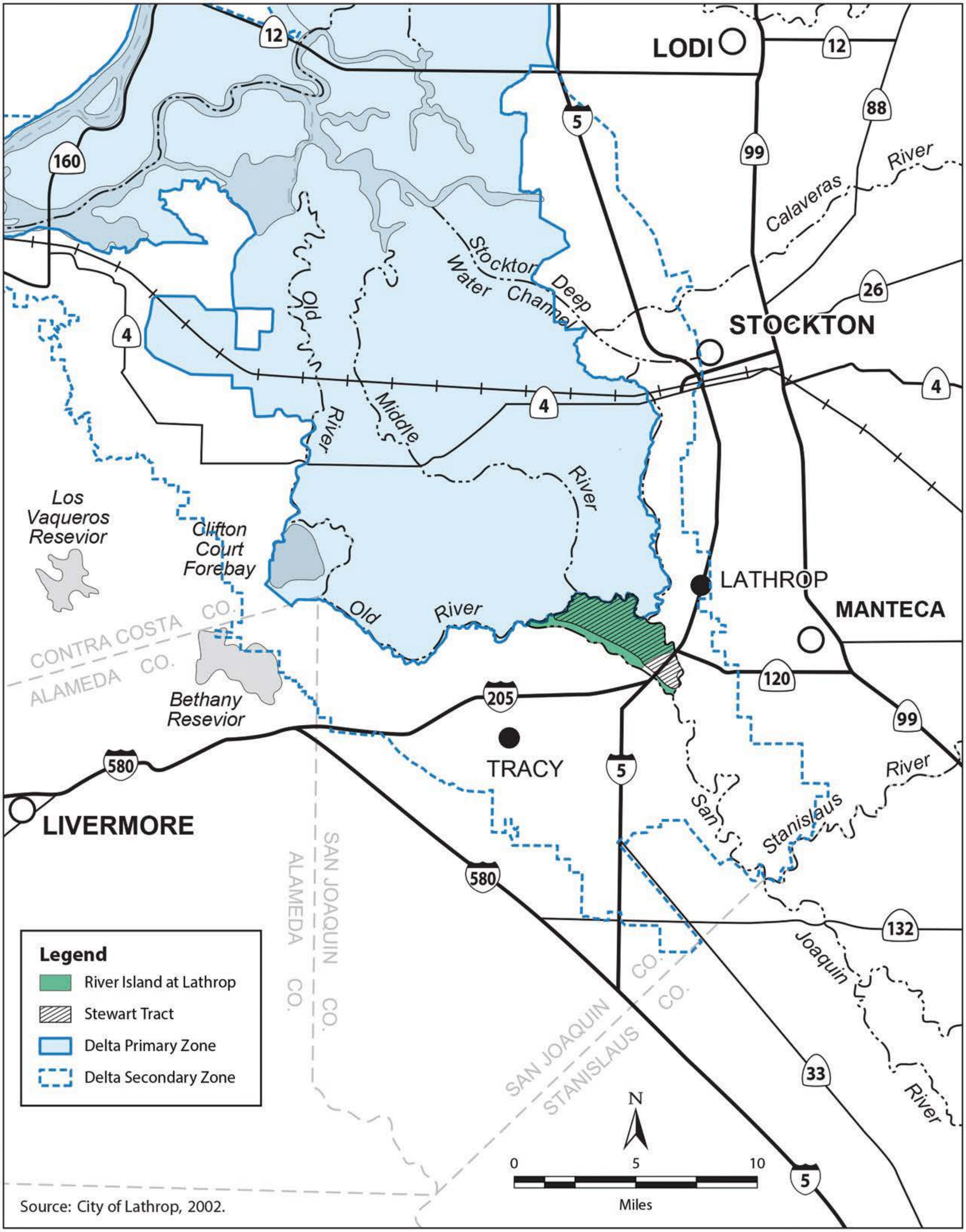

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Figure 1-1
Regional Location

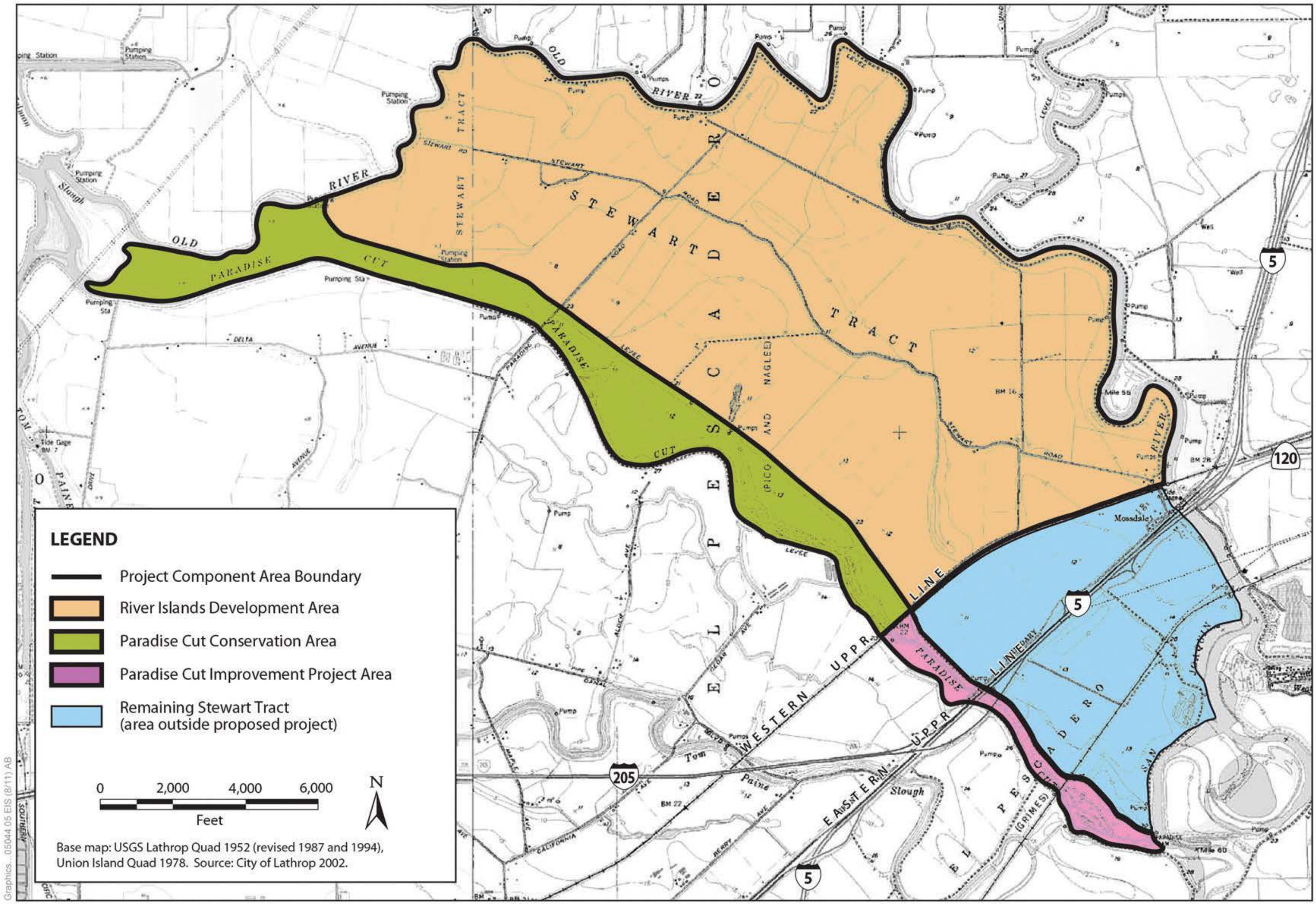

Figure 1-2
Project Component Areas

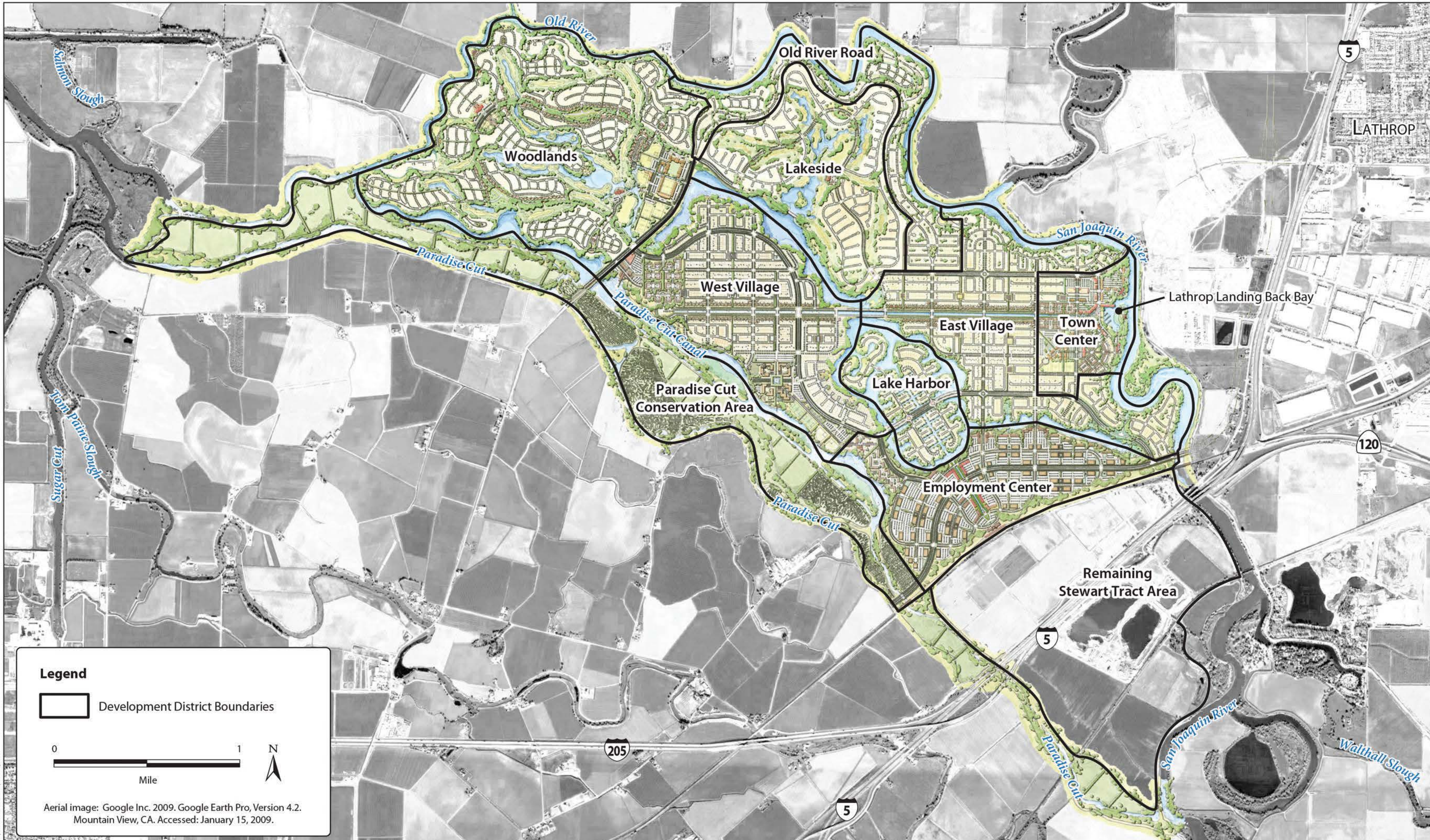

Figure 1-3
River Islands at Lathrop at Buildout (2031)

1.2.2 Project Component Areas

Because of the project's large size and complexity, construction and occupancy would be sequenced over a period of approximately 20 years. At buildout, the project is planned to encompass three major functions: flood risk management, private development, and recreation. Project-related work would occur in three distinct component areas, as shown in Figure 1-2. Development would be phased as discussed in Section 1.2.3, *Project Phasing*.

1.2.2.1 River Islands Development Area

The River Islands Development (RID) Area would contain all of the project's new urban development, including residential neighborhoods, commercial and retail space, and support infrastructure such as schools and fire and police facilities. It would also provide an internal lake system, canals, and other constructed internal waterways; several parks and a system of trails; a Town Center marina on a new *back bay* water feature along the San Joaquin River; and boat docks, built both outside the Stewart Tract levee system along the San Joaquin River and Old River, as well as within the newly created internal lake system. Other boat docks would be constructed in areas outside the RID Area, as discussed below.

1.2.2.2 Paradise Cut Conservation Area

In the Paradise Cut Conservation (PCC) Area, new extended setback levees would be constructed landside of the existing levee along Paradise Cut. The existing levee would be breached in several locations, widening the floodway and increasing flood conveyance capacity. The remnants of the existing levee would be restored with riparian vegetation to provide fish and wildlife habitat—in particular, habitat for riparian brush rabbit (*Sylvilagus bachmani riparius*)—and as a visual amenity. Portions of the setback levee could include a waterside bench area to accommodate additional riparian plantings suitable for riparian brush rabbit and other terrestrial and aquatic species. Revegetation in the PCC Area would be in compliance with the Corps' Engineering Technical Letter 1110-2-583, *Guidelines for Landscape Planting and Vegetation Management at Levees, Floodwalls, Embankment Dams, and Appurtenant Structures* (ETL) (U.S. Army Corps of Engineers 2014).

1.2.2.3 Paradise Cut Improvement Project Area

The Paradise Cut Improvement Project (PCIP) Area is a portion of the Paradise Cut flood management bypass planned for expansion to provide additional flood conveyance capacity, increasing the level of flood risk reduction for Stewart Tract and downstream areas. A setback levee would be constructed landside of the existing levee. The existing levee would be breached in a few (likely two) locations, and levee remnants would be revegetated much like the levee remnants created in the PCC Area. A 40-acre terrace near the existing Paradise Weir would be lowered to increase flood conveyance capacity.

1.2.3 Project Phasing

As proposed by River Islands, the River Islands at Lathrop project would provide 11,000 homes and 5 million square feet of commercial space; water-oriented recreational amenities; and preserved open space. Because of the project's large size and complexity, construction and occupancy would be sequenced in phases over a period of approximately 20 years (Figure 1-4). Project elements and activities that did not require federal approval were addressed under Phases 1 and 2 A. Project elements and activities that are subject to federal approval are addressed under Phase 2B. Project elements under each phase and the status of these elements as of preparation of this EIS are described in Table 1-1 and summarized below.

Table 1-1. Overview of River Islands at Lathrop Phasing and Current Status

Phase	Project Elements/Activities	August 2012 Status
Flood Risk Reduction		
1	• Placement of fill in Phase 1 area to construct approximately 300 acres of high ground outside 200-year floodplain • Construction of new interior levee to provide flood risk reduction for the protected portion of the Phase 1 area, including a portion of the "cross levee" proposed between the new Employment Center and the existing UPRR alignment • Earthwork to connect the new cross levee paralleling the UPRR alignment to existing levees along the San Joaquin River	Completed
2A	• Reconstruction and placement of fill in setback between existing levee along San Joaquin River and new interior levee, creating extended levee high-ground perimeter	Completed
2B	• Alteration of existing project levee to construct new high ground perimeter (extended levee) along Old River • Completion of remainder of cross levee along UPRR berm to connect to existing levee along Paradise Cut • Construction of new setback extended levee along Paradise Cut • Installation of designed levee breach along upper Paradise Cut levee between I-5 and western UPRR alignment to allow controlled floodwater drainage from Stewart Tract • Expansion of flood conveyance and storage capacity in Paradise Cut; breaching of existing Paradise Cut levee; removal of flow constriction at existing Paradise Weir	Not completed
Private Development		
1	• Construction of Stewart Road to serve the first 800 units of Phase 1 development	Completed
1, 2	• Construction of remaining arterial and collector roadways to serve Phase 1 development • Construction of offsite electricity delivery infrastructure to serve Phases 1and 2 • Construction of offsite natural gas delivery infrastructure to serve Phase 1 and part of Phase 2 • Construction of water, sewer, and reclaimed water infrastructure to serve Phases 1 and 2	Partially completed
1	• Construction of approximately 4,284 residential units (3,741 single-family units and 543 multi-family units), along with commercial areas, associated schools, local roadways, and public service facilities and infrastructure, in the following areas: *Town Center, portion of Employment Center, East Village district, portion of Old River Road district, portion of Lakeside district*	Partially completed
2B	• Construction of approximately 6,716 residential units (3,891 single-family units and 2,825 multifamily units), along with commercial areas, associated schools, local roadways, public service facilities, and infrastructure, in the following areas: *remainder of Employment Center, remainder of Old River Road district, remainder of Lakeside district, Woodlands district, Lake Harbor district, West Village district*	Not completed

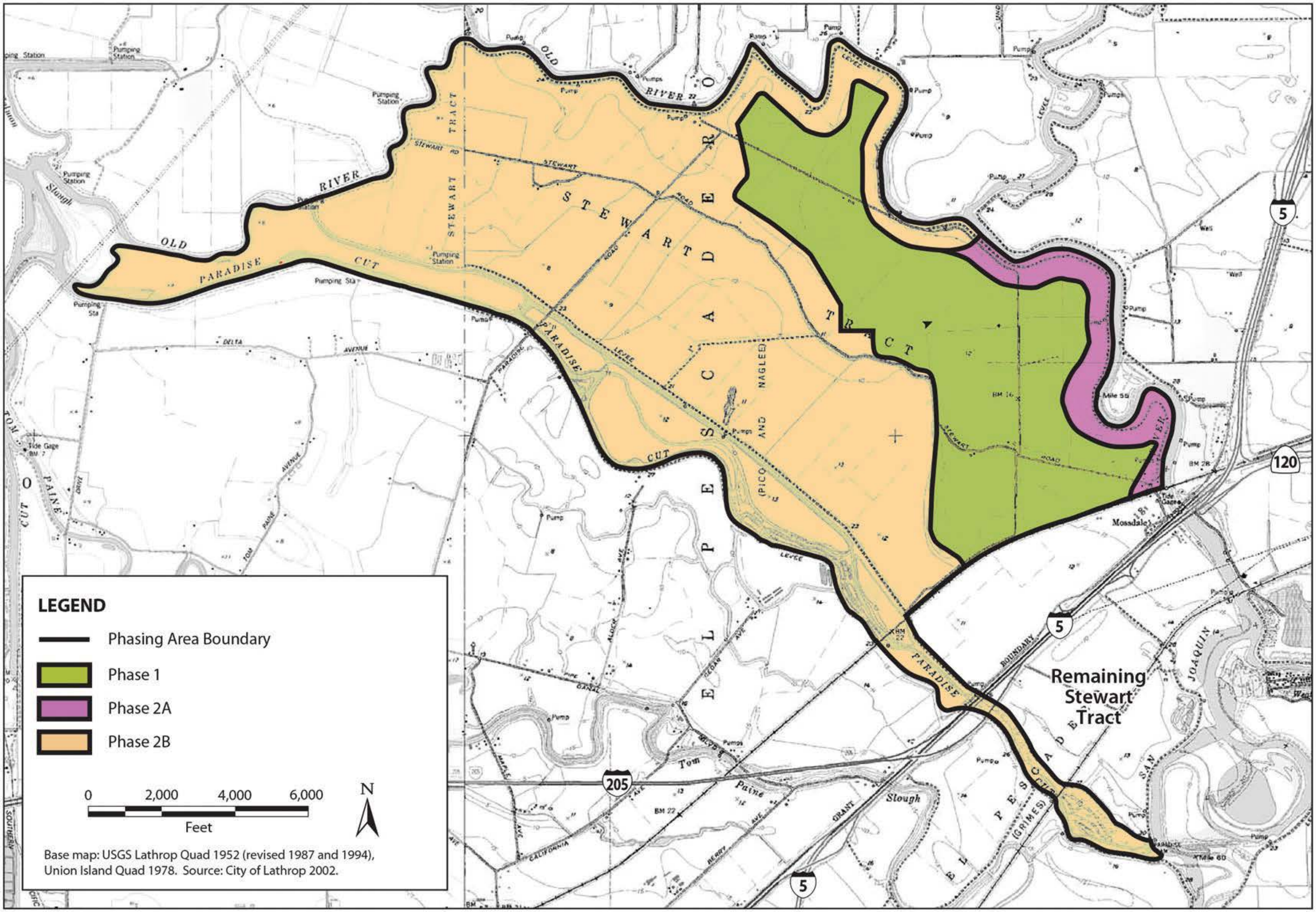

Figure 1-4
Project Phasing Areas

Phase	Project Elements/Activities	August 2012 Status
2B	• Fill placement for bridge footings (Golden Valley Parkway Bridge over San Joaquin River, Golden Valley Parkway and Paradise Road bridges over Paradise Cut) • Construction of Golden Valley Parkway Bridge over San Joaquin River, Golden Valley Parkway over Paradise Cut, and second span of Paradise Road Bridge over Paradise Cut	
Recreation/Amenities		
1	• Construction of two artificial lakes, including a portion of the interior central lake, and related retention areas	Completed
1	• Construction of two additional lakes, including standalone lake in Lakeside district, retention areas, portion of the central canal, and Phase 1 wetlands • Construction of parks and recreational areas to serve Phase 1 residential development	Not completed
2B	• Completion of internal lake system, Phase 2 constructed wetlands, retention areas, central canal, and storm drainage system • Construction of Lathrop Landing back bay along San Joaquin River • Installation of docks along San Joaquin River and Old River • Construction of additional docks in Lathrop Landing back bay and new Paradise Cut Canal • Breaching of existing levees to fill Lathrop Landing back bay • Dredging to create boat access between Lathrop Landing and San Joaquin River • Recontouring and revegetation of levee remnants along Paradise Cut to create riparian brush rabbit refugia with bridges between high-ground habitat islands • Additional preservation, enhancement, and creation of open space and special-status species habitat in Paradise Cut Conservation Area • Vegetation of waterside of levees along Old and San Joaquin Rivers in compliance with the Corps' Engineering Technical Letter 1110-2-583, *Guidelines for Landscape Planting and Vegetation Management at Levees, Floodwalls, Embankment Dams, and Appurtenant Structures*	Not completed

1.2.3.1 Phase 1

Phase 1, in the eastern portion of the RID Area, is currently in progress and comprises several flood risk reduction measures as well as residential, and commercial components. This phase includes development of 4,284 single- and multifamily residential units, commercial space (approximately 60% of the total proposed commercial space), and public amenities. The flood risk reduction components (which are currently in place) entailed placement of fill to raise approximately 300 acres at the eastern end of the RID Area above the 0.5% (200-year) flood elevation, construction of a new setback levee paralleling the existing San Joaquin River levee, construction of a portion of a cross levee that parallels the western side of the UPRR tracks, and construction of an approximately 1.9-mile interior (i.e., non-federal) levee to provide the required level of performance for the eastern portion of the Phase 1 area. The cross levee is not being proposed as part of the federal system. The interior levee was designed to provide levels of performance from events up to and including the 0.5% (200-year) flood event, but it will not be incorporated into the federal levee system except at the back bay; moreover, most of the interior levee would likely be removed during the course of buildout, following completion of the 0.5% (200-year) levees surrounding the River Islands at Lathrop development. Fill placement and levee construction were completed in 2005, accredited to the 1% (100-year) level by the Federal Emergency Management Agency (FEMA) in 2006, and identified by the California Department of Water Resources (DWR) as outside the 0.5% (200-year) floodplain in 2008.

1.2.3.2 Phase 2

Phase 2 comprises two sub-phases: Phase 2A and Phase 2B. These sub-phases are described in detail below.

Phase 2A

Phase 2A consists of additional flood risk reduction measures, which were completed in 2005 and 2006,[2] and included filling the area between the existing levee along the San Joaquin River and the Phase 1 setback levee for approximately 13,600 linear feet (2.6 miles) to create an *extended levee* (essentially a very wide levee) to increase the level of performance (*Extended levees* are further described in Section 2.2.1, *Flood Risk Reduction Measures*). Phase 2A fill placement was carried out in 2006, accredited at the 1% (100-year) level by FEMA in 2007, and identified by DWR as outside the 0.5% (200-year) floodplain in 2008. Additional components under Phase 2A have not yet been constructed because the required federal permission under Section 408 has not been issued, as well as authorizations under CWA Section 404 and RHA Section 10. Elements of Phase 2A not yet completed include breaching the federal levee along the San Joaquin River to fill the Lathrop Landing back bay and constructing boat docks along the San Joaquin River (discussed further in Chapter 2, *Proposed Action and Alternatives*). These Phase 2A activities are evaluated in this EIS as part of the proposed action.

Phase 2B

Phase 2B, the major focus of this EIS, entails additional flood risk reduction measures and the remainder of the proposed private development: 6,716 single- and multifamily homes, commercial space, and public amenities. Specifically, Phase 2B proposes altering approximately 29,500 linear feet (approximately 5.6 miles) of the existing Old River levee to extend the level of performance around the Phase 2B development area. The remainder of the cross levee (i.e., the portion not constructed under Phase 1) paralleling the UPRR berm would also be constructed under Phase 2B, along with the Paradise Cut flood risk reduction measures and conservation improvements, the Lathrop Landing back bay, and boat docks along the San Joaquin and Old Rivers.

1.2.4 Flood Risk Management Elements

The River Islands at Lathrop site is bounded on the northeast, north, and southwest by levees along the San Joaquin River, Old River, and Paradise Cut, respectively. Its proximity to these features makes flood risk reduction a key feature of the project.

There are multiple methods for determining flood risk. A probabilistic approach has been used for this project. Accordingly, a *100-year flood* is a flood event with a 1% chance of occurring in any given year, and a *200-year flood* is a flood event with a 0.5% chance of occurring in any given year. This

[2] Proposed phasing for River Islands at Lathrop has changed somewhat over the multi-year planning and environmental compliance period, so the phasing described in this EIS differs somewhat from that analyzed in the City's Supplemental Environmental Impact Report (SEIR) for River Islands (City of Lathrop 2002) and also from that analyzed in the City's first Addendum to the SEIR (City of Lathrop 2005).

document uses the 1% nomenclature to refer to a 100-year flood (e.g., 0.5% for a 200-year flood, 0.2% for a 500-year flood). Additional information about defining and understanding flood risk can be found on the National Flood Insurance Program's (NFIP's) official website: <http://www.floodsmart.gov>.

1.2.4.1 Existing Levels of Performance

Prior to development considerations, the San Joaquin River and Tributaries (SJRT) project in this area consisted of agricultural levees that were accepted into the federal project levee system in the 1950s (referred to in this EIS as *federal project levees*). Levees in this area—for example, the levees along San Joaquin River, Old River, and Paradise Cut—were designed to achieve the level of performance relative to a 2% (50-year) flood event and were never accredited to provide the level of performance required by FEMA's present 1% (100-year) standard.

On the southeast, the River Islands at Lathrop site is bounded by the elevated UPRR track alignment, which may have afforded some flood risk reduction in past years, but was not designed for that purpose. However, flood risk reduction elements completed under Phase 1 are in place in the southeast portion of the site as described above in Section 1.2.3.1. Flood risk reduction on the remaining Stewart Tract is provided by SJRT federal project levees on the San Joaquin River from the western UPRR tracks to Paradise Weir, by Paradise Weir at the San Joaquin River/Paradise Cut confluence, and by levees along Paradise Cut from Paradise Weir to the western UPRR track alignment.

1.2.4.2 Need for New Levels of Performance

Flood risk reduction components are not specifically identified in the purpose and need, since these facilities are not a necessary part of offering employment and housing opportunities in the region. However, as discussed in greater detail in Chapter 2, the proposed action and alternatives identified through the screening process would include new levels of performance related to thedevelopment that would occur on Stewart Tract. If completed, these components would provide the level of performance for the 0.5% (200-year) flood event as required by the Central Valley Flood Protection Act of 2008, which mandates that urban development in the Central Valley's flood-prone areas be protected to this standard.

Because levee changes evaluated in this EIS would entail alterations to the SJRT project, such alterations are subject to permission from the Corps under Section 408. Accordingly, River Islands is seeking Section 408 permission and levels of performance for a 1% (100-year) flood event as accredited by FEMA and for a 0.5% (200-year event) as accredited by DWR. The Central Valley Flood Protection Board (originally the Reclamation Board of the State of California, later reauthorized as the Central Valley Flood Protection Board [CVFPB]) is the applicant for the Section 408 permission.

1.3 Public and Agency Involvement

NEPA mandates specific periods during the environmental review process when public and agency comments are solicited: during the scoping comment period, when the draft EIS document has been completed, and during the release of the final EIS document. Lead agencies are also encouraged to hold public meetings or hearings on the draft version of the document. Brief descriptions of these milestones are provided below, as they apply to the proposed action.

1.3.1 Scoping Process

Scoping refers to the public outreach process used under NEPA to determine the coverage and content of an EIS. The scoping process for an EIS is initiated by publication of the notice of intent (NOI), which is a formal announcement to the public and to interested agencies and organizations that an EIS is in preparation. During the scoping period, agencies and the public are invited to comment on the proposed action, the approach to environmental analysis, and any issues of concern.

The Corps published the NOI for this EIS in the *Federal Register* on June 10, 2005 (see Appendix A for the full text of the NOI), and hosted two public scoping meetings later the same month. The public comment period closed on July 29, 2005. A transcript of the scoping meeting and scoping comments received are presented in Appendix A.

1.3.2 Areas of Known Controversy

In cases such as this, where a project has been in development for some time and the public is aware of it, there may be known areas of concern or controversy. The EIS must identify any such issues. Areas of known controversy identified during the scoping process are listed below.

- **Water quality and aquatic resources**
  - Potential for water quality degradation as a result of development, and effects of the River Islands project on designated beneficial uses of Delta water.
  - Concerns related to handling, treatment, and discharge of stormwater runoff from the new development.
  - Concerns about the ability of the proposed central lake system to sequester pollutants, provide appropriate levels of performance, and prevent the spread of invasive nonnative plant species.
  - Potential degradation of aquatic habitat due to increases in recreational activity.
  - The need to explore alternatives that would reduce effects on waters of the United States.
- **Levee stability and flood risks**
  - The ability of the proposed extended levee to provide adequate levels of performance.
  - The extended levee's susceptibility to erosion and burrowing by animals.
  - The potential that installing the proposed extended levee would increase flood risks to nearby levees, as well as the Wetherbee Lake Pumping Plant and Navigation Gate.
  - Effects of the proposed Paradise Cut modifications on nearby Delta islands and on water levels in the San Joaquin River.
  - The effects of potential levee failure on local water and sewage.
  - Flooding problems related to potential increased siltation in the San Joaquin River.
- **Land use planning**
  - The potential effects of the proposed development on adjacent agricultural lands.

- The need to site commercial and public recreation facilities such that access to Delta waterways is safe and supervised.
- **Economics effects**
  - The costs and benefits of the proposed development.
  - The effects of River Islands at Lathrop on low-income and minority populations in the Lathrop area.
- **Air quality effects** of constructing a large project in an area that is currently in nonattainment for three federal air quality standards (the National Ambient Air Quality Standards for ozone, carbon monoxide, and inhalable particulate materials).
- **Effects of increased traffic** on local roadways, including I-5, I-205, and the State Route (SR) 120 Bypass.
- **Seismic safety** of the proposed development.
- The need to ensure adequate provision of **law enforcement resources**.

1.3.3 Public and Agency Review of EIS

Once a draft EIS is complete, the lead agency is required to notify agencies and the public that it is available for review. The official notification—referred to as a notice of availability (NOA)—is published in the Federal Register and is usually also printed in newspapers in the project area and mailed to individuals who have requested it. Issuance of the NOA initiates a review period during which the lead agency receives and collates public and agency comments on the proposed action and the document.

The Corps is now circulating this Draft EIS for a 45-day public review and comment period, and will also hold a public meeting to present the results of the EIS and solicit comments in person. The purpose of public circulation and the public meeting is to provide agencies and interested individuals with opportunities to comment on the contents of the Draft EIS.

1.3.4 Preparation of Final EIS

Before the lead agency can approve a proposed action, it must prepare and circulate a final EIS that addresses all comments received on the draft document. The final EIS must include a list of all individuals, organizations, and agencies that provided comments, and must contain copies of all comments received during the public review period, along with the lead agency's responses. The final EIS for the proposed action is expected to be available in 2013.

1.4 Other Compliance Requirements

In addition to the requirements of the CWA, the RHA, and Section 408 identified above, the proposed action would be subject to a number of federal, state, and local regulations that protect various aspects of environmental quality. Table 1-2 provides an overview of key regulations; additional detail is given in Chapters 3 through 25, which discuss the proposed action's potential effects relative to specific resources.

Table 1-2. Compliance and Review Requirements Applicable to the Proposed Action

Resource Area	Compliance Requirements
Air Quality	• Federal Clean Air Act and Clean Air Act Amendments of 1990 • California Clean Air Act • Local air quality plans
Biological Resources	• Federal and California Endangered Species Acts • Federal Migratory Bird Treaty Act • Federal Bald and Golden Eagle Protection Act • Magnuson-Stevens Fisheries Conservation and Management Act • Fish and Wildlife Coordination Act • California Native Plant Protection Act • California Fish and Game Code (Sections 1602, 3503, 3511, 3513)
Cultural and Paleontological Resources	• National Historic Preservation Act • Native American Graves Protection and Repatriation Act • State Office of Historic Preservation requirements • California Public Resources Code
Geology and Geologic Hazards	• Alquist-Priolo Earthquake Fault Zoning Act • Seismic Hazards Mapping Act • City of Lathrop grading and building codes
Hazards and Hazardous Materials	• California Code of Regulations Title 22 • California Hazardous Materials Release Response Plans and Inventory Act (Business Plan Act) • California Hazardous Waste Control Act
Hydrology and Water Resources	• Federal Clean Water Act • Federal Rivers and Harbors Act • Federal Safe Drinking Water Act • Executive Order 11988 (*Floodplain Management*) • California Porter-Cologne Water Quality Control Act • California Groundwater Management Act • California Senate Bills 610 and 221 • Title 23, California Code of Regulations • Applicable Water Code Sections

1.5 Legal Challenge to CVFPB Permit Process

Following the CVFPB's (at that time the Reclamation Board's) August 2006 decision to issue fill and encroachment permits enabling River Islands to proceed with Phase 2A and development of structures 75 feet back from the waterside hinge point of the levee, the Natural Resources Defense Council, California Sportfishing Protection Alliance, Deltakeeper Chapter of Baykeeper, and Natural Heritage Institute filed a legal challenge arguing (1) that the Board had not adequately discharged its environmental review responsibilities under CEQA prior to its decision to approve the permits, and (2) that the Board's *de facto* approval of construction violated its own existing flood control regulations (*Natural Resources Defense Council, et al. v. The Reclamation Board of the Resources Agency of the State of California, et al.*, Sacramento County Superior Court Case No. 06CS01228).

Negotiations among the parties resulted in a settlement agreement between River Islands and the groups that had filed the lawsuit. As one of the settlement outcomes, the parties agreed to work cooperatively in pursuing a Lower San Joaquin River Regional Flood Bypass (LSJB). Details of the LSJB are discussed further in Chapter 2 (see *Screening Approach to the EIS Analysis* and *Alternative 4—Proposed Action with Expanded Flood Risk Reduction*).

The objectives of the LSJB are listed below.

- Provide for at least a 20-inch reduction in flood stage at Mossdale from the 1% (100-year) flood peak.
- Cause no significant increase in flood stage during the 2% (50-) or 1% (100-year) flood at the confluence of Paradise Cut and Old River.
- Provide for establishment of riparian habitat buffers along both sides of the bypass of a biologically significant width, but no less than 100 feet (within the floodway).
- Support a significant net increase in riparian vegetation and floodplain habitat in the flood storage area.
- Provide for seasonal inundation of the bypass on an annual basis when conditions will provide floodplain benefits for anadromous and other native fish.
- Have a reasonable prospect of public funding for purchase and construction of any physical alterations.

In reaching the settlement, the parties agreed to request that the Corps include the LSJB in its *Lower San Joaquin River Feasibility Study*, undertaken to investigate the feasibility of reducing the threat of flooding and flood damages along the lower San Joaquin River. Moreover, River Islands agreed to provide funding and authorize the use of proprietary modeling software (prepared by MBK Engineering) in this undertaking. The requested analysis of the LSJB is presented as Alternative 4 of this EIS).

1.6 Contents of this Draft EIS

Each resource chapter of this EIS is organized into two major sections: *Affected Environment* and *Environmental Consequences*. The affected environment section includes a discussion of the regulatory framework and existing conditions. The environmental consequences section begins with a description of the *Methods for Analysis of Effect*s and the *Definition of Adverse Affects*, followed by the *Effects and Mitigation Approaches* for the proposed action and each alternative. In the effects and mitigation approaches section, the *Effect* heading identifies the subject of analysis (e.g., "Effects on Electrical Services") and the finding without implementation of any proposed mitigation measures in parentheses (i.e., Not Adverse, Adverse, or Beneficial).

Mitigation measures from previous environmental documents (SEIR, FEIR, and addendums) prepared under CEQA are included in this EIS, if valid and applicable, to reduce adverse effects. These mitigation measures were included to streamline the organization of this EIS and to identify measures the lead agency (the City of Lathrop) has already committed to through the CEQA process. This EIS, however, represents an independent review of the proposed action and alternatives completed by the Corps, satisfying the requirements for NEPA compliance.

The EIS is presented in two volumes, as shown below.

Volume 1

- Chapter 1, *Introduction*
- Chapter 2, *Proposed Action and Alternatives*

Section 1—Natural Resources

- Chapter 3, *Terrestrial Biological Resources*
- Chapter 4, *Fish Resources*
- Chapter 5, *Geology, Soils, and Mineral Resources*
- Chapter 6, *Water Resources and Flood Risk Management*

Section 2—Heritage Resources

- Chapter 7, *Cultural Resources*
- Chapter 8, *Paleontological Resources*

Section 3—Land Use Planning

- Chapter 9, *Land Use*
- Chapter 10, *Agricultural Resources*
- Chapter 11, *Recreation*

Section 4—Infrastructure and Built Environment

- Chapter 12, *Transportation and Circulation*
- Chapter 13, *Noise*
- Chapter 14, *Air Quality*
- Chapter 15, *Climate Change*
- Chapter 16, *Public Health and Environmental Hazards*

Section 5—Social Environment

- Chapter 17, *Public Services and Utilities*
- Chapter 18, *Aesthetics*
- Chapter 19, *Socioeconomics*
- Chapter 20, *Environmental Justice*

Section 6—Other Required Analyses and Information

- Chapter 21, *Cumulative Effects*
- Chapter 22, *Growth Inducement and Related Effects*
- Chapter 23, *Energy Resources and Environmental Sustainability*

- Chapter 24, *Comparison of Alternatives*
- Chapter 25, *Indian Trust Assets*
- Chapter 26, *List of Preparers*

Volume 2 (provided on compact disc)

- Appendix A, *EIS Distribution, Noticing, and Scoping*
- Appendix B, *Biological Technical Resources*
- Appendix C, *Alternatives Analysis*
- Appendix D, *MBK Final Hydraulic Analysis for River Islands at Lathrop*
- Appendix E, *TJKM Draft Traffic Impact Study for River Islands Phase 2B Development*
- Appendix F, *Air Quality and Climate Change Supporting Information*
- Appendix G, *River Islands at Lathrop Evaluation of Compliance with Executive Order 11988, Flood Plain Management*

1.7 References Cited

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Appurtenant Structures. Washington, DC. April 30. <http://www.publications.usace.army.mil/Portals/76/Publications/EngineerTechnicalLetters/ETL_1110-2-583.pdf>.

Chapter 2
Proposed Action and Alternatives

This chapter presents a description of the proposed action and alternatives. This discussion addresses both the construction and operational aspects of the proposed flood risk reduction and development components, restoration elements that have been incorporated into the project design, and environmental commitments that are incorporated into the proposed action to reduce potential effects. This chapter also discusses the process through which alternatives to the proposed action were developed; describes the alternatives analyzed in this EIS, including the No Action Alternative; and gives an overview of the alternatives eliminated from further consideration along with the reasons for their dismissal. The alternatives analyzed in this EIS are described at a level of detail similar to that provided for the proposed action to provide for a robust comparison of alternatives, as NEPA requires.

2.1 Scope of Federal Action

The *federal nexus* activities of the not-yet-completed components of Phase 2A and all of Phase 2B—and the subsequent residential and commercial developments—are the focus of this EIS, and are hereafter referred to as the *proposed action*. The areas within which these activities would take place—the Phase 2B portion of the RID Area, the PCC Area, the PCIP Area, and those portions of the Phase 2A area associated with the Lathrop Landing back bay and boat docks along the San Joaquin River—are collectively referred to as the *proposed action area*. Activities that are not the focus of this EIS (i.e., Phase 1 and already completed Phase 2A activities) are hereafter referred to as *earlier* or *prior phases* of the River Islands at Lathrop project.

Phase 1 and a portion of Phase 2A were designed to avoid any discharge of dredged or fill material or other effects on waters of the United States, as well as any modifications to the federal project levee system. Therefore, these phases did not require federal review or permitting under the CWA. Minor encroachments to federal project works, such as those under Phase 2A, proceed under authorization through the CVFPB, which has management responsibility for the SJRT project. All the Phase 1 and a portion of the Phase 2A flood risk reduction works were thus outside direct Corps jurisdiction and were constructed under local and state agency permits. The additional residential, commercial, and recreational features of Phase 1 development are also outside federal jurisdiction and are proceeding separately under local authorization.[1]

The proposed action would involve activities affecting United States jurisdictional waters along the San Joaquin River, Old River, and Paradise Cut, and thus would require permits from the Corps under CWA Section 404 and Sections 9 and 10 of the Rivers and Harbors Act. Alterations to existing

[1] At the time planning and construction work for Phase 2A was carried out, some types of modifications to federal project works, including those in Phase 2A, proceeded under primary authorization from the State Reclamation Board (now Central Valley Flood Protection Board) through the local Reclamation Districts, which have management responsibility for federally constructed flood risk reduction infrastructure. More specifically, some of the flood risk reduction components analyzed under Phase 1 in the second Addendum to the SEIR (City of Lathrop 2007)—construction of the boat docks along the San Joaquin River, breaching of the Lathrop Landing back bay, and realigning the federal project levee system—are now included in the proposed action, and are therefore analyzed as part of the federal action in this EIS.

federal project levees under the proposed action would require authorization under Section 408. The federal actions (i.e., federal nexus activities) with regard to the proposed action thus consist of the following components.

- The Corps' permit review and decisions under CWA Section 404 and Sections 9 and 10 of the Rivers and Harbors Act.
  - Installation of group boat docks and/or fishing piers in the San Joaquin River, Old River, and Paradise Cut.
  - Fill activities needed to construct footings for several new access bridges.
  - Earthwork that would modify waters of the United States, including the drainage ditch internal to Stewart Tract.
  - Levee breaching to create an opening for the new Lathrop Landing back bay along the San Joaquin River.
  - Maintenance dredging for Paradise Cut Canal and Lathrop Landing back bay.
- The Corps' review and decisions under Section 408.
  - Alterations to expand and upgrade existing federal project levees.
  - Incorporation of new setback levees into the federal project levee system.
  - Levee breaching to create an opening for the new Lathrop Landing back bay along the San Joaquin River.
  - Habitat preservation, restoration, and creation along Paradise Cut, the San Joaquin River, and the Old River.
  - Earthwork to breach the existing federal project levee along Paradise Cut.
  - Earthwork associated with other flood risk reduction measures along Paradise Cut, including construction of a designed levee breach in the PCIP area.

2.2 Alternative 1—Proposed Action

The proposed action would occur in the RID, PCC, and PCIP Areas as shown in Figure 1-2. Development would be phased as shown in Figure 1-4 and summarized in Table 1-1. The sections below discuss the various project components in more detail.

2.2.1 Flood Risk Reduction Measures

This section describes the flood risk reduction measures under the proposed action.[2] All the proposed alterations (with the exception of the cross levee) would be incorporated into the federal levee system once they are completed and accepted. Figure 2-1 illustrates the locations of existing and proposed federal project levees in the project area. *Existing levees* refers to the levees currently present on Stewart Tract. *Setback levees* refers to levees constructed either behind existing levees or

[2] There may be changes in technology, construction methodology, and one or more materials that could alter the sequencing and type of construction proposed herein. However, no such changes would result in greater impacts than those described in this EIS. Any increase in effects would necessitate additional environmental review.

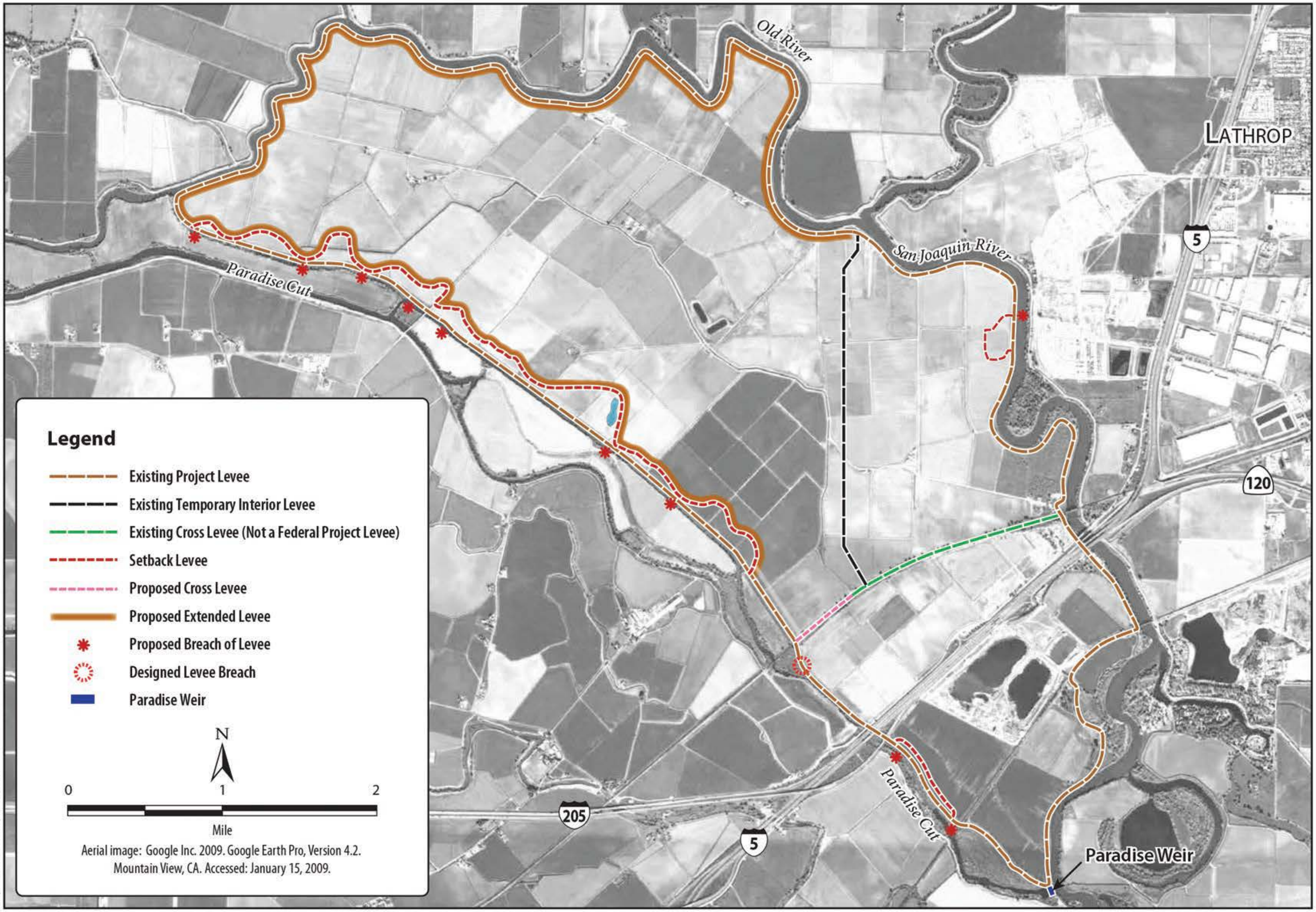


Figure 2-1
Existing and Proposed Levees
Associated with River Islands at Lathrop

at some distance from the water's edge to permit landscaping activities on the waterside of the levee in compliance with the ETL. *Extended levees* refers to levees widened beyond the theoretical prism to facilitate construction on the long landside slope as described below.

2.2.1.1 Extended Levee Construction

Under the proposed action, the existing 2% (50-year) project levee along Old River would be reconstructed and widened to extend the levee (Figure 2-1). Levees would initially be reconstructed in years 2017-2019 with a crown width of 65-75 feet and height adequate to provide the level of performance needed for a 0.5% (200-year) flood event plus 3 feet.[3] The levees would be progressively extended by placing engineered fill on top of the standard levee prism to a finished crown width of 300 feet as development proceeds over the next 12-14 years, with completion anticipated in 2031. The finished extended levee would serve the same flood risk reduction function as a traditional levee, but its cross section would be wide enough to accommodate placement of structures on the landside of the levee outside the theoretical prism and access road as shown in Figure 2-2. The Old River extended levee could also be set farther back to reduce flow constriction, widen the channel reach between Paradise Cut and Middle River, and create planting benches. Design of this reach (i.e., from Paradise Cut to Middle River) is in progress and has not yet been finalized, but preliminary analysis indicates that approximately 16 acres of planting benches could be created along this reach if the levee was set farther back from the existing levee.

Adjacent to the new Town Center (Figure 1-3), the extended levee constructed during earlier phases along the San Joaquin River side of Stewart Tract was set back from the existing federal project levee to allow breaching of the federal project levee to create a "back bay" water feature that would accommodate the proposed Lathrop Landing marina along the San Joaquin River (discussed in more detail below) (Figures 2-1 and 2-3). This setback levee would become the new federal project levee under the proposed action. The remnants of the existing levee would be retained and either allowed to revegetate naturally or planted with native vegetation.[4]

2.2.1.2 Cross Levee and Remaining Stewart Tract Drainage

The proposed action also includes completion of the cross levee immediately northwest of and parallel to the existing embankment that supports the UPRR tracks (Figure 2-1). The southeast toe of the cross levee would be approximately 50 feet from the toe of the railroad berm, outside the UPRR right-of-way (ROW), allowing UPRR to patrol its alignment by vehicle and avoiding removal of existing riparian brush rabbit habitat within the UPRR ROW. Like the other new levees, the cross levee would be built to a design condition to resist a 0.5% (200-year) flood level plus 3 feet of freeboard, although it would be designed as a standard levee, not an extended levee.

Currently, floodwaters that build up in the portion of Stewart Tract outside the RID Area perimeter (i.e., Remaining Stewart Tract) have been able to drain to the junction of Paradise Cut and Old River through the RID Area. During flood events, floodwaters currently flow under the UPRR tracks east of I-5 through one or more trestle or bridge underpasses; under I-5 through the causeway at the Mossdale/Manthey interchange; past the western UPRR berm through existing 4- by 8-foot concrete

[3] This translates to a minimum levee crown elevation of equivalent to the 1-in-200 Annual Exceedance Probability (AEP) flood elevation (0.5% or 200-year flood elevation) plus 3 feet, to ensure adequate freeboard under 0.5% (200-year) flood conditions. Final levee crown widths would be determined during later design phases.

[4] Additional information on planned revegetation is provided in *Environmental Commitments* below.

box culverts and any breaches of the berm; and through what is now the RID Area to the Paradise Cut/Old River confluence. Completion of the cross levee under the proposed action would prevent floodwaters from exiting the Remaining Stewart Tract via the box culverts or trestle. To address potential flooding of the Remaining Stewart Tract, new construction would provide an approximately 100-foot-long *designed breach location* along the northern (upper) Paradise Cut levee between I-5 and the western UPRR tracks (Figure 2-1) in the PCIP Area.

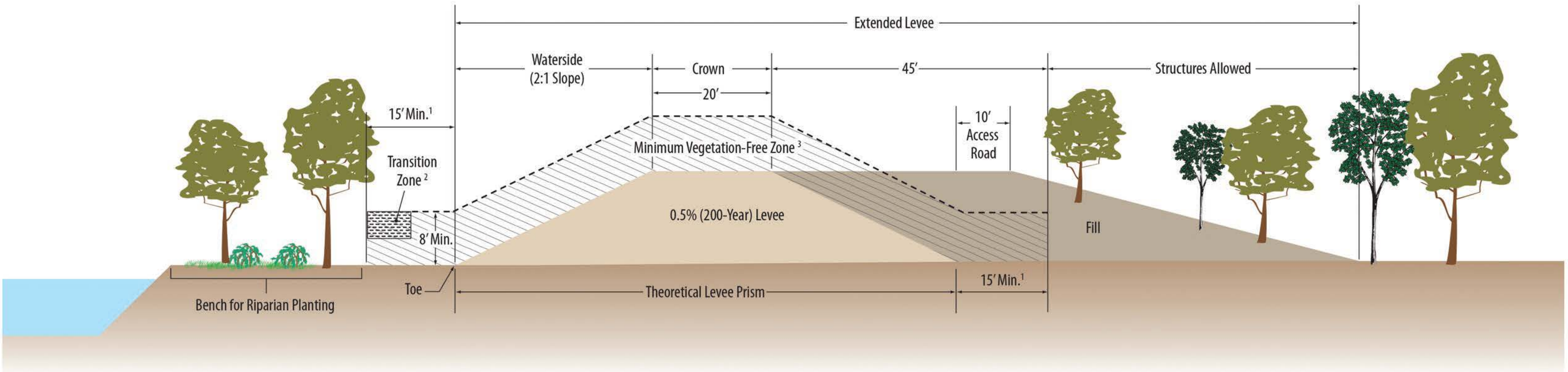
The designed levee breach would be constructed by installing a slurry wall within the levee. The top of the slurry wall would be 9 feet below the levee crown. Structurally, the designed breach location would meet current Corps standards, and would be high and robust enough to provide a level of performance equal to that provided by adjacent levee segments. In the event that floodwaters overtop remaining Stewart Tract levees, the fill overlying the slurry wall would be rapidly removed by water spilling over the slurry wall, allowing peak floodwaters to drain from the remaining Stewart Tract into Paradise Cut without eroding the levee below the top of the slurry wall. Pumps would be used to drain floodwaters that remain below the elevation of the designed breach.

Depending on final project design, either permanent or portable pumps could be used. Because of the high capital cost to install the size and number of permanent pumps that would be needed, the ongoing expense of monthly maintenance, and the expected infrequency of use, portable pumps are a likelier choice. Assuming that portable pumps are selected, a concrete platform would be constructed at the intersection of the UPRR berm and the Paradise Cut levee to act as a base for the pumps when they are needed. As many as 20 separate outfalls into Paradise Cut would be installed to convey water from the pump platform into Paradise Cut. The project applicant would enter into a maintenance agreement with the Reclamation District to obtain the pumps on demand from a local supplier, and funds to cover pump delivery and operation would be set aside in the local Reclamation District's budget.

If permanent pumps are installed, a pump enclosure would be constructed at the intersection of the UPRR berm and the Paradise Cut levee. Only three outfalls would be required in this case, because permanent pumps typically have a larger capacity discharge than portable equipment. Pumps could be either diesel or electric. If diesel pumps are selected, they would be configured to operate from a portable fuel tank for extended use; only a small amount of fuel would be stored in an onsite tank, enabling the pumps to be "exercised" or test-run approximately once a month to ensure that they are in proper condition in the event of an emergency. If electric pumps are selected, a portable generator would be used to provide backup power.

2.2.1.3 Paradise Cut Flood Conveyance Modifications

New setback levees would be constructed along Paradise Cut in two areas (Figure 2-4). The first would be the upland area on the landside of the existing Paradise Cut levee. This setback levee would be constructed to achieve the level of performance needed for a 0.5% (200-year) flood event, and it would be configured to avoid the pond near the existing Paradise Cut levee. It would be an extended levee as described above, although it would not be constructed on top of an existing levee but rather would entail entirely new construction. The second setback levee, east of I-5 and west of the eastern UPRR line that parallels the RID Area, would be set back 150–300 feet. This setback levee would be designed to provide 1% (100-year) level of performance. Both levees would be constructed to meet all applicable agency standards. The setback levee in the PCIP Area would be constructed with a waterside bench to allow for the planting of riparian vegetation suitable for



Notes:
1. 15-foot or distance to edge of normal water surface, if less
2. In this 4- x 7-foot transition zone, temporary obstruction by limbs and crown is allowed during development of new plantings for up to 10 years
3. The vegetation-free zone is defined in Engineering Technical Letter 1110-2-571 (2009)

NOT TO SCALE

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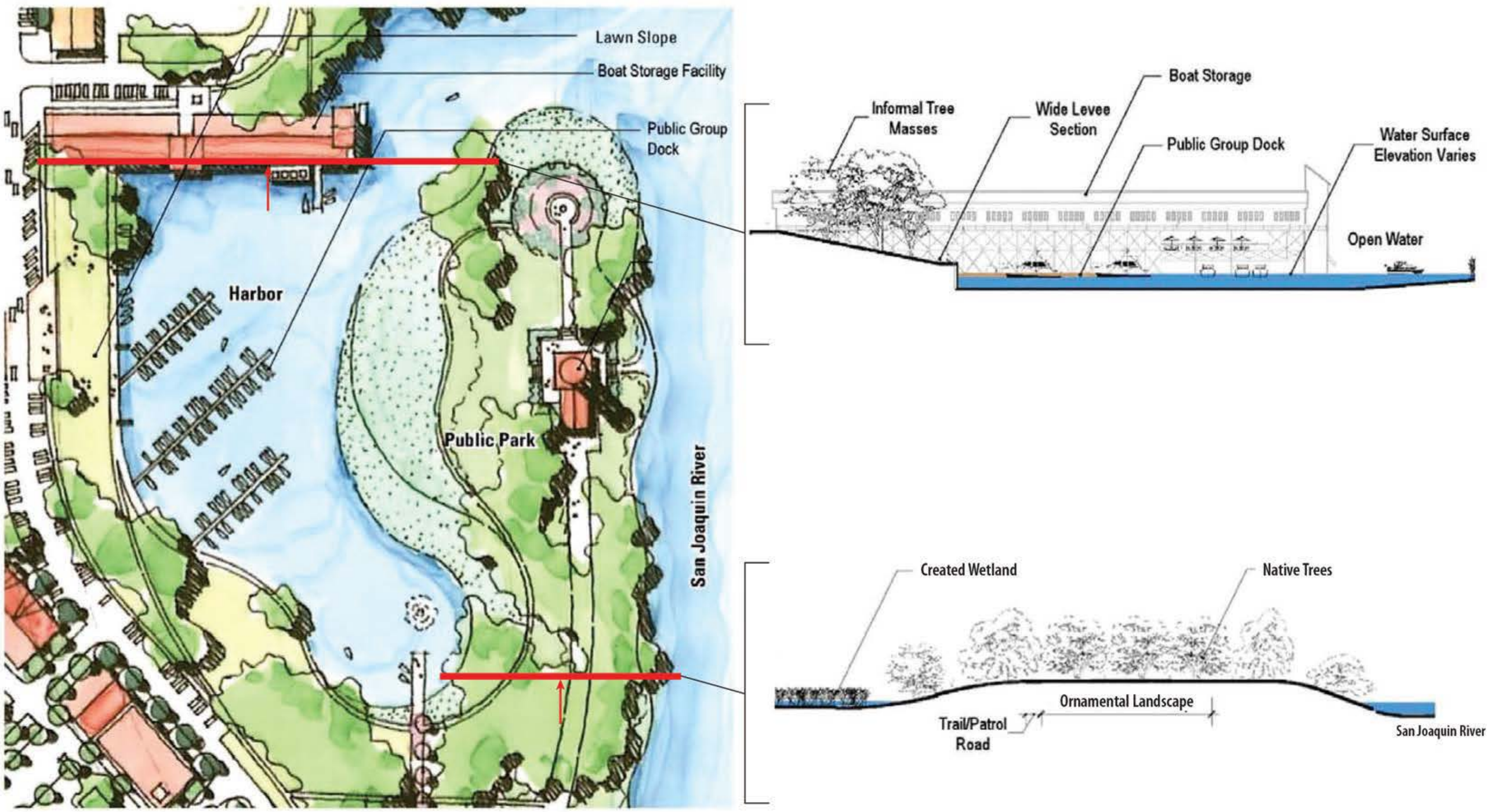
Figure 2-2
Extended Levee Cross Section



Not to Scale

Source: SWA Group 2002.

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Figure 2-3
Conceptual Rendering of Lathrop Landing Back Bay and Marina

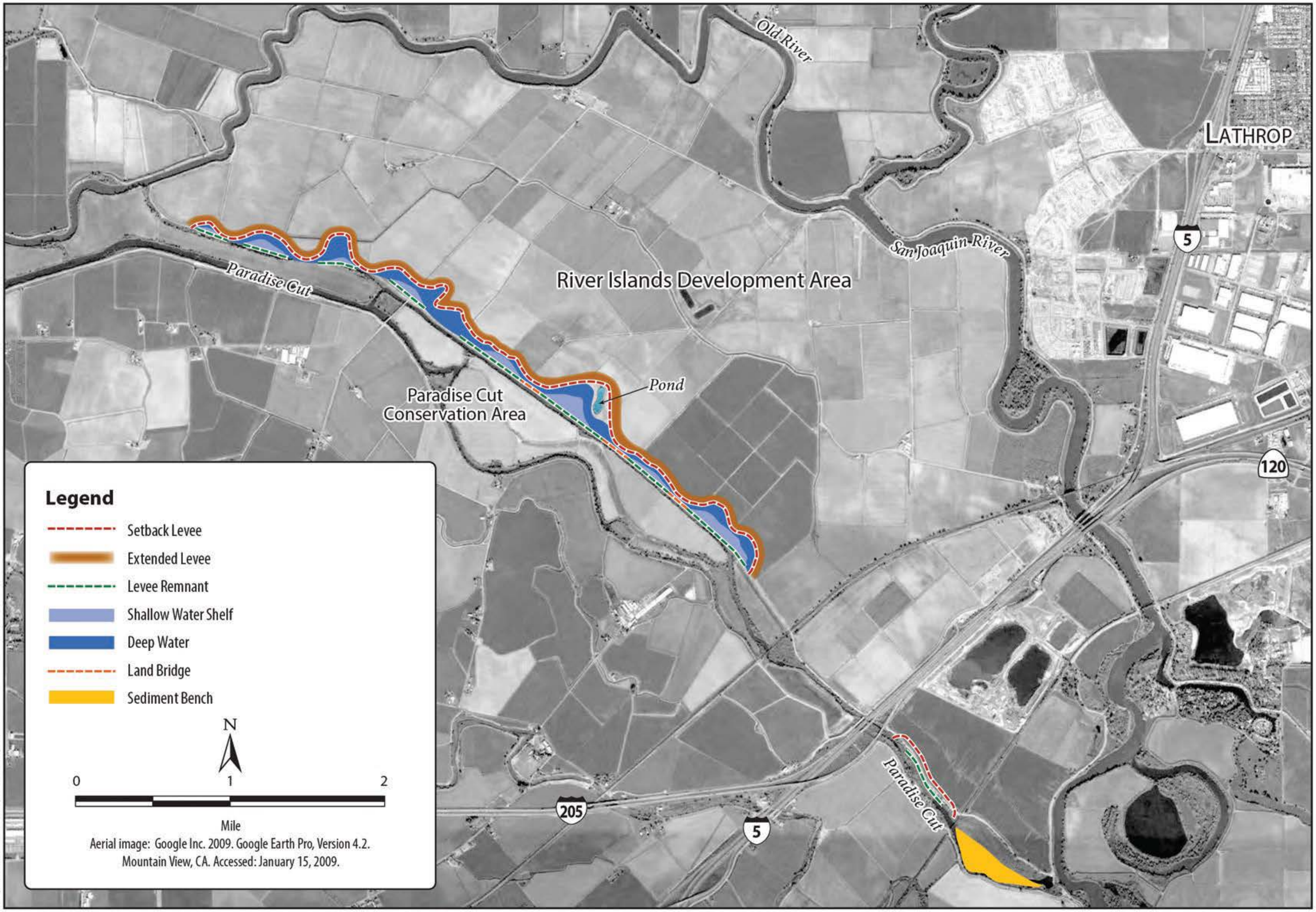

Figure 2-4
Proposed Paradise Cut Improvements

riparian brush rabbit and other terrestrial species, as well as for riparian tree cover to benefit aquatic species.

Once the new levees are in place, the existing federal levee in the PCC Area would be breached in several places and abandoned. The levee remnants would be left in place and revegetated to provide emergent/upland habitat for riparian brush rabbit[5]. The overall effects of constructing the new setback levees and breaching the existing levee would be to widen the effective floodway and restore flood conveyance capacity in Paradise Cut and to provide high-ground refugia for riparian brush rabbits.

The existing Paradise Weir near the San Joaquin River diversion would remain in place at its current width and elevation, but the proposed action would include additional activities to reduce the flow constriction where a large meander has formed immediately downstream of Paradise Weir. Approximately 4–5 vertical feet of material would be removed from the existing 40-acre terrace bench across this area (Figure 2-4). This would slightly increase discharge, but not in excess of the design capacity, from the San Joaquin River into Paradise Cut when flows in the San Joaquin River at Vernalis are 18,000 cubic feet per second (cfs) or greater (roughly equivalent to the 4-year flood event). Some of the material removed from the bench would be used in construction of the new setback levee, assuming it is suitable. If materials excavated from the bench require amendment to meet levee construction standards, this could likely be accomplished using materials from other borrow areas on the project site. The balance of the excavated materials would be delivered to the landowner on the landside of the south levee.

2.2.1.4 Riparian Restoration and Vegetation Management

Corps levee vegetation guidelines (ETL 1110-2-583) apply to federal project levees as illustrated in Figure 2-2. River Islands would retain vegetation that is currently in compliance with the guidelines. Approximately 15.32 acres along the San Joaquin River and 3.50 acres along Old River could be vegetated on existing waterside benches in full compliance with the Corps' levee vegetation guidelines. In addition, the extended levee along the reach of Old River between its confluence with Paradise Cut and its confluence with Middle River would be contoured and further set back to create additional planting benches that would be in compliance with the levee vegetation guidelines. Although exact acreages would be determined during the design phase, initial assessments suggest that approximately 16 acres of planting areas could be created along Old River.

As previously described in this document, the setback levee proposed in the PCIP Area could be constructed with a bench area to allow for additional riparian vegetation and habitat area along the waterside slope of the newly created water channel in compliance with the vegetation guidelines. A similar bench could be created along the waterside slope of Old River with reconstruction of that portion of the federal levee to allow for riparian plantings above the mean high tide mark (MHTM) so as to not affect normal river flows.

The proposed action and action alternatives would be designed to be in compliance with the Corps' levee vegetation guidance—that is, approximately 52 acres of noncompliant vegetation would be removed. Vegetation on the 2.5-mile section of the federal project levee along the San Joaquin River reach that would not be affected by development of the proposed action would be removed by the Reclamation District in accordance with the Central Valley Flood Protection Plan (CVFPP) (California

[5] Additional information on habitat creation and enhancement is provided in *Environmental Commitments* below.

Department of Water Resources 2011:4-13). Any environmental regulatory permissions needed for this activity would be obtained by the Reclamation District prior to vegetation removal. Moreover, with implementation of mitigation as discussed in greater detail in Chapter 3, *Terrestrial Biological Resources*, there would be no net loss of riparian vegetation, and all new planting would be designed to enhance habitat.

2.2.2 New Water Features

2.2.2.1 Lathrop Landing Back Bay

As discussed above, the proposed action would include breaching of the existing federal levee along the San Joaquin River to create a new 5- to 10-acre back bay water feature along the San Joaquin River adjacent to the Town Center (Figure 2-3). The new back bay feature—Lathrop Landing—would offer a visual and recreational amenity for residents. It would incorporate group docks for temporary berthing of as many as 100 boats. Park facilities and limited, site-appropriate commercial facilities would be developed along the water's edge.

Construction of the Lathrop Landing back bay would be initiated in the upland area behind the existing levees. Construction of the extended levee that would constitute the inland riverbank of the back bay and excavation of the back bay itself have already been conducted during earlier phases of the project. During construction of the proposed action, in-water features such as docks and piers would be installed while the embayment is still dry. Once this work is complete, the existing federal levee would be breached, allowing river water to enter and fill the bay and creating the boat entrance to Lathrop Landing. After water levels in the back bay have equalized with those in the river, the back bay entrance would be dredged to a sufficient depth to allow boat passage.

Remnants of the breached levee would be planted with predominantly native trees and shrubs, arranged to appear as natural as possible.

Alternatively, should construction of the back bay prove too costly, be delayed, or otherwise not proceed, River Islands could develop an internal water feature (lake) in the back bay area without breaching the existing federal project levee. This new water feature would become an integral part of the Town Center area and would include recreational features similar to those described above. Boats could be berthed outside the levee impounding the internal water feature at riverbank docks that would replace the internal back bay marina.

2.2.2.2 Paradise Cut Canal

As part of the proposed action, Paradise Cut would be expanded by constructing an additional channel segment in the area between the proposed setback levee and the existing Paradise Cut north levee. This new channel—referred to as the Paradise Cut Canal—would allow boat passage from the Old River to Paradise Cut near the southwestern toe of the cross levee. The extent of the Paradise Cut expansion to create the Paradise Cut Canal is illustrated in Figure 2-4. The Paradise Cut Canal, in an area that now consists of upland agricultural land, would be excavated to a depth below the water table and would be filled by a combination of groundwater and Paradise Cut/Old River surface waters to enable year-round connectivity and navigation. The slopes of the levee remnants could be contoured to allow for the construction of a waterside bench that would support additional riparian plantings.

Excavation would be completed before the existing levees are breached and would therefore be carried out in dry conditions—i.e., separated from the waterway by the existing levee. In-water features such as boat docks would be constructed before the canal is connected to the Old River or the existing Paradise Cut channel. As shown in the figures, the Paradise Cut Canal is intended to have a naturalistic, winding riverbank.

2.2.2.3 Dock and Fishing Pier Facilities

Docks providing a total of 675 new boat berths would be constructed by buildout of River Islands at Lathrop. All docks would be group (multi–boat berth) docks and would be constructed during the proposed action. Five-berth docks in jurisdictional waters (specifically, the San Joaquin and Old Rivers) would be associated with groups of riverbank residential parcels, and would typically be installed when the homes are built. Docks in the created water features would be installed while the features are dry, before the existing levees are breached to fill them. Additional docks may be added in the future, depending on demand. A similar approach would be followed for fishing piers, which would be constructed near the docks. Tentative locations of docks are shown in Figure 2-5.

As summarized in Table 2-1, 75 docks offering a total of 375 berths would be installed along the shores of the San Joaquin and Old Rivers: 24 docks (120 berths) along the San Joaquin River and 51 docks (255 berths) along Old River. Fishing piers would be installed near most of the docks.

Table 2-1. Proposed Distribution of Docks for River Islands at Lathrop

Location	Linear Feet of Riverbank	Number of Docks	Number of Berths	Average Berth Density
San Joaquin River				
Project boundary to Golden Valley Parkway bridge	500	0	0	N/A
Golden Valley Parkway bridge to Lathrop Landing (back bay)	5,150	14	70	1 berth/75 feet of riverbank
Lathrop Landing Marina to Bradshaw's Crossing Bridge	1,200	0	0	No docks proposed
Bradshaw's Crossing Bridge to Head of Old River	3,450	10	50	1 berth/69 feet of riverbank
Total—San Joaquin River		24	120	
Old River				
Head of Old River to OR-1	12,350	20	175	1 berth/75 feet of riverbank
OR-1 to Paradise Cut	5,650	16	80	1 berth/70 feet of riverbank
Total—Old River		36	255	
Total—Shorelines		60	375	
Backbays (10-boat berths)				
Lathrop Landing	N/A	10	100	N/A
Paradise Cut	N/A	20	200	N/A
Total—Backbays		30	300	
Total—River Islands at Lathrop		90	675	

Ten-berth docks, as well as two lanes of boat ramps, would be constructed in the Lathrop Landing back bay (100 berths) and Paradise Cut Canal (200 berths) before these artificial water bodies are connected to surface waters (San Joaquin River, Old River, existing Paradise Cut bypass).

Multi-boat group docks in the rivers would be oriented parallel to the riverbank. They would be connected to the bank by strongarms and gangways. Gangways, 90–120 feet long, would be attached to pilings, allowing them to move up and down as the water surface elevation changes seasonally and with the tides. No pilings would be installed within the waterway or within 15 feet of the levee waterside toe; the pilings would be installed on the waterside toe of the levee, above the MHTM, to anchor the floating boat docks. Although dock sizes could vary, the average dimensions of the five-berth floating dock platform are expected to be approximately 36 by 96 feet, with an open footprint of 1,188 square feet. Ten-berth docks in the new Lathrop Landing back bay and Paradise Cut Canal could have a variety of designs, but would likely have average dimensions of 36 by 178 feet, with an open footprint of approximately 2,200 square feet. Some would connected to the bank similarly to the shoreline docks; others may incorporate piers.

Fishing piers would be oriented approximately perpendicular to the riverbank. Each pier would be about half the size of a five-berth boat dock.

Fishing piers and marinas would be equipped with fish-cleaning facilities to minimize the discharge of organic waste into surface waters.

2.2.2.4 Bridge Crossings

The proposed action includes three new bridge crossings[6] to provide improved access between the RID Area and neighboring portions of Lathrop: four bridge lanes where the new Golden Valley Parkway crosses the San Joaquin River, accessing areas to the north of Stewart Tract; four bridge lanes where the Golden Valley Parkway crosses Paradise Cut, accessing areas to the south; and an additional two-lane bridge adjacent to the existing Paradise Road bridges over Paradise Cut (Figure 2-5). Construction of these bridges would require coordination with the U.S. Coast Guard. Descriptions of each crossing are provided below.

San Joaquin River Crossing

Overview

The new Golden Valley Parkway Bridge across the San Joaquin River would be similar to the City's new bridge at Bradshaw's Crossing, of which construction was initiated in July 2011. The Bradshaw's Crossing Bridge consists of two parallel bridge structures, each being approximately 41.5 feet wide. The structures are three-span structures, with the center span being supported on 8.5-foot-diameter, cast-in-steel-shell (CISS) piles at two locations within the San Joaquin River. The abutments of the bridge are supported on either side of the river on 3-foot-diameter, cast-in-drilled-hole (CIDH) piles. The bridge abutments are constructed on the existing levee embankments adjacent to the San Joaquin River.

[6] There may be changes in technology, construction methodology, and one or more materials that could alter the sequencing and type of construction proposed herein. However, no such changes would result in greater impacts than those described in this EIS. Any increase in effects would necessitate additional environmental review.

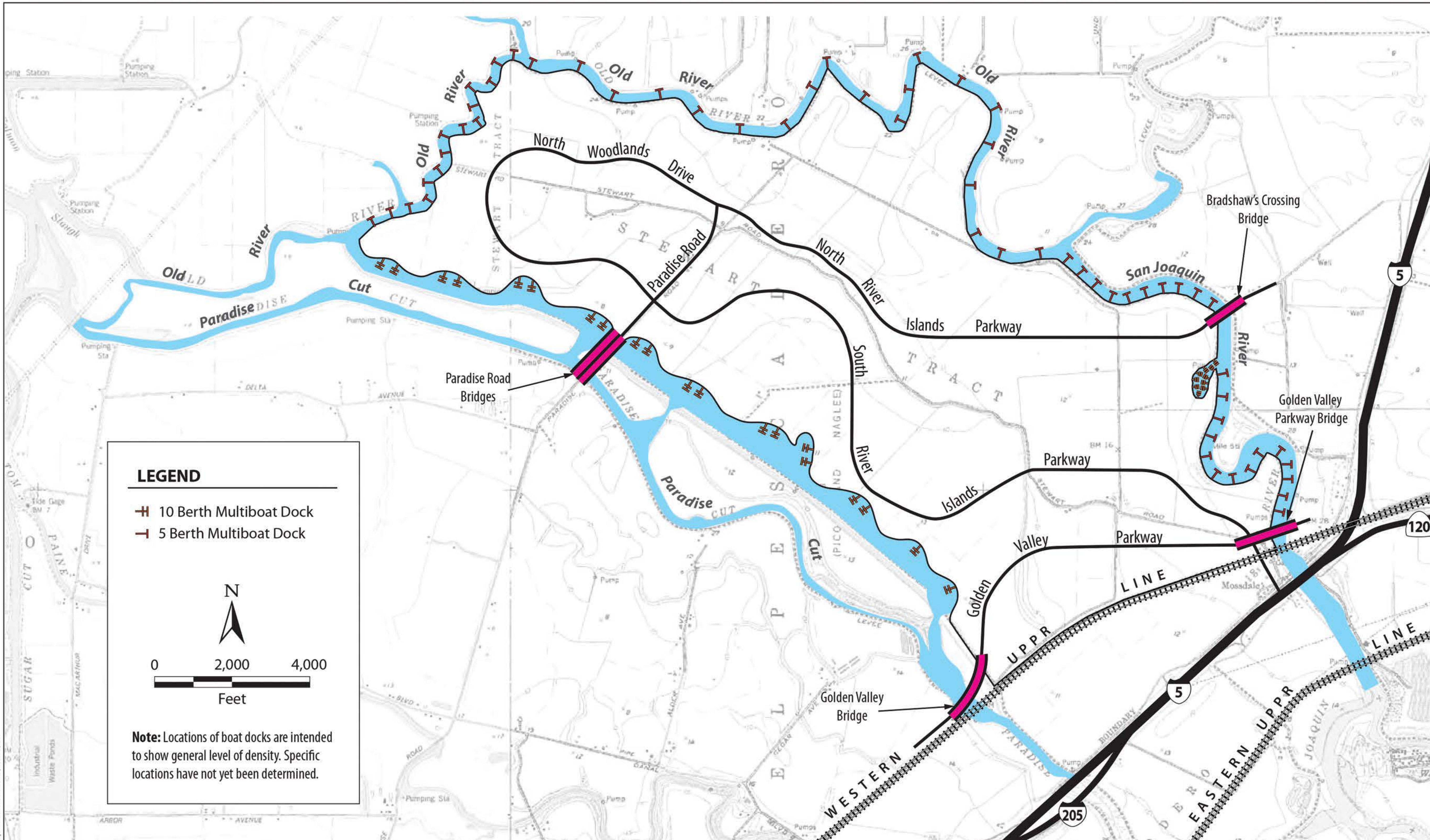

Figure 2-5
Structures Associated with Water Features and Waterways

When completed, the Golden Valley Parkway Bridge would consist of two parallel bridge structures, one for inbound traffic and one for outbound. Each bridge would be approximately 600 feet long and 44 feet wide, providing a total of four travel lanes (two per bridge), along with shoulder areas approximately 10 feet wide on each side to allow emergency access.

Although both bridges may be constructed at the same time, bridge construction is more likely to be phased on the basis of need. Assuming this is the case, one of the Golden Valley Parkway bridges would be constructed during the earlier stages of the proposed action (anticipated approximately 2018) and would initially accommodate two-way (inbound plus outbound) traffic. As the proposed action residential construction proceeds and traffic increases, the second bridge would be added and both bridges would be converted to one travel direction (inbound or outbound only) (anticipated approximately 2022).

Both new bridges are proposed to be cast-in-place post-tensioned box girder structures. Each bridge would consist of three approximately 200-foot-long cast-in-place end spans that cantilever about 40 feet into the 200-foot center span. Since the falsework required to construct cast-in-place spans is not permitted over the river's main navigational channel, a fourth drop-in precast prestressed girder approximately 120 feet long would be erected over the navigational channel once the end spans are complete.

Each bridge would be supported by four cast-in-place concrete column footings supported on CISS concrete piles. Column diameter would be approximately 8 feet, and the maximum footing diameter would be 10 feet.[7]

The west abutment for the new bridges would be situated on the existing top of the levee and would consist of short seat-type abutments, likely supported on 24- to 36-inch-diameter CIDH concrete piles. The east abutments are planned for the landside of the existing levee and are also expected to consist of short seat-type abutments supported on 24- to 36-inch-diameter CIDH piles. Alternatively, if access can be provided for Reclamation District (RD) 17 across Golden Valley Parkway, then the east abutment could be situated on the existing levee top. In either case, the abutments would be designed to provide approximately 16 feet of clearance from the levee road to the underside of the bridge superstructure.

Runoff from the new bridges would be collected by deck drainage systems and routed through the bridge abutments to the new Golden Valley Parkway storm drain. Stormwater drainage from the bridges would not be allowed to discharge to the river; the bridge decks would be contoured to ensure that all runoff is effectively captured by the deck drainage system for delivery to the storm drain system.

Riprap is expected to be necessary to protect the new bridge abutments and adjacent levee segments from river erosion. As much as 138,000 square feet of new riprap may be added to the existing riprap protection below the new bridge crossing, extending as much as 150 feet upstream and downstream of the bridges, totaling approximately 430 linear feet of bank protection. The new riprap would likely be placed to a depth of 3–4 feet for a total of approximately 21,000 cubic yards. However, no riprap would be placed in areas verified as wetlands by the Corps.

[7] This design was selected to minimize impacts on in-river habitats. An alternate approach using rectangular pile caps with multiple small-diameter piles was considered but eliminated because it would have required more extensive disturbance of riverine habitat.

Construction Process

Construction of the cast-in-place bridge spans would require installation of a system of temporary falsework beneath the footprint of the bridge end spans, extending approximately 40 feet into the center span. The design of the falsework would be the contractor's responsibility, so there may be some variation, but the falsework system is expected to consist of driven steel pipe piles. Individual piles would likely be limited to a maximum diameter of about 20 inches, and the piles would be installed in a grid pattern with a longitudinal spacing (spacing parallel to the bridge alignment) of about 30 feet on center and a transverse (across-bridge) spacing of about 10 feet on center. Falsework is expected to clear the 1% (100-year) water surface elevation. As discussed above, no falsework is permitted over the river's main navigation channel, which is approximately 100 feet wide and corresponds to the main center spans of the bridges. A trestle system would be needed to provide equipment access over the river for construction of the falsework, CISS/CIDH piles, and cast-in-place footing columns. The trestle system would probably be constructed outboard of the bridge alignment to the north and south. Each trestle would be approximately 35 feet wide and—like the falsework system—the trestles would extend approximately 40 feet into the main bridge span. The trestle system would be supported by a foundation consisting of driven steel pipe piles in a grid pattern similar to that used for the falsework. As described for the falsework system, no trestle structure is permitted over the river's main navigation channel. If necessary, the trestle could be constructed beneath the footprint of the proposed structure and converted to falsework after the bridge foundations have been constructed. This would reduce the number of temporary driven piles in the river. The piles would serve a dual purpose: first as support of the temporary construction equipment trestle and then to support the falsework for construction of the cast-in-place structure. This approach may be necessary to limit temporary impacts within the river, if required by federal or state resource agencies (U.S. Fish and Wildlife Service [USFWS] or the California Department of Fish and Wildlife [CDFW]).

About 250–300 driven steel piles are expected to be necessary to support the falsework and trestle systems; however, as described above, this number could be reduced if necessary to meet state or federal construction noise standards. The falsework and trestle piles would be driven using a diesel impact hammer or a vibratory hammer, with appropriate noise mitigation (e.g., bubble curtains) if such is deemed necessary. The time required to install each pile is expected to be about 20 minutes, for a total estimated driving time of 6,000 minutes (approximately 100 hours). Following construction, the piles would be removed using a vibratory hammer. Any piles that cannot be removed would be cut off 2–5 feet below the mud line and left in place.

Construction of the in-river piles and columns would require the work areas at the pile locations to be dewatered using cofferdams. The cofferdams may consist of sheet piling or oversized temporary casing penetrating below the mud line with sufficient embedment such that the area inside the oversized casing can be dewatered. To mitigate noise impacts, the permanent piles would likely consist of CIDH piles constructed with temporary casing, for constructability reasons. The temporary casing would be installed and removed using *casing oscillator* technology. This technology uses hydraulic actuating arms to clamp onto segments of temporary steel casing and pushes the casing into the ground using a back-and-forth twisting motion (contrasted with driving using an impact hammer). The pile shaft can then be drilled, as the caving potential is mitigated by the temporary casing. After drilling, the temporary steel casing segments are removed as the concrete for the pile is being placed using a reverse twisting motion with the casing oscillator.

The dimensions of each work area would be a maximum of 15 by 15 feet, for an area of approximately 225 square feet per column. Cofferdams would consist of steel sheet piling or an oversized temporary steel casing, installed with a vibratory hammer. Installation is expected to take about 10 days. Work areas would then be dewatered, and work would take place in the dewatered, cofferdammed area. The permanent piles for the bridge footings would be constructed with the cofferdams still in place, in order to take advantage of the cofferdams' noise/vibration buffering effect. Drilling, pouring, constructing the permanent CISS/CIDH piles, and constructing all the columns are expected to take about 45 days. The cofferdams would be removed upon completion of the columns and permanent piles, requiring an additional 5 days.

Construction of the west footing on the existing levee top would require excavation of approximately 1,400 cubic yards of levee material. If the east abutment is also constructed on the existing levee top, an additional 1,400 cubic yards of excavation would be required for the east abutment. All spoils would be used onsite for fill dirt on the high-ground perimeter.

Paradise Cut Crossing—Golden River Valley Parkway

Overview

The proposed Golden Valley Parkway alignment over Paradise Cut would require two parallel bridges. The parallel bridges are likely to consist of multi-span cast-in-place concrete flat slab bridges. A cast-in-place box girder structure, with larger span lengths and fewer supports within the floodplain may also be considered. The box girder option would require a deeper superstructure, which in turn would provide less headroom above the floodplain than a flat slab superstructure. Because Paradise Cut also serves as a wildlife corridor, required minimum vertical clearances for wildlife should be specified in applicable resource agency permits. The cast-in-place concrete flat slab would have more permanent impacts on Paradise Cut than the box girder bridge, because it would require many more supports within Paradise Cut. The temporary impacts would be similar for both alternatives; accordingly, to allow for a worst-case scenario, this description considers the cast-in-place concrete flat slab alternative, which may be constructed with driven, drilled, or "twisted" piles.

Paradise Cut consists of two well-defined channels within a very wide floodplain. At the crossing site, a long causeway bridge is required for two reasons: to avoid impediment of flood waters that may pass through the channel and to preserve a movement corridor for riparian brush rabbit. The parallel bridges would be approximately 110 feet long (two 25- to 44-foot spans). When complete, the bridges would convey four lanes of traffic (two per bridge). Each bridge would be approximately 41 feet 5 inches wide. The total bridge deck area for both bridges will be approximately 91,945 square feet (2.11 acres).

The superstructure is likely to consist of a cast-in-place concrete slab approximately 1 foot 10 inches deep. The abutments would consist of end diaphragm-type abutments, likely supported on driven steel pipe piles, driven precast concrete piles, or CIDH piles with a maximum diameter of 24 inches. The piers are likely to consist of driven precast concrete piles or CIDH piles with a maximum pile diameter of 30 inches.

If abutment piles are to be driven piles, the driving process would require pile-driving equipment at the abutment location. Alternatively, if the geotechnical engineer recommends CIDH piles, then a drill rig and crane would be required. Conceptually, the bridge piers would be spaced at approximately 44 feet on center longitudinally, and would likely consist of 15- to 18-inch driven precast prestressed concrete piles or 30-inch-diameter CIDH piles and pile extensions, depending on foundation recommendations made by the geotechnical engineer. If concrete or steel driven piles are used, pile-driving equipment would be required within the floodplain at each of the pier locations. Alternatively, if CIDH piles are used, drilling equipment would be required for drilling the piles and a crane would be required for erection of the rebar cage during construction. Concrete trucks would also require access within the floodplain via a temporary at-grade haul road.

Construction Process

A trestle system would be necessary to provide access for construction equipment over the two channels, which are situated approximately between abutment 1 and pier 3 and between pier 5 and pier 11. A temporary trestle system would likely be constructed north and south of the parallel bridges (outboard) across each of the channels. The trestle on each side of the parallel bridges would be approximately 34 feet wide and 350 feet long. The trestle system would likely require a steel pile foundation in a grid pattern layout with longitudinal spacing of approximately 30 feet on center and transverse spacing of approximately 10 feet on center. The piles would be limited to approximately 20 inches in diameter. Approximately 128 steel piles would be used for the temporary trestle system. Because the design of the temporary trestle would be the responsibility of the contractor, the trestle pile layout may differ from this description. The piles would be installed with an impact or vibratory hammer and removed after construction with a vibratory hammer, or cut off below the mud line and abandoned in place. It is anticipated that it will take approximately 20–30 minutes to install each temporary trestle pile, for a total estimated installation time of 8 days.

Construction of driven or cast-in-place piles and pile extensions within the defined channels of Paradise Cut would require that cofferdams (an approximately 50- by 15-foot rectangle at each pier) of steel sheet piling be constructed at the pile/column locations, so that the columns can be constructed in the dry above the mud line. The cofferdams would provide the added benefit of reducing acoustic impacts on aquatic species during pile construction operations. The sheet piling would be installed using vibratory hammers and would take approximately 20 days to complete. The sheet piling would be removed upon completion of the permanent piles and columns. Sheet piling removal is expected to take approximately 15 days. The permanent piles, if driven, would be driven with an impact hammer, requiring approximately 30 minutes per pile, for a total estimated driving time of 5 weeks. If the piles are to be CIDH piles, they would be constructed at a rate of four piles per day and would require a total of approximately 10 weeks to complete. The total plan area of permanent piles required for the piers (conservatively assuming CIDH piles are used) would be approximately 653 square feet (0.0015 acre).

The abutments would be constructed on the existing top of levee, necessitating approximately 60 cubic yards of excavation. Within the floodplain, construction of the cast-in-place slab would require falsework construction that is likely to be supported by the permanent piles or temporary timber falsework supported on timber foundation pads. Cast-in-place construction would require that concrete trucks and pumps have access within the floodplain during construction via a temporary haul road. Forklifts would used for construction of the falsework system in the floodplain.

In general, construction of the cast-in-place structure would require forklifts, concrete trucks, concrete pumps, and cranes to operate within the flood plain via a temporary haul road. Falsework removal would require similar equipment within the floodplain.

Rock slope protection would likely be required to protect the abutments from scour and erosion. Up to 40,000 square feet (1 acre) of riprap may be required for abutment protection. Although a scour analysis has not yet been performed, it is anticipated that rock slope protection may extend up to 200 feet upstream and downstream of the bridges, for a total of approximately 520 linear feet of protection. Rock slope protection would be placed to a depth of 3–4 feet for a total of approximately 6,000 cubic yards. Riprap would not be placed in areas verified as wetlands by the Corps or below the mean high water marks of Paradise Cut.

All drainage on the bridge would be collected by a deck drainage system incorporated into the bridge and conveyed through the bridge abutments to the principle storm drain system for the roadway. Storm drainage on the bridge would not be discharged directly into Paradise Cut.

Paradise Cut Crossing—Paradise Road

Overview

The new Paradise Road Bridge would be a two-lane structure installed alongside the existing Paradise Road Bridge. The existing bridge crossing consists of two separate bridge structures that cross the two streams in Paradise Cut, constructed of precast I-girders supported on five-column piers and diaphragm-type abutments. Each is a three-span bridge approximately 200 feet long by 28 feet wide. The support columns are approximately 2 feet in diameter. The existing bridge structures would not be altered, although the approaches would be modified so that the existing bridge, which currently carries both inbound and outbound traffic, would convey only one travel direction; the other travel direction would be accommodated on the new bridge structure.

The new bridges would be two- or three-span bridges, each approximately 200 feet long by 41.4 feet wide. Bridge superstructures would consist either of a cast-in-place box girder approximately 4 feet deep, or precast I-girders similar to the existing bridges.

Abutments for the new bridges would consist of short seat-type abutments, which would be supported on driven steel piles, driven precast concrete piles, or CIDH piles, with a maximum diameter of 24 inches. Intermediate supports would probably be piers consisting of single 4-foot-diameter CIDH or CISS piles. For structural soundness, piers may have to be placed within the live channels in Paradise Cut. A hydraulic casing oscillator may be used for construction of the CIDH to mitigate noise impacts if such an approach is deemed necessary by USFWS or CDFW.

Runoff from the new bridges would be collected by deck drainage systems and routed through the bridge abutments to the new storm drain system in Paradise Road. Stormwater drainage from the bridges would not be allowed to discharge to Paradise Cut; the bridge decks would be contoured to ensure that all runoff is effectively captured by the deck drainage system for delivery to the storm drain system.

Riprap would likely be necessary to protect the new bridge abutments from erosion. Design-level scour analyses have not yet been conducted, but preliminary assessments suggest that as much as 12,200 square feet of riprap protection may be needed, with riprap extending as much as 50 feet up- and downstream of the bridge crossing, totaling approximately 220 linear feet of protection. Riprap would likely be placed to a depth of 3–4 feet, for a total of approximately 2,000 cubic yards. No riprap would be placed in areas verified as wetlands by the Corps, and no riprap would be placed below the ordinary high water mark (OHWM).

Construction Process

If the abutments for the new Paradise Cut Bridges use driven piles, abutment construction would require pile-driving equipment at the abutment locations. Alternatively, if CIDH piles are used, a drill rig and crane would be required for construction of the piles.

As described above for the Golden Valley Parkway Bridge, construction of cast-in-place bridge spans would require a temporary falsework system. A trestle system would also be needed to allow equipment access over the live streams during construction.

The trestle system would be constructed outboard—on either side—of the new bridge alignments across each of the channels in Paradise Cut. Each trestle would be approximately 34 feet wide and 200 feet long. Because the design of the temporary trestle would be the contractor's responsibility, there could be some variation, but based on experience with similar projects and the conditions at the site, the trestle system is expected to require a driven steel pile foundation, which would be installed in a grid pattern with longitudinal spacing of approximately 30 feet on center and transverse spacing of approximately 10 feet on center. About 72 steel piles would be needed for the trestle system foundation, and individual piles would be no larger than 20 inches in diameter. The piles would be installed with an impact or vibratory hammer. Driving time is expected to be approximately 20–30 minutes per pile, for a total estimated driving time of 5 days. Piles would be removed after construction using a vibratory hammer. Any piles that cannot be removed would be cut off below the mud line and left in place.

The falsework system used to construct cast-in-place bridge elements is expected to consist of steel pipe piles with a maximum diameter of 20 inches, installed on a grid with a 30-foot longitudinal spacing and 10-foot transverse spacing. A total of about 80 piles would be required for the falsework, and the total installation time is expected to be about 5 days. The falsework structure would be required to clear the 1% (100-year) water surface elevation.

Before any in-water work (pile driving or pouring of cast-in-place piles or pile extensions) takes place, cofferdams would be installed to isolate the work areas from the live stream. The dimensions of each work area would be approximately 15 by 15 feet. Cofferdams would consist of steel sheet piling or oversized steel casings installed with a vibratory hammer. Installation is expected to take about 10 days. Work areas would then be dewatered and work would take place within the dewatered, cofferdammed area. The permanent piles for the bridge foundations would be constructed with the cofferdams still in place to take advantage of the cofferdams' noise/vibration buffering effect and reduce the effects of pile driving on aquatic species. Bubble curtains and other noise mitigation devices could also be employed. The cofferdams would be removed upon completion of in-water activities, requiring about 6 workdays.

2.2.3 Residential and Commercial Development

River Islands at Lathrop would be a residential mixed-use, water-oriented community (Figure 1-3). In addition to the project components that would require permit review by the Corps and are therefore included in the proposed action, the proposed action would entail construction of a number of additional components that do not require Corps permits. These components would represent direct outcomes of the Corps' permit decisions and thus are also analyzed in detail in this EIS.

As discussed in Chapter 1, the private development component of River Islands at Lathrop is proposed to include a total of approximately 11,000 homes and 5 million square feet of commercial and retail space at buildout. Approximately 4,284 homes and 3 million square feet of commercial/retail space are expected to be built under earlier phases of the project, with the remaining 6,716 homes and the balance of the Employment Center and associated public facilities and recreational amenities slated for the proposed action. Specific facilities put forth under the proposed action—and not already described in the previous two sections—include one or more fire stations; the remaining school campuses and community parks, trails, and paseos; and facilities at Lathrop Landing. The internal lake would be completed under the proposed action, and the two proposed golf courses and associated clubhouses and water features would also be developed during this phase.

2.2.3.1 Residential Neighborhoods and Commercial Space

The proposed action would include development in the Woodlands, West Village, Lakeside, Old River Road, and Lake Harbor neighborhoods (Figure 1-3). This construction would be primarily residential, but would also include six schools, up to two fire stations, and one or two golf courses. Other public facilities may also be provided. The golf courses would be irrigated with tertiary treated reclaimed water and would have storage ponds for water reclamation. A runoff management plan would be developed to ensure that reclaimed water is not allowed to enter the central lake. The fire stations would be constructed as development proceeds, based on service demands calculated by Lathrop-Manteca Fire Protection District (LMFPD).

The proposed action would also include construction of the balance of the proposed Employment Center, or about 40% of its total acreage, southwest of the portion developed under earlier phases of the project.

2.2.3.2 Stormwater Management System

Prior to the initiation of earlier phases of the project, all storm drainage and irrigation runoff from the RID portion of Stewart Tract was collected into a central drainage ditch and pumped into Paradise Cut without treatment. At buildout, River Islands is planned to include a storm drainage system to minimize the volume of stormwater discharged into adjacent surface waters during all storm events and improve the quality of stormwater that must be discharged.

The first storm drainage master plan for Stewart Tract was developed as part of the West Lathrop Specific Plan (City of Lathrop 2003). It provided for large artificial lakes that would collect and clean stormwater runoff before it was discharged into adjacent rivers. Design for River Islands at Lathrop has expanded on this concept by incorporating stormwater treatment—including grassy swales, a large internal lake system with some 35 acres of constructed wetlands along its margins, canals, and other features—throughout the proposed development. The drainage system is designed to retain stormwater in areas of permeable ground rather than collecting it immediately into pipes or hardscape, maximizing percolation and providing natural passive treatment through sediment settlement and the growth of vegetation.

Earlier phases of the project, now in process, provide for approximately 100 acres of internal lakes and canals. Phase 1 includes the initial construction of the main central lake, which would be completed under the proposed action.[8] The lake would be constructed progressively as fill is needed to widen the new extended levees associated with the proposed action. When complete, the internal lake system is planned to encompass approximately 280 acres with a maximum depth of 30 feet, sufficient to collect and store all onsite drainage for events up to and including the 1% (100-year) flood. The lakebeds would not be lined. Groundwater levels on the site fluctuate, but the deepest parts of the lake system are expected to be in contact with groundwater throughout most normal years. Stormwater would infiltrate through the remainder of the lake's wetted area. Additional supply to maintain lake water levels would be delivered via one new intake structure on the San Joaquin River and one new intake structure on the Old River. The new intakes would be fitted with fish screens and would replace the existing unscreened intakes that were used to supply irrigation water when Stewart Tract was in agricultural use. With the exception of the intakes, the new lake and canal system would not be directly connected to the San Joaquin River, Old River, or Paradise Cut—instead, water would be expected to percolate into the subsurface through the permeable lakebed, with excess water discharged from the lake into the new Paradise Cut Canal at outfalls near the locations of the existing agricultural tailwater discharges. Each intake and outfall would be equipped with a pump capable of delivering approximately 4,000 gallons per minute (GPM). Pumps would be screened to prevent fish entrainment and to ensure that nonnative species stocked in the lake are not transferred to waterways. The pump system would be designed to ensure that the City of Lathrop's noise standards are met, and it would have built-in redundancy to ensure reliable operation.

The lake would be designed to provide a visual amenity, with a variety of treatments possible along the lakeshore. The majority of the lakeshore would be vegetated with trees and grasses to create a natural appearance. A portion of the lakeshore may be stabilized with a bulkhead or retaining wall, allowing water levels to fluctuate without erosion or visual damage.

2.2.3.3 Public Utilities Infrastructure

Electricity

Prior to the initiation of prior phases of the project, electricity was delivered to the RID Area by two Pacific Gas and Electric Company (PG&E) 12-kilovolt (kV) overhead electrical distribution lines. These lines are sufficient to serve the first 600 housing units in earlier project phases and are expected to continue in use for that purpose.

Access to higher capacity transmission lines would be required to serve the earlier phases of the project and the proposed action. Additional offsite delivery infrastructure, planned for installation under earlier phases of the project, would be built either by PG&E or by the Lathrop Irrigation District (LID). There are several options, but the preferred approach is to connect to the existing PG&E Manteca-Kasson 115-kV line east of I-5 in the remaining Stewart Tract, outside the proposed development area. If PG&E constructs the new infrastructure, it would link existing PG&E service to a new 115- to 12-kV substation or substations planned by PG&E outside the immediate project area; from the substation(s), 12-kV distribution lines would serve the entire River Islands at Lathrop project. If LID is responsible, a new 115- to 12-kV substation would be constructed in the east corner of the Employment Center to serve all phases of River Islands at Lathrop. In either case, internal electricity delivery infrastructure would be constructed progressively as development

[8] Until the lake system is completed, stormwater is being retained in storage ponds in the proposed action area.

moves forward. An interconnection agreement between PG&E and LID has already been reached as part of the development of earlier phases of the project.

Overhead lines would be used to connect existing 115-kV service with the new 115- to 12-kV substation(s). The lines would be mounted on a standard steel pole system 60–70 feet tall, designed and constructed to meet or exceed existing California Public Utilities Commission (CPUC) requirements. From the new substation(s), power would be distributed to customers through an underground system radiating out from the substation along major roadways. Where possible, installation of the new electricity distribution system would be coordinated with other utilities to allow the use of common trenches.

Natural Gas

Offsite natural gas delivery infrastructure sufficient to support the proposed action is planned for completion under earlier phases of the project. The natural gas delivery system internal to the proposed action area would be constructed as development proceeds, with PG&E as the service provider.

Initial natural gas service to River Islands at Lathrop would be provided by a connection to PG&E's Louise Avenue feeder, which parallels Louise Avenue east of South Harlan Road. An underground gas distribution regulator station approximately 1,000 feet east of I-5 is the endpoint of the existing feeder.

From this point, the proposed action area (and other phases of the project) would be served by a newly completed 8-inch gas line carried in conduit within the recently constructed pedestrian and bicycle bridge that crosses the San Joaquin River near Manthey Road. The bicycle bridge was built by the City as part of its pedestrian trail system and bicycle transportation network. This 8-inch line is fully functional and is at a lower distribution pressure, ready to serve new construction of earlier phases of the project. A second line, serving earlier phases of the project and a portion of the proposed action area, would be an 8- to 10-inch gas main passed through a utility conduit included in the City's new bridge over the San Joaquin River at Bradshaw's Crossing. During prior project phases, a pressure-regulating station would be constructed at the River Islands end of the bridge to bring the gas pressure down to distribution levels.

As the proposed action is developed, a third line is expected to become necessary, connecting from the Tracy area along Paradise Road, and serving the proposed action area exclusively.

After each line enters the RID Area, it would follow planned or existing roadway alignments to a new pressure-regulating station. The location of the pressure-regulating station has not been determined at this time.

Water Supply

Water supply infrastructure—water mains, booster pumps, and storage tanks—would be constructed in phases, as needed, consistent with the City of Lathrop's *Water, Wastewater, and Recycled Water/Wastewater Plan* (Water/Wastewater Plan) (City of Lathrop 2001) and the City's Water Supply Study (City of Lathrop 2009), which assumes buildout of River Islands at Lathrop. Water supply would initially be delivered to River Islands through a new 16-inch pipeline entering Stewart Tract on the Manthey Road pedestrian/bicycle bridge utility crossing. The 16-inch pipeline is to be constructed as part of earlier phases of the project development and would serve initial homes in the prior phases. As needed, water supply for additional housing in earlier phases of the project and for the proposed action would be provided through the construction of a storage tank served by the existing 36-inch South San Joaquin Irrigation District (SSJID) water line, which also enters Stewart Tract on the Manthey Road Bridge and ultimately delivers supply to the Tracy area. The City's proposed Water Storage Tank/Booster Pump Station #4 (identified in the Water/Wastewater Plan) would be built in the Employment Center and would include a storage tank with a capacity of approximately 2 million gallons (MG), along with the necessary booster pumps. Additional water delivery—and, if needed, storage—infrastructure in the RID Area would be constructed as development proceeds. Water mains and other necessary pipelines would be installed in road ROWs and other appropriate utility corridors.

The City of Lathrop may implement several water conservation measures for future developments in the area, including River Islands at Lathrop. These measures include the installation of high-efficiency appliances such as dishwashers, clothes washers, and low-flow toilets; the installation of dual-plumbing pipelines for recycled water distribution; and the installation of irrigation controllers to reduce the irrigation water lost to evaporation and transpiration (City of Lathrop 2009). The City also has a water conservation program that it implements during water supply shortages. The water conservation program involves four phases aimed at water rationing and reducing water use. The phases range from voluntary conservation (Phase I), which encourages water conservation, to mandatory conservation (Phase IV), which requires water conservation practices (City of Lathrop 2009). The City is also able to implement additional water conservation measures depending on the severity of the water shortage and water demand.

Sewer Service

Sanitary sewer infrastructure—pump stations, mains, and treatment facilities—would be constructed in phases, as needed, consistent with the Water/Wastewater Plan. River Islands at Lathrop would receive treatment capacity either directly from the City's Water Recycling Plant 1 (WRP1) located north of Stewart Tract or through the City's contractual rights to capacity from the Manteca Water Quality Control Facility (WQCF). River Islands currently has 100,000 gallons of average daily flow (ADF) capacity allocated to it for earlier phases of the project, and the City is expected to continue to expand WRP1 based on demand, as envisioned in the Water/Wastewater Plan. Sewer mains would be built along the UPRR ROW and would connect the RID Area to WRP1 via the Manthey Road pedestrian/bicycle bridge. Pump stations and mains would be constructed throughout the project site as needed to serve development.

Recycled Water Management

River Islands proposes to use the maximum permissible proportion of recycled water for irrigation. All common areas have been designed for recycled water use, as have the public golf courses and park facilities. The two golf courses are proposed to include ornamental ponds that would also use recycled water.

Recycled water infrastructure—mains, spray fields, and ponds—would be constructed in phases by the City, as needed, consistent with the Water/Wastewater Plan. Spray fields would be located south of Stewart Tract in the Pescadero area, and ponds would be located east of the RID Area in the remaining Stewart Tract area. The City is also pursuing a river discharge permit that would allow any clean, unused recycled water to be returned to the river.

2.2.3.4 Animal Campus

In addition to the public utilities infrastructure described above, the proposed action would include a 15- to 20-acre Animal Campus for animal control services and environmental education. The Animal Campus would likely be located in the Employment Center.

2.2.4 Habitat Restoration and Creation

The proposed action includes several elements designed to provide mitigation for project-related impacts on listed species. Habitat-related activities comprise creation or restoration of natural habitats, habitat enhancement, and in-perpetuity protection and preservation of habitat and open space.[9] All these habitat enhancement and preservation elements were developed to mitigate project-related effects on listed fish and terrestrial wildlife species under the jurisdiction of USFWS and listed anadromous fish species under the jurisdiction of the National Marine Fisheries Service (NMFS). These efforts will focus on the PCC Area, but may also include habitat creation in appropriate areas along the banks of the San Joaquin and Old Rivers in compliance with Corps levee vegetation policies and along the UPRR. Moreover, as discussed in Chapter 3, *Terrestrial Biological Resources*, the Riparian Brush Rabbit Mitigation and Monitoring Plan prepared as part of mitigation for effects of the proposed action would be developed in consultation with USFWS and CDFW. In addition to the habitat restoration activities described below, the proposed action would entail construction of 200 boat docks in the new Paradise Cut Canal. As discussed in more detail in *Stormwater Management System* above, development is also proposed to include constructed water features internal to the project, but the central lake and wetlands are intended primarily for stormwater treatment and aesthetic benefits and would offer only small pockets of habitat isolated from larger natural areas.

The following sections describe the proposed habitat creation, restoration, and enhancement elements. Long-term management of habitat areas is discussed in *Habitat Management* in *Operation of the Proposed Action Components* below.

2.2.4.1 Paradise Cut Conservation Area

Construction of the proposed new setback levee on the north side of the PCC Area would expand the areal extent of Paradise Cut, increasing the availability of riparian habitat and reducing the relative extent of agricultural land and roadways. In addition, lands in Paradise Cut have been identified for habitat creation to support shallow-water fish species, giant garter snake (*Thamnophis gigas*), and riparian brush rabbit.

Shallow-Water Habitat in PCC Area

When the Paradise Cut Canal is created, the riverbank would be contoured in some areas to provide shallow-water habitat (i.e., habitat with water depths less than 10 feet) at different flood events. On the northeast side of the Paradise Cut levee remnants, shallow-water habitat would be created (Figure 2-4) to offer water depths appropriate for growth of emergent marsh vegetation; these areas would be actively planted with appropriate vegetation. The remaining Paradise Cut levee remnants would consist of shallow open water habitat. The new marsh and open water areas are intended to

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[9] Additional measures specifically aimed at avoiding or reducing effects of construction activities are discussed in Section 2.4, *Environmental Commitments*.

provide shallow-water habitat for giant garter snake, delta smelt (*Hypomesus transpacificus*), Sacramento splittail (*Pogonichthys macrolepidotus*), and anadromous fish species that may use the project vicinity.

Riparian Habitat in PCC Area

Existing riparian habitat in Paradise Cut has been designated for conservation and will be protected in perpetuity as part of the River Islands project. The proposed action also provides for active and passive restoration of additional riparian habitat in the PCC Area. Of River Islands' 273 acres within Paradise Cut, about 113 acres were in cultivation prior to initiation of prior phases of the project, and would remain in cultivation through construction of these phases before being actively restored under the proposed action. An additional 100 acres would be taken out of agricultural use under the proposed action and allowed to return passively to a natural riparian community. Additional riparian habitat would be created along remnants of the Paradise Cut levee to be breached under the proposed action. The restored/created riparian habitat would largely consist of SRA cover.

River Islands has reached agreements with willing landowners to restore areas in the vicinity of Paradise Weir, where the existing 40-acre bench would be returned to its current vegetated state following the earthwork proposed to reduce its elevation. In agricultural areas slated for restoration, contouring is proposed to create topographic variation and provide high-water refugia.

As described in Section 2.2.1, *Flood Risk Reduction Measures*, once the proposed new setback levee and expanded Paradise Cut Canal are created, the existing federal project levee on the north side of Paradise Cut would be breached. Elevated levee remnants would form islands that could support riparian vegetation and provide high-water refugia for riparian brush rabbits and upland basking habitat and winter refugia for giant garter snakes. Levee remnants would be contoured to allow brush rabbits to move between islands. In most locations, land bridges would consist of either earthen berms or concrete culverts that would connect the high-ground areas. An existing bridge between the levee and the upland area in the central portion of Paradise Cut would be left in place, resurfaced with soil and rock, and planted with native vegetation to serve as a movement corridor for riparian brush rabbits (Figure 2-4). New vegetated earthen bridges and underground culvert passages would be constructed at three remaining levee remnants in the western portion of Paradise Cut to provide connectivity with nearby upland areas (Figure 2-4).

Some of the created or restored riparian areas would provide suitable upland habitat for giant garter snake, although riparian areas with dense canopies would likely be too shady to offer suitable basking sites. Rock piles would be placed in both the lower and upper zones of levee remnants to provide basking opportunities. Rock piles on the tops of levee remnants, which are out of the floodplain, would also provide suitable winter hibernacula for giant garter snake.

2.2.4.2 Paradise Cut Improvement Project Area

Riparian Habitat Restoration and Creation

Riparian habitat and SRA cover would be created or restored in the PCIP Area. As described in Section 2.2.1, *Flood Risk Reduction Measures*, the Paradise Cut floodway would be widened by constructing a new setback levee and breaching the existing levee; existing flow restrictions near the Paradise Weir would be removed; and a portion of the existing north levee would be expanded in the PCIP Area. Additional habitat would be provided by revegetating the bench that would be lowered to provide fill material for levee widening. Levee remnants resulting from levee breaching would also be planted with riparian species to provide expanded habitat and upland refugia for riparian brush rabbit.

Paradise Weir Improvements

The existing Paradise Weir is a rock and concrete structure separating the San Joaquin River channel from the southeastern terminus of Paradise Cut. On the Paradise Cut side (the weir's downstream face), the large boulders that make up the weir are exposed, creating a rough surface with sharp protruding edges. Although the flood conveyance improvements included in the River Islands proposal do not specifically require or include alterations of Paradise Weir, River Islands is proposing to smooth a portion of the downstream surface of the weir in response to comments from NMFS indicating concern that fish may be injured by the rough surface when passing over the weir during high flows. Concrete or another appropriate material would be placed in the spaces between the boulders to provide a more even surface on the portion of the weir above the OHWM. The height of the weir would not be altered. No alteration is proposed for the portion of the weir below the OHWM.

2.2.4.3 Cross Levee

As described above in Section 2.2.1, *Flood Risk Reduction Measures*, the new cross levee parallel to the western UPRR tracks, which was begun under earlier phases of the project, would be completed under the proposed action (Figure 2-1). River Islands owns the area between the existing railroad berm and the new cross levee (outside the UPRR ROW), but this area would not be actively managed as habitat as part of the River Islands at Lathrop project. The area is expected to be largely undisturbed after construction is complete, and over time vegetation would likely mimic existing vegetation on the UPRR berm, where riparian brush rabbits are currently known to occur. Consequently, this area would provide almost 9 acres of riparian brush rabbit habitat. A barrier with signage explaining that the area is a biological preserve would be built along the cross levee to prevent people and domestic animals from entering the area between the cross levee and the UPRR ROW.

2.2.4.4 Riverbanks

Restoration of riparian habitat and SRA cover along the modified levees adjacent to the San Joaquin River and Old River could be provided through several mechanisms. As stated above, approximately 18.82 acres along these riverbanks are suitable for vegetation. All plantings would be outside the vegetation-free zone in accordance with Corps levee vegetation guidelines. The waterside levee slopes along Old River would be contoured with a waterside bench to allow for riparian vegetation planting. In addition, in the Lathrop Landing area, although some portions of the breached levee remnants would be landscaped, the majority would be planted with native vegetation, providing wildlife habitat and enhancing views for homes, retail stores, and commercial areas along the perimeter of the back bay. Planting plans would be designed to enhance habitat along the river edge while maintaining flood conveyance capacity and compliance with the Corps' levee vegetation guidelines. All planting would occur in the area above the OHWM, and would be designed and implemented for consistency with applicable guidelines in the California Code of Regulations (CCR) (Title 23, Division 1, Chapter 1, Article 8). Plantings would be designed to mimic natural communities to the extent permissible, but would be limited primarily to overstory species because of the palette of species allowable for levee plantings. Native grassland species may be planted in upland areas on the extended levees.

2.2.5 Construction Schedule

Because of the project's large size and complexity, construction and occupancy would be sequenced over a period of approximately 20 years. At buildout, the project is planned to encompass three components: flood risk management, private development, and recreation. The anticipated construction timeline for the proposed action is presented below, based on an assumption of permit approval in late 2014. Note that construction of the proposed action is expected to overlap with residential and commercial construction of earlier phases of the project. Moreover, this schedule should be considered flexible in terms of precise timing and sequencing of various elements, subject to changing economic conditions and project requirements. Components that are italicized below indicate activities approved under earlier phases of the project under CEQA; these are not evaluated in this EIS except as cumulative effects, which are addressed in Chapter 21, *Cumulative Effects*.

- 2015
  - *Construct first 1,500–2,300 units (completion in 4–6 years)*.
- 2015-2019
  - Build all docks in San Joaquin River and Lathrop Landing back bay.
- 2017
  - Construct Paradise Cut improvements.
- 2017-2019
  - Construct setback levees along Paradise Cut and Old River. Levees would be constructed to a levee crown of 20 feet with unengineered fill placed on top of the standard levee prism toward the ultimate objective of creating the 300-foot crown of the extended levee; however, completion of the extended levees would likely occur later during the development process.
- 2019
  - Begin construction of interior lake system (*some interior lakes have already been completed*).
  - Begin breaching of existing federal project levee along San Joaquin River for Lathrop Landing back bay.
  - Construct backbone roads for Town Center, including *principal roadways* and South River Islands Parkway (to Golden Valley Parkway).
  - *Continue residential development in Phase 1 area*.
  - Begin residential development in proposed action area.
  - Construction of residential development is assumed to continue at a rate of approximately 500 units per year. While all phases are in simultaneous development, the rate of construction is expected to be 250 units per year in overlapping phases (i.e., 250 units per year in earlier phases and 250 units per year in Phase 2B). Once earlier phases are built out, construction would continue at 500 units per year in the Phase 2B area.
  - *Begin commercial development, to be completed by 2025*.

- 2020
  - Finish breaching of San Joaquin River levee for Lathrop Landing back bay.
  - *Construct first fire station*.
  - Begin construction of parks associated with residential areas.
  - Begin construction of first elementary school in Lakeside District.
- 2021
  - *Construct boat storage facility in Town Center adjacent to Lathrop Landing.*
  - *Construct 2-lane bridge section initiating Golden Valley Parkway Bridge over San Joaquin River.*
- 2022
  - Construct bridges to and from Lake Harbor District on South River Islands Parkway.
- 2023
  - Construct Old River Road.
  - Construct Paradise Road Bridge and Golden Valley Parkway Bridge over Paradise Cut.
  - Begin construction of elementary school in West Village District.
  - Construct 18-hole golf course in Lakeside District.
- 2024
  - *Finish construction of Canal Street and remaining adjacent interior roads.*
  - Begin construction of middle school in West Village or Woodlands District.
- 2025
  - Construct second fire station.
  - Construct second 2-lane bridge section widening Golden Valley Parkway Bridge over San Joaquin River.
- 2027
  - Begin construction of additional elementary school in West Village or Woodlands District.
- 2028
  - Begin construction of high school in Woodlands District.
- 2029
  - Begin commercial development for proposed action area.
- 2030
  - Construct Woodlands Drive and any needed improvements to Paradise Road.
  - Begin hotel construction in Employment Center District (325 rooms).
- 2031
  - Complete proposed action levee widening.

    - Complete interior lake system.
- 2032
    - Construct additional fire station in Woodlands District, if needed.
    - Construct 18-hole golf course in Woodlands District.
- 2032
    - Construct additional elementary school in Woodlands District.
- 2034
    - Finish construction of hotel in Employment Center (650 rooms total).
    - Project reaches buildout.

2.2.6 Operation of Proposed Action Components

This section summarizes current planning for operation, maintenance, and management of public facilities associated with the proposed action. Additional activities would be required for the upkeep of private residential and commercial properties, including landscape and structural maintenance. Private maintenance activities at River Islands would be similar to those required for any recent development of similar scale; for the sake of brevity, they are not discussed in detail here.

2.2.6.1 Levees

Levees require regular inspection and maintenance to ensure their condition. The CVFPB holds an easement to and operates the levees surrounding Stewart Tract; however, RD 2062 is presently responsible for inspection and maintenance of all Stewart Tract levees. RD 2062 coordinates with DWR, and maintenance standards are set according to DWR and Corps guidelines.

Existing levees surrounding Stewart Tract are operated and maintained in accordance with the Corps' *Standard Operation and Maintenance Manual, Lower San Joaquin River Levees, Lower San Joaquin River and Tributaries Project, California* (U.S. Army Corps of Engineers 1959), which provides general guidance; River Islands will prepare a new supplement to the operations and maintenance manual specific to Stewart Tract levees in accordance with Corps requirements.

Levee maintenance tasks may be carried out by a Geologic Hazards Abatement District (GHAD). A GHAD is a special district formed for the purpose of preventing or mitigating geologic hazards to ensure public health, safety, and welfare, pursuant to the Beverly Act of 1979. As special districts, GHADs have the authority to issue bonds, purchase and sell property, levy and collect assessments, pursue legal action, and maintain improvements. Formation of a GHAD requires development of a plan of control that describes the hazard in question and identifies the approach for mitigation. A GHAD Plan of Control is currently in preparation. It will be finalized following completion of NEPA compliance and permitting, to ensure that it reflects input from the NEPA process and permit terms.

2.2.6.2 Lathrop Landing Back Bay and Paradise Cut Canal

To support continued boat access, part or all of the new Lathrop Landing back bay and Paradise Cut Canal may require dredging every 5–10 years (requiring Corps authorization pursuant to Section 10 of the Rives and Harbors Act). River Islands would coordinate and develop dredging protocols in consultation with CDFW, USFWS, and NMFS. Because it is difficult to predict siltation rates, and because some locations may require more frequent dredging than others, specific locations and schedules for dredging are unknown at this time. However, it is likely that maintenance dredging would occur at some location(s) on the project site annually. Dredging would be scheduled for the window between August 1 and September 15 (pursuant to conditions established through ESA Section 7 consultation with USFWS and NMFS), to avoid the period when sensitive fish species are more likely to be present and susceptible to disturbance. All dredging would use suction dredge equipment, unless USFWS and NMFS specify an alternative method. Onsite disposal would be the first preference. If this is infeasible, dredged material would be delivered to neighboring reclamation districts that have expressed interest in using them to strengthen existing agricultural protection. Because of this local reuse opportunity, dredged material would not be transported more than 10 miles from Stewart Tract.

2.2.6.3 Public Access to Waterfront

The design for River Islands at Lathrop provides for public and levee maintenance access to the riverbanks by means of linear park areas along the waterfront. Fishing would be allowed on fishing piers extending into the main channel of the river. The fishing piers would be similar to the boat docks described above, but would be smaller (approximately half the size of a group boat dock). Riverbank access would also be provided at neighborhood parks and trailheads; additionally, the public would be able to access the waterfront using levee roads. In addition, River Islands residents would be able to keep their boats at group docks (multi-berth public docks) along the Old and San Joaquin Rivers, in the Lathrop Landing back bay, and in the new Paradise Cut Canal. No individual boat docks are proposed on the water system. Residents on the extended levees would have direct access to the riverbank adjacent to their properties, and to the new boat docks.

Waterfront residents would have ownership of the property to the edge of the linear park. To ensure appropriate levee inspections and maintenance, the linear park, which overlies the majority of the levee section, would be owned by a public agency—RD 2062 or the GHAD. Along the lakes, residents would own the property to the top of the wall along the lake, and a public agency—the GHAD or the City—would have a 60-foot-wide easement over the lake slope.

2.2.6.4 Stormwater Management

As discussed above, the internal lake system and the constructed wetlands along its edge are intended to treat stormwater runoff from developed areas of River Islands at Lathrop. Before runoff enters the wetlands and lake system, it would run through continuous deflective separation (CDS) *debris collector* units, which capture and remove larger particles such as litter, leaves, twigs, and other debris common in urban storm runoff. Runoff would be further slowed by passage through the wetland areas, allowing sediment to settle out and providing some contaminant removal. Stormwater would then collect and be stored in the lake, where further settling and passive filtration would occur.

The central lake would be managed to keep the water level within about 9 inches of the optimal water surface elevation of 4 feet above sea level, allowing no more than about 18 inches of total variation in lake level under normal conditions. To maintain the desired lake level, water would be pumped into the lake during dry periods, using existing riparian water rights, and discharged from the lake to Paradise Cut during extreme rainfall events. During the storm season, lake level would be kept at a minimum to provide flood storage capacity.

Modeling based on rainfall data from 1983 through 2000 suggests that water would need to be diverted into the lake 3 or 4 years out of every 5 years to maintain the desired lake level. Diversions would be most likely to occur in October and November, when lake levels would be lowest. The mean annual volume of water diverted into the lake is expected about 8,000 acre-feet (af) or less, representing a reduction of approximately 43% by comparison with the typical diversion rates of nearly 14,000 af per year required to support preproject agricultural uses on Stewart Tract.

Discharges from the lake into Paradise Cut are expected to occur primarily during the winter and early spring storm season (December through March), when storm runoff into the lake would be at its peak. Precipitation and groundwater data from 1983 through 2000 suggest that if the project had been in place over that period, discharges would have been required in 14 of these 18 years. During these years, the mean annual discharge to Paradise Cut to maintain lake water levels would have been between about 300 af and about 4,300 af, depending on the water level retained in the lake.

2.2.6.5 Recreational Use of Central Lake

The central lake would provide a range of recreational uses consistent with its stormwater treatment function. Swimming would be prohibited, but fishing would be allowed, and the lake would be stocked to enhance recreational fishing opportunities and meet lake management needs such as vegetation removal and mosquito control. Docks in the internal lake system, including the central lake and the other constructed lakes, would accommodate as many as 604 boats. However, boating use would be restricted to rowboats, paddleboats, canoes/kayaks, electric boats, and small sailboats; no internal combustion engines would be permitted, except for those on boats used by police and fire departments for emergency response.

2.2.6.6 Habitat Management

Monitoring of Restored, Enhanced, and Created Habitat

Areas where habitat for listed species has been restored or created will be monitored following construction as required by USFWS/NMFS to ensure that success criteria are met, in accordance with the requirements of the mitigation monitoring plan developed under the project SEIR (City of Lathrop 2005). Additional specifics regarding monitoring of riparian brush rabbit habitat are provided in the *Riparian Brush Rabbit Mitigation and Management Plan* (included in Appendix B). Monitoring reports will be prepared and submitted to the appropriate regulatory agencies upon completion of restoration implementation and during the monitoring period. Monitoring reports will identify when various required activities are complete and explain any variation from plan guidelines, and will include photodocumentation and lists of planting and other materials used. As appropriate, monitoring reports will also include recommendations for any remedial actions identified as necessary.

In addition to the brush rabbit monitoring plan, a detailed fishery resources monitoring plan for River Islands was prepared (Rich 2009). Existing data on fish populations and fisheries habitat in the San Joaquin River, Old River, and Paradise Cut will be analyzed before construction to assess the presence of anadromous fish species, delta smelt, and Sacramento splittail; these species will be monitored during and after project construction. Ongoing fish population sampling conducted by CDFW, DWR, and USFWS will be used as a source of fish population data and will be incorporated into the fisheries monitoring program. Water quality data collected by various agencies will be evaluated as an additional indicator of habitat quality for special-status fish species.

Long-Term Habitat Protection and Conservation Commitment

As discussed above, the River Islands at Lathrop proposal includes in-perpetuity conservation of the portion of Paradise Cut under project ownership (i.e., the PCC Area), including aquatic habitats. Because the PCIP Area lands are not owned by River Islands, in-perpetuity protection of the new and enhanced habitat in this area cannot be ensured.

As restoration proceeds, the PCC Area would be transferred to a suitable land management organization, and conservation easements would be placed on the Paradise Cut property.

River Islands proposes to coordinate with the San Joaquin Council of Governments (SJCOG) regarding the long-term management and maintenance of the PCC Area. Under this approach, SJCOG would manage the PCC Area in conjunction with its management of mitigation areas under the San Joaquin Multi-Species Habitat Conservation and Open Space Plan (SJMSCP). Areas not restored by River Islands would be available to SJCOG for purposes of restoration and creation of riparian habitat required under the SJMSCP. River Islands would be responsible for paying the SJMSCP mitigation fees in effect at the time grading permits are obtained for the proposed action. Monies generated by River Islands' payment of SJMSCP mitigation fees could be used by SJCOG to fund the long-term management and monitoring of the PCC Area, or other funding mechanisms might be agreed upon.

Alternatively, another authorized conservator or conservators, or the proposed River Islands GHAD, may serve as the entity responsible for management and monitoring in the PCC Area.

As part of the River Islands proposal, several programs have been developed to provide long-term protection for the riparian brush rabbit population in the PCC Area. These are summarized in Section 2.4.3, *Measures to Protect Habitat Areas*, and described in detail in the *Riparian Brush Rabbit Mitigation and Management Plan* (Appendix B).

2.3 Alternatives to the Proposed Action

NEPA and its implementing regulations require that an EIS evaluate a reasonable range of feasible alternatives to the proposed action. Although the No Action Alternative is not the baseline for evaluating environmental effects,[10] the EIS must also evaluate the No Action Alternative to allow decision makers to compare the effects of approving the proposed action with the effects of not approving it. Alternatives must be evaluated at the same level of detail provided for the proposed action (40 Code of Federal Regulations [CFR] 1502.14).

The following sections present a brief overview of the alternatives development approach and describe the alternatives that are analyzed in this EIS, including the No Action Alternative.

2.3.1 Alternatives Development and Screening Approach

A key purpose of this EIS is to support the Corps in evaluating River Islands' application for permitting under CWA Section 404. Review of Section 404 permit applications is governed by 40 CFR 230–233 (*Restrictions on Discharge*). To ensure that this EIS contains an appropriate range

[10] The baseline for analysis of environmental effects is defined as existing environmental conditions at the time the NOI was published.

of alternatives to support Section 404 compliance, the alternatives development and screening approach was designed to satisfy both the Restrictions on Discharge and NEPA and its implementing regulations.

2.3.1.1 Screening Approach to the Section 404(b)(1) Analysis

As required by CWA Section 404, the 404(b)(1) analysis included an analysis of offsite as well as onsite alternatives. Although the overall criteria for offsite alternatives generally parallel those for onsite alternatives, they are applied with a slightly different emphasis. With offsite alternatives, the first step is to identify feasible alternate sites; project approaches can then be developed and screened. The process for onsite alternatives, on the other hand, focuses on development of alternate approaches within the same approximate area and with the potential to affect the same set of resources and conditions; consequently, the analysis is directed at identifying the most promising alternatives and eliminating the least promising. ICF International (ICF) prepared an Alternatives Analysis in August 2010 (Appendix C). However, the array of alternatives analyzed in this EIS has since been modified. Nevertheless, the Alternatives Analysis presented in Appendix C was the basis for the development of the alternatives ultimately selected for evaluation in this EIS.

This analysis entailed an examination of the market area (i.e., San Joaquin County and the south Delta region), although it considered housing and employment influences exerted by the San Francisco Bay Area. The supply and demand considerations in the market analysis are listed below.

- Access to jobs.
- Price and value.
- Transportation availability.
- Commute patterns and times.
- Quality of schools, recreation, and shopping.
- Types of housing (e.g., single-family, apartment, condominium).
- Types of communities (e.g., urban, suburban, rural).
- Climate.
- Taxes.
- Parks and open space.

Screening Criteria for Offsite Alternatives

A summary of the screening criteria for offsite alternatives is presented below.

Project Purpose

Alternatives were screened to determine if they would meet the project purpose. The characteristics that follow were considered in this evaluation.

Large-Scale Project

A *large-scale project* was defined as being of sufficient size to accommodate the variety and range of dwelling unit types and densities, employment-generating uses, and associated amenities to meet the overall project purpose. The City of Lathrop General Plan designated Stewart Tract as a distinct sub-planning area (Sub-Plan Area 3) that "represents the largest remaining area in Lathrop that is available for future master planned development. The 5,794-acre Stewart Tract represents a unique opportunity to control phasing of a large-scale mixed use development designed to establish an integrated community environment west of Interstate 5" (City of Lathrop 2004:4-A-22). The type and extent of uses set forth in the City's General Plan and proposed by River Islands could be accommodated on a site encompassing approximately 3,000 acres; accordingly, 3,000 acres has been adopted as the minimum site size for this screening criterion.

Mixed-Use Residential/Commercial Complex

To support a mixed-use residential/commercial complex, the subject site must be suitable to accommodate a contiguous (i.e., must comprise single property or multiple properties controlled by a single landowner) development providing an appropriate combination of residential, retail, employment, community, open-space, and recreational uses and the infrastructure to sustain such uses. An alternative site need not support water-oriented recreational amenities to meet the project purpose, but must accommodate sufficient open space and recreational opportunities to complement the site-specific land uses and characteristics.

South Delta / San Joaquin County Location

The site must be located in the San Joaquin County or the south Delta area to support identified housing and employment needs.

Availability

Each alternative site, whether or not owned by River Islands, was evaluated to determine if it could reasonably be obtained, utilized, expanded, or managed to meet the project purpose.

Practicability

Each alternative site was screened to determine if the project could be implemented and the project purpose achieved in consideration of cost, logistics, and existing technology.

Logistics

Acceptable sites must be in areas designated for development compatible with the project, or in areas likely to be so designated in the foreseeable future. Moreover, sites with constraints that would preclude development were excluded.

Technology

Acceptable sites were required to have reasonable access to transportation infrastructure, water supply, wastewater treatment and disposal facilities, and utilities (e.g., electricity, natural gas).

Environmental Effects

Environmental considerations used in screening alternative sites are listed below.

Biological Resources

Sites whose development would entail potential jeopardy to federally listed threatened or endangered species or destruction or adverse modification of designated critical habitat were excluded. Similarly, sites whose development could result in a substantial effect on essential fish habitat, state-listed threatened or endangered species, or natural communities of local importance were excluded.

Water Quality or Quantity

Sites were excluded if their development would result in significant adverse water quality effects on surface water bodies or groundwater. Similarly, if project development would lead to adverse effects on water supply, the site was excluded.

Agricultural Resources

Sites were excluded that would entail development in the primary zone of the Delta or that would lead to effects greater than those of the project.

Flooding and Seismic Risks

Acceptable sites were required to meet level of performance requirements (i.e., 1% [100-year] FEMA and 0.5% [200-year] DWR standards) in accordance with existing flood risk reduction plans. Sites in seismically active areas or on an active fault as defined by the California Geological Survey were excluded.

Land Use Incompatibility

Sites were excluded that were located on or near incompatible uses such as hazardous waste disposal facilities, airports, and other uses incompatible with residential development.

Aquatic Resources

The following effects of alternative sites on aquatic resources were evaluated in comparison to the identified effects of the proposed action at its currently proposed location.

- Discharge of dredged or fill material into a special aquatic site.
- Adverse effects on a special aquatic site.
- Discharge of dredged or fill material into waters of the United States.
- Adverse effects on wetlands or other waters of the United States.

Screening Criteria for Onsite Alternatives

The screening criteria for onsite alternatives are summarized below. The overall project purpose criterion is the same as that described in the discussion of offsite alternatives.

Cost

The cost analysis considered the project's *backbone* infrastructure (e.g., flood risk reduction measures, roads and bridges, wastewater treatment and disposal facilities, water supply, schools and parks, storm drainage). In-tract infrastructure—such as interior streets, fine lot grading, and utilities—are typically constructed by individual builders rather than the master developer, and are not considered in this analysis. Although many of these backbone costs would remain constant regardless of the onsite action alternative selected, others would vary between alternative. These variations provide the basis for the financial comparison. The specific components considered in evaluating the cost are listed below.

- Road infrastructure.
- Water and sewer infrastructure.
- Land cost.
- Community facilities.
- School construction requirements.
- Fill costs.
- Flood risk reduction measures costs.
- Additional infrastructure costs.

The assessment of financial reasonableness is relative; in other words, the criterion addresses what is considered reasonable for a project of the proposed action's parameters.

Logistics

The criteria used to evaluate the logistic feasibility of each onsite alternative are listed below.

- **Sewer/water and storm water service.** Alternatives that would preclude provision of these services were eliminated.
- **Volume of imported fill.** Alternatives that would require the importation of more than 1 million cubic yards of material were eliminated because of cost, as well as the associated traffic and air quality effects associated with such transport.

Technology

The criterion of technological feasibility entailed consideration of the following components.

- **Geotechnical safety.** Alternatives that would not facilitate appropriate geotechnical engineering to ensure resistance to geological hazard (e.g., ground shaking, liquefaction) were eliminated.
- **Constructability of infrastructure.** Any alternatives that would entail significantly greater costs or require use of extraordinary technology were eliminated.

Aquatic Resources

The following effects on aquatic resources were evaluated in comparison to the effects of the proposed action.

- Discharge of dredged or fill material into a special aquatic site.
- Adverse effects on a special aquatic site.
- Discharge of dredged or fill material into waters of the United States.
- Adverse effects on wetlands or other waters of the United States.

Other Environmental Criteria

Alternatives whose development would entail potential jeopardy to federally listed threatened or endangered species or destruction or adverse modification of designated critical habitat were excluded. Similarly, alternatives whose development could result in a substantial effect on essential fish habitat, state-listed threatened or endangered species, or natural communities of local importance were excluded.

Alternatives were excluded if their development would result in significant adverse water quality effects on surface water bodies or groundwater. Similarly, if project development would lead to adverse effects on water supply, the alternative was excluded.

2.3.1.2 Screening Approach to the EIS Analysis

The Council on Environmental Quality's (CEQ's) NEPA Regulations specify that an EIS must "[r]igorously explore and objectively evaluate all reasonable alternatives, and for alternatives which were eliminated from detailed study, briefly discuss the reasons for their having been eliminated" (40 CFR 1502.14[a]).

In developing the range of alternatives to be evaluated in the EIS, it was determined that some slight departure from the alternatives evaluated in the 404(b)(1) analysis was warranted. Because only a single alternative in addition to the proposed action met the screening criteria, a wider range of alternatives reflecting a more varied range of environmental effects was deemed appropriate. Moreover, several of the alternatives identified as infeasible by the project proponent (River Islands) were determined by the Corps to be *reasonable* for purposes of further analysis.

Moreover, the legal challenge discussed in Chapter 1 resulted in a settlement agreement that specified pursuit of the LSJB as one of its conditions. The LSJB proposal assumes construction of the proposed action improvements to Paradise Cut, and would include additional improvements to divert floodflows from the San Joaquin River, transferring them to an improved downstream portion of Paradise Cut and eventually into Grant Line Canal. Additional flood storage may also be provided. The stated purpose of the LSJB is to "alleviate flooding conditions along the Lower San Joaquin River" (River Islands at Lathrop 2008:1). Consequently, as a standalone undertaking, the LSJB would not satisfy the purpose and need identified for the proposed action. However, the Corps has determined that it would form part of a reasonable alternative to the proposed project, as long as that alternative included other elements to ensure satisfaction of the project purpose and need. Accordingly, the LSJB was incorporated into the alternatives process and this EIS analysis (see Alternative 4 in following section).

2.3.2 Alternatives Analyzed in the 404(b)(1) Analysis

2.3.2.1 Offsite Alternatives

The sites discussed below were eliminated through the screening process.

Alternative Site 1—Tracy Hills

This site was eliminated because its current owners are pursuing development; accordingly, it is not available.

Alternative Site 2—South Schulte / Ellis Specific Plan Area

This site was eliminated because it is too small (less than 2,000 acres); moreover, because its current owner is actively pursuing development plans, it is not available.

Alternative Site 3—Shima Tract

The site was eliminated because it is too small (2,000 acres); moreover, because its current owner is actively marketing and pursuing infrastructure-related entitlements and a specific plan and EIR have already been approved, the site is not available.

Alternative Site 4—North Bishop Tract

This site was eliminated because it is too small (approximately 2,000 acres); moreover, because its current owner is actively marketing and pursuing entitlements for the site as a master-planned community, it is not available.

Alternative Site 5—Mariposa Lakes

The major owners of this site are actively pursuing development of this site as a master-planned community. The site was eliminated because it is not available.

Alternative Site 6—New Jerusalem

This site was eliminated because the San Joaquin County General Plan designates New Jerusalem as a rural community (San Joaquin County Community Development Department 2009:2-164). In addition, no water supply is currently available, and a wastewater treatment plant would have to be constructed. Moreover, the large number of owners (more than 55) would so complicate the process of acquisition as to render the site functionally unavailable.

Alternative Site 7—Thornton Area

This site was eliminated because it is held by more than 50 owners; is not approved for urban development; and lacks a reliable water source and wastewater treatment and disposal capacity. The large number of owners would so complicate the process of acquisition as to render the site functionally unavailable.

Alternative Site 8—Oakley Area

This site was eliminated because it is too small (slightly more than 300 acres) and would entail more than 50 acres of wetland and other water-related impacts.

Alternative Site 9—East Cypress

This site was eliminated because it is too small (approximately 2,000 acres) and because various parcels that it comprises are already in the development process. Moreover, the East Cypress corridor Specific Plan EIR identified more than 120 acres of wetlands on the site.

Alternative Site 10—Central Lathrop

This site was eliminated because it is too small (2,300 acres).

Alternative Site 11—South Lathrop

This site was eliminated because it is too small (600 aces) and because much of it is controlled by developers actively pursuing development. Additionally, the site is not designated for residential development and water supply is not currently available.

Alternative Site 12—Multiple Sites

This alternative would entail distribution of components of the proposed action among three sites: the Phase 1 portion of the River Islands Project, a portion of Alternative Site 11, and a portion of Alternative Site 10. The site was eliminated because it does not meet the Mixed-Use Residential/Commercial Complex criterion, the water supply is not fully procured, and developers are actively pursuing entitlements for development of large portions of two of the sites.

Alternative Site 13—Lower San Joaquin River Regional Flood Bypass

This is a flood risk reduction alternative that entails no development. Because it would not meet the overall project purpose, this alternative was eliminated from consideration. However, because its consideration was mandated by the settlement agreement as discussed in Chapter 1, it was retained as a component of one of the alternatives (Alternative 4) evaluated pursuant to NEPA.

Alternative Site 14—Eastern San Joaquin County / Farmington Area

This site was eliminated because it would entail a greater extent of impacts on aquatic resources (up to 100 acres of wetlands) and because there is a dearth of infrastructure (e.g., wastewater treatment, water supply, natural gas).

Alternative Site 15—Northern San Joaquin County Area

This site was eliminated because it is not designated in the General Plan for urban development, and new facilities for treatment and disposal of wastewater would be necessary. Water supply is not currently available, and development could result in impacts on up to 100 acres of potentially jurisdictional wetlands and other waters of the United States.

Alternative Site 16—Northern Tracy Planning Area

This site was eliminated because the large number of owners (more than 100 parcels) would so complicate the process of acquisition as to render the site functionally unavailable, because most of the site is not designated for urban development, and because water supply is not currently available. In addition, development could necessitate fill of up to 220 acres of jurisdictional features.

2.3.2.2 Onsite Alternatives

Alternative 1—Proposed Action

This alternative is the proposed action as described in Section 2.2 of this Draft EIS.

Alternative 2—No Alteration of Paradise Cut

Except for the elimination of the Paradise Cut improvements, this alternative is the same as the proposed action. However, the absence of those improvements would necessitate downstream flood risk reduction measures at an estimated cost of $130 million. River Islands deemed this alternative infeasible; however, the Corps found this alternative to be reasonable for purposes of further analysis.

Alternative 3—Avoidance of Central Drainage Ditch

This alternative would entail avoidance of the central drainage ditch, decreasing the size of the central lake complex, and constructing up to 10 bridges over the drainage ditch, entailing an additional estimated cost of $3.6 million. The decreased amount of available fill from excavation of the central lakes would necessitate import of 6.7 million cubic yards of fill to complete levee modifications, adding approximately $44 million to the cost of fill. Finally, the importation of fill would increase air quality, noise, and traffic impacts. River Islands deemed these costs infeasible; however, the Corps found this alternative to be reasonable for purposes of further analysis.

Alternative 4—Proposed Action with Expanded Flood Risk Reduction

This alternative is similar to the proposed action, except that it would include extensive additional flood risk reduction adjacent to and beyond Stewart Tract. Although this alternative could only be analyzed at a programmatic level due to the conceptual stage of its development, the extensive work involved in the additional flood risk reduction infrastructure would add considerable costs. Moreover, a greater extent of impacts on aquatic resources would result from the expanded flood risk reduction measures—approximately 15 acres of wetlands and other waters of the United States would be affected. Finally, the availability of lands where flood risk reduction measures would be conducted is unknown. Accordingly, River Islands found this alternative to be infeasible. However, the Corps found this alternative to be reasonable for purposes of further analysis.

Alternative 5—No Action

This alternative entails avoiding all alterations of federal project levees and jurisdictional waters (i.e., the peripheral water bodies, the central drainage ditch, and the pond). Instead, a setback levee would be constructed inside the existing federal project levees. The increased cost associated with downstream flood risk reduction measures ($130 million), the increased amount of fill ($92.5 million), and the infrastructure necessary to accommodate avoidance of the central drainage ditch (additional $3.2 million) rendered this alternative financially infeasible according to River Islands' screening criteria. However, NEPA requires analysis of a no action alternative.

2.3.3 Alternatives Analyzed in this EIS

This EIS analyzes five alternatives, including the proposed action. All five alternatives and the key features of each are shown in Table 2-2.

The following sections describe the alternatives in detail. Note that under all the alternatives, including No Action, earlier phases of the project would proceed as described above. All action alternatives are assumed to incorporate the environmental commitments described in Section 2.4.

Table 2-2. Comparison of Key Features of Alternatives

Alternative 1— Proposed Action	Alternative 2— No Modification of Paradise Cut	Alternative 3— Avoidance of Central Drainage Ditch	Alternative 4— Proposed Action with Expanded Flood Risk Reduction	Alternative 5— No Action
FLOOD RISK REDUCTION				
Improvement of existing levee along Old River	Same as Alt 1	Same as Alt 1	Same as Alt 1	No improvements; setback levee constructed inside existing levee
Construction of new setback extended levee along Paradise Cut	No setback levee; existing levee expanded on landside	Similar to Alt 1; minor reconfiguration at downstream end of ditch	Same as Alt 1	Similar to Alt 1; levee along Paradise Cut connects to southwest end of existing cross levee
Completion of remainder of cross levee along UPRR berm	Connects to expanded existing levee rather than new setback levee on Paradise cut	Same as Alt 1	Same as Alt 1	Southwest end of existing cross levee connects to new setback levee
Installation of designed breach location in upper Paradise Cut levee to allow controlled floodwater drainage from Stewart Tract	No improvements to upper Paradise Cut levees	Same as Alt 1	Same as Alt 1	No improvements to upper Paradise Cut levees
Expansion of flood conveyance and storage capacity in Paradise Cut; breaching of existing Paradise Cut levee; removal of flow constriction at existing Paradise Weir	No expansion of flood conveyance/capacity in Paradise Cut	Same as Alt 1	Widens existing Paradise Cut weir; constructs additional weir upstream; constructs new bypass channel southwest of Paradise Cut; increases widening of Paradise Cut; creates new flood storage areas	No expansion of flood conveyance/capacity in Paradise Cut

Alternative 1— Proposed Action	Alternative 2— No Modification of Paradise Cut	Alternative 3— Avoidance of Central Drainage Ditch	Alternative 4— Proposed Action with Expanded Flood Risk Reduction	Alternative 5— No Action
NEW WATER FEATURES				
Completion of internal lake system	Same as Alt 1	Internal lake system reconfigured to avoid ditch	Same as Alt 1	Internal lake system reconfigured to avoid ditch
Installation of boat docks along San Joaquin River	Same as Alt 1	Same as Alt 1	Same as Alt 1	No boat docks along river
Installation of boat docks along Old River	Same as Alt 1	Same as Alt 1	Same as Alt 1	No boat docks along river
Construction of boat docks in Lathrop Landing back bay	Same as Alt 1	Same as Alt 1	Same as Alt 1	No construction of Lathrop Landing back bay
Construction of boat docks in new Paradise Cut Canal	No construction of Paradise Cut Canal	Same as Alt 1	Same as Alt 1	No construction of boat docks
Breaching of existing levees to fill Lathrop Landing back bay	Same as Alt 1	Same as Alt 1	Same as Alt 1	No construction of Lathrop Landing back bay
Breaching of existing levees to fill Paradise Cut Canal	No construction of Paradise Cut Canal	Same as Alt 1	Same as Alt 1	No construction of Paradise Cut Canal
Dredging to create boat access between Lathrop Landing and San Joaquin River	Same as Alt 1	Same as Alt 1	Same as Alt 1	No construction of Lathrop Landing back bay
RESIDENTIAL AND COMMERCIAL DEVELOPMENT				
Construction of 6,716 residential units (3,891 single-family units and 2,825 multi-family units), commercial areas, associated schools, local roadways, public service facilities, and infrastructure	Same as Alt 1; additional 225 developable acres	Same as Alt 1; decrease of 150 developable acres; up to 10 internal bridges constructed across Central Drainage Ditch	Same as Alt 1	Same as Alt 1; decrease of 20 developable acres; up to 10 internal bridges constructed across Central Drainage Ditch
Fill placement for bridge footings and construction of Golden Valley Parkway Bridge over San Joaquin River	Same as Alt 1	Same as Alt 1	Same as Alt 1	Golden Valley Parkway bridges constructed by City of Lathrop
Fill placement for bridge footings and construction of Golden Valley Parkway over Paradise Cut and construction of second span of Paradise Road Bridge over Paradise Cut	Same as Alt 1	Same as Alt 1	Same as Alt 1	Golden Valley Parkway bridges constructed by City of Lathrop

Alternative 1— Proposed Action	Alternative 2— No Modification of Paradise Cut	Alternative 3— Avoidance of Central Drainage Ditch	Alternative 4— Proposed Action with Expanded Flood Risk Reduction	Alternative 5— No Action
HABITAT RESTORATION AND CREATION				
Recontouring and revegetation of levee remnants along Paradise Cut to create riparian brush rabbit refugia with bridges between high-ground habitat islands	No habitat creation or restoration in Paradise Cut	Same as Alt 1	Increased potential for riparian brush rabbit habitat improvement in and near Paradise Cut	No habitat creation or restoration in Paradise Cut
Additional preservation, enhancement, and creation of open space and special-status species habitat in Paradise Cut Conservation Area	No habitat creation or restoration in Paradise Cut	Same as Alt 1	Increased potential for riparian brush rabbit habitat improvement in and near Paradise Cut	No habitat creation or restoration in Paradise Cut
Isolated pond avoided	Pond filled	Pond avoided	Pond avoided	Pond avoided
EXTENT OF FILL (Waters of the U.S./Wetlands [acres])				
7.21 /0.04 = 7.25	7.97/0.84 = 8.81	0.81/0.04 = 0.85	≥7.21/0.04 = ≥7.25	0/0

2.3.3.1 Alternative 1—Proposed Action

The proposed action is described in detail in Section 2.2 above.

2.3.3.2 Alternative 2—No Alteration of Paradise Cut

Alternative 2 would eliminate all alterations to Paradise Cut (Figure 2-6).

Levee Construction and Alteration

No setback levee would be constructed along Paradise Cut in the RID Area. Instead, the existing project levee would be widened in its current location; it would be deconstructed and then rebuilt to create a larger levee prism, with additional engineered fill placed on and against the landside of the levee. The reconstructed and widened levee would be designed to provide 0.5% (200-year) level of performance. Levee reconstruction work would be confined to the landside of the existing levee, and the levee would not be breached. There would be no Paradise Cut Canal, because its potential footprint would be occupied by the expanded levee prism. The pond on the landside of the existing levee would be filled.

Extended Levee

Alternative 2 would entail a reconstructed and widened federal levee that would serve the same purpose as the proposed action setback extended levee in this portion of the RID Area.

Cross Levee and Remaining Stewart Tract Drainage

Alternative 2 would include essentially the same cross levee described for the proposed action, immediately west of and parallel to the existing embankment that supports the UPRR tracks. However, since the existing Paradise Cut project levee would not be breached, the cross levee would connect with the landside of the augmented Paradise Cut levee.

Paradise Cut Flood Conveyance Modifications

Under Alternative 2, no alterations to the Paradise Cut floodway would be undertaken, and the existing Paradise Weir would not be altered. The new Alternative 2 augmented levee would increase the level of performance for Stewart Tract from the 2% (50-year) level to the 0.5% (200-year) level, but the overall flood conveyance capacity of Paradise Cut would not be improved.

Under the proposed action, excavation to create the new Paradise Cut Canal between the existing Paradise Cut levee and new setback levee would provide approximately 5.4 million cubic yards of fill, much or all of which is expected to be suitable for onsite reuse in levee construction. Under Alternative 2, this source of fill would not be available, and additional fill would need to be imported to the site.

New Water Features

Lathrop Landing Back Bay

Under Alternative 2, Lathrop Landing back bay would be designed and constructed as described for the proposed action.

Paradise Cut Canal

As discussed above, there would be no Paradise Cut Canal under Alternative 2, because its potential footprint would be occupied by the expanded levee prism.

Habitat Restoration and Creation

Paradise Cut Conservation Area

Under Alternative 2, there would be no expansion of Paradise Cut, and the habitat restoration and creation described for Paradise Cut under the proposed action would not take place. The altered portion of the existing Paradise Cut levee could be contoured and planted to provide upland habitat. However, the extent and value of the wildlife habitat in this area would likely be limited because it would be less extensive, less connective, and more closely surrounded by developed areas.

Paradise Cut Improvement Project Area

Under Alternative 2, there would be no alteration of existing features or habitat in the PCIP Area. The riparian habitat slated for creation under the proposed action would not be created.

Cross Levee

Under Alternative 2, the cross levee would be similar to that described for the proposed action except that it would connect to the Paradise Cut extended levee rather than the new setback levee under the proposed action. As described for the proposed action, the cross levee area is expected to be largely undisturbed after construction is complete, and over time vegetation would likely mimic existing vegetation on the UPRR berm, where riparian brush rabbit is currently known to occur. Therefore, as under the proposed action, the cross levee area could provide almost 9 acres of riparian brush rabbit habitat.

Riverbanks

Under Alternative 2, habitat creation and restoration along Old River and the San Joaquin River would be the same as described for the proposed action. Riparian habitat and SRA cover would be created or restored along the modified levees as described for the proposed action.

Dock Facilities

Dock facilities under Alternative 2 would be the same in the San Joaquin and Old Rivers and internal lake system as under the proposed action, but there would be no Paradise Cut Canal and therefore no Paradise Cut Canal docks.

Bridge Crossings

Alternative 2 would include the same three new bridge crossings as the proposed action to provide improved access between the RID Area and neighboring portions of Lathrop.

Residential and Commercial Development

The proposed action offers approximately 2,000 acres for residential development.

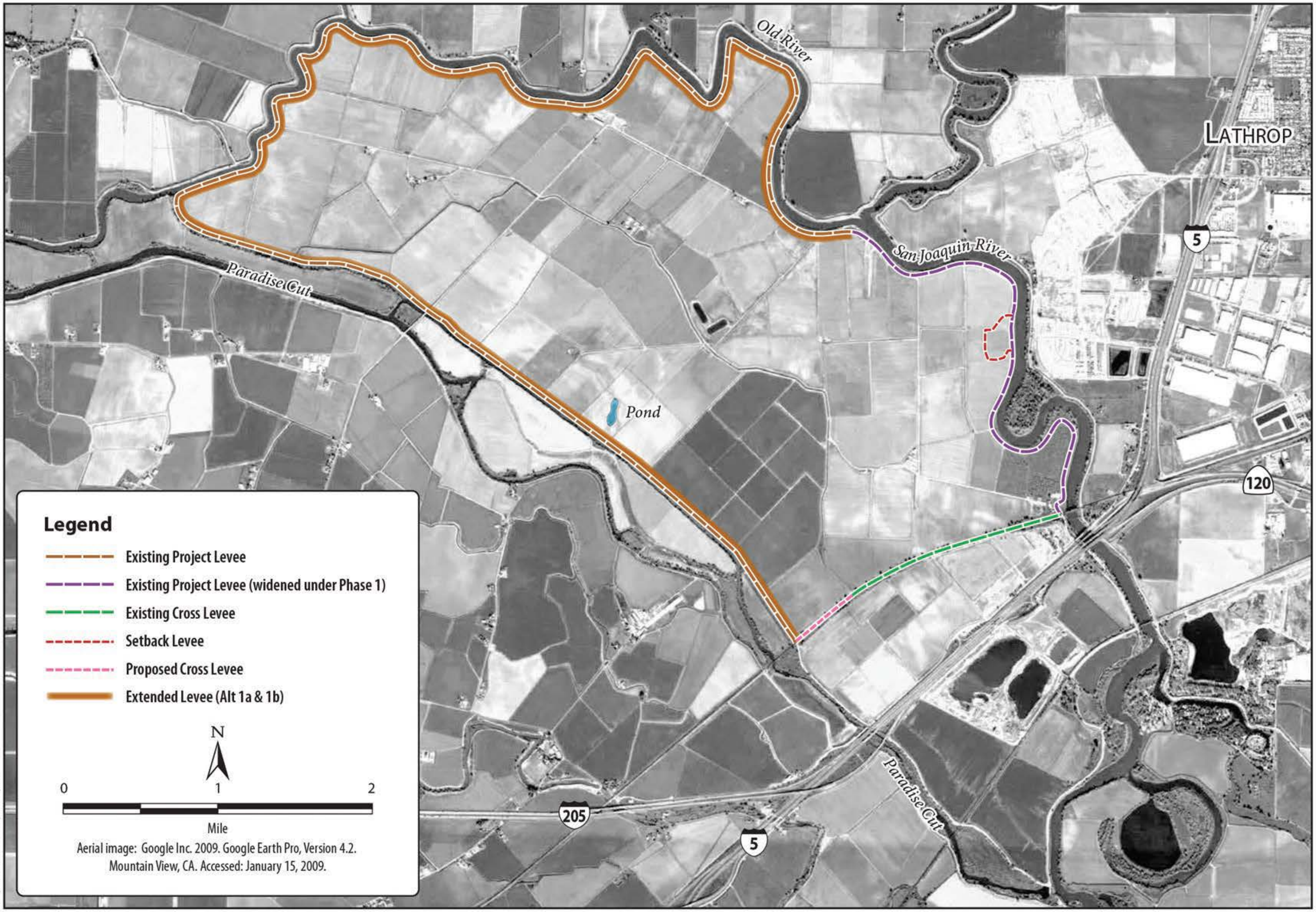

Figure 2-6
Alternative 2—No Alteration of Paradise Cut

Under Alternative 2, where the Paradise Cut levee is reconstructed and expanded on the landside, approximately 225 additional acres would be available for residential development, allowing a reduction in single-family development density in areas along Paradise Cut. Commercial development would occur as described for the proposed action.

Stormwater Management System

Under Alternative 2, stormwater management needs would be slightly increased because of the increased development footprint. However, the general approach would be very similar to that described for the proposed action.

Public Utilities Infrastructure

Under Alternative 2, the 10% increase in developable area would require a 10% increase in road and utility construction.

Operation of Alternative 2 Components

Operation and maintenance of components of the proposed action would generally be similar under Alternative 2 and the proposed action.

2.3.3.3 Alternative 3—Avoidance of Central Drainage Ditch

Under Alternative 3, the proposed action would be modified to avoid all construction affecting the central drainage ditch (Figure 2-7), which would be protected from the effects of nearby development by a no-development buffer zone. The buffer would extend along both sides of the ditch and would likely need to be at least 100 feet wide on each side, consistent with general standards of CDFW. The buffer could offer an opportunity for limited restoration of upland habitat, or it could be landscaped as a visual amenity. It could also be designed to incorporate stormwater treatment features.

Levee Construction and Alteration

Under Alternative 3, levee alterations along Old River and breaching of the San Joaquin River federal project levee to allow water into the Lathrop Landing back bay would occur as described for the proposed action, and most of the remaining levee construction and alterations would proceed as described under the proposed action. However, adjustments to the levee design along Paradise Cut would be necessary at the terminal end of the central drainage ditch to accommodate the 100-foot buffer described above. Similarly, as under Alternative 1, the pond would be avoided.

New Water Features

Under Alternative 3, the Lathrop Landing back bay and Paradise Cut Canal would be largely the same as described for the proposed action. However, the footprint of the Canal would be slightly altered because the central drainage ditch would influence the alignment of the levee along Paradise Cut. The development footprint within the RID Area—especially in the area of the internal lake system—would also differ from that under the proposed action since the central drainage ditch would be avoided.

Habitat Restoration and Creation

Habitat restoration and creation in the following areas would be the same as those described for the proposed action.

- Paradise Cut Conservation Area.
- Paradise Cut Improvement Project Area.
- Riverbank (i.e., Old River, Sacramento River) areas.

Avoiding the central drainage ditch would require the internal lake system to be constructed as two separate water bodies, one on either side of the protective buffer surrounding the lake. This could result in additional lakefront areas, offering potential habitat restoration opportunities.

Dock Facilities

Docks on waterways would be the same as those described for the proposed action.

Bridge Crossings

Bridges and access to the RID Area from other parts of the City would be the same as described for the proposed action. However, avoiding fill of the central drainage ditch and preserving it as a waterway would require construction of additional internal bridges to provide access between different parts of the RID Area. This could require construction of as many as 10 new bridges, which are assumed to be clearspan structures to avoid affecting the ditch during footing construction.

Residential and Commercial Development

Avoiding the central drainage ditch and a 100-foot protective buffer would decrease the available development footprint by about 150 acres, increasing the density of commercial development in the Employment Center and residential development in the Lake Harbor district, East Village district, West Village district, and Woodlands district (Figure 1-3).

Stormwater Management System

Stormwater management would be very similar under Alternative 3 to that under the proposed action, although the area available for development would be slightly smaller under Alternative 3; however, although it would be reconfigured, the extent of internal stormwater management features (internal lake system) would not be substantially reduced.

Public Utilities Infrastructure

Public utilities needs and infrastructure would be very similar under Alternative 3 to those described for the proposed action. External delivery points and routes are assumed to be the same. However, avoiding disturbance to the central drainage ditch while providing utilities service throughout the RID Area would require additional pump stations to pump water and sewer service across the new internal bridges. Electrical and gas infrastructure would also be built on the bridges.

Operation of Alternative 3 Components

Operation of proposed action components under Alternative 3 would be similar to operation under the proposed action. However, additional maintenance would be required for the central drainage

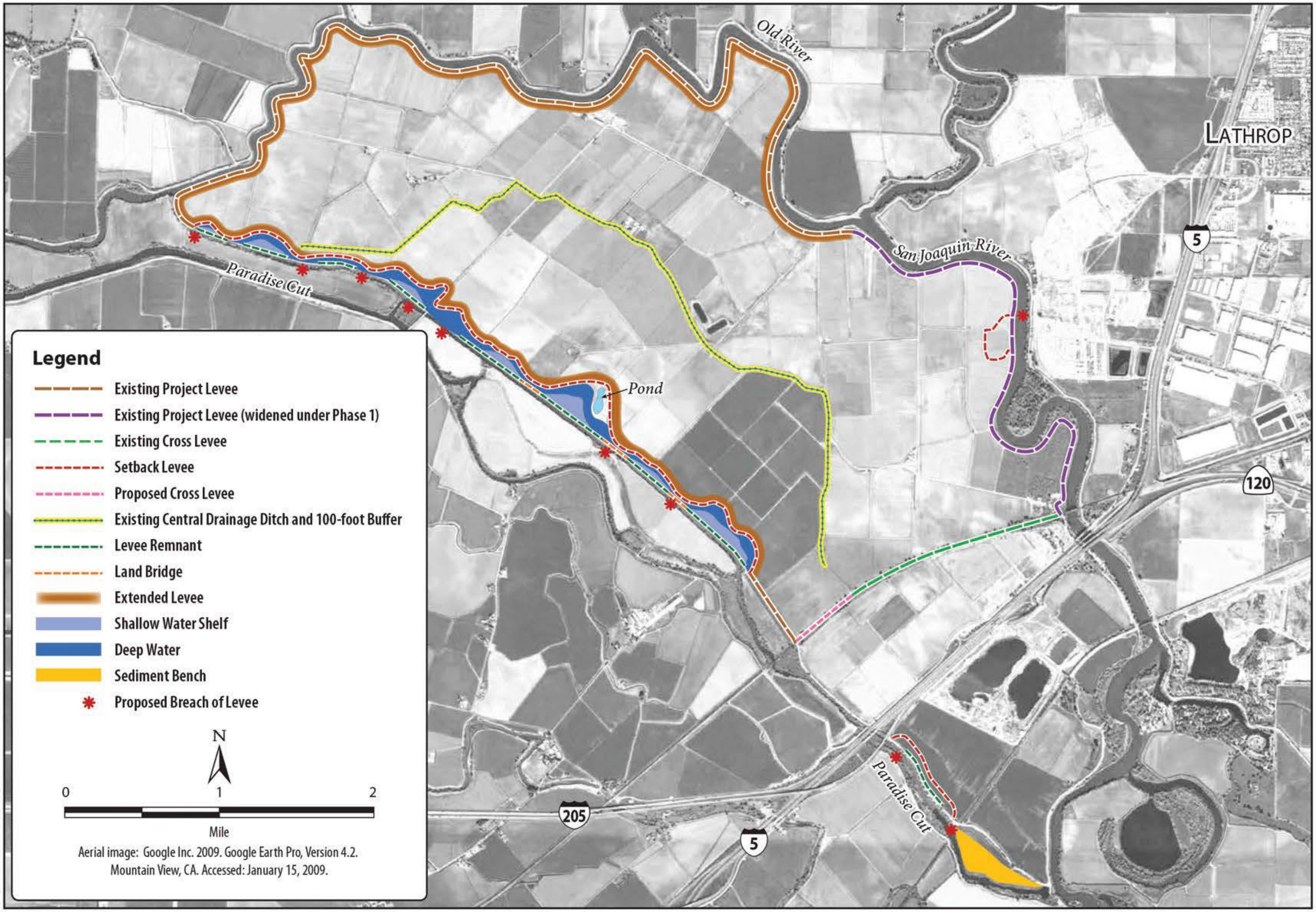

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Figure 2-7
Alternative 3—Avoidance of Central Drainage Ditch

ditch buffer zone (e.g., sediment removal in water quality features, vegetation maintenance) and associated infrastructure (i.e., additional bridges and public utilities). The buffer around the central drainage ditch would be designed to prevent any need for maintenance encroachment into the ditch itself.

2.3.3.4 Alternative 4—Proposed Action with Expanded Flood Risk Reduction

Under Alternative 4, the proposed action would be constructed as described above, but the flood risk reduction measures would include the additional elements listed below.

- Constructing a new bypass channel or channels southwest of the existing Paradise Cut flood bypass.
- Implementing more extensive widening in Paradise Cut.
- Widening Paradise Weir and constructing an additional weir upstream of the existing weir.
- Creating new flood storage areas.

Salmon Slough and Doughty Cut could also be dredged to provide additional flood management capacity. All measures would be designed to maximize their potential benefit to fisheries and wildlife. Because none of these elements has been designed beyond a conceptual level, Figure 2-8 depicts only tentative locations for the additional flood management features under consideration.

The potential expanded flood risk reduction elements in Alternative 4 and the related differences between Alternative 4 and the proposed action are described below. Because Alternative 4 would involve substantial additional acreage outside Stewart Tract, it could not be implemented without developing numerous landowner agreements and has only been developed at a very generalized level at this time. Consequently, the information available for Alternative 4 is less detailed than that for the action alternatives that would involve construction only on Stewart Tract lands owned by the project proponent.

New Bypass Channel(s)

Alternative 4 would entail construction of a new flood bypass channel west of the existing Paradise Cut bypass to convey elevated floodflows from the widened Paradise Weir into downstream Paradise Cut. The new bypass is envisioned as a single shallow channel (less than 10 feet deep) with 15- to 20-foot-high levees on both banks. Approximately 1.5 million cubic yards of engineered fill would be required to construct the adjacent levee segments. Fill is expected to come from adjacent lands, if landowner agreements can be developed. The combined footprint of the channel and levees would be approximately 500 acres in areas consisting primarily of farmlands, with small areas of riparian habitat.

As an alternative to constructing a new bypass channel, Tom Payne Slough, which runs south of and roughly parallel to Paradise Cut, could be restored and connected with Paradise Cut to function as an additional flood bypass channel.

Widened Paradise Cut

Alternative 4 would provide for further widening of Paradise Cut, in addition to (downstream of) the segment proposed for widening under the proposed action. The additional Alternative 4 widening of

Paradise Cut would extend from the confluence with the new bypass channel downstream to the confluence with Old River, and would entail constructing a new 1% (100-year) setback levee on the south side of Paradise Cut, approximately 1,000 feet waterside of the existing 2% (50-year levee) Paradise Cut levee. The existing levee would be breached. The majority of the land between the existing levee and the new setback levee would remain as agricultural land, inundated during periodic flood events and returning to farmland use after the flood flows subside. A portion of the land adjacent to the levee remnants would be converted to riparian and/or upland habitat.

Widened Paradise Weir

Under Alternative 4, Paradise Weir would be widened from 180 feet to an effective width of 400 feet by constructing a new weir adjacent to the existing weir. The new weir would be about 220 feet wide and would have the same crest elevation as the existing weir. With the additional weir segment in place, the widened Paradise Weir would allow additional flow to enter Paradise Cut during flood events exceeding 18,000 cfs (roughly equivalent to the 0.04% [4-year] flood recurrence interval).

Additional Upstream Weir

In addition to widening the existing Paradise Weir, Alternative 4 would include construction of a new weir upstream of the existing Paradise Weir on the San Joaquin River. The new weir would be approximately 500 feet wide. Three possible upstream locations have been identified, all within about 2 miles of the existing weir. A fourth potential location would be immediately adjacent to the south side of the widened Paradise Weir. If this location were selected, the additional width would result in a 900-foot-wide compound weir at the location of the existing Paradise Weir.

New Flood Storage Areas

Alternative 4 would include the creation of new flood storage areas to decrease peak floodflows and allow for "queuing" of floodwaters into Paradise Cut and the proposed new bypass.[11] Flood storage areas would be established by working with willing landowners to obtain flood risk reduction and/or environmental easements over existing farmland. Farmlands supporting such easements would remain in full production. Any existing habitable structures within the easement areas would be altered to raise living areas 1 foot above the 1% (100-year) flood elevation, and new habitable construction would be required to follow current building codes for flood-resistant construction.

Salmon Slough and Doughty Cut Dredging

As an option to provide additional flood management capacity, Salmon Slough and Doughty Cut could be dredged 5–15 feet deeper to increase their channel cross sections. Dredged material would be placed on adjacent farmland outside the floodway, by arrangement with willing landowners. Alternatively, some or all of the dredged material might prove to be usable in constructing the new bypass channel, future levee modifications, and/or unrelated repairs by adjacent reclamation districts.

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[11] The flood discharge at which the new flood storage areas would be "engaged" and in use has not been determined; it will depend on more detailed design, which in turn depends on the extent and location of lands available through agreement with willing landowners.

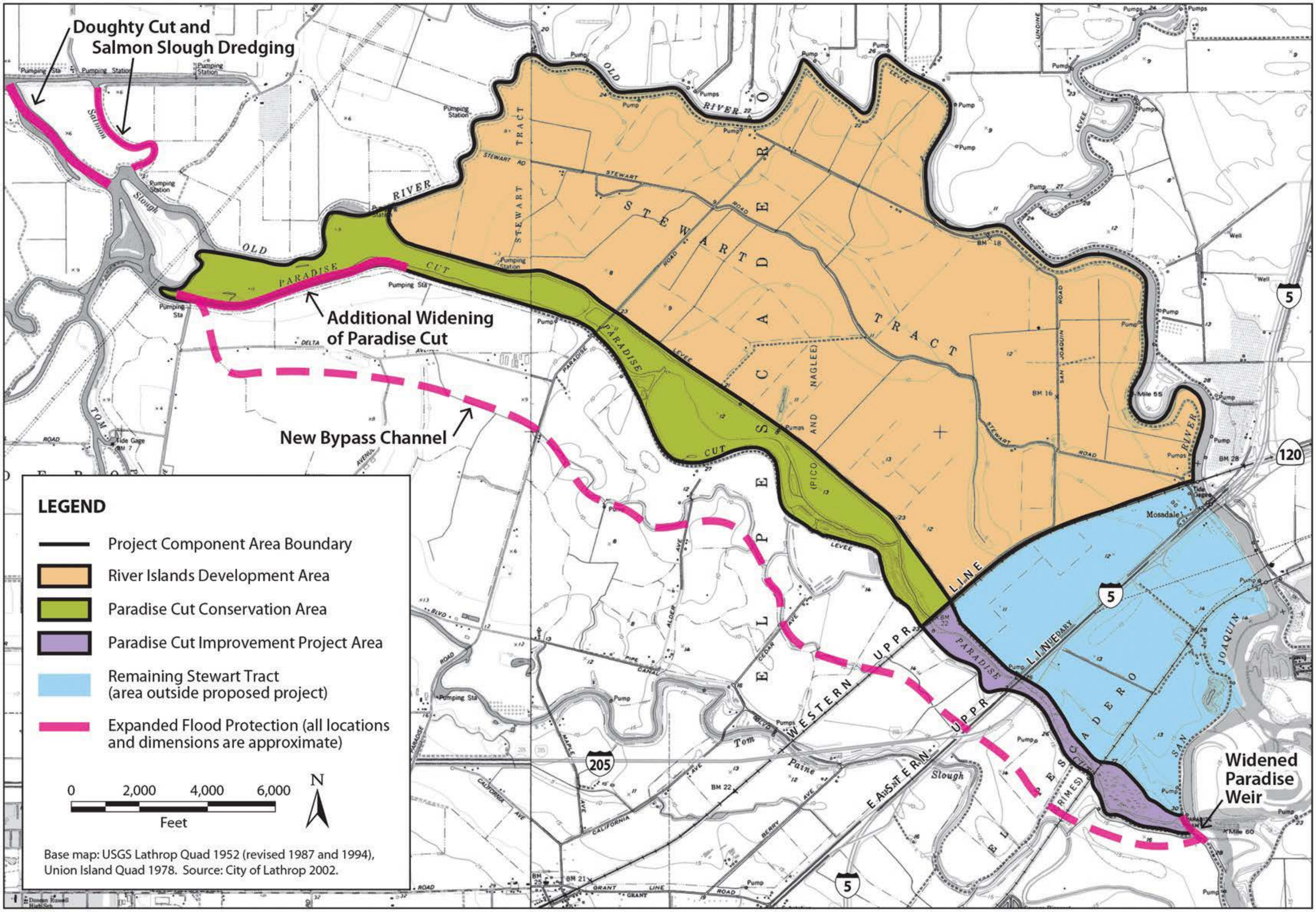

Figure 2-8
Alternative 4—Proposed Action with Expanded Flood Risk Reduction

Habitat Restoration and Creation

Although the details are not known at this time, opportunities for habitat restoration and creation could be increased under Alternative 4 in comparison with the proposed action. Riparian habitat could be created along the proposed new bypass channel; riparian and upland habitat could also be created on the levee remnants along the additional segment of Paradise Cut that would be widened under Alternative 4.

Operation of Alternative 4 Components

Operation of Alternative 4 components would include all those described under the proposed action. However, additional maintenance and operations activities would be required for the new flood risk reduction components included in Alternative 4. The general nature of activities (e.g., levee maintenance, channel dredging, vegetation maintenance) would be similar to those described above for the proposed action flood risk reduction components. Specifics would depend on the design details of each Alternative 4 element.

2.3.3.5 Alternative 5—No Action

Under the No Action Alternative (Figure 2-9), a project would be implemented that does not require federal review and permitting under CWA Section 404, Section 408, and RHA Section 10. River Islands Phases 1 and 2A are already under construction under local and state authorization, so the No Action Alternative is assumed to include completion of those components of River Islands at Lathrop approved through the CEQA process, along with a slightly smaller (approximately 20 acres) proposed development area. Like the proposed action, the No Action Alternative would include compliance by RD 2062 with the Corps' levee vegetation guidelines. However, because RD 2062 would not encroach upon existing levees, it is unclear whether noncompliant vegetation would be removed from those areas. The major differences between this alternative and the proposed action would be the lack of PCIP improvements (e.g., setback levees, lowered bench, high-ground refugia); an interior levee system rather than the use of extended levees; and the lack of waterside vegetation on project levees along the San Joaquin and Old Rivers. While waterside vegetation would be allowed on the waterside of levees outside the vegetation-free zone under the proposed action, under the No Action Alternative vegetation would be removed from this zone in compliance with the ETL. Ecosystem restoration and enhancement activities associated with the PCIP and SRA habitat plantings would not be realized. Moreover, avoidance of the central drainage ditch would necessitate the same design modifications as described under Alternative 3—the interior lake system would be redesigned, decreasing the available extent of lakefront properties; up to 10 additional bridges would be necessary to carry traffic and utilities across the central drainage ditch; and the developable extent of the RID Area would be reduced by about 150 acres.

The following components would be completed under the No Action Alternative. Italicized items were approved through the CEQA process.

- *Placement of fill to raise the southeast portion of the Phase 1 area sufficient to provide 0.5% (200-year) level of performance (completed; accredited by FEMA at the 1% [100-year] level and by DWR at the 0.5% [200-year] level).*
- *Construction of a new interior levee system to provide 0.5% (200-year) level of performance for the remainder of the Phase 1 area (completed; accredited by FEMA).*

- *Fill placement in approximately 13,600 linear feet of the setback area between the new ring levee and the existing levee along the San Joaquin River to create an extended levee for improved flood risk reduction (completed; accredited by FEMA at the 1% [100-year] level in compliance with criteria developed by DWR)*.
- *Development of 4,519 single- and multifamily residential units along with 60% of the proposed commercial space and public amenities in the Phase 1 area (in progress; approved under the CEQA process)*.
- *Construction of a new interior levee (approximately 10 linear miles) to provide 0.5% (200-year) level of performance for the remainder of the RID Area (i.e., the proposed action area).*
- *Placement of fill necessary to extend the existing cross levee and connect to an interior levee system of at least 50 feet in crown width (not constructed).*
- Construction by the UPRR of a 500-foot-long trestle in place of the 48-inch box culverts that currently exist in the ROW (not constructed).
- Construction of up to 10 clear-span bridges across the central drainage ditch to facilitate traffic and utility access (not constructed).
- *Development of the remaining 6,716 single- and multi-family residential units, along with the remaining 40% of the proposed commercial space and public amenities not constructed within the Phase 1 area (not constructed).*

The following components would not be completed under the No Action Alternative.

- Levee breaching and dredging to create an opening for the new Lathrop Landing back bay along the San Joaquin River.
- Installation of group boat docks and/or fishing piers in the San Joaquin River and Old River.
- Earthwork that would alter jurisdictional waters, including the existing pond and drainage ditch internal to Stewart Tract.
- Alterations to expand and upgrade existing federal project levees.
- Incorporation of new setback levees into the federal project levee system.
- Habitat restoration and creation along Paradise Cut, the San Joaquin River, and Old River.
- Earthwork to widen Paradise Cut and breach the old federal project levee.
- Earthwork associated with other flood risk reduction measures along Paradise Cut.
- The Golden Valley Parkway and Paradise Road bridges would be constructed under authority of the City of Lathrop.

2.4 Environmental Commitments

Environmental commitments are measures and practices adopted by a project proponent to reduce or avoid adverse effects that could result from the construction or operation of a project. Environmental commitments usually include *best management practices* (BMPs), which may be mandated by agencies with jurisdictional authority over regulated activities. Many BMPs are industry-specific techniques or procedures, often formalized by industry associations or regulatory

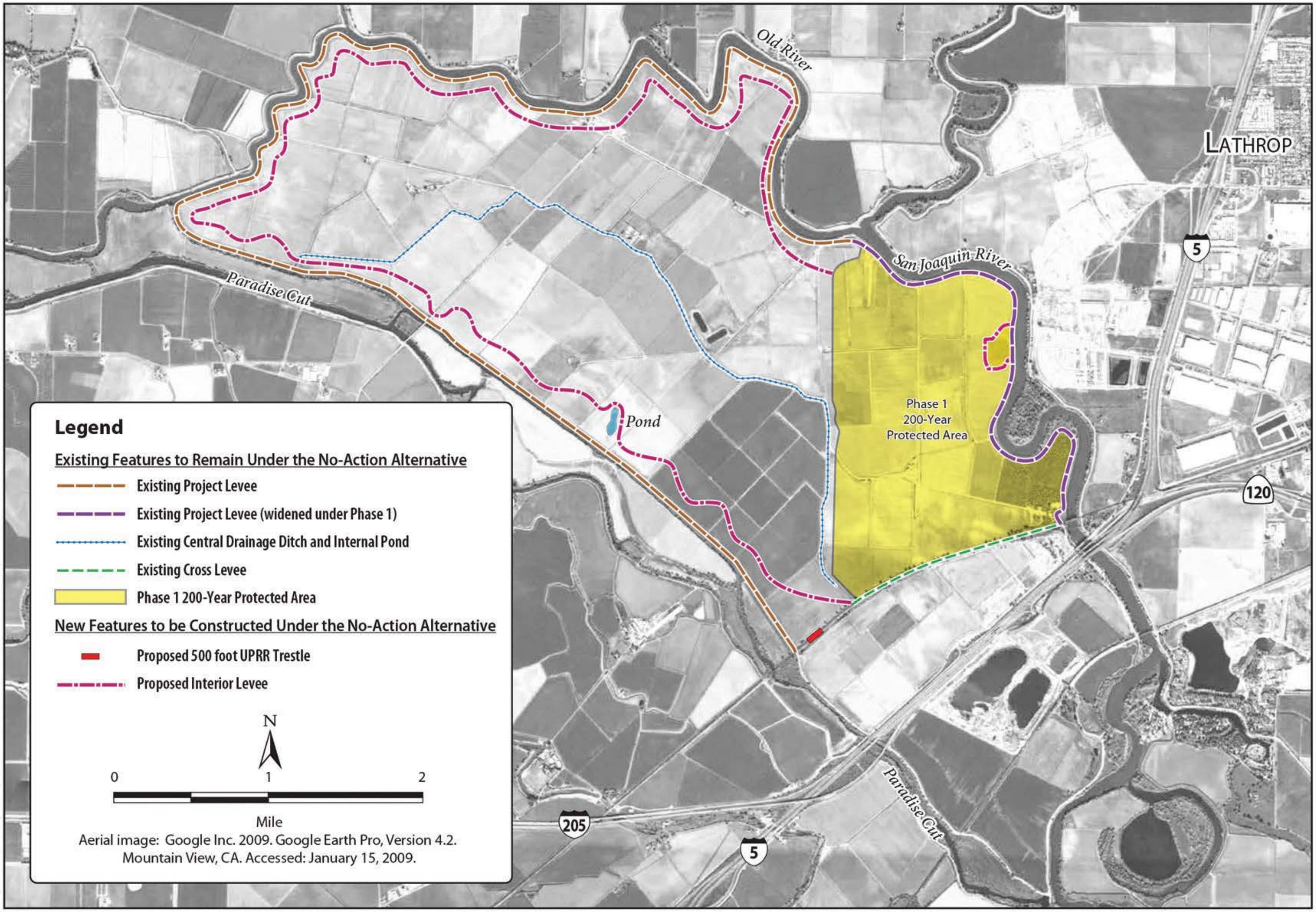

Figure 2-9
Alternative 5—No Action

agencies that establish methods for avoiding particular effects or categories of effect on relevant resource areas. This section describes the environmental commitments and BMPs incorporated into the proposed action.

2.4.1 Construction Measures

2.4.1.1 Measures to Protect Fish and Fish Habitat

Implementation of measures during construction activities would limit the potential for disturbed soils to enter waterways, thereby limiting the potential for long-term increases in fine sediment input that may have adverse effects on aquatic communities through increased sedimentation or turbidity. Construction-related environmental commitments are listed below.

General Construction Activities

- Limit in-water work (including dredging) to approved work windows such as August 1–September 15 (precise dates will be developed in consultation with CDFW, USFWS, and NMFS and will include the stipulation that fishery resource agencies must concur in writing with any extensions for dredging outside the authorized period).
- Construct new waterways in the dry prior to breaching existing levees.
- Prohibit washing of equipment or material in or adjacent to watercourses.
- Install cofferdams to isolate in-stream work areas from the live stream.
- Maintain a qualified fish biologist onsite during cofferdam installation and dewatering to remove fish from the cofferdam area.
- Minimize the amount of overwater structures, and design docks and other marina structures, where practicable, to maximize the amount of light penetration.
- Plant SRA cover vegetation where feasible and outside the vegetation-free zone, and install biotechnical features such as brush piles, logs, and rootwads to replace habitat affected by marina construction and to compensate for potential effects associated with increased predation around floating docks.

Dredging-Related Activities

- Install silt curtains around dredging areas.
- Transfer dredged material to land-based drying ponds, rather than disposing of them in watercourses.
- Prepare a sampling and analysis plan for proposed dredging areas within 1 year of proposed dredging activities. If sampling indicates any layer of toxic materials above applicable standards, contractors will dredge in such a manner that either the subject layer is not disturbed or the entire layer is removed.
- Reduce the volume of material that must be dredged and the frequency of dredging whenever possible.
- Use dredge types and methods that result in the least adverse effect on fish and their habitat (to be determined through consultation and coordination with USFWS, NMFS, and CDFW).

- Monitor turbidity at 100 feet upstream and downstream of the dredge—dredging will immediately cease when turbidity levels downstream of the dredge are elevated by more than 10% of ambient turbidity levels (as determined from upstream measurements).
- If a fish kill occurs or fish are observed in distress, immediately cease dredging and notify CDFW and NMFS.
- Minimize ambient light changes caused by nighttime artificial lighting on dredging structures that may alter prey-predator relationships and increase predation risks for special-status species.

2.4.1.2 Measures to Protect Water Quality

Under Section 402 of the CWA and the National Pollutant Discharge Elimination System (NPDES) permitting process, all construction projects that disturb more than 1 acre of land are required to prepare and implement a Stormwater Pollution Prevention Plan (SWPPP), pronounced "swip." This requirement will apply to most projects under the proposed action because of the extent of the proposed construction. To meet this requirement, the project applicant or construction contractor will prepare a SWPPP for the project and include it in project plans and specifications. The construction contractor will then be required to post a copy of the SWPPP at the project site, file a notice of intent to discharge stormwater with the Central Valley Regional Water Quality Control Board (Central Valley Water Board), and implement all measures required by the SWPPP. The City will be responsible for monitoring to ensure that the provisions of the SWPPP are effectively enforced. In the event of noncompliance, the City will be responsible for shutting down the construction site until it is brought into compliance with the SWPPP.

SWPPPs typically include the following types of information and stipulations.

- A description of site characteristics, including runoff and drainage characteristics and soil erosion hazard.
- A description of proposed construction procedures and construction-site housekeeping practices, including prohibitions on discharging or washing any of the following materials into streets, shoulder areas, inlets, catch basins gutters, natural or modified drainages, or agricultural drainages: concrete, solvents and adhesives, thinners, paints, fuels, sawdust, dirt, gasoline, asphalt and concrete saw slurry, and chlorinated water.
- A description of measures that will be implemented for erosion and sediment control, including the requirements listed below.
    - Conduct major construction activities involving excavation and dredged material haulage during the dry season, to the extent possible.
    - Conduct all construction work in accordance with site-specific construction plans that minimize the potential for increased sediment inputs to storm drains and surface waters.
    - Grade and stabilize dredged material sites to minimize erosion and sediment input to surface waters and generation of airborne particulate matter (see *Measures to Protect Air Quality* below).
    - Implement erosion control measures as appropriate to prevent sediment from entering the storm drains and surface waters to the extent feasible, including the use of silt fencing or fiber rolls to trap sediments and erosion control blankets on exposed slopes.

- A Spill Prevention and Response Plan that identifies the hazardous materials to be used during construction; describes measures to prevent, control, and minimize the spillage of hazardous substances; describes transport, storage, and disposal procedures for these substances; and outlines procedures to be followed in case of a spill of a hazardous material. The Spill Prevention and Response Plan will require that hazardous and potentially hazardous substances stored onsite be kept in securely closed containers located away from drainage courses, storm drains, and areas where stormwater is allowed to infiltrate. It will also stipulate procedures, such as the use of spill containment pans, to minimize hazard during onsite fueling and servicing of construction equipment. Finally, the Spill Prevention and Response Plan will require that adjacent land uses be notified immediately of any substantial spill or release.
- A stipulation that construction will be monitored to ensure that contractors are adhering to all provisions relevant to state and federal stormwater discharge requirements, and that the site will be shut down in the event of noncompliance.

Some portions of the project may qualify as Small Linear Underground/Overhead Projects (Small LUPs). Small LUPs that disturb at least 1 acre but less than 5 acres (including trenching and staging areas) may be covered by the Statewide General Permit for Storm Water Discharges Associated with Construction Activity from Small Linear Underground/Overhead Projects (Small LUP General Permit) in place of the general construction permitting process described above. (Note that linear projects disturbing 5 or more acres of land must obtain coverage under the Construction General Permit described in the preceding section.) Application and permitting requirements for Small LUPs vary somewhat depending on the nature of the project, but do include completion of a SWPPP, as described in the preceding section.

For any activities that do not require a SWPPP, the proponent will ensure that similar protective measures are required through the construction documents (plans and specifications).

2.4.2 Long-Term and Operational Measures

2.4.2.1 Measures to Protect Fish and Fish Habitat

- To eliminate potential stranding of fish in Paradise Cut, fill any large expanses of low-lying areas while conducting activities to increase the flood conveyance and storage capacity in Paradise Cut to reduce the potential for standing water to pond following overtopping of Paradise weir.
- Monitor the Paradise Cut floodway following flood events that result in overtopping of Paradise weir to identify where areas have scoured, posing a stranding risk to fish. If monitoring indicates that fish stranding has occurred, River Islands will use appropriate methods (e.g., seining, electrofishing) as soon as possible following isolation of the water body to remove stranded fish. Rescued fish will be released to the nearest main channel area. Qualified fish biologists will conduct monitoring and fish rescue operations. To reduce the potential for further fish stranding, use appropriate methods (e.g., grading, rock placement) to fill in new scour holes to reduce their potential to strand fish in the future. Scour areas and depressions that are identified as potential stranding sites will be filled that year before the beginning of the next winter season.
- Implement a fisheries monitoring plan (Rich 2009).
- Screen the remaining agricultural diversions following current CDFW and NMFS screening guidelines.

- To protect riverbanks and docks and promote navigational safety around docks, at the entrance to Lathrop Landing, and at existing and planned bridge sites, the following areas will be subject to a 5-mph "no wake" zone speed limit.
  - All portions of Old River that border the RID Area.
  - All portions of San Joaquin River that border the RID Area.
  - Paradise Cut Canal.
- To reduce the risk of introduction of petrochemical pollutants into area waterways, no refueling stations will be included as part of the Lathrop Landing back bay facilities or in association with facilities along the Paradise Cut Canal.

2.4.2.2 Measures for Energy Conservation

As part of the overall energy strategy for the project, the project applicant will work to identify economically feasible alternative energy solutions, such as nonpolluting renewable energy sources and load-shifting technologies intended to reduce peak demand.

Energy Efficiency Standards

The Energy Efficiency Standards for Residential and Nonresidential Buildings, as specified in CCR Title 24, Part 6, were established in 1978 in response to a legislative mandate to reduce California's energy consumption. The standards are updated periodically to allow consideration and possible incorporation of new energy efficiency technologies and methods. The most recently updated version of the standards was adopted on April 23, 2008, and went into effect August 1, 2009.

Compliance with these standards is mandatory at the time new building permits are issued by city and county governments. River Islands would be required to adhere to these standards pertaining to lighting, roofing, and HVAC requirements. These standards promote cost-effective means to reduce energy use for new development relative to business-as-usual-conditions. California's building efficiency standards (including standards for energy-efficient appliances) have saved more than $56 billion in electricity and natural gas costs since 1978 (California Energy Commission 2007). It is estimated that an additional $23 billion will be saved by 2013.

In addition, amendments to Title 24 called the "Green Building" standards are currently in the rulemaking process. These largely voluntary standards would encourage building techniques that would substantially reduce energy consumption and water use below Title 24 standards.

River Islands Architectural Guidelines

According to the *Residential Design Guidelines and Development Standards of River Islands at Lathrop* (DG/DS), all buildings within River Islands at Lathrop are required to incorporate energy conservation design. Some methods that should be considered are listed below.

- Passive solar design, such as thermal masses to absorb winter sun energy and roof overhangs and carefully placed deciduous trees to provide summer shade.
- Active solar design, such as solar collectors to heat water or photovoltaic cells to generate electricity.
- Energy-efficient mechanical equipment for heating and cooling, such as heat pumps.

- Extra thermal insulation in roofs and walls to control heat gain and loss.
- Operable windows in commercial buildings.
- Home integrated systems—wireless PC-based systems that allow homeowners to program appliances to restrict usage during peak energy periods.
- Load-shifting technologies, such as thermal energy storage for residential and commercial use that moves the operation of air conditioning compressors for on-peak operation to off-peak hours.
- Thermal rated glazing, including reflective coatings to reduce heat load in the summer.
- Use of Energy Star–rated appliances.
- District heating and cooling, where feasible and economical, to medium- and high-density residential areas, the Town Center, and Employment Center.
- Distributed generation facilities, including fuel cells, wind technology, photovoltaics, provided such facilities are consistent with other requirements of the DG/DS, Specific Plan, and other regulations.
- Geothermal heat pumps used to heat and cool multiple homes in an area where such facilities are feasible and economical. Use of the central lake for such facilities is permitted in River Islands at Lathrop. Use of water from the San Joaquin River System may be subject to additional environmental review, but is permitted within the River Islands at Lathrop development, subject to the DG/DS, Specific Plan, and other regulations.

2.4.3 Measures to Protect Habitat Areas

To protect restored and preserved habit in the PCC and PCIP Areas from trespass-related disturbance, River Islands has committed to implementing the following measures (Sycamore Environmental Consultants 2003; Ascent Environmental, Inc. 2011). River Islands would be responsible for identifying an appropriate organization (e.g., River Islands GHAD) to maintain the habitat areas, exclusion measures, and signage.

- Access restrictions.
  - Access to restored and preserved habitat will be restricted, and informational signage will be installed to identify the area as sensitive habitat and provide information on key species, including riparian brush rabbit.
  - Group boat docks in the Paradise Cut Canal will be situated away from the revegetated levee remnants.
  - No boat docks will be located south of Paradise Road, and no pedestrian or vehicle access will be provided from Paradise Road to the Paradise Cut area.
  - Riverbanks will be graded to steep slopes that discourage boat landings and will be planted with native riparian species, where appropriate (i.e., outside the vegetation-free zone), that create dense and/or thorny growth to discourage human incursions.
  - Visitors to the proposed recreation areas will be required to obtain permits (e.g., day use permits) and will be restricted to designated areas. Restrictions will also apply to kayakers,

canoeists, and those using similar watercraft that could access the smaller waterways in the PCC Area.

- A fence, wall, or other appropriate barrier will be constructed along the cross levee to exclude human and domestic animal access from the cross levee alignment and UPRR ROW. The barrier will be designed to prevent cats from crossing from the developed portion of River Islands at Lathrop into this area. A similar barrier will be installed where the Employment Center borders dry land in Paradise Cut. Commercially available fences have been shown to effectively exclude multiple species—including cats and dogs—from entering areas of conservation value. The barrier will be designed for aesthetic consistency with the *River Islands Urban Design Concept* and with its natural surroundings.

  Where development borders the Paradise Cut Canal or other water features, the water feature would function as a natural barrier to animal movement between developed and natural areas, especially for cats. In these areas, the primary constraint against incursion by dogs would be enforcement of the City's Municipal Code, which further restricts access by domestic animals, prohibiting dog owners or caretakers from allowing dogs to run freely on any public property or private property in the absence of the property owner's consent (Code 6.12.050).

- Education and public outreach.
  - River Islands will develop and distribute informational brochures that explain River Islands at Lathrop's unique biological setting, the federal and state permits that were needed before development could proceed, and the agreements that River Islands has made with the regulatory agencies.
  - Informational material will specifically address riparian brush rabbits and their habitat in Paradise Cut. It will explain the species' biology, habitat, endangered status, and threats; and will clarify that dogs and cats are not allowed to enter Paradise Cut, and that any activities that may adversely affect riparian brush rabbit or its habitat are prohibited.
  - These materials will be included in the real estate disclosure package provided to purchasers, and may also be made available separately.
- Predator management.
  - River Islands will conduct a trapping program twice each year throughout the PCC Area to remove black rats (*Rattus rattus*) and feral and domestic animals from Paradise Cut.
  - No trapping will occur during the riparian brush rabbit breeding season (December to May).
  - All captured black rats will be humanely euthanized.
  - If captured cats or dogs have tags or microchips with owner contact information, the owners will be notified. Cats and dogs not recovered promptly (within approximately 1 hour) by their owners, and those without tags or microchips, will be turned over to City of Lathrop Animal Services (for the area of Paradise Cut within city limits) or San Joaquin County Animal Control (for the area of Paradise Cut outside city limits). If a cat or dog has no identification and/or is captured twice by the trapping program, it would be surrendered to the appropriate animal control agency for resolution.

2.5 References

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Chapter 3
Terrestrial Biological Resources

This chapter analyzes the proposed action's potential effects on terrestrial biological resources in the proposed action area**.** For the purposes of this chapter, *terrestrial biological resources* comprise vegetation, wildlife, and waters of the United States (including wetlands). Project-related effects are discussed separately for each of these resource areas. Related discussions are found in Chapter 4, *Fish Resources*, Chapter 6, *Water Resources and Flood Risk Management*, and Chapter 21, *Cumulative Effects*.

The key sources of data listed below were used in the preparation of this chapter.

- *Comprehensive General Plan for the City of Lathrop, California* (2004).
- *West Lathrop Specific Plan* (City of Lathrop 2003).
- *Draft Subsequent Environmental Impact Report for the River Islands at Lathrop Project* (City of Lathrop 2002).
- *South Delta Improvements Program Environmental Impact Statement/Environmental Impact Report*. (California Department of Water Resources 2005).
- USFWS endangered and threatened species database (U.S. Fish and Wildlife Service 2010).
- CDFW's California Natural Diversity Database (CNDDB) (2010).
- California Native Plant Society (CNPS) Online Inventory (California Native Plant Society 2009).
- *San Joaquin County Multi-Species Habitat Conservation and Open Space Plan* (SJMSCP) (San Joaquin County 2000).
- *Draft Recovery Plan for the Giant Garter Snake* (U.S. Fish and Wildlife Service 1999).
- *Recovery Plan for the Upland Species of the San Joaquin Valley, California* (U.S. Fish and Wildlife Service 1998).
- *Draft Environmental Impact Report: West Lathrop Specific Plan* (City of Lathrop 1995).
- *Verified Revised Jurisdictional Wetlands Delineation Report for the River Islands at Lathrop Project* (Sycamore Environmental Consultants Inc. 2004a).
- *USFWS Biological Assessment for the River Islands at Lathrop Project* (EDAW 2005).
- *United States Fish and Wildlife Service Biological Assessment for the River Islands at Lathrop Project* (Ascent Environmental, Inc. 2011).
- *Draft Environmental Impact Report North Delta Flood Control and Ecosystem Restoration Project*. (Jones & Stokes Associates 2006).
- Data gathered during reconnaissance-level survey conducted by ICF biologists on February 26, 2009, to verify accuracy of the habitat evaluations prepared for the River Islands Draft SEIR.

Specific reference information is provided in the text.

3.1 Affected Environment

3.1.1 Regulatory Framework

3.1.1.1 Federal

The federal Endangered Species Act of 1973 (16 USC Sec. 1531 et seq.) (ESA), the Migratory Bird Treaty Act (16 USC Sec. 703–712 et seq.) (MBTA), and the Bald and Golden Eagle Protection Act (16 USC Sec. 668 et seq.) are the principal federal laws relevant to biological resources in the action area. The federal Clean Water Act (CWA), which regulates effects on wetlands, is discussed in Chapter 6, *Water Resources and Flood Risk Management*.

Endangered Species Act

ESA protects plant, fish, and wildlife species that are listed as threatened or endangered, and their habitats. *Endangered* refers to species, subspecies, or distinct population segments that are in danger of extinction in all or a significant portion of their range. *Threatened* refers to species, subspecies, or distinct population segments that are considered likely to become endangered in the future. ESA is administered by USFWS for terrestrial and freshwater species and by NMFS for marine species and anadromous fishes.

ESA prohibits "take" of any fish or wildlife species listed by the federal government as endangered or threatened. *Take* is defined as harassment, harm, pursuit, hunting, shooting, wounding, killing, trapping, capture, or collection, or the attempt to engage in any such conduct. ESA also prohibits removing, digging up, cutting, or maliciously damaging or destroying federally listed plants on sites under federal jurisdiction. River Islands will seek take authorization through consultation under ESA Section 7 for riparian brush rabbit and giant garter snake. Although both species are "covered species" under the SJMSCP, they are not covered for take (San Joaquin County 2000). Therefore, a biological opinion (BO) would be required to cover actions that would result in take of these two species.

Migratory Bird Treaty Act

The MBTA enacted the provisions of treaties between the United States, Great Britain, Mexico, Japan, and the Soviet Union, and authorizes the U.S. Secretary of the Interior to protect and regulate take of migratory birds. The MBTA is administered by USFWS. It renders taking, possession, import, export, transport, sale, purchase, and barter of migratory birds, their occupied nests, and their eggs illegal except where authorized under the terms of a valid Federal permit. Activities for which permits may be issued include scientific collecting; falconry and raptor propagation; "special purposes," which include rehabilitation, education, migratory game bird propagation, and miscellaneous other activities; control of depredating birds; taxidermy; and waterfowl sale and disposal.

More than 800 species of birds are protected under the MBTA. Specific definitions of *migratory bird* are discussed in each of the international treaties; in general, however, species protected under the MBTA are those that migrate to complete different stages of their life history or to take advantage of different habitat opportunities during different seasons. Examples of migratory bird species that are addressed in this document are yellow warbler (*Dendroica petechia*), white-tailed kite (*Elanus leucurus*), and northern harrier (*Circus cyaneus*).

Bald and Golden Eagle Protection Act

The federal Bald and Golden Eagle Protection Act makes it unlawful to import, export, take, sell, purchase, or barter any bald eagle or golden eagle, or their parts, products, nests, or eggs. *Take* includes pursuing, shooting, poisoning, wounding, killing, capturing, trapping, collecting, molesting, or disturbance. Exceptions may be granted by USFWS for scientific or exhibition use, or for traditional and cultural use by Native Americans. However, no permits may be issued for import, export, or commercial activities involving eagles.

U.S. Army Corps of Engineers Levee Vegetation Guidelines

As stated in Chapter 2, *Proposed Action and Alternatives*, the Corps' levee vegetation guidelines must be implemented on existing federal project levees and future levees for which the Corps would have "responsibility for design, operation, maintenance, inspection, or certification" (ETL 1110-2-583 30 April 2014). Under the Corps' levee vegetation guidelines, no vegetation other than perennial grasses is permitted within 15 feet of either the waterside toe or landside toe of the federal project levee unless a variance (i.e., exemption) is obtained from the Corps.

3.1.1.2 State

The principal state authorities regulating biological resources are the California Endangered Species Act (CESA), the California Fish and Game Code (CFGC), the California Native Plant Protection Act of 1977 (CNPPA), and the Porter-Cologne Water Quality Control Act.

California Endangered Species Act

CESA protects wildlife and plants listed as *threatened* and *endangered* by the California Fish and Game Commission, as well as species identified as candidates for such listing. It is administered by CDFW. CESA requires state agencies to conserve threatened and endangered species (Section 2055) and thus restricts all persons from taking listed species except under certain circumstances. CESA defines *take* as any action or attempt to "hunt, pursue, catch, capture, or kill." Under certain circumstances, CDFW may authorize limited take, except for species designated as *fully protected* (see *California Fish and Game Code* below). The requirements for an application for an incidental take permit under CESA are described in Section 2081 of the California Fish and Game Code and in final adopted regulations for implementing Sections 2080 and 2081.

California Fish and Game Code

Several sections of the CFGC apply to the proposed action; these are described below.

Section 1602: Streambed Alteration Agreements

Under CFGC 1602, both private entities and public agencies are required to notify CDFW before undertaking any project that would divert, obstruct, or change the natural flow, bed, channel, or bank of any river, stream, or lake. Preliminary notification and project review generally occur during the environmental process. When an existing fish or wildlife resource may be substantially adversely affected, CDFW is required to propose reasonable project changes to protect the resources. These modifications are formalized in a streambed alteration agreement (SAA) that becomes part of the plans, specifications, and bid documents for the project.

Sections 3503 and 3503.5: Birds and Raptors

CFGC Section 3503 prohibits destruction of bird nests. Section 3503.5 prohibits killing of raptor species and destruction of raptor nests. Trees and shrubs may be present in and adjacent to the study area and could provide potential nesting habitat for birds and raptors.

Section 3511: Fully Protected Birds

The CFGC provides protection from take for a variety of species, referred to as *fully protected species*. Section 3511 lists fully protected birds and prohibits take of these species. (No fully protected mammals, reptiles, or amphibians occur in the proposed action area). The code defines *take* as "to hunt, pursue, catch, capture, or kill or attempt to hunt, pursue, catch, capture, or kill." Except for take related to scientific research, all take of fully protected species is prohibited.

Section 3513: Migratory Birds

CFGC 3513 prohibits the take or possession of any migratory non-game bird as designated under the MBTA or any part of such migratory non-game bird, except as provided by rules and regulations adopted by the Secretary of the Interior under provisions of the MBTA.

California Native Plant Protection Act

The CNPPA was enacted to preserve, protect, and enhance rare and endangered plants in California. It specifically prohibits the importation, take, possession, or sale of any native plant designated by the California Fish and Game Commission as rare or endangered, except under specific circumstances identified in the act. Various activities are exempt from CNPPA, although take as a result of these activities may require other authorization from CDFW under the CFGC.

Porter-Cologne Water Quality Control Act

California Water Code Section 13260 requires "any person discharging waste, or proposing to discharge waste, in any region that could affect the waters of the state to file a report of discharge (an application for waste discharge requirements)." Under the Porter-Cologne Act definition, waters of the state are "any surface water or groundwater, including saline waters, within the boundaries of the state." Although all waters of the United States that are within the borders of California are also waters of the state, the reverse is not true. California retains authority to regulate discharges of waste into any waters of the state, regardless of whether the Corps has concurrent jurisdiction under Section 404 of the CWA. If the Corps determines that a wetland is not subject to regulation under Section 404, Section 401 of the CWA water quality certification is not required. However, Regional Water Quality Control Boards (RWQCBs) may impose waste discharge requirements (WDRs) if fill material is placed into waters of the state.

3.1.1.3 Local

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

The SJMSCP provides a strategy for balancing the need to conserve open space with the need to develop open space, while providing for the long-term management of nearly 100 plant, fish, and wildlife species—especially those that are listed or may become listed under ESA or CESA. The SJMSCP was developed to avoid, minimize, and mitigate effects on plant and wildlife habitat that would result from the conversion up to 109,302 acres of open space land to non–open space uses, projected to occur in San Joaquin County between 2001 and 2051 (San Joaquin County 2000).

Permittees—or Plan Participants—covered under the SJMSCP comprise local jurisdictions, utilities, water agencies, the California Department of Transportation (Caltrans), SJCOG, and the San Joaquin Area Flood Control Agency. The plan is administered by a Joint Powers Authority (JPA) consisting of representatives from all the participating jurisdictions, in consultation with a Habitat Technical Advisory Committee (HTAC), consisting of representatives from the Permitting Agencies (USFWS, CDFW, and the Corps), as well as representation from the agricultural community.

The SJMSCP addresses potential effects on approximately 100 special-status plant, fish, and wildlife species in 52 vegetation communities throughout San Joaquin County. As outlined in the plan, projects affecting any of these resources are required to implement mitigation measures to avoid or lessen these effects and to provide compensation through payment of fees (or in-lieu land dedication) for conversion of open space lands. Fees are to be used to fund the purchase of conservation easements on agricultural lands and the preservation and creation of natural habitats to be managed in perpetuity through the establishment of habitat preserves. Participation in the SJMSCP is voluntary. If a project applicant decides to participate in the SJMSCP, specific avoidance, minimization, and compensation requirements apply to the project; the project applicant in turn receives the benefit of more efficient permitting.

Paradise Cut is identified in the SJMSCP as a potential preserve area where conservation easements may be purchased or property may be purchased in fee title to address effects on biological resources located elsewhere in San Joaquin County. Final management of SJMSCP conservation areas is determined by the SJCOG.

The SJMSCP establishes guidelines for the San Joaquin River Wildlife Corridor as reproduced below.

> Development of the San Joaquin River Wildlife Corridor shall be situated to maintain a 1200 foot corridor encompassing 600 feet from the mean high water mark of the San Joaquin River, on both sides of the river, from Stewart Tract to the Stanislaus/San Joaquin County border except as follows:
>
> A. For the area on the west side of the river bordering Stewart Tract, the corridor shall extend west from the river to the top of the levee on the waterside of the levee; and
>
> B. For the area on the east side of the river bordering lands in the Lathrop and Manteca planned land use areas …, the final setbacks shall be established after the completion of surveys for the riparian brush rabbit.

Participation in the SJMSCP is voluntary for local jurisdictions and project proponents. The City of Lathrop adopted the SJMSCP in January 2001. USFWS issued a Section 10(a)(1)(B) permit to the City in 2002. This Section 10 permit also constitutes a special purpose permit for MBTA-covered species. CDFW issued a Section 2081 permit to the City in 2002.

West Lathrop Specific Plan Habitat Management Plan for Swainson's Hawk

The West Lathrop Specific Plan (WLSP) *Habitat Management Plan and Section 2081 Management Agreement for Swainson's Hawk* (HMP) was developed to minimize and compensate for effects on Swainson's hawk (*Buteo swainsoni*) from implementation of the WLSP (Sycamore Environmental Consultants 1995). The document was developed for use by the City in negotiating with CDFW for CESA Section 2081 permitting that would authorize the City, in cooperation with Stewart Tract applicants, to manage Swainson's hawk in conjunction with development under the WLSP (Sycamore Environmental Consultants 1995).

HMP mitigation measures include preservation of foraging habitat at a 0.5-to-1 (0.5:1) preservation-to-effect ratio, preconstruction nest surveys, and establishment of buffer areas around active nests. The SJMSCP was complete when the HMP was authorized. It is anticipated that either the SJMSCP or the HMP could be used to mitigate effects on Swainson's hawk in the proposed action area.

The HMP identifies the entirety of Paradise Cut, totaling 900 acres, for preservation. A total of 538 acres of existing nesting and foraging habitat is to be preserved and managed for the benefit of Swainson's hawk. Another 242 acres of walnut orchards in Paradise Cut will eventually be converted to suitable foraging habitat, and 120 acres of jurisdictional riverine wetlands in Paradise Cut are identified as unsuitable for foraging habitat but will also be preserved as Resource, Conservation, and Open Space Lands in accordance with the WLSP (Sycamore Environmental Consultants 1995).

San Joaquin County Tree Ordinance

The County's natural resources regulations contain provisions to preserve the County's tree resources (Chapter 9-1505). The removal of a native oak, heritage oak, or historical trees requires an approved improvement plan application (Chapter 9-1505.3), which requires replacement of the tree subject to requirements described in the ordinance (Chapter 9-1505.4). Native oaks, heritage oaks, and historical trees covered by the San Joaquin County Tree Ordinance are defined as follows (all stem diameters are measured 4.5 feet above the average ground elevation of the tree).

- Native Oaks
  - Valley oaks (*Quercus lobata*) with stem diameters of 6–32 inches for single-trunk trees and a minimum combined trunk diameter of 8 inches for multi-trunk trees.
  - Interior live oaks (*Quercus wislizeni*) or blue oaks (*Q. douglassi*) with stem diameters of 4–32 inches for single-trunk trees and a minimum combined diameter of 6 inches for multi-trunk trees.
- Heritage oaks
  - Native oaks with a single-trunk diameter of 32 inches or more.
- Historical trees
  - Any trees or groups of trees given special recognition by the County Planning Commission because of size, age, location, or history.

These provisions do not cover horticultural or orchard trees that could be removed as part of proposed projects.

3.1.2 Existing Conditions

3.1.2.1 Methods Used to Identify Existing Conditions

The study area considered for existing conditions for terrestrial biological resources encompasses all areas that would be directly or indirectly affected by all components of the proposed action (i.e., the flood risk management, private development, and recreational components). Information on the existing conditions at the site was obtained largely from the sources listed at the beginning of this chapter, supplemented by reviews of aerial photographs. A reconnaissance-level survey was conducted by ICF biologists on February 26, 2009, to verify that the habitat evaluations prepared for the Draft SEIR (City of Lathrop 2002) and biological assessment (BA) (EDAW 2005) were still accurate. This one-day reconnaissance survey entailed a combination of walking and driving the proposed action area. No focused or protocol-level surveys were conducted for the Draft SEIR (City of Lathrop 2002), and none have been conducted for this EIS. However, because River Islands is proposing to obtain coverage under the SJMSCP, focused surveys and habitat assessments would be conducted for all SJMSCP-covered special-status species as part of the JPA's process (San Joaquin County 2000).

3.1.2.2 Methods Used to Identify Vegetation Affected by Corps Levee Vegetation Guidelines

River Islands is proposing to reconstruct and enhance existing federal project levees that currently protect Stewart Tract. The levees are designed to reduce the chance of flooding from the San Joaquin River to the east, Old River to the north, and Paradise Cut to the southwest. Portions of the existing levee system that define the proposed action area are out of compliance with the vegetation guidelines and would be required to adhere to these guidelines as part of the proposed action. While the reclamation district may apply for a vegetation variance, acquisition of such a variance is an uncertainty. Thus, removal of noncompliant vegetation is assumed to be necessary under all action alternatives.

To update the assumptions in the 2005 BA prepared by EDAW, Monk & Associates conducted field assessments in 2010 to determine the amount of riparian vegetation along the Old River portion of the proposed action area (from Paradise Cut to San Joaquin River) within the vegetation-free zone depicted in Figure 2-2. The extent of riparian vegetation in the vegetation-free zone that would be affected by compliance with the Corps' levee vegetation policy is shown in Table 3-2.

To assess the amount of riparian vegetation that could be subject to removal under the ETL along the San Joaquin River upstream of the Old River confluence, a theoretical levee prism was determined using the estimated mean levee crown width of 20 feet, a 3(H):1(V) slope on both the waterside and landside slopes of the levee, and a 15-foot levee height. A 15-foot buffer was applied to the theoretical levee prism to define the entire vegetation-free zone through aerial photo interpretation. This buffer extends outward from the levee toe on the landside and the waterside; however, because existing noncompliant vegetation exists only on the waterside, this effort focused only on determination of effects on waterside vegetation. Riparian vegetation present within the vegetation-free zone is shown in Figure 3-1. Aerial photo interpretation was also used to evaluate planting benches that could be created by setting the levee farther back along Old River (between Paradise Cut and Middle River).

The levee improvements along Paradise Cut mainly involve the creation of an extended setback levee in the RID Area and a conventional setback levee in the PCIP Area. The proposed setback levees would become the new federal project levees. Plantings along the newly created setback project levees would comply with the Corps' levee vegetation guidelines. The existing federal project levees would be breached, and vegetation on the levee remnants (previously federal project levees) would not be removed. Instead, these areas would become upland refugia for riparian brush rabbit. Although some riparian vegetation would be removed through the process of breaching the existing federal project levee, this vegetation would not only be allowed to reestablish, but surface area created by the breach (i.e., slopes perpendicular to the centerline of the existing levee) would support riparian habitat that was previously not extant.

3.1.2.3 Biological Communities

The proposed action area consists predominantly of former and existing agricultural and open space land. The dominant biological communities are agricultural crops and ruderal grassland. In the proposed action area, native vegetation is primarily associated with riparian and wetland communities. A discussion of the existing biological communities in each of the three project-related work areas is provided below. Table 3-1 shows the biological communities that occur in each.

Table 3-1. Biological Communities Present in the Proposed Action Area

	Biological Community						
Component Area	Agricultural Land	Ruderal Grassland	Riparian Forest	Willow Scrub	Freshwater Marsh	Pond	Riverine
RID Area	X	X			X	X	X
PCIP Area				X			X
PCC Area	X	X	X	X	X		X

Agricultural Land

Agricultural land is the dominant community type in the RID and PCC Areas. Crop production on these lands includes tomatoes, melons, grain, and hay. A number of wildlife species have adapted well to agricultural habitats, including Swainson's hawk, long-billed curlew (*Numenius americanus*), western burrowing owl (*Athene cunicularia hypugea*), and sandhill crane (*Grus canadensis*). Row and field crops support small mammals such as Botta's pocket gopher (*Thomomys bottae*), western harvest mouse (*Reithrodontomys megalotis*), and California meadow vole (*Microtus californicus*), which provide an important food source for several raptor species known to occur in the RID Area, including American kestrel (*Falco sparverius*), northern harrier, red-tailed hawk (*Buteo jamaicensis*), and Swainson's hawk.

Ruderal Grassland

Ruderal grasslands are found in the RID and PCC Areas along agricultural field boundaries, fallow fields, roadsides, the UPRR tracks, and on levees banks along the San Joaquin River, Old River, and Paradise Cut. These areas are dominated by nonnative species including Italian thistle (*Carduus pycnocephalus*), yellow star-thistle (*Centaurea solstitialis*), horseweed (*Conyza canadensis*), milk thistle (*Silybum marianum*), Russian thistle (*Salsola tragus*), knotweed (*Polygonum arenastrum*), ripgut brome (*Bromus diandrus*), and foxtail barley (*Hordeum murinum* ssp. *leporinum*) (City of Lathrop 2002).

In addition to wildlife species listed in the description of agricultural land, wildlife species observed or expected to occur in ruderal areas include western fence lizard (*Sceloporus occidentalis*), coyote (*Canis latrans*), raccoon (*Procyon lotor*), gray fox (*Urocyon cinereoargenteus*), and opossum (*Didelphis viginiana*). Vegetation along the UPRR tracks supports a population of riparian brush rabbit, a state- and federally listed endangered species.

Riparian Forest and Scrub

Riparian communities in the proposed action area include riparian forest (mixed riparian forest and Great Valley valley oak riparian forest) and riparian willow scrub. These communities are described

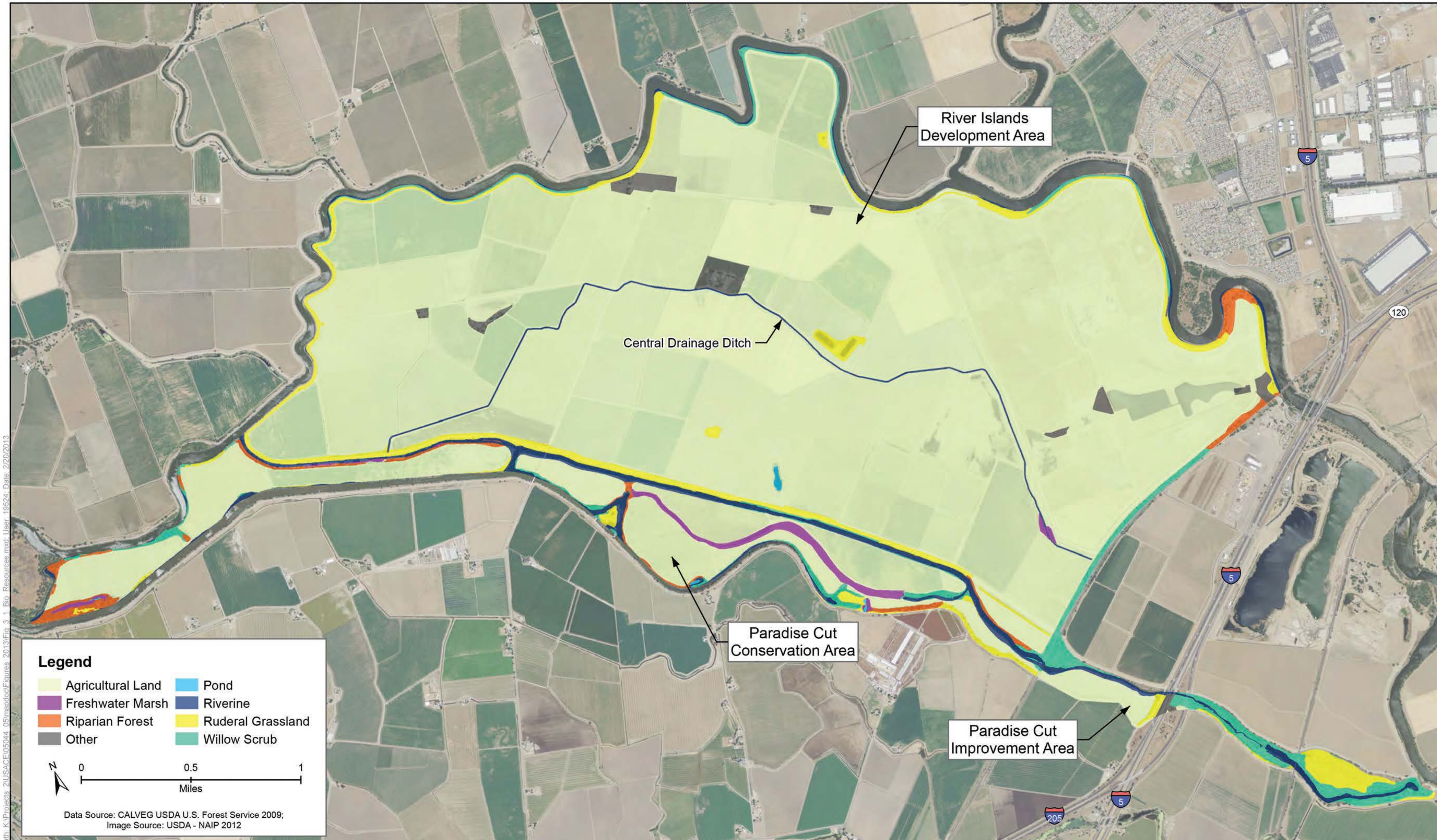

Figure 3-1
River Islands at Lathrop — Biological Communities

below. Table 3-2 summarizes the total amount of riparian vegetation in the entire River Islands at Lathrop project area by location and phase. The proposed action area is confined to Phase 2B; Phases 1 and 2A are included in the table to provide context.

Table 3-2. Riparian Vegetation in the Entire River Islands at Lathrop Project Area

Location	Project Phase	Area (acres)
Paradise Cut Conservation Area	Phase 2B	63.97
Paradise Cut Improvement Project Area	Phase 2B	53.87
River Islands Development Area	Phase 2B	24.34
Phase 2B total		142.18
RID Area (earlier phases)	Phase 1	13.15
	Phase 2A	19.51
Total		174.84
ICF aerial photo analysis.		

Riparian Forest

Riparian forest is found along the banks of the San Joaquin River in the RID Area and in scattered patches along Paradise Cut in the PCC Area. Dominant riparian plant species include valley oak, California black walnut (*Juglans californica* var. *hindsii*), box elder (*Acer negundo*), Gooding's black willow (*Salix gooddingii*), narrow-leaved willow (*Salix exigua*), and Fremont cottonwood (*Populus fremontii*). The understory vegetation is sparse due to regular burning and other vegetation management along the levees (City of Lathrop 2002). Great Valley valley oak riparian forest is present in one location in the proposed action area: a small patch at the northwest point of the PCC Area at the confluence of Old River and Paradise Cut (Figure 3-1). This community type is designated by CDFW as a sensitive natural community (California Natural Diversity Database 2010).

Riparian forest habitats in the proposed action area provide nesting habitat for birds such as black phoebe (*Sayornis nigricans*), western kingbird (*Tyrannus verticalis*), western scrub-jay (*Aphelocoma californica*), oak titmouse (*Baeolophus inornatus*), Bewick's wren (*Thryomanes bewickii*), and spotted towhee (*Pipilo maculates)*. Raptors—Swainson's hawk, red-tailed hawk, white-tailed kite, red-shouldered hawk (*Buteo lineatus*), and great horned owl (*Bubo virginianus*)—may also nest in riparian areas.

Riparian Willow Scrub

Riparian willow scrub occurs in the PCIP and PCC Areas. In the PCC Area, narrow strips of willow scrub border many of the stream channels, and larger patches of willow scrub are scattered throughout the PCIP Area. The dominant species in the willow scrub community is narrow-leaved willow (City of Lathrop 2002). Willow scrub supports many of the same bird species as Great Valley valley oak riparian forest, with the exception of those that require large trees.

Freshwater Marsh and Pond

In the RID Area, freshwater marsh occurs along the edge of a 3-acre pond (Ascent Environmental, Inc. 2011). Dominant plant species include cattail (*Typha latifolia*), Gooding's black willow, narrow-leaved willow, and Fremont cottonwood (City of Lathrop 2002). Freshwater marsh vegetation also colonizes drainage ditches that cross the RID Area. Dominant plant species in the ditches include broad-leaved cattail and bulrush (*Scirpus* sp.). This vegetation is regularly cleared to improve water flow; however, over time the dominant species eventually recolonize the ditches. Patches of freshwater marsh are scattered throughout the PCC Area. Freshwater marshes in this area are dominated by cattail and bulrush.

Wildlife species commonly inhabiting drainage ditches and ponds and adjacent vegetation include marsh wren (*Cistothorus palustris*), song sparrow (*Melospiza melodia*), aquatic garter snake (*Thamnophis atratus*), giant garter snake, western pond turtle (*Actinemys marmorata*) and Pacific tree frog (*Pseudacris regilla*).

Riverine

Riverine habitat in the proposed action area comprises open water portions of the San Joaquin River, Old River, Paradise Cut, and unnamed drainage ditches. Riparian and wetland communities described above occur along some portions of these waterways. A detailed description of the San Joaquin River, Old River, and Paradise Cut riverine systems is provided in Chapter 4, *Fish Resources*.

A variety of invertebrate and vertebrate species occur in drainage ecosystems in the project area. Aquatic invertebrates provide food for fish, birds, amphibians, and reptiles as well as bats. Belted kingfishers (*Megaceryle alcyon*), double-crested cormorants (*Phalacrocorax auritus*), and common mergansers (*Mergus merganser*) forage for fish in streams and ponds. Many amphibians and reptiles depend on riverine systems; these include western toad (*Bufo boreas*), western terrestrial garter snake, and aquatic garter snake. Mammals in riverine systems include northern river otter (*Lontra canadensis*), muskrat (*Ondatra zibethicus*), and American beaver (*Castor canadensis)*. Emerging aquatic insects are a major food source for many bat species that forage over open waters in the proposed action area.

3.1.2.4 Waters of the United States, Including Wetlands

The Corps defines wetlands as areas that are inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions (33 CFR 328.3[b], 40 CFR 230.3). For a wetland to qualify as a jurisdictional aquatic site under Section 404 of the CWA, the site must support a prevalence of hydrophytic vegetation, hydric soils, and wetland hydrology. This determination is made on a project-level site-specific basis.

Unlike the Corps, CDFW has adopted the Cowardin et al. (1979) definition of wetlands:

> Wetlands are transitional lands between terrestrial and aquatic systems where the water table is usually at or near the surface of the land or is covered by shallow water. For purposes of this classification, wetlands must have one or more of the following three attributes: (1) at least periodically, the land supports predominantly hydrophytes (at least 50% of the areal vegetative cover); (2) the substrate is predominantly undrained hydric soil; and (3) the substrate is nonsoil and saturated with water or covered by shallow water at some time during the growing season of each year.

The wetland delineation report prepared for River Islands at Lathrop determined that there are 378.61 acres of waters of the United States in the delineation area: 127.11 acres of wetlands and 251.5 acres of other waters of the United States (Sycamore Environmental Consultants 2004a). The Corps verified the preliminary delineation.

Wetland types in the proposed action area include emergent wetlands (equivalent to freshwater marsh community), forested wetlands, and scrub/shrub wetlands (equivalent to riparian forest and scrub community). These are found predominantly along Paradise Cut in the PCIP and PCC Areas. Additionally, an approximately 5-acre patch of forested wetland occurs along a bend in the San Joaquin River in the RID Area. Other waters of the United States under Corps jurisdiction in the proposed action area are the San Joaquin River, Old River, Paradise Cut, drainage ditches, and the pond.

3.1.2.5 Special-Status Species

For the purpose of this EIS, special-status species include plants, animals, and fish that are legally protected under ESA, CESA, or other regulations, as well as species considered sufficiently rare by the scientific community to qualify for such listing. Special-status species are defined as species meeting any of the criteria listed below.

- Species listed or proposed for listing as threatened or endangered under ESA (50 CFR 17.12 [listed plants]; 50 CFR 17.11 [listed animals]; various notices in the Federal Register [FR] [proposed species]).
- Species that are candidates for possible future listing as threatened or endangered under ESA (FR 75176, December 10, 2008).
- Species listed or proposed for listing by the State of California as threatened or endangered under CESA (14 California Code of Regulations [CCR] 670.5).
- Species that meet the definitions of rare or endangered under CEQA (State CEQA Guidelines Section 15380).
- Plants listed as rare under the CNPPA (CFGC Section 1900 et seq.).
- Plants considered by CNPS (2010) to be “rare, threatened, or endangered in California” (Lists 1B and 2).
- Plants listed by CNPS (2010) as plants about which more information is needed to determine their status and plants of limited distribution (Lists 3 and 4), which may be included as special-status species on the basis of local significance or recent biological information.
- Animal species of special concern to CDFW, as identified and defined in the Special Animals List (California Department of Fish and Game 2012).
- Animals fully protected in California (CFGC Sections 3511 [birds], 4700 [mammals], and 5050 [amphibians and reptiles]).
- Bat species identified as at risk by the Western Bat Working Group.

Special-Status Plants

A review of the special-status species databases resulted in 32 special-status plant species known or suspected to occur within 10 miles of River Islands at Lathrop (Table B-1 in Appendix B provides information on these special-status plants). Nine of these species were considered likely to occur in the proposed action area based on the presence of suitable habitat conditions (Table 3-3). However, none of these plants are federally listed. Reconnaissance-level surveys conducted by an ICF botanist on February 26, 2009, confirmed the presence of suitable habitat in the proposed action area for the nine non–federally listed species (Table 3-3).

The special-status plant species listed in Table 3-3 occur in aquatic habitats associated with riverine, pond, riparian forest, and freshwater marsh communities. Potentially suitable habitat for these species in the RID Area is restricted to the edges of the San Joaquin River, drainage ditches, and the pond. Although the drainage ditches are regularly cleared of vegetation, patches of cattails and bulrush persist in some locations that could also support special-status plants. Old River does not provide suitable habitat, because it generally lacks wetland vegetation and riparian vegetation is limited to a few scattered shrubs. Potentially suitable habitat in the PCIP and PCC Areas is present in the channels of Paradise Cut.

Slough thistle, Wright's trichocoronis, and Delta-button celery have been recorded within 1 mile of the RID Area (Figure 3-2). The slough thistle occurrence is from 1933, and no plants were observed when the location was revisited in 1974. The Wright's trichocoronis occurrence is from 1914, but the site has not been resurveyed. The Delta button-celery occurrence is from 1974, but the area was resurveyed in 1984 and the habitat had been destroyed; this species is considered by CNPS and CDFW to be extirpated in San Joaquin County.

Botanical surveys for special-status plants were not conducted for this EIS. Protocol-level botanical surveys were conducted in support of the WLSP EIR (City of Lathrop 1995); however, those surveys covered only a portion of the proposed action area and were conducted 15 years prior to this EIS. For these reasons, special-status plants cannot be assumed to be absent in the proposed action area until surveys have been conducted in areas identified as supporting suitable habitat.

As stated previously, because River Islands is proposing to obtain coverage under the SJMSCP, focused surveys and habitat assessments would be conducted for all SJMSCP-covered special-status plants as part of the Joint Powers Authority's process. All the plants listed in Table 3-3 are covered species under the SJMSCP.

Table 3-3. Special-Status Plants Potentially Occurring in the Proposed Action Area

Species	Status[a] State/CNPS	California Distribution	Habitat	Blooming Period	Elevation (meters)
Cirsium crassicaule Slough thistle	–/1B.1	San Joaquin Valley: San Joaquin, Kings, and Kern Counties	Chenopod scrub, riparian scrub, sloughs in swamps and marshes	May–Aug	3–100
Eryngium racemosum Delta button-celery	E/1B.1	San Joaquin River Delta, floodplains, and adjacent Sierra Nevada foothills: Calaveras, Contra Costa, Merced, San Joaquin,* and Stanislaus Counties	Riparian scrub in seasonally inundated depressions on clay soils	Jun–Sep	3–30
Hibiscus lasiocarpus Rose mallow (California hibiscus)	–/2.2	Scattered locations in the Central and southern Sacramento Valley from Butte to San Joaquin Counties	Freshwater marshes along rivers and sloughs	Jun–Sep	Below 120
Lathyrus jepsonii var. *jepsonii* Delta tule pea	–/1B.2	San Francisco Bay region; part of Central Valley in Alameda, Contra Costa, Napa, Santa Clara,* San Joaquin, Solano, and Sonoma Counties	Coastal and estuarine marshes (freshwater and brackish)	May–Sep	Below 4

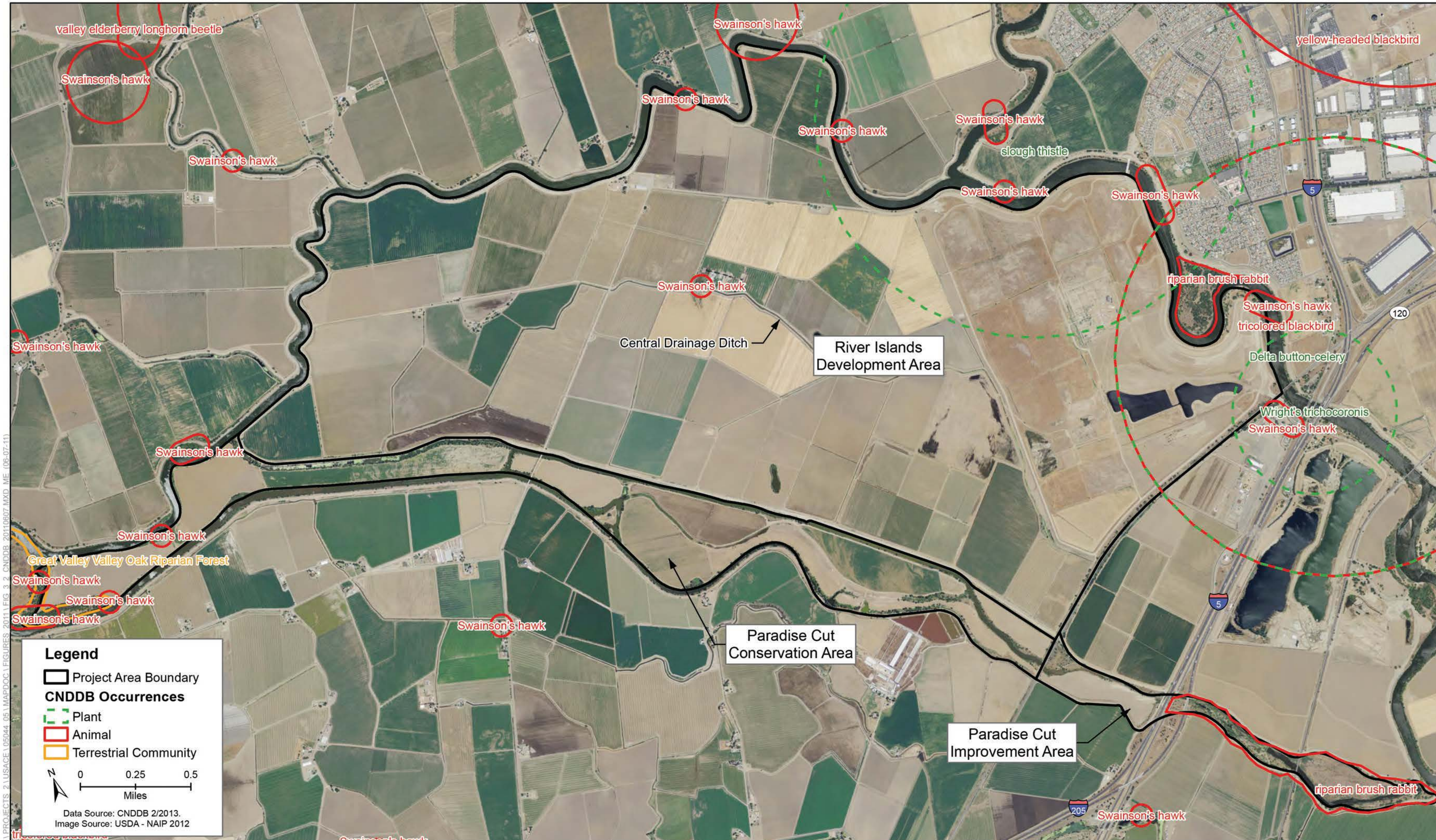

Figure 3-2
River Islands at Lathrop — California Natural Diversity Database Occurrences

Species	Status[a] State/CNPS	California Distribution	Habitat	Blooming Period	Elevation (meters)
Lilaeopsis masonii Mason's lilaeopsis	R/1B.1	Southern Sacramento Valley; Sacramento–San Joaquin River Delta; northeast San Francisco Bay area in Alameda, Contra Costa, Marin, Napa, Sacramento, San Joaquin, and Solano Counties	Freshwater or brackish marsh, riparian scrub, in tidal zone	Apr–Nov	In tidal zone
Limosella subulata Delta mudwort	–/2.1	Deltaic Central Valley: Contra Costa, Sacramento, San Joaquin, and Solano Counties; Oregon	Muddy or sandy intertidal flats and marshes, streambanks in riparian scrub generally at sea level	May–Aug	Generally at sea level
Sagittaria sanfordii Sanford's arrowhead	–/1B.2	Scattered locations in Central Valley and Coast Ranges	Freshwater marshes, sloughs, canals, and other slow-moving water habitats	May–Oct	Below 610
Symphyotrichum lentum (formerly *A. lentus*) Suisun Marsh aster	–/1B.2	Sacramento–San Joaquin Delta, Suisun Marsh, Suisun Bay: Contra Costa, Napa, Sacramento, San Joaquin, and Solano Counties	Brackish and freshwater marshes and swamps	May–Nov	Below 3
Trichocoronis wrightii var. *wrightii* Wright's trichocoronis	–/2.1	Scattered locations in the Central Valley and southern coast; Texas	On alkaline soils in floodplains, meadows and seeps, marshes and swamps, riparian forest, vernal pools	May–Sep	5–435

Source: Calflora 2008; California Native Plant Society 2009; California Natural Diversity Database 2013.

[a] Status:

State Listing Categories

E = Listed as endangered under CESA.

R = Listed as rare under the California Native Plant Protection Act. This category is no longer used for newly listed plants, but some plants previously listed as rare retain this designation.

– = No listing status.

California Native Plant Society (CNPS) Categories

1B = List 1B species: rare, threatened, or endangered in California and elsewhere.

2 = List 2 species: rare, threatened, or endangered in California but more common elsewhere.

3 = List 3 species: plants for which we need more information—Review list.

4 = List 3 species: plants of limited distribution—Watch list.

Threat Code extensions

.1 = Seriously threatened in California (over 80% of occurrences threatened; high degree and immediacy of threat).

.2 = Fairly threatened in California (20-80% of occurrences threatened; moderate degree and immediacy of threat).

* = Species considered extirpated in identified county.

Special-Status Wildlife

No protocol-level wildlife surveys were conducted in preparation of this EIS. This analysis is based on a habitat assessment for special-status species and data from existing study reports, as stated above. Because River Islands is proposing to obtain coverage under the SJMSCP, focused surveys and habitat assessments would be conducted for all SJMSCP-covered special-status wildlife.

A CNDDB search was conducted (California Natural Diversity Database 2013) for the nine quadrangles containing and surrounding the proposed action area. The full output of the search is presented in Table B-1 of Appendix B.

Based on the review of existing information and documented presence of suitable habitat, several special-status wildlife species have the potential to occur in the proposed action area (Table 3-4). Some of these species are not expected to occur either because there is no suitable habitat or because the proposed action area is outside the species' geographic range. More detailed discussions of these species follow the table.

Table 3-4. Special-Status Wildlife Species Potentially Occurring in the Proposed Action Area

	Status[a]		River Islands Component Area			Potential to Occur in Proposed Action Area
Species	Federal /State	Habitat	RID	PCIP	PCC	
Invertebrates						
Valley elderberry longhorn beetle *Desmocerus californicus dimorphus*	T/–	Riparian and oak savanna habitats with elderberry shrubs; elderberry is host plant	Elderberry shrubs present in 1993 and 2010	No surveys for elderberry shrubs	Elderberry shrubs present in 1993	High
Reptiles						
Western pond turtle *Actinemys marmorata*	–/SSC	Ponds, marshes, rivers, streams, and irrigation canals with muddy or rocky bottoms and watercress, cattails, water lilies, or other aquatic vegetation in woodlands, grasslands, and open forests	Marginal nesting; suitable aquatic	Suitable nesting and aquatic	Suitable nesting and aquatic	High
Giant garter snake *Thamnophis gigas*	T/T	Sloughs, canals, low-gradient streams and freshwater marsh habitats with prey base of small fish and amphibians; irrigation ditches and rice fields; requires grassy banks and emergent vegetation for basking and areas of high ground protected from flooding during winter	Aquatic and upland	Aquatic and upland	Aquatic and upland	Moderate

Species	Status[a] Federal /State	Habitat	River Islands Component Area RID	PCIP	PCC	Potential to Occur in Proposed Action Area
Birds						
Tricolored blackbird *Agelaius tricolor*	–/SSC	Nests in dense colonies in emergent marsh vegetation, such as tules and cattails, or upland sites with blackberries, nettles, thistles; forages in grassland and agricultural fields	Foraging	None	None	High (foraging); Low (nesting)
Western burrowing owl *Athene cunicularia hypugea*	–/SSC	Grasslands and agricultural fields with available burrows	Foraging and marginal nesting habitat; pellet found	Foraging habitat	Foraging and marginal nesting habitat	High (foraging); Low (nesting)
Swainson's hawk *Buteo swainsoni*	–/T	Nests in oaks or cottonwoods in or near riparian habitats; forages in grasslands, irrigated pastures, and grain fields	Nesting and foraging; nests found	Nesting and foraging; nests found	Nesting and foraging	High
Mountain plover *Charadrius montanus*	–/SSC	Open plains or rolling hills with short grasses or very sparse vegetation; nearby bodies of water not needed; may use newly plowed or sprouting grainfields	Foraging (winter only)	None	None	Low
Northern harrier *Circus cyaneus*	–/SSC	Grasslands, meadows, marshes, and seasonal and agricultural wetlands	Foraging	Nesting and foraging	Nesting and foraging	High
Yellow warbler *Setophaga petechia*	–/SSC	Nest in riparian habitat, especially willows	Marginal nesting habitat	Foraging and nesting habitat	Marginal nesting habitat	Low
White-tailed kite *Elanus leucurus*	–/FP	Low foothills or valley areas with valley or live oaks, riparian areas, agricultural lands, and marshes near open grasslands for foraging; nests in isolated trees or small woodland patches	Suitable nesting and foraging habitat; nests present	Suitable nesting and foraging habitat	Suitable nesting and foraging habitat	High
Greater sandhill crane *Grus canadensis tabida*	–/T, FP	Summers in open terrain near shallow lakes or freshwater marshes; winters in plains and valleys near bodies of fresh water	Foraging	Foraging	Foraging	Moderate (foraging), wintering habitat only
Yellow-breasted chat *Icteria virens*	–/SSC	Riparian woodland with dense shrub cover	Marginal nesting habitat	Foraging and nesting habitat	Marginal nesting habitat	Low

Species	Status[a] Federal /State	Habitat	River Islands Component Area RID	PCIP	PCC	Potential to Occur in Proposed Action Area
Loggerhead shrike *Lanius ludovicianus*	–/SSC	Prefers open habitats with scattered shrubs, trees, posts, fences, utility lines, or other perches	Foraging	Foraging and nesting	Foraging and nesting	Moderate
American white pelican *Pelecanus erythrorhynchos*	–/SSC	Rivers, lakes, reservoirs, estuaries, bays, and open marshes, sometimes inshore marine habitats; rest/roost on islands and peninsulas	Foraging	Foraging	Foraging	Low; roosting and foraging habitat only
Mammals						
Townsend's big-eared bat *Corynorhinus townsendii*	–/SSC	Oak savanna, riparian, and grassland; roosts in caves, buildings, and mines	Foraging; limited roosting	Foraging; limited roosting	Foraging; limited roosting	Moderate
Greater western mastiff-bat *Eumops perotis californicus*	–/SSC	From desert scrub to montane conifer; roosts and breeds in deep, narrow rock crevices, but may also use crevices in trees, buildings, and tunnels	Foraging; limited roosting	Foraging; limited roosting	Foraging; limited roosting	Moderate
Red bat *Lasiurus blossevillii*	–/SSC	Wooded areas at lower elevations; typically roosts in snags and trees with moderately dense canopies	Foraging; limited roosting	Foraging; limited roosting	Foraging; limited roosting	Moderate
Pallid bat *Antrozous pallidus*	–/SSC	From desert to coniferous forest, but most common in open, dry habitats; relies heavily on trees for roosts	Foraging; limited roosting	Foraging; limited roosting	Foraging; limited roosting	Moderate
Riparian brush rabbit *Sylvilagus bachmani riparius*	E/E	Native valley riparian habitats with large clumps of dense shrubs, low-growing vines, and some tall shrubs and trees	No habitat	Present	Present	High in PCC and PCIP Areas; no suitable habitat in RID Area

Source: EDAW 2005; California Natural Diversity Database 2013.

Status:

Federal:

E = Listed as endangered under ESA.

T = Listed as threatened under ESA.

P = Proposed for listing as threatened under ESA.

– = No federal status.

State:

E = Listed as endangered under CESA.

T = Listed as threatened under CESA.

SSC = California species of special concern.

FP = Fully protected under California Fish and Game Code.

– = No state status.

Valley Elderberry Longhorn Beetle

Valley elderberry longhorn beetle (VELB) is federally listed as threatened. VELB requires elderberry shrubs (*Sambucus mexicana*) for reproduction and survival. The CNDDB lists two occurrences within a 10-mile radius (California Natural Diversity Database 2013). Elderberry shrubs (but no exit holes) were documented at the pond, in the western half of the PCC Area, and on the Old River levee near the confluence with Middle River (Sycamore Environmental Consultants 2001). Elderberry shrubs were found in 1993 in the RID and PCC Areas (City of Lathrop 1995). No surveys have been conducted in the PCIP Area. Additional survey work conducted by Monk & Associates in June 2010 identified six elderberry shrubs along Old River (Ascent Environmental, Inc. 2011).

Based on the presence of suitable habitat there is potential for VELB to be present in the proposed action area (Table 3-4).

Western Pond Turtle

Western pond turtle, a California species of special concern, occurs in ponds, rivers, streams, and irrigation canals throughout most of California from near sea level to about 4,900 feet (Stebbins 2003:249–251). These turtles require basking sites such as partially submerged logs, rocks, mats of floating vegetation, or open mud banks. They also utilize upland habitat within 0.25 mile of aquatic habitat for basking, nesting, and overwintering (Reese and Welsh 1997). Nests are built in uplands in a variety of soil types with relatively high humidity (Crump 2001).

The CNDDB (2013) lists seven records for western pond turtle within a 10-mile radius of the proposed action area. Individuals have been observed during surveys in the San Joaquin River and Paradise Cut (City of Lathrop 1995). There is high potential for this species to occur in the proposed action area based on the presence of suitable aquatic habitat in the San Joaquin River, pond, and drainages. Suitable nesting habitat is not present in the vicinity of the pond because it is entirely surrounded by cultivated agricultural fields (Table 3-3). Levees along the San Joaquin River could provide suitable nesting sites; however, due to regular disturbance from vegetation removal activities, such as burning, mowing, and herbicide spraying, it is unlikely that pond turtles nest in these levees.

Giant Garter Snake

Giant garter snake (GGS) is state- and federally listed as threatened. Historically, GGS occurred in the Sacramento and San Joaquin Valleys from Butte County south to Buena Vista Lake in Kern County. Today, populations are found only in the Sacramento Valley and isolated portions of the San Joaquin Valley as far south as Fresno County. GGS is still presumed to occur in 11 counties in California: Butte, Colusa, Fresno, Glenn, Merced, Sacramento, San Joaquin, Solano, Stanislaus, Sutter, and Yolo (U.S. Fish and Wildlife Service 1999). USFWS recognizes only 13 separate populations of the species, with each population representing a cluster of discrete locality records (U.S. Fish and Wildlife Service 1999).

GGSs inhabit wetlands, irrigation and drainage canals, rice fields, marshes, sloughs, ponds, low-gradient streams, and adjacent uplands in the Central Valley. They require adequate water during the active season (early spring through fall); emergent, herbaceous wetland vegetation for foraging habitat and escape cover; open areas for basking; and upland habitat, especially grassland, high above the high water line with rodent burrows for winter hibernation. Riparian woodlands do not provide suitable habitat because potential basking areas are often shaded. GGSs do not inhabit large rivers or wetlands with sand, gravel, or rock substrates and tend to stay within 200 feet of wetland habitat (U.S. Fish and Wildlife Service 1999). They hibernate from early October to late March. The breeding season begins soon after the snakes emerge from hibernation, from March to May, and resumes briefly during September (U.S. Fish and Wildlife Service 1999). The CNDDB (2013) lists no records for GGS within a 10-mile radius of the proposed action area.

The RID Area is in an area designated as "potential habitat" under the SJMSCP (San Joaquin County 2000). The central agricultural ditch and smaller connected ditches are considered suitable habitat for juveniles and wintering individuals, and may be suitable for active adults if the prey base (mosquitofish and Pacific treefrogs) is sufficient. The agricultural ditch area provides approximately 11.2 acres of aquatic habitat and 5.6 acres of upland habitat (based on the assumption that agricultural activities do not begin closer than 25 feet from the centerline of the drainage ditch) (EDAW 2005). There is potential for some agricultural habitat to provide foraging, refugia, or basking sites, although active farming would increase the potential for mortality. The San Joaquin River and Old River are not expected to provide suitable aquatic habitat because they are too wide, deep, and fast (U.S. Fish and Wildlife Service 1999). Based on the presence of suitable habitat there is potential for GGS to be present in the proposed action area.

Suitable aquatic and upland habitat for GGS is present in the PCIP and PCC Areas (Figure 3-3). Paradise Cut provides potentially suitable habitat for adult, juvenile, and wintering giant garter snakes. Levees may provide suitable refugia and basking habitat.

Tricolored Blackbird

Tricolored blackbird is a California species of special concern. Tricolored blackbirds nest colonially and prefer relatively large, dense cattail patches, but they also use blackberry (*Rubus* spp.) and other patches of dense vegetation. They forage in grasslands and agricultural fields. Suitable foraging habitat is present throughout the RID Area. The CNDDB (2013) lists nine records of tricolored blackbird nesting colonies within a 10-mile radius of the proposed action area. The most recent occurrence was recorded in 1998. Patches of freshwater marsh in drainage ditches and at the pond are unlikely to provide suitable nesting habitat because the vegetated areas are too narrow to provide protection from predators. In addition, no tricolored blackbird colonies are currently present, and there are no CNDDB records of past colonies in the RID Area. There are records from the 1970s of a historic colony approximately 5 miles to the east, but it was removed by development. Tricolored blackbirds could forage but are not expected to nest in the RID Area. The PCIP and PCC Areas do not provide nesting or foraging habitat for tricolored blackbirds (Table 3-4).

Western Burrowing Owl

Western burrowing owl is a California species of special concern. Burrowing owls prefer dry grasslands and other dry, open habitats, but are also known to nest along the margins of agricultural fields where conditions are appropriate. They typically nest and roost in burrow systems created by ground squirrels, or they use artificial sites (drains and culverts). The CNDDB (2013) lists 63 records of burrowing owls within a 10-mile radius of the proposed action area, many of which are documented nesting locations. During a field survey during the non-breeding season, biologists found a pellet determined to be that of a burrowing owl—based on size, content, and consistency with known burrowing owl pellets—along the landside of the San Joaquin River levee (City of Lathrop 2002).

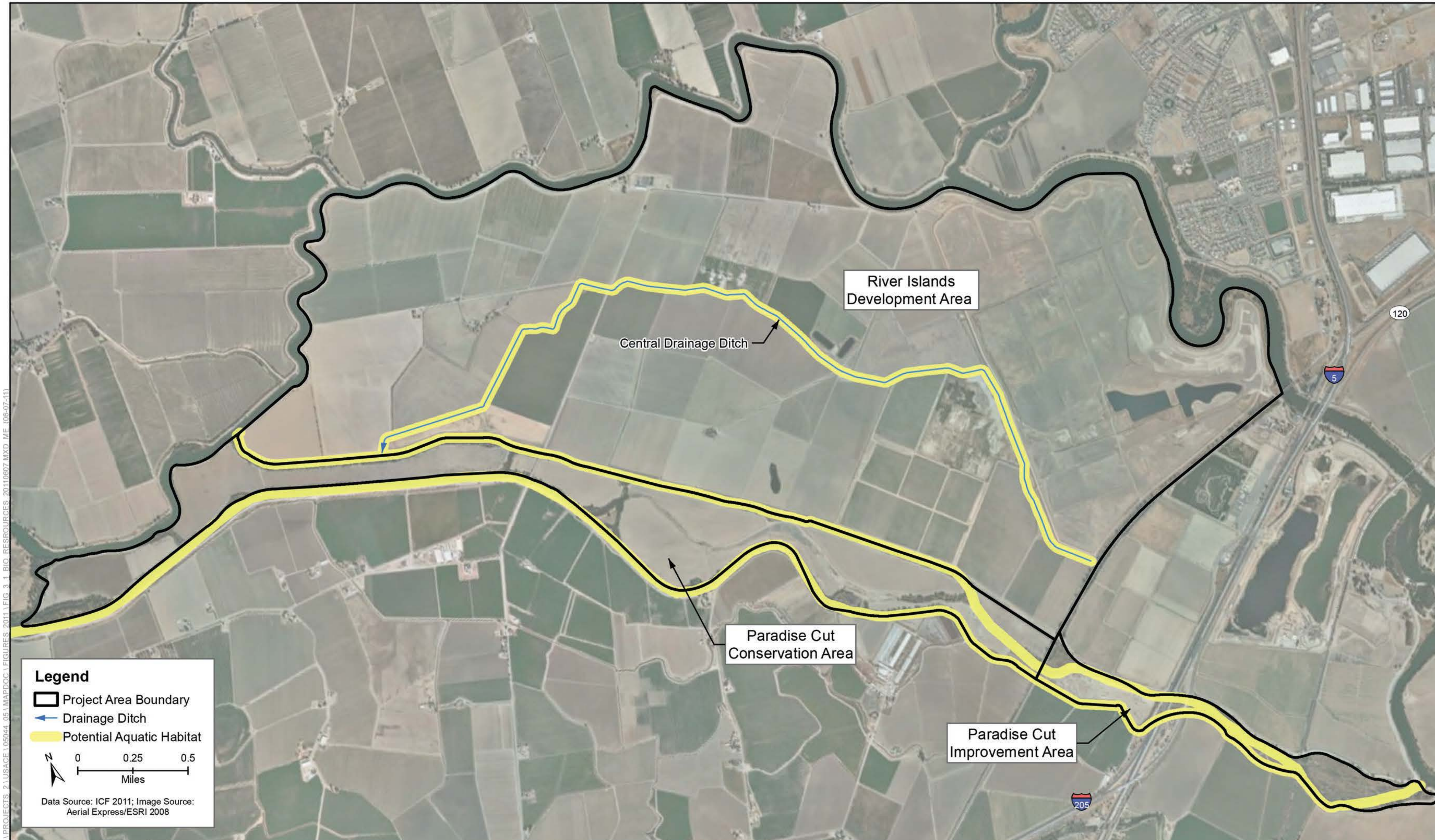

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Figure 3-3
River Islands at Lathrop — Potential Aquatic Habitat for Giant Garter Snake

Based on the presence of suitable habitat and burrowing owl sign, there is potential for burrowing owls to occur in the RID, PCIP, and PCC Areas (Table 3-4).

Swainson's Hawk

Swainson's hawk is state-listed as threatened. Swainson's hawks prefer to nest in riparian forests or scattered trees adjacent to grasslands and/or agricultural fields that provide suitable foraging habitat. The CNDDB (2013) lists 176 records of Swainson's hawk, including several nest sites, within a 10-mile radius of the proposed action area.

Agricultural fields in the proposed action area, particularly alfalfa, provide suitable foraging habitat for Swainson's hawk, and Swainson's hawk nests have been documented along the San Joaquin River, in and adjacent to the PCC Area (Figure 3-1). Foraging and nesting habitat is also present in the RID and PCC Areas.

Mountain Plover

Mountain plover is a California species of special concern. Mountain plovers could use the RID Area as foraging and roosting habitat. They typically forage in grasslands and agricultural fields and could forage in fields in the proposed action area. The CNDDB (2013) lists no records of mountain plover within a 10-mile radius of the proposed action area. This species does not breed in California. Although the PCIP and PCC Areas provide suitable wintering habitat for mountain plovers, there is low likelihood that the species would occur because of the dearth of records in the area (Table 3-4).

Northern Harrier

Northern harrier is a California species of special concern. Northern harriers nest on the ground in dense, low-lying vegetation, typically in grassland or marsh habitats. The CNDDB (2013) lists one record of northern harrier within a 10-mile radius of the proposed action area, although sightings of this species can go unreported. Vegetation around the pond and drainage ditch is unlikely to provide suitable nesting habitat because these areas are too narrow to provide protection from predators. A large vegetated area in upper Paradise Cut (PCIP Area) could provide suitable nesting habitat. Agricultural fields in the RID Area are likely to provide foraging habitat (Table 3-4).

Yellow Warbler and Yellow-Breasted Chat

Yellow warbler and yellow-breasted chat are both California species of special concern. Yellow warblers and yellow-breasted chats both nest in riparian habitats. The CNDDB (2013) lists no records of either species within a 10-mile radius of the proposed action area. Both species typically nest in willow thickets, typically in riparian habitats with a dense shrub layer. The 5-acre patch of riparian forest habitat near the San Joaquin River in the PCIP Area does not provide suitable nesting habitat because it is dominated by mature trees with very little shrubby understory vegetation. In addition, breeding pairs of yellow warbler are very rare in San Joaquin County. Although unlikely, there is a low potential for these species to nest in the proposed action area (Table 3-4).

White-Tailed Kite

White-tailed kite is fully protected under the CFGC. White-tailed kites prefer scattered trees for nesting and open grassland and marshes for foraging. The CNDDB (2013) lists two records of white-tailed kite within a 10-mile radius of the proposed action area. Two nests were documented in 1993: one along the UPRR tracks and the other along the San Joaquin River (City of Lathrop 1995). Suitable nesting and foraging habitat for white-tailed kite is present in the RID, PCIP, and PCC Areas (Table 3-4).

Greater Sandhill Crane

Greater sandhill crane is state-listed as threatened. These cranes overwinter in agricultural fields in the Central Valley. They forage in agricultural habitats, particularly fields that are flooded, newly disked, or irrigated, and could forage in fields in and near the RID, PCIP and PCC Areas (Table 3-4). The CNDDB (2013) lists no records of greater sandhill crane within a 10-mile radius of the proposed action area, though this species is traditionally underreported in the CNDDB. The proposed action area is outside the species' known nesting range.

Loggerhead Shrike

Loggerhead shrike is a California species of special concern. Loggerhead shrikes inhabit lowland and foothill areas with scattered shrubs and trees. They nest in shrubs and small trees and typically forage in grasslands and agricultural fields. The CNDDB (2013) lists one record of loggerhead shrike within a 10-mile radius of the proposed action area. Suitable foraging habitat is present throughout the RID Area, but suitable nesting habitat is limited to vegetation along the San Joaquin River, at the pond, and along the UPRR tracks west of I-5 in the PCIP and PCC Areas (Table 3-4).

American White Pelican

American white pelican is a California species of special concern. White pelicans could use the RID, PCIP, and PCC Areas as foraging and roosting habitat (Table 3-4). The CNDDB (2013) lists no records of American white pelican within a 10-mile radius of the proposed action area. Due to the area's distance to large, open bodies of water (e.g., large lakes or ocean) the potential for this species to occur in the proposed action area is low. The proposed action area is outside the species' known nesting range.

Bats

Several bat species that are California species of special concern could forage in the RID, PCIP, and PCC Areas: greater western mastiff bat, red bat, Townsend's big-eared bat, and pallid bat (Table 3-4). The CNDDB (2010) lists one record for greater western mastiff bat, one historical record for pallid bat, and no records for red bat or Townsend's big-eared bat within a 10-mile radius of the proposed action area. The brick silos between the RID Area and I-5 (outside the proposed action area) are known to provide bat roosting habitat, but potential roost sites in the proposed action area are very limited. Trees and buildings could provide roosting habitat for small numbers of individuals. Because of the occurrence of known nearby roost sites, bats may use the area for foraging.

Riparian Brush Rabbit

Riparian brush rabbit is state- and federally listed as endangered. Riparian brush rabbits inhabit the brushy understory of riparian forest and savanna-like areas with dense vine and shrub cover. They avoid large openings in the understory cover, frequenting only small clearings in the vegetation while foraging (U.S. Fish and Wildlife Service 1998).

The CNDDB (2010) lists three records for riparian brush rabbit within a 10-mile radius of the proposed action area. Only two known populations of this subspecies exist, one of which is in

Paradise Cut and along the UPRR tracks west of I-5 (PCC and PCIP Areas) (Figure 3-2). The other population is in Caswell Memorial State Park in Stanislaus County, approximately 10 miles southeast of the proposed action area.

Paradise Cut is considered occupied habitat for riparian brush rabbit based on a 2001 trapping study (Williams and Hamilton 2002). The trapping study resulted in the capture of 21 individuals, primarily in the area immediately northwest of the UPRR tracks west of I-5. The surveyors estimated a population of up to several hundred individuals (Williams and Hamilton 2002). Brush rabbits likely use the UPRR ROW as high-water refugia during flood events (Williams and Hamilton 2002). Vegetation along the UPRR ROW outside the survey area is also known to support brush rabbits, but this area is owned and managed by UPRR and is not within the proposed action area.

Riparian brush rabbit habitat occurs in Paradise Cut, which provides both forage and cover in most years. In Paradise Cut, existing habitat for riparian brush rabbits is confined to levee bases, the channel banks of Paradise Cut, and pockets of low ground along the bottom of Paradise Cut. Areas of suitable habitat in these locations are very narrow (15–100 feet). Most of the channels in Paradise Cut are in dead-end sloughs fed by Old River, with significant portions containing water year-round, resulting in isolation of some upland areas (i.e., islands). On average, the existing habitat for rabbits is submerged by water once every 4 years, when flood flows in the San Joaquin River are sufficient to overtop Paradise Weir. No suitable habitat for riparian brush rabbit occurs in the RID Area (Table 3-4).

3.2 Environmental Consequences

3.2.1 Methods for Analysis of Effects

Direct effects are those that are caused by the proposed action and occur at the same time and place as the action. Activities that have direct effects include grubbing, grading, and other construction activities that remove vegetation, fill drainages, or otherwise disrupt the function of drainages and other wetlands. The majority of direct effects would be permanent, resulting from the placement of fill material for levees, new access road construction, and construction of housing and other infrastructure. Other direct effects include soil compaction, dust and water runoff from the construction area, and construction-related noise and vibrations from equipment. Periodic operation and maintenance activities, including dredging of Lathrop Landing back bay and Paradise Cut canal and maintenance of recreation areas, would primarily result in temporary direct effects such as habitat disturbance.

Indirect effects are those that occur later in time or are farther removed from the project site than direct effects, but that are still reasonably foreseeable. Examples of indirect effects include the modification of habitat functions resulting from wind-blown dust; erosion of sediments; noxious weed invasion; hydrologic modifications (e.g., changes in downstream hydrology from the discharge of treated wastewater, the addition of impervious surfaces, altered stormwater drainage); and the creation of barriers to the movement of wildlife.

3.2.2 Definition of Significant Effects

Adverse biological effects may occur at the individual, population, or ecosystem level. For special-status species, outcomes that are detrimental to individuals are likely to be construed as significant. For common species, concern is typically focused at the population level. Specifics follow.

- Significant effects on botanical resources include degradation and loss of sensitive habitat, including wetlands and riparian areas. Damage and mortality of special-status plants also constitutes a significant effect on botanical resources.
- Significant effects on wildlife include direct mortality, injury, or disturbance of individuals belonging to special-status species, indirect effects on individuals and populations of such species through degradation or loss of their habitat, and interference with migration routes or breeding/nursery habitat. Similar effects on common wildlife species may also be considered significant, particularly where populations are likely to be affected.
- Any outcome that would degrade the overall function of a habitat or ecosystem is typically considered a significant effect.

3.2.3 Effects and Mitigation Approaches

3.2.3.1 Alternative 1—Proposed Action

This section identifies potential construction- and operations-related effects and, where appropriate, mitigation approaches for the proposed action. Project elements and operational activities associated with this alternative that could have adverse or beneficial effects on biological resources are listed below.

- Levee alteration (including breaching) and construction.
- Expansion of flood conveyance and storage capacity in Paradise Cut.
- Construction of River Islands at Lathrop components.
- Fill placement for bridge footings in the San Joaquin River and Paradise Cut and construction of bridges.
- Construction of Paradise Cut Canal and Lathrop Landing back bay.
- Installation of docks along San Joaquin River and Old River.
- Construction of docks in Lathrop Landing back bay and new Paradise Cut Canal
- Dredging to create boat access between Lathrop Landing and San Joaquin River.
- Recontouring and revegetation of levee remnants along Paradise Cut to create shallow-water shelves and riparian brush rabbit refugia with bridges between high-ground habitat islands; these mitigation measures may affect other species.
- Additional preservation, enhancement, and creation of open space and special-status species habitat in the PCC Area and along riverbanks.
- Periodic maintenance dredging of Paradise Cut Canal and Lathrop Landing back bay.

Effects on common upland biological communities (less than significant)

The proposed action would largely affect agricultural land and ruderal grassland communities, thereby affecting mostly nonnative plant species. Approximately 3,491 acres of agricultural and ruderal grassland would be lost during development of the proposed action area. Although these common communities may provide habitat for special-status wildlife, from a botanical perspective, the loss of these agricultural lands and ruderal grasslands is not significant because they are dominated by common plant species and do not provide habitat for special-status plants. Therefore, the direct and indirect effects on upland biological communities would be less than significant.

Effects on special-status plant species (significant)

As described previously, potential habitat for nine non–federally listed plant species occurs in the proposed action area (Table 3-2). It is currently unknown if these species are present because the previous surveys are more than 10 years old and no additional surveys have been conducted. All nine plant species are associated with wetland, riparian, drainage, and pond habitat. Recent CNDDB searches conducted for the proposed action area indicate that nearby occurrences have been documented for Delta button-celery, Wright's trichocoronis, and slough thistle (Figure 3-2).

If special-status plants are present in the proposed action area, project-related activities conducted in riparian and freshwater marsh habitats could affect individuals or populations. For example, in the PCIP Area, riparian habitat would be temporarily removed to lower the terrace bench along the San Joaquin River near Paradise Weir. Although this area is slated for restoration once the work is completed, any special-status plants on site would be removed to complete this task. In the PCC Area, earthwork/construction activities that could result in removal of riparian habitat include dredging to connect Paradise Cut Canal to Old River, bridge construction, and breaching of the existing levee.

Consequently, the proposed action could result in the loss of a substantial portion of a special-status plant population. This would be considered a significant direct effect. However, River Islands is required to conduct focused special-status plant surveys for SJMSCP-covered species prior to construction. No indirect effects were identified. If special-status plants are found, Mitigation Measure BIO-1 will be implemented.

Mitigation Measure BIO-1. Implement measures required by SJMSCP for special-status plant species

Before project implementation, surveys for the special-status plants listed in Table 3-5 will be conducted by a qualified botanist at the appropriate time of year when the target species would be in flower or otherwise clearly identifiable. Because all the target special-status plants are associated with wetland and riparian habitats, the survey will focus on these habitats.

If no special-status plants are found during focused surveys, the findings will be documented in a letter report to the regulatory agencies, and no additional mitigation will be required. If special-status plant populations are identified during focused surveys, specific measures consistent with the requirements of the SJMSCP will be implemented. These measures are detailed in Table 3-5.

Table 3-5. SJMSCP Species-Specific Special-Status Plant Measures

Plant Species	Mitigation Measure
Plant Species Requiring Complete Avoidance	
• Sanford's arrowhead • Delta button-celery • Slough thistle	The SJMSCP requires complete avoidance of these species; therefore, potential effects on these species could not be covered through participation in the plan. If these species are present in the action area and cannot be avoided, a separate consultation with the regulatory agencies will be required. This consultation will determine appropriate mitigation measures for any populations affected by the proposed action, such as creation of offsite populations through seed collection or transplanting, preserving and enhancing existing populations, or restoring or creating suitable habitat in sufficient quantities to compensate for the effect. River Islands will implement all mitigation measures specified in the USFWS BO or the Section 2081 incidental take permit.
Widely Distributed Plant Species	
• Mason's lilaeopsis • Woolly rose mallow • Suisun marsh aster • Delta tule pea • Delta mudwort	The SJMSCP identifies these species as widely distributed, and dedication of conservation easements is the preferred option for mitigation. If these species are found in the proposed action area and a conservation easement is not an option, payment of SJMSCP development fees may be used to mitigate effects.
Narrowly Distributed Plant Species	
• Wright's trichocoronis	The SJMSCP identifies this species as narrowly distributed, and dedication of conservation easements is the preferred option of mitigation. If this species is found in the proposed action area and the dedication of conservation easement is not an option, the SJMSCP requires consultation with the permitting agency representatives on the HTAC to determine the appropriate mitigation measures. These may include seed collection or other measures and would be determined on a population basis, taking into account the species characteristics, relative health, and abundance. After the appropriate mitigation has been determined, it will be implemented by River Islands.

Further clarification regarding the requirements for specific SJMSCP-covered plant species is provided below.

- **For widely distributed plant species:** Mason's lilaeopsis, Suisun marsh aster, Delta tule pea, and Delta mudwort.
    - **Attempt acquisition.** If the plant population is considered healthy by the JPA with the concurrence of the Permitting Agencies' representatives on the HTAC, then the parcel owner will be approached to consider selling a conservation easement including a buffer area as prescribed in Section 5.4.4 of the SJMSCP and sufficient to maintain the hydrological needs of the plants. Alternatively, the landowner may be approached to consider land dedication in lieu of paying SJMSCP development fees. If River Islands is not agreeable to acquisition, then compensation will be as prescribed in the SJMSCP (Section 5.3.1).
- **For narrowly distributed plant species:** Wright's trichocoronis.
    - **Attempt acquisition.** If the plant population is considered healthy by the JPA with the concurrence of the Permitting Agencies' representatives on the HTAC, then the parcel owner will be approached to consider selling a conservation easement including a buffer

area as prescribed in Section 5.4.4 of the SJMSCP and sufficient to maintain the hydrological and ecological needs (e.g., account for weed control, buffers, inclusion of pollinators) of the plants. Alternatively, the landowner may be approached to consider land dedication in lieu of paying SJMSCP development fees.

- **Consultation.** If the landowner rejects acquisition of the population, then the JPA will, with the concurrence of the Permitting Agencies' representatives on the HTAC, determine the appropriate mitigation measures (e.g., seed collection) for each plant population based on the species type, relative health, and abundance.

Effects on waters of the United States (significant)

Construction of the proposed action would result in effects on 30.22 acres of waters of the United States: 19.88 acres of temporary effects and 10.34 acres of permanent effects (Table 3-6). Temporary effects would involve approximately 9.03 acres of wetlands and 10.85 acres of other waters of the United States. Project activities associated with lowering the terrace bench near Paradise Weir would result in 9.03 acres of temporary effects on wetlands. The wetland system would be restored in place after the bench is lowered. Conversion of a portion of the central ditch to the internal lakes (4.49 acres) and Paradise Cut (0.36 acre) would also result in temporary losses. Other temporary effects would be associated with bridge construction over Paradise Cut and breaching levees at Paradise Cut and the entrance to Lathrop Landing back bay. Temporary dredging effects include connecting Paradise Cut to Old River to complete construction of the Paradise Cut Canal and creating a channel at the entrance to the Lathrop Landing back bay on the San Joaquin River.

Implementation of the proposed action would result in the permanent loss of waters of the United States: approximately 0.04 acre of wetlands and 10.30 acres of other waters. A total of 6.36 acres of drainage ditch would be lost due to excavation of fill and borrow material for construction of levee setbacks. Additional losses would result from bridge construction over Paradise Cut, fill for installation of riparian brush rabbit crossings, and installation of floating docks. Losses of waters of the United States constitute a significant direct effect. No indirect effects were identified.

Table 3-6. Effects on Waters of the United States (acres)—Proposed Action

	Temporary Effects[a]			Permanent Effects		
Activity	Total	Wetland[b]	Other Waters[b]	Total	Wetland[b]	Other Waters[b]
Fill/excavation of central drainage ditch as borrow material for levees and associated habitat				6.36		6.36
Central drainage ditch converted to central lake	4.49	–	4.49	–	–	–
Central drainage ditch converted to Paradise Cut waters	0.36	–	0.36	–	–	–
Excavation of wetland to lower terrace bench near Paradise Weir	9.03	9.03		–	–	–
Dredging and cut at confluence of Old River and Paradise Cut to connect Paradise Cut Canal with Old River[c]	0.25	–	0.25	–	–	–
Breaching of existing Paradise Cut levee after new levee complete	4.89		4.89	–	–	–

	Temporary Effects[a]			Permanent Effects		
Activity	Total	Wetland[b]	Other Waters[b]	Total	Wetland[b]	Other Waters[b]
Fill to install riparian brush rabbit crossings connecting Paradise Cut islands	–	–	–	0.04	0.04	
Trestle and falsework construction for Golden Valley Parkway bridge over Paradise Cut	0.14		0.14	–	–	–
Footings and roadway for Golden Valley Parkway bridge over Paradise Cut	–	–	–	0.52	–	0.52
Trestle and falsework construction for Paradise Road bridge over Paradise Cut	0.05	–	0.05	–	–	–
Footings for Paradise Road bridge over Paradise Cut	–	–	–	0.29	–	0.29
Dredging of San Joaquin River for Lathrop Landing back bay entrance[c]	0.41	–	0.41	–	–	–
Breaching existing San Joaquin River levee for Lathrop Landing back bay entrance	0.26	–	0.26	–	–	–
Installation of floating docs in Old River and the San Joaquin River[d]				3.13		3.13
Total	19.88	9.03	10.85	10.34	0.04	10.30

Sources: EDAW 2005; Ascent Environmental, Inc. 2011.

[a] The *Temporary* category includes recoverable disturbances as well as conversion to another type of jurisdictional water.

[b] Extent of effects on wetland and other waters was derived by visually estimating the proportion of each category in the proposed action area.

[c] Temporary effects associated with maintenance dredging of Lathrop Landing back bay and Paradise Cut canal are presently unknown and are not quantified here. Such activities would be subject to a separate, future authorization under RHA Section 10.

[d] No fill is associated with construction of docks or fishing piers. However, shading effects of these facilities constitute a significant effect on fish species; see Chapter 4, *Fish Resources*.

As described in Chapter 2, *Proposed Action and Alternatives*, the proposed action includes the creation or restoration of natural habitats, habitat enhancement, and in-perpetuity protection and preservation of habitat and open space. The restoration activities would focus on the PCC Area in and along the banks of the San Joaquin and Old Rivers (in compliance with the Corps' levee vegetation guidelines). Restoration activities in the PCC Area would be carried in the vicinity of approximately 200 boat docks that would be constructed in the Paradise Cut Canal. In addition to these restoration activities, Mitigation Measure BIO-2 would address direct significant effects on waters of the United States.

Mitigation Measure BIO-2. Minimize effects on waters of the United States and riparian habitat

- Before project implementation, a delineation of waters of the United States, including jurisdictional wetlands and riparian vegetation, that would be affected by the proposed action will be conducted by qualified biologists through the formal Section 404 wetland delineation process. Reverification of the existing wetland delineation is anticipated to satisfy this requirement.

- Authorization for fill of the agricultural ditch, alteration of waters of the United States, and disturbance of riparian habitat will be secured from the Corps through the Section 404 permitting process.
- A CDFW SAA will be obtained for work waterside of existing levees along the San Joaquin River, Old River, and Paradise Cut.
- The acreage of jurisdictional habitat (wetlands and other waters) removed will be replaced or restored/enhanced on a "no-net-loss" basis in accordance with Corps and CDFW regulations. Habitat restoration, enhancement, and/or replacement will be at locations and by methods agreeable to the Corps and CDFW.
- Measures to minimize erosion and runoff into drainage channels will be included in all drainage plans. Appropriate runoff controls such as berms, storm gates, detention basins, overflow collection areas, filtration systems, and sediment traps will be implemented to control siltation and the potential discharge of pollutants.

Effects on riparian habitat (significant)

There is a total of 174.84 acres of riparian forest and riparian scrub on the entire River Islands at Lathrop project site; riparian habitat in the proposed action area totals 142.18 acres (Table 3-2). Under the proposed action, riparian vegetation in the PCC Area and the majority of the PCIP Area would not require removal because of the setback levee scenario that is proposed in these reaches. Temporary effects on riparian habitat are expected to be limited to the 40-acre bench proposed for lowering to improve flood conveyance in the PCIP area. Compliance with the Corps' levee vegetation guidelines would result in permanent vegetation removal as shown in Table 3-7.

Table 3-7. Riparian Vegetation Removal Required under the Proposed Action

Location	Temporary	Permanent	Total Acres
Old River		9.98	9.98
Paradise Cut (PCIP Area)	40.00		40.00
Total		9.98	49.98
Source: ICF aerial photo analysis.			

In addition to removal of riparian vegetation in compliance with the Corps' levee vegetation guidelines, a small amount of riparian vegetation could be removed in association with construction of bridges serving River Islands at Lathrop. Because construction plans have not been finalized, it is not possible to precisely quantify the extent of this loss; however, mitigation measures described below would address this potential effect. Nevertheless, loss of riparian habitat would be considered a significant direct effect. No indirect effects were identified.

In accordance with CDFW regulations, it is anticipated that mitigation requirements would be met by onsite in-kind restoration or enhancement, as there are several benches along the waterways of the proposed action area that would be suitable for riparian planting (i.e., outside the Corps' vegetation-free zone). Approximately 15.32 acres along San Joaquin River and 3.96 acres along Old River could be revegetated. Also, as described in Chapter 2, there is a potential to set back and contour the extended levees along Old River to create approximately 16 acres of planting benches between Paradise Cut and Middle River. Thus, considering that the 40-acre temporary removal of riparian scrub in the PCIP Area would be expected to reestablish quickly, there is a potential for a net increase in riparian habitat. In addition to these restoration activities, Mitigation Measures BIO-1 and BIO-2 would address this effect.

Mitigation Measure BIO-1. Implement measures required by SJMSCP for special-status plant species

Mitigation Measure BIO-2. Minimize effects on waters of the United States and riparian habitat

Effects on valley elderberry longhorn beetle habitat (significant)

The proposed action would result in loss or disturbance of blue elderberry shrubs, which provide habitat for VELB. Elderberry shrubs are known to occur in the RID and PCC Areas, and they could be present in the PCIP Area. Removal of elderberry shrubs could result from various vegetation removal and construction activities in all three areas. Consequently, there is potential for a significant direct effect on VELB; No indirect effects were identified. Mitigation Measure BIO-3 would address this direct effect.

Mitigation Measure BIO-3. Implement avoidance measures for valley elderberry longhorn beetle

- Before project construction, a survey for elderberry shrubs will be conducted where elderberries could occur within 50 feet of construction areas: the banks of the San Joaquin River, the PCIP Area, and the PCC Area.
- For all shrubs that are to be retained on the project site, a setback of 20 feet from the dripline of each elderberry shrub found during the survey will be established.
- Brightly colored flags or fencing will be used to demarcate the 20-foot setback area and will be maintained until project construction in the vicinity is complete.
- For all shrubs without evidence of VELB exit holes that cannot be retained on the project site, all stems of 1 inch or more in diameter at ground level will be counted. Compensation for removal of these stems will be provided in SJMSCP preserves as specified in SJMSCP Section 5.5.4(B).
- All shrubs with evidence of VELB exit holes or other evidence of VELB occupation that cannot be retained in the project area will be transplanted to VELB mitigation sites during the dormant period for elderberry shrubs (November 1–February 15). For elderberry shrubs displaying evidence of VELB occupation that cannot be transplanted, compensation for removal of shrubs will be implemented in accordance with SJMSCP Section 5.5.4(C).

Effects on western pond turtle (less than significant)

Western pond turtles are known to occur in Paradise Cut and the San Joaquin River, and suitable habitat exists in the central drainage ditch and the pond in the RID Area. Suitable habitat for western pond turtle is typically the same as that for giant garter snake, except that the central lake system could provide suitable habitat for pond turtles, whereas it would not be suitable for giant garter snake. Levees along the San Joaquin River and Paradise Cut could provide suitable nesting sites, but regular management activities make it unlikely for pond turtles to nest there. Consequently, potential nesting habitat is confined to less disturbed upland areas in Paradise Cut that would not be affected by the proposed action.

A total of 7.19 acres of suitable aquatic habitat for western pond turtle would be lost or disturbed as a result of the proposed action. Permanent loss of aquatic habitat would result from construction of the two bridges in Paradise Cut and from fill and excavation of the central drainage ditch. Conversion of 4.49 acres of the central drainage ditch would result in a potential increase in suitable aquatic habitat, although the precise extent of that increase is not available. Temporary disturbance of 5.33 acres of aquatic habitat in the PCC Area would result from breaching the existing levee and from activities associated with bridge construction and dredging. Because the overall creation and improvement of habitat could compensate for any habitat losses, this direct effect is considered less than significant. No indirect effects were identified. Mitigation Measure BIO-4 would address this direct effect.

Mitigation Measure BIO-4. Minimize potential loss of western pond turtles

Requirements of the SJMSCP related to western pond turtle are identified below.

- If nesting areas for pond turtles are identified on a project site, a buffer area of 300 feet will be established between the nesting site (which may be immediately adjacent to wetlands or in uplands up to 400 feet away from aquatic habitat) and the aquatic habitat near the nesting site. These buffers will be indicated by temporary fencing if construction has or will begin before nesting periods.

Effects on giant garter snake (significant)

The proposed action area is in a region identified in the SJMSCP as potential habitat for GGS (San Joaquin County 2000). Suitable aquatic habitat is present in drainage ditches and the pond in the RID Area and in aquatic areas in the PCIP and PCC Areas. All ruderal areas within 200 feet of aquatic habitat are considered suitable upland habitat for GGS (U.S. Fish and Wildlife Service 1999).

The various types of effects related to construction and future operation of the proposed action, described below, were derived from the Draft BA (EDAW 2005). The 2005 BA has been revised to include additional information as requested by USFWS (Ascent Environmental, Inc. 2011).

Table 3-8 lists aquatic and upland habitat suitable to support GGS that would be affected by the proposed action. Surrounding the aquatic habitat are uplands that are in agricultural production and are routinely tilled. Because tilling and other agricultural activities routinely disturb the uplands and could potentially destroy any burrow sites, currently cultivated agricultural areas were not considered suitable basking or wintering habitat for GGS. To calculate the amount of potential upland habitat that would be affected by the project, all ruderal areas within 200 feet of suitable aquatic habitat were considered to be suitable (Ascent Environmental, Inc. 2011). All effects on upland habitat were determined to be permanent.

Table 3-8. Potential Giant Garter Snake Habitat Affected by the Proposed Action (acres)

	Aquatic		
Activity	Permanent	Temporary	Upland
Central drainage ditch			
Fill/excavation as borrow material for levees	6.36		
Conversion to central lake	4.49		16.01
Conversion to Paradise Cut waters		0.36	
Paradise Cut			
Breaching of existing levee after construction of new levee		4.89	9.10
Riparian brush rabbit bridges	0.02		
Footings and road for Golden Valley Parkway bridge	0.52		
Trestle and falsework construction for Golden Valley Parkway bridge		0.14	
Footings for Paradise Road bridge	0.29		
Trestle and falsework construction for Paradise Road bridge		0.05	
Dredging at confluence of Paradise Cut and Old River		0.25	
Paradise Weir			
Paradise Weir: lowering of earthen bench downstream		9.03	0.34
Paradise Weir: smoothing downstream surface			0.14
Totals	11.68	14.72	25.59

Source: Ascent Environmental, Inc. 2011.

Approximately 47.43 acres of shallow-water habitat (about 10 feet or less) would be created adjacent to the levee remnants in Paradise Cut. Of this, approximately 29.81 acres of the shallow water habitat would become open water habitat and 17.62 acres would be vegetated with emergent marsh species to provide suitable foraging habitat for GGS. Although these locations could be dredged or otherwise managed in the future, the depth would remain less than 10 feet.

Some of the riparian vegetation planted on the levee remnants would provide suitable upland basking habitat and winter refugia for GGS. Rock piles would be placed on levee remnants in Paradise Cut for winter refugia and basking habitat. Of the riparian habitat that would be restored in Paradise Cut, at least 45 acres would be restored in a manner consistent with USFWS's *Guidelines for Restoration and/or Replacement of Giant Garter Snake Habitat* (U.S. Fish and Wildlife Service 1997), providing replacement of aquatic and upland habitat at a ratio of at least 3:1.

Disturbance and Loss of GGS and GGS Habitat during Construction

Construction activities for the bridge footings for Golden Valley Parkway and Paradise Road bridges over Paradise Cut would permanently remove 0.52 acre and 0.29 acre of aquatic habitat for GGS, respectively. The trestle and falsework construction for the two bridges would temporarily disturb a total of 0.19 acre of aquatic habitat. Construction-related noise, vibrations, and other physical activities can harass GGSs or disrupt their behavior, as well as cause injury or mortality. In Paradise Cut, construction activities associated with breaching the existing levees would disturb upland habitat.

The installation of bridges for riparian brush rabbit crossings between levee remnants and islands in Paradise Cut would permanently remove 0.02 acre of aquatic habitat. These small bridges would allow riparian brush rabbits and other wildlife to move between levee remnants and islands in Paradise Cut.

In Paradise Cut, breaching the existing levees would temporarily affect approximately 4.89 acres of potential aquatic habitat; all of this area would be converted to another category of aquatic habitat for GGS. Breaching the existing levees in Paradise Cut would remove portions of the levee, converting 9.10 acres of estimated upland habitat to aquatic habitat. The estimate of upland habitat was based on the following assumptions: (1) the levee in the PCIP Area would be breached in two places, each of which is estimated to be 450 feet long and 100 feet wide; and (2) seven breaches in the levee in the PCC area would total 4,085 linear feet at a width of 75 feet (Ascent Environmental, Inc. 2011).

The riprap of Paradise Weir may provide suitable GGS basking and winter hibernation habitat. Smoothing Paradise Weir to reduce potential injury to fish during high flows would permanently remove this basking habitat (0.14 acre) and could eliminate Paradise Weir as suitable winter hibernation habitat because the refugia afforded by the riprap would be filled during the smoothing process.

The 40-acre earthen bench downstream of Paradise Weir would be lowered by approximately 4–5 feet to increase the capacity of Paradise Cut. This activity would temporarily remove 9.03 acres of emergent wetland—aquatic habitat for GGS. This area would be expected to regain suitable aquatic habitat characteristics for GGS following construction activities. Lowering of the bench would also permanently remove 0.34 acre of upland grassland habitat.

Construction in the RID Area would require excavation and permanent fill of portions of the central drainage ditch during earth moving as part of levee improvements, and conversion of portions of the ditch to the internal lake system and the Paradise Cut Canal. Approximately 10.85 acres of the aquatic portion of the ditch would be permanently lost, with a temporary conversion of 0.36 acre of GGS aquatic habitat. An estimated 16.10 acres of upland habitat along the banks of the agricultural ditch would potentially be disturbed.

Dredging at the confluence of Paradise Cut and Old River to connect the new Paradise Cut Canal to the river system would temporarily affect 0.25 acre of aquatic habitat in Paradise Cut.

These construction-related activities could result in significant direct and indirect effects on GGS. The SJMSCP requires full avoidance of habitat known to be occupied by GGS. Although GGS is not expected to be present on the project site, Mitigation Measure BIO-5 is available to address this effect.

Mitigation Measure BIO-5. Implement avoidance and minimization measures for giant garter snake

The following is a summary of SJMSCP and USFWS incidental take avoidance and minimization measures for GGS. If GGS is discovered on the project site, a separate consultation with USFWS under ESA and take authorization from CDFW under CESA may be required.

- Preconstruction surveys for GGS will be conducted within 24 hours of ground disturbance.
- Construction within 200 feet of suitable aquatic habitat for GGS will be conducted during the active period for the snake (May 1–October 1). Between October 2 and April 30, the JPA, with the concurrence of the Permitting Agencies' representatives on the HTAC, will

determine whether additional measures (e.g., daily presence/absence surveys, exclusion fencing) are necessary to minimize and avoid take.

- Vegetation clearing within 200 feet of the banks of potential GGS aquatic habitat will be limited to the minimum area necessary.
- The movement of heavy equipment within 200 feet of the banks of potential GGS aquatic habitat will be confined to existing roadways to minimize habitat disturbance. Before ground disturbance, all onsite construction personnel will be given instructions regarding the presence of GGS and the importance of avoiding effects on this species and its habitats.
- In areas where wetlands, irrigation ditches, or other potential GGS habitats are being retained and are within 200 feet of an active construction area:
  - install temporary fencing around potential GGS habitat;
  - restrict working areas, placement of dredged material, equipment storage, and other project activities to areas outside potential GGS habitat; and
  - maintain water quality and limit construction runoff into wetland areas through the use of hay bales, filter fences, vegetative buffer strips, or other accepted equivalents.
- Other provisions of USFWS's *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).

In addition to the above measures, SJMSCP Incidental Take Mitigation Measure 5.2.4.8 for GGS will be implemented, as applicable.

A. Full avoidance of known occupied GGS habitat is required in compliance with Section 5.5.9 (C) for the following SJMSCP Covered Activities with the potential to adversely affect GGS and that have not been mapped: golf courses; religious assembly; communications services; funeral; internment services; public services—police, fire, and similar; projects impacting channel or tule island habitat; major impact projects including landfills, hazardous waste facilities, correctional institutions, and similar major impact projects; recreational trails and campgrounds, recreational outdoors sports clubs; utility services, museums, and similar facilities. Known occupied GGS habitat is that area west of I-5 on Terminous Tract, Shin Kee Tract, White Slough Wildlife Area, and Rio Blanco Tract. New sites identified during the life of the SJMSCP as confirmed habitat sites for GGS shall be considered known occupied sites for the purposes of this section.

B. For areas with potential GGS habitat, the following is required. Potential GGS habitat elements are described in SJMSCP Section 2.2.2.2 and exist in the *Primary Zone of the Delta* and the Central Zone contiguous with known occupied habitat in the White Slough area north to the San Joaquin/Sacramento County line and south to Paradise Cut; in the Central Zone east of Stockton in Duck Creek, Mormon Slough, Stockton Diverting Canal, Little John's Creek, Lone Tree Creek, and French Camp Slough (wherever habitat elements are present); and the Southern Central Zone and Southwest/ Central Transition Zone including the area east of J4 from the Alameda–San Joaquin County Line to Tracy and the area south of Tracy and east of I-580 to the east edge of Agricultural Habitat Lands east of the San Joaquin River.

   1. If onsite wetlands, irrigation ditches, marshes, etc. are being relocated in the vicinity: the newly created aquatic habitat will be created and filled with water prior to dewatering and destroying the preexisting aquatic habitat. In addition, non-predatory 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.

2. If wetlands, irrigation ditches, marshes, etc. will not be relocated in the vicinity, then the aquatic habitat will be dewatered at least 2 weeks prior to commencing construction.

Mortality and Disturbance of GGS Caused by Domestic Pets and Other Predators Associated with Urban Development

As a result of project development, GGSs, if they were to occur in the proposed action area, may be indirectly affected by increased mortality from domestic pets, particularly cats, or other predators associated with urban development. There would be no direct effects. Mitigation Measure BIO-6 would address this significant indirect effect.

Mitigation Measure BIO-6. Implement an animal control and public education program

Methods to reduce the potential for increased mortality from domestic or feral animals associated with development of the area as well as to educate the public about the sensitivity of listed species and laws protecting them have been integrated into the project design. These design features and methods are discussed below.

A fence, wall, or other barrier will be built along the cross levee to prevent people and domestic pets from entering the area between the cross levee and the west UPRR ROW. The barrier will be designed to prevent cats from crossing from the developed portion of River Islands at Lathrop into this area. A similar barrier will be installed where the Employment Center borders dry land in Paradise Cut. Commercially available fences have been shown to effectively exclude multiple species—including cats and dogs—from entering areas of conservation value (Day et al. 2007). One study recommends that cat fences be at least 1.8 meters high; have an overhang that is at least 600 millimeters in circumference and that is curved or shaped so that animals cannot climb over, and include an apron of high-quality mesh (Robley et al. 2006). Where development borders the Paradise Cut Canal or other water features, the water feature would function as a natural barrier to animal movement between developed and natural areas, especially for cats. In these areas, the primary constraint against incursion by dogs would be enforcement of the City's Municipal Code, which further restricts access by domestic animals, prohibiting dog owners or caretakers from allowing dogs to run freely on any public property or private property in the absence of the property owner's consent (Code 6.12.050). To enforce this provision, animal control officers may impound any dog found in violation and confine the dog at an animal shelter (Code 6.12.050). Codes also direct individuals to report stray and lost animals to the City's Animal Services Division.

River Islands will develop and distribute to residents informational brochures and/or other literature and materials that explain the unique aspects of the River Islands at Lathrop development. Permanent signs will be placed at intervals in Paradise Cut describing the area as protected habitat for sensitive species. Access will be limited and controlled. Visitors will be required to obtain permits and will be restricted to designated trails. The residents of River Islands at Lathrop will also be advised of the uniqueness of Paradise Cut and the habitat it provides for special-status species and the need to control their pets.

River Islands will conduct a trapping program twice each year throughout the PCC Area to remove black rats and feral animals. The trapping program will not occur during the breeding season of riparian brush rabbits (December to May). All captured black rats will be euthanized. If captured cats have tags with owner contact information, the owners will be notified. If owners cannot immediately pick up their pet from trapping personnel (e.g., within approximately

1 hour) or the cats do not have tags, then the captured cats will be turned over to the City Animal Services Division. If a cat has no tags, the animal may be humanely euthanized.

Mortality and Disturbance of GGS from Dredging Activities

Of the approximately 47.43 acres of shallow-water habitat (approximately 10 feet or less) created adjacent to the levee remnants in Paradise Cut, 29.81 acres of shallow water habitat would be open water and 17.62 acres would be vegetated with emergent marsh species and would provide suitable foraging habitat for GGS. Although these locations could be dredged or otherwise managed in the future, the depth would remain less than 10 feet. Mortality or disturbance to GGS could occur during dredging activities. This would constitute a significant direct effect. No indirect effects were identified. However, application to dredging activities of the construction period restriction of May 1–October 1 (see Mitigation Measure BIO-5) would avoid potential disturbance to GGSs during their active period.

Effects on riparian brush rabbit (significant)

The proposed action could result in the loss or disturbance of riparian brush rabbit habitat. Riparian brush rabbit habitat would be temporarily affected by developing recycled water storage and disposal areas; constructing new water, wastewater, and recycled water lines in the UPRR ROW; lowering the bench downstream of Paradise Weir; constructing the Golden Valley Parkway bridge over Paradise Cut; constructing land bridges to connect the levee remnants to the Paradise Cut islands; breaching the existing Paradise Cut levee; loss of habitat around the pond in the RID Area; vegetation removal to comply with the Corps' levee vegetation guidelines; and constructing the Paradise Road bridge (Table 3-9). A total of 36.43 acres of riparian brush rabbit habitat would be temporarily affected by the proposed action (Sycamore Environmental Consultants 2004b). These effects are considered temporary because the affected areas would be revegetated after construction, returning the habitat to existing conditions.

Table 3-9. Riparian Brush Rabbit Habitat Permanently and Temporarily Affected by the Proposed Action (acres)

Project Action	Permanent	Temporary
Improvements and modifications to Stewart Road at the at-grade crossing		1.00
Construction traffic access at UPRR crossing on north Paradise Cut levee		0.01
Construct new water, wastewater, and recycled water lines and develop recycled water storage and disposal areas, as needed, in Paradise Cut	–	0.30
Construct new water, wastewater, and recycled water lines in UPRR ROW	–	0.20
Seven breaches on north Paradise Cut levee in PCC area	1.05	–
Construct designed breach on the upper Paradise Cut levee east of UPRR ROW	0.02	–
Install bridge piers in Paradise Cut for Golden Valley Parkway bridge and Paradise Road bridge	0.01	1.86
Create three land bridges between four levee remnants in PCC area	–	3.84
Setback levee: Two new breaches on upper Paradise Cut levee between eastern UPRR tracks and I-5 (will be restored after breach)	–	0.09
Lower bench west of Paradise Weir (26.08 acres of bench to be lowered 4–5 feet; 3.05 acres disturbed by construction equipment)	–	29.13
Construct Paradise Road Bridge over Paradise Cut (bridge piers)	0.01	–
Loss of habitat around pond on Stewart Tract	0.84	–

Project Action	Permanent	Temporary
Vegetation removal on project levees	9.98	–
Total	11.91	36.43
Source: Ascent Environmental, Inc. 2011.		

Approximately 11.91 acres of riparian brush rabbit habitat would be permanently affected by the proposed action (Table 3-9) (Ascent Environmental, Inc. 2011). Figure 2-4 illustrates the improvements to Paradise Cut that include restoration actions for riparian brush rabbit habitat (these improvements are presented in greater detail in Appendix B).

Permanent effects include the loss of 1.05 acres of habitat when the existing Paradise Cut levee is breached in seven places, and loss of 0.02 acre when the Golden Valley Parkway and Paradise Road bridges over Paradise Cut are constructed. Construction of the designed breach location on the upper Paradise Cut levee east of the UPRR ROW would permanently affect 0.02 acre of riparian brush rabbit habitat.

After construction, temporarily affected areas would be restored at least to existing conditions; in many cases, the value of the habitat would increase. It is anticipated that permanent effects would be mitigated with in-kind onsite habitat creation. There is also a potential to contour the setback levee along Old River to create additional acreage for vegetation restoration, as described in Chapter 2, thereby providing a net increase in riparian habitat. Habitat losses, whether temporary or permanent, are significant direct effects.

Significant indirect effects on brush rabbits could occur as a result of project development; these include increased mortality from domestic pets, particularly feral cats, or from predators associated with urban development, such as rats. Mitigation Measure BIO-6, discussed above in the analysis of effects on GGS, would address this effect. Mitigation Measure BIO-7 would also be implemented.

Mitigation Measure BIO-6. Implement an animal control and public education program

Mitigation Measure BIO-7. Consult with regulatory agencies and implement avoidance and minimization measures for riparian brush rabbit

The SJMSCP requires full avoidance of riparian brush rabbit habitat in Paradise Cut and along the UPRR ROW, because it is known occupied habitat. No conversion of occupied habitat or mortality to individual riparian brush rabbits is allowed under the SJMSCP. For the proposed action to qualify for coverage under the SJMSCP in the context of effects on riparian brush rabbit, a permanent setback of 300 feet from the outer edge of the dripline of riparian vegetation would be required. Because maintenance of such setbacks is not feasible, a separate consultation with USFWS under ESA and CDFW under CESA will be conducted, and an incidental take permit will be required. Specific mitigation measures will be developed during the consultation process. Potential take avoidance measures may include those listed below.

- Conducting preconstruction surveys.
- Conducting daily surveys of construction areas.
- Installing exclusion fencing to prevent brush rabbits from entering construction areas.
- Minimizing vegetation removal.

- Supporting the existing USFWS captive breeding program to establish new populations in appropriate habitat.

Compensation for loss of habitat and other potential effects is expected to include enhancement of existing habitat and creation of additional habitat in Paradise Cut. New high ground areas will be created in the PCIP Area, and the existing Paradise Cut levee will provide new high ground after construction of the setback levee. Suitable vegetation will be planted in these areas. In addition, the levee remnants retained after breaching the Paradise Cut levee will provide upland refugia for riparian brush rabbit, of which none currently exists in the area.

In addition to these measures, the potential for direct take of riparian brush rabbit will be avoided and minimized during construction through implementation of SJMSCP Incidental Take Mitigation Measure 5.2.4.23 for riparian brush rabbit. Implementation of these measures would reduce potential adverse effects on riparian brush rabbit. A summary of the SJMSCP measures, Riparian Brush Rabbit Mitigation and Monitoring Plan measures, and avoidance and minimization measures outlined in the BA is provided below.

SJMSCP Measure 5.2.4.23

This measure sets forth the following specifications.

A. **Occupied Habitat.** Kill of individual riparian brush rabbits and conversion of occupied habitat is prohibited by the SJMSCP unless the provisions of SJMSCP Section 5.5.2.7 have been met. Full avoidance of riparian brush rabbit is required in areas of known occupied habitat in accordance with Section 5.5.9(I). Known occupied habitat for riparian brush rabbit consists of the following vegetation types: Great Valley riparian forest, Great Valley valley oak riparian forest, Great Valley cottonwood riparian forest; arroyo willow thicket; Great Valley mixed riparian forest; Great Valley riparian shrub; mix of riparian scrub and valley grassland; drainage ditch; river/deep water channel wider than 200 feet; tributary stream 100–200 feet wide; creek 20–100 feet wide; dead-end slough; freshwater lake, pond, or vernal pool; and unlined canal. Occupied habitat consists of these vegetation types in Caswell State Park and along the adjoining Stanislaus River; and surrounding Stewart Tract including Paradise Cut and the adjacent UPRR ROW on Stewart Tract, Old River adjacent to Stewart Tract, and the San Joaquin River as it bounds Stewart Tract. Additional populations of riparian brush rabbit identified after the Effective Date of the SJMSCP Permits by the JPA or the Permitting Agencies shall become known occupied riparian brush rabbit habitat.

B. **Potential Habitat.** Conversion of potential habitat for riparian brush rabbit is prohibited by the SJMSCP unless: (1) the provisions of Paragraph C (below) apply; (2) the provisions of SJMSCP Section 5.5.2.7 have been met; or (3) a survey, conducted pursuant to the protocol established in *Survey Methods for Riparian Brush Rabbits* (D. F. Williams and P. A. Kelly—San Joaquin Valley Endangered Species Recovery Planning Program) is undertaken and proves absence for the species. If absence is established by the survey, then the incidental take minimization measures for riparian habitat, established in SJMSCP Section 5.2.4.31, shall apply. Potential riparian brush rabbit habitat is the vegetation types listed above, located along the Stanislaus River downstream of SR 99 to the junction with the San Joaquin River and riparian habitat along the San Joaquin River downstream of the mouth of the Stanislaus River north to and including Tom Paine Slough and Paradise Cut to the Southern Pacific railroad ROW.

Riparian Brush Rabbit Mitigation and Management Plan

Potential for direct take of riparian brush rabbit will be avoided and minimized during construction though implementation of the following measures from the *Riparian Brush Rabbit Mitigation and Monitoring Plan*.

- Riparian brush rabbit habitat will be avoided wherever possible. Where habitat cannot be avoided, disturbance/removal will be minimized to the extent practicable.
- In areas where suitable habitat may be affected, (e.g., the UPRR construction crossing and levee breaching areas), riparian brush rabbit habitat to be preserved adjacent to construction sites will be identified as environmentally sensitive areas. A silt fence or other suitable temporary barrier that would exclude brush rabbits from the construction site will be installed around the construction area where it borders the environmentally sensitive area. Vegetation within the construction area will be removed by hand 2 weeks before construction to ensure that no riparian brush rabbits are present within the construction area. Construction personnel, vehicles, and equipment must remain within the identified construction area. Temporary signage will be placed along the rabbit exclusion fence at 150-foot intervals warning contractors to stay within the construction area. The temporary rabbit exclusion fence and associated signage will be inspected by the construction contractor each morning before beginning construction activities and will be repaired and maintained as necessary. A biological monitor will also inspect the fence at least once a week. The temporary rabbit exclusion fence and signage will be removed after construction activities are no longer required in the exclusion area. If UPRR does not allow installation of a temporary rabbit exclusion fence in its ROW, a biological monitor will be onsite whenever construction activities occur in riparian brush rabbit habitat adjacent to the UPRR ROW where no temporary rabbit exclusion fence is in place. The monitor(s) will be trained before construction and will be responsible for preconstruction surveys, staking resources to avoid disturbance, onsite monitoring, documentation of violations and compliance, coordination with contract compliance inspectors, and postconstruction documentation.
- Remove by hand (hand tools or hand operated power equipment) vegetation in potential riparian brush rabbit habitat to be disturbed at least 2 weeks before construction ground disturbance in the habitat area. Vegetation will be cut to ground level and maintained at ground level throughout the construction period.
- Where a construction access road is proposed to allow vehicle passage across the UPRR ROW just northeast of Paradise Cut, a brush rabbit undercrossing will be incorporated into the access road design. Four 6-inch-diameter pipes (i.e., brush rabbit tunnels) will be installed under the construction access road to allow rabbits to cross under the road without risk of being hit by construction vehicles. The pipes will be steel and secured in concrete. The undercrossing will be of sufficient strength to support the weight of construction vehicles without collapsing. To encourage rabbits to use the undercrossing, a temporary fence will be installed near the entry of the undercrossing structure to “funnel” rabbits toward the pipes as they approach the construction access road. The maintenance and inspection schedule described above for the temporary riparian brush rabbit exclusion fencing will also apply to the temporary fence at the construction crossing. If UPRR will not allow the temporary fence to be installed within its ROW as proposed, River Islands will coordinate with USFWS to determine an alternate approach.

- To the extent possible, earth removal activities during levee breaching will originate from the landside of the levee. This will minimize disturbance of any riparian habitat in the breach area, which is limited to the water side of the levee.
- Land bridges and railroad flatcar bridges will be created/installed to connect levee remnants to each other and other islands in Paradise Cut so that rabbits can move between levee remnants and the main island.
- Areas of temporary habitat disturbance in Paradise Cut will be revegetated with appropriate native plant species consistent with the Paradise Cut Restoration Plan.
- Where the bench is to be lowered near Paradise Weir, vegetation will be removed by hand (hand tools or hand-operated power equipment) in all areas where construction disturbance or staging will take place. Vegetation will be cut to ground level and maintained at ground level throughout the construction period. Vegetation removal will be initiated on the southeastern of the bench and will move progressively west toward the eastern UPRR ROW so that any riparian brush rabbits that might be present will be herded toward the newly created habitat area between the eastern UPRR ROW and I-5. Vegetation removal will be completed at least 2 weeks before ground disturbance on the bench.
- After lowering of the bench near Paradise Weir is complete, disturbed areas will be revegetated with native species consistent with the Levee Restoration Plan.

Biological Assessment Avoidance and Minimization Measures

The Draft BA was prepared in 2005 for the entire River Islands at Lathrop project. The BA was revised in August 2011 to reflect new additional information that has resulted since the preparation of the previous BA. (Ascent Environmental, Inc. 2011.)

Biological Monitoring and Worker Education

Environmentally sensitive areas will be identified in locations where construction activity is to be limited in or near riparian brush rabbit habitat. Construction personnel, vehicles, and equipment must remain within the identified construction area. A silt fence or other suitable temporary barrier will exclude brush rabbits from the construction area when it borders the environmentally sensitive area. Temporary signage will be placed along the rabbit exclusion fence at 150-foot intervals warning contractors to stay within the construction area. The temporary rabbit exclusion fence and associated signage will be inspected by the construction contractor each morning before beginning construction activities and repaired and maintained as necessary. A biological monitor will also inspect the fence at least once a week. The temporary rabbit exclusion fence and signage will be removed after construction activities are no longer required in the exclusion area. If UPRR does not allow installation of a temporary rabbit exclusion fence in its ROW, a biological monitor will be onsite whenever construction activities occur in riparian brush rabbit habitat adjacent to the UPRR ROW where no temporary rabbit exclusion fence is in place.

When in-stream work is to occur, a qualified biologist or resource specialist will be present to monitor construction activities and ensure compliance with mitigation requirements and terms and conditions of permits issued by regulatory agencies. The monitor(s) will be trained before construction and will be responsible for preconstruction surveys, staking resources to avoid disturbance, onsite monitoring, documentation of violations and compliance, coordination with contract compliance inspectors, and postconstruction documentation.

A biological resource education program for construction crews will be conducted before construction activities begin. The education program will include a brief overview of the special-status species and other sensitive resources that may exist on the project site and in what portions of the project site they may occur. The education program will include materials describing resource avoidance, permit conditions, and possible fines for violations of state or federal environmental laws.

Long-Term Population Protection

Methods to reduce the potential for increased mortality from domestic or feral animals associated with the development of the area, as well as efforts to educate the public about the sensitivity of riparian brush rabbits and laws protecting them, have been integrated into the project design. Mitigation Measure BIO-6 (*Implement an animal control and public education program*) would be implemented for the proposed action.

Habitat Creation and Enhancement

Permanent and temporary effects on riparian brush rabbit habitat will be mitigated by preservation, creation, and restoration of habitat (Table 3-10). A total of 86.53 acres of existing riparian brush rabbit habitat will be protected as part of the riparian brush rabbit mitigation plan. An additional 273.39 acres on Paradise Cut will be created and/or restored and preserved in perpetuity resulting in a mitigation ratio of more than 141:1 for permanent effects. The total area of permanently protected habitat for riparian brush rabbit after project completion will be 359.92 acres. An additional 47.43 acres of habitat for riparian brush rabbit will be preserved and restored in the PCIP Area but cannot be preserved in perpetuity because this area is not owned or controlled by River Islands. Much of the new habitat to be created will be above the current floodplain. Details regarding the restoration and creation of riparian brush rabbit habitat are provided in the *Riparian Brush Rabbit Mitigation and Management Plan* (Appendix B). Another 8.55 acres of additional riparian brush rabbit will be created along the cross levee paralleling the UPRR tracks in an area that will not be actively managed.

Table 3-10. Mitigation for Permanent and Temporary Effects on Riparian Brush Rabbit Habitat

Feature	Location	Habitat Treatment	Acres	Included in Preserve?
Restoration units in PCC Area	PCC	Create	212.77	Yes
Levee remnants and land bridges	PCC	Create	47.83	Yes
		Total habitat created	260.60	
Existing habitat on perimeters of islands	PCC	Preserve/avoid	86.53	Yes
		Total habitat preserved in perpetuity	347.13	
Setback levee; levee remnant; south bank of setback levee; area between setback levee and remnant	PCIP	Create	12.79	No
Levee bench and adjacent flood refugia	PCIP	Restore/create	47.43	No
		Total riparian brush rabbit habitat	407.35	

Source: Sycamore Environmental Consultants 2004b.
Note: Does not include 8.55 acres of habitat created along the cross levee.

Effects on bats (less than significant)

Construction of the proposed action could remove foraging habitat for bats (red bat, Yuma myotis, Townsend's big eared bat, and greater western mastiff-bat), but foraging habitat is locally and regionally abundant. The proposed action area is not expected to contain important roost sites that would be affected. The direct effects on bats are less than significant. No indirect effects were identified.

Effects on tricolored blackbird (less than significant)

Suitable foraging habitat for tricolored blackbird is present but no nesting colonies are known to occur in the proposed action area, and suitable foraging habitat is locally and regionally available. Direct effects on tricolored blackbird are anticipated to be less than significant. No indirect effects were identified.

Effects on western burrowing owl (significant)

Burrowing owls are not known to nest in the proposed action area, but evidence of their presence has been observed in the RID Area. Potential burrow habitat in the proposed action area is limited to agricultural field edges and levees along the San Joaquin River, Old River, and Paradise Cut, and suitable burrows are expected to be limited in number as a result of intensive agricultural activity and low numbers of California ground squirrels. Nevertheless, suitable burrowing owl breeding habitat is present and occupied burrows could be destroyed and nesting owls could be disturbed by nearby construction activities, potentially resulting in nest abandonment and mortality of chicks and eggs.

Agricultural fields, fallow fields, and other areas of herbaceous vegetation in the RID and PCC Areas provide suitable foraging habitat. Approximately 2,155 acres of potential foraging habitat would be lost in the RID Area. An additional 190 acres would be converted to open water by improvements in Paradise Cut. Loss of potential foraging habitat would be a significant direct effect, as would loss or disturbance of occupied burrows. No indirect effects were identified. Mitigation Measure BIO-8 would address this direct effect.

Mitigation Measure BIO-8. Implement avoidance and minimization measures for burrowing owl

Preconstruction surveys for burrowing owls will be conducted within 75 meters of areas of project activity in locations with potential to contain burrows—field edges, roadsides, levees, and fallow fields. Actively farmed agricultural fields and regularly disked or graded fields do not provide suitable burrow sites and need not be surveyed. The survey will be conducted within 1 week before the beginning of construction. If burrowing owls are found, the following measures will be implemented.

- During the nonbreeding season (September 1–January 31), burrowing owls occupying the project site will be evicted from the site by passive relocation as described in CDFW's *Staff Report on Burrowing Owls* (California Department of Fish and Game 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 and unless the HTAC, with the concurrence of the permitting agencies' representatives on the HTAC, or a qualified biologist approved by the permitting agencies, verifies through noninvasive means that either (1) the birds have not begun egg laying or (2) juveniles from the occupied burrows are foraging independently and are capable of independent survival. After the fledglings are capable of independent survival, the burrow can be destroyed.

In addition, River Islands would be required to implement the SJMSCP Incidental Take Mitigation Measure 5.2.4.15 for western burrowing owl. This measure is detailed below.

SJMSCP Measure 5.2.4.15

The presence of ground squirrels and their burrows is attractive to burrowing owls. Burrowing owls may therefore be discouraged from entering or occupying construction areas by discouraging the presence of ground squirrels. To accomplish this, River Islands should prevent ground squirrels from occupying the proposed action area early in the planning process by employing one of the following practices.

A. Plant new vegetation or retain existing vegetation entirely covering the site at a height of approximately 36 inches above the ground. Vegetation should be retained until construction begins. Vegetation will discourage both ground squirrel and owl use of the site.

B. Alternatively, if burrowing owls are not known or suspected on a project site and the area is an unlikely occupation site for red-legged frog, San Joaquin kit fox, or tiger salamander, then River Islands may disk or plow the entire site to destroy any ground squirrel burrows. At the same time burrows are destroyed, ground squirrels should be removed through one of the following approved methods to prevent reoccupation of the project site.

   1. **Anticoagulants.** Establish bait stations using the approved rodenticide anticoagulants Chlorophacinone or Diphacinone. Rodenticides will be used in compliance with U.S. Environmental Protection Agency (EPA) label standards and as directed by the San Joaquin County Agricultural Commissioner.
   2. **Zinc phosphide.** Establish bait stations with non-treated grain 5–7 calendar days in advance of rodenticide application, then apply zinc phosphide to bait stations. Rodenticides shall be used in compliance with EPA label standards and as directed by the San Joaquin County Agricultural Commissioner.

3. **Fumigants.** Use below-ground gas cartridges or pellets and seal burrows. Approved fumigants include aluminum phosphide (Fumitoxin, Phostoxin) and gas cartridges sold by the local Agricultural Commissioner's office. Note: Crumpled newspaper covered with soil is often an effective seal for burrows when fumigants are used. Fumigants will be used in compliance with EPA label standards and as directed by the San Joaquin County Agricultural Commissioner.

4. **Traps.** For areas with minimal rodent populations, traps may be effective for eliminating rodents. If trapping activities are required, their use shall be consistent with all applicable laws and regulations.

These incidental take minimization measures are consistent with the provisions of the MBTA as described in Section 5.2.3.1(G) of the SJMSCP. Detailed descriptions of these methods are included in Appendix A of the SJMSCP.

Effects on Swainson's hawk (significant)

The proposed action has the potential to disturb Swainson's hawks and result in the permanent loss of habitat. Nine Swainson's hawk nests were documented in or within 2 miles of the proposed action area in 1994 (Sycamore Environmental Consultants 1995). Nesting pairs within 0.25 mile of construction activities could be disturbed, potentially resulting in nest abandonment and mortality of chicks and eggs.

Suitable Swainson's hawk foraging habitat would be lost, and loss of active nests could occur as a result of the proposed action. Agricultural and fallow fields in the RID and PCC Areas provide suitable Swainson's hawk foraging habitat. Approximately 2,155 acres of suitable foraging habitat in the RID Area would be lost. An additional 190 acres would be converted to open water through the creation of the Paradise Cut Canal. Loss of foraging habitat would be a significant direct effect. Swainson's hawks have been known to nest in the RID, PCIP, and PCC Areas. Removal of suitable nest trees would be limited to those few present at the pond and other scattered locations in the RID Area. Direct nest loss could result from tree removal. This would be a significant direct effect. There would be no indirect impacts.

Because River Islands would seek coverage under the SJMSCP, it is anticipated that the SJMSCP would be the mechanism used to mitigate effects of the proposed action on Swainson's hawk.

Mitigation Measure BIO-9. Implement minimization measures for Swainson's hawk

The City has obtained a CESA Management Authorization from CDFW for the WLSP to offset the effects on Swainson's hawk from development of West Lathrop. The management authorization is dependent on implementation of the WLSP habitat management agreement for Swainson's hawk (Sycamore Environmental Consultants 1995). However, because the project proponent would seek coverage under the SJMSCP, it is anticipated that the SJMSCP would be the mechanism used to mitigate effects of the proposed action on Swainson's hawk. As an alternative, the existing management authorization could be used. A summary of both mitigation alternatives is provided below.

The following minimization measures are a summary and clarification of those set forth in the SJMSCP (City of Lathrop 2002). These measures would be implemented in addition to payment of development fees required by the SJMSCP for funding of the establishment of habitat conservation areas.

- If project activity would occur during the Swainson's hawk nesting season (March 1–August 15), preconstruction surveys will be conducted during the nesting season in areas with suitable nest trees in and immediately adjacent to the construction area. The survey will be conducted within 1 week before the beginning of construction.
- If an active nest is found, all construction activities will remain a distance of two times the dripline of the tree, measured from the nest. A setback of this distance will be established and maintained during the nesting season for the period encompassing nest building and continuing until fledglings leave the nest. This setback applies whenever construction or other ground-disturbing activities must begin during the nesting season in the presence of nests that are known to be occupied. Setbacks will be marked by brightly colored temporary fencing.

The following measures are a summary of those set forth in the CESA Management Authorization from CDFW for the WLSP.

- Mitigation for the loss of suitable Swainson's hawk foraging habitat will be provided at a ratio of 0.5 acre of dedicated habitat to 1 acre of foraging habitat to be lost.
- Before project construction that would occur during the nesting season (March 1–August 15), surveys will be conducted for active Swainson's hawk nests in areas with suitable nest trees within 0.25 mile of the proposed construction area. Large trees throughout the project site provide suitable habitat. Surveys will be conducted at the beginning of the nesting season (April 15–April 30). A visible exclusion zone will be established around the portion of the construction area that occurs within 0.25 mile of the nest tree, and no project construction activity will commence in the exclusion zone between March 1 and August 15. Nests will be revisited during the post-hatching stage (June 1–June 30) and during the fledging period (July 1–July 31) to determine the number of juveniles that have fledged.
- All active and historic (those used during the previous 5 years) Swainson's hawk nest trees in the project area will be preserved during implementation of the proposed project. No construction will occur within 100 feet of a historic nest tree. A visible 100-foot exclusion zone will be established around any historic nest tree located within 150 feet of a designated construction area.

These minimization measures are consistent with the provisions of the MBTA as described in Section 5.2.3.1(G) of the SJMSCP.

Effects on northern harrier (significant)

The proposed action could result in disturbance of northern harriers and loss of nesting habitat. Suitable nesting habitat for northern harrier occurs in the PCIP Area near Paradise Weir and suitable foraging habitat is available in the RID Area, the PCC Area, and the PCIP Area. Construction activities could result in the temporary loss of nesting habitat near Paradise Weir. This would be a significant direct effect. No indirect effects were identified. Mitigation Measure BIO-10 would address this direct effect.

Mitigation Measure BIO-10. Implement avoidance and minimization measures for ground-nesting or streamside/lakeside-nesting birds

- If construction activity would occur during the northern harrier nesting season (March 15–September 15), preconstruction surveys will be conducted during the nesting season in suitable nesting habitat within 500 feet of areas of construction activity. Suitable habitat is currently limited to the bench in the PCIP Area but could include fallow fields if they are allowed to develop herbaceous cover. The survey will be conducted within 1 week before the beginning of construction.
- 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.

Effects on white-tailed kite (significant)

Suitable nesting habitat for white-tailed kite is present in riparian habitat in the proposed action area, and nests have been documented along the San Joaquin River and the UPRR tracks in the RID Area (City of Lathrop 1995). Active nests could be lost as a result of construction in or near riparian habitat. Direct loss could result from tree removal, and nesting pairs could be disturbed by nearby project activity, potentially resulting in nest abandonment and mortality of chicks and eggs. This would be a significant direct effect. No indirect effects were identified. Mitigation Measure BIO-11 would address this direct effect.

Mitigation Measure BIO-11. Implement avoidance and minimization measures for birds nesting along riparian corridors

- If construction activity would occur during the 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 construction activity. Suitable nesting habitat is present in the PCIP Area and in riparian patches adjacent to the San Joaquin River and in the PCC Area. The survey will be conducted within 1 week before the beginning of construction or tree removal.
- 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.

In addition to the above measures, the following minimization measure from the SJMSCP would also apply.

SJMSCP Measure 5.2.4.19

A. For white-tailed kites, preconstruction surveys will investigate all potential nesting trees on the project site (e.g., especially treetops 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 onsite or within the vicinity during the nesting season.

This measure is consistent with the provisions of the MBTA as described in Section 5.2.3.1(G) of the SJMSCP.

Effects on greater sandhill crane (less than significant)

Suitable winter foraging habitat for greater sandhill crane would be lost, but suitable foraging habitat for this species is locally and regionally available. Cranes are highly mobile while they forage and can easily relocate to nearby foraging sites in the event of a disturbance at the foraging field. There is virtually no risk of actually killing or harming (taking) one of these birds during SJMSCP Permitted Activities. Direct and indirect effects on greater sandhill crane would be less than significant.

Effects on loggerhead shrike (significant)

Loggerhead shrike nesting habitat in isolated trees or shrubs outside riparian habitat could be lost during vegetation removal around Paradise Weir. Shrikes that may nest along the UPRR tracks and in Paradise Cut could be disturbed by nearby project construction. This would be a significant direct effect. No indirect effects were identified. Mitigation Measure BIO-12 would address this direct effect.

Mitigation Measure BIO-12. Implement avoidance and minimization measures for birds nesting in isolated trees or shrubs outside riparian habitat

- If construction activity would occur during the loggerhead shrike nesting season (March 1–August 31), preconstruction surveys will be conducted during the nesting season in suitable nesting habitat within 100 feet of areas of construction activity. Suitable nesting habitat includes areas with naturally occurring shrubs and small trees, including the UPRR tracks west of 1-5, the PCIP Area, and the PCC Area. The survey will be conducted within 1 week before the beginning of construction.
- 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.

These measures are consistent with the provisions of the MBTA as described in Section 5.2.3.1(G) of the SJMSCP.

Effects on American white pelican (less than significant)

Suitable foraging habitat for American white pelican would be lost, but suitable foraging habitat is locally and regionally available. Due to the considerable distance between the proposed action area and large bodies of water, there is a low potential that American white pelicans would be present in the proposed action area. Direct and indirect effects on American white pelican are anticipated to be less than significant.

Effects on yellow-breasted chat, yellow warbler, and other migratory bird species (significant)

Heavy equipment and human activity during construction would increase noise in the vicinity of the work area, potentially resulting in disturbance of migratory birds, such as yellow-breasted chat and yellow warbler, nesting and foraging in the proposed action area. If occupied nests are present in or adjacent to the construction area, construction activities could result in the abandonment of nests, the death of nestlings, and the destruction of eggs in active nests. This would constitute a significant direct effect. During and following the buildout period, ongoing human presence could continue to disturb nesting birds, constituting a significant indirect effect.

Migratory birds, raptors, and their nests are protected under the MBTA and the CFGC. Disturbance of nesting migratory birds or raptors constitutes a significant effect. Mitigation Measure BIO-13 would address this effect.

Mitigation Measure BIO-13. Conduct preconstruction surveys for nesting migratory bird species and establish buffer zones as necessary

Prior to the start of construction activities that begin during the migratory bird nesting period (January 15–September 15), River Islands will retain a qualified wildlife biologist to conduct a survey for nesting migratory birds that could nest in the proposed action area, including special-status species such as yellow-breasted chat and yellow warbler. Surveys will cover all suitable migratory bird nesting habitat that will be affected directly or by disturbance, including habitat potentially used by ground-nesting migratory bird species.

All nesting migratory bird surveys will be conducted no more than 2 weeks (14 days) prior to any activity related to the proposed action that could affect migratory birds. With the exception of raptor nests, inactive bird nests may be removed. No birds, nests with eggs, or nests with hatchlings will be disturbed. In addition, nesting bird preconstruction surveys will be conducted prior to ground disturbance, including site preparation.

If an active nest is discovered, a no-disturbance buffer zone around the nest tree (or, for ground-nesting species, the nest itself) will be established by the qualified wildlife biologist. The no-disturbance zone will be marked with flagging or fencing that is easily identified by the construction crew and will not affect the nesting bird. Buffer widths will be based on professional judgment of the wildlife biologist and the proximity of the nest to construction activities, whether the nest would have a direct line of sight to construction activities, existing disturbance levels at the nest, local topography and vegetation, the nature of proposed activities, and the species potentially affected. Buffer widths may be modified based on discussions with CDFW. Buffers will remain in place as long as the nest is active or young remain in the area. No construction presence or activity of any kind will be permitted within any buffer zone until the biologist determines that the young have fledged and moved away from the area and the nest is no longer active.

Effects on wildlife corridors (significant)

The San Joaquin River Wildlife Corridor outlined in the SJMSCP (Section 5.5.2.3) encompasses approximately 19 miles of the San Joaquin River (or approximately 38 linear miles of riverbank on both sides of the river). Although the proposed action is generally consistent with the provisions of the SJMSCP, the RID Area occupies approximately 5 miles of the western riverbank within this corridor, which extends 600 feet to either side of the river. Development along the southern 3 miles of this segment would be limited to walkways and docks. These structures are not expected to have a significant effect on wildlife movement. In addition, existing habitat along this portion of the river would be retained and enhanced as part of the proposed action.

However, the Lathrop Landing back bay and adjacent commercial development to the north and west could act as a barrier to wildlife movement, excluding terrestrial wildlife from approximately 2 miles at the end of the wildlife corridor between Lathrop Landing and Old River, or approximately 5.3% of the total riverbank in the SJMSCP wildlife corridor. Such a barrier to terrestrial wildlife access to these 2 miles of riverbank is not likely to interfere substantially with the movement of terrestrial wildlife species or with established wildlife corridors, because this segment supports very little vegetation and provides little value as wildlife habitat. In addition, Old River acts as a barrier to the movement of terrestrial wildlife along the western bank of the San Joaquin River beyond this 2-mile area. Moreover, habitat improvements in Paradise Cut would enhance its function as a wildlife corridor connecting the San Joaquin River south of Lathrop Landing to the Old River system. However, development of Lathrop Landing in the San Joaquin River Wildlife Corridor would conflict with the SJMSCP restriction on development in this area. This disruption would constitute a significant direct effect on an identified wildlife corridor. No indirect effects were identified. Construction of the Lathrop Landing back bay on the San Joaquin River would conflict with the SJMSCP prohibition against development in the San Joaquin River Wildlife Corridor. Mitigation Measure BIO-14 would address this inconsistency with the SJMSCP.

Mitigation Measure BIO-14. Require coordination with appropriate entities to obtain minor revision to the SJMSCP

Coordination with the HTAC, JPA, and resource agencies (USFWS and CDFW) will be conducted to obtain a minor revision, minor amendment, or major amendment, as appropriate, to the SJMSCP. No amendment to the incidental take permit is anticipated, because development of the riverbank (with implemented mitigation measures) is not expected to result in significant effects on any state- or federally listed species.

During this coordination process, it will be determined if any compensation will be required. Compensation may include, but would not necessarily be limited to, onsite or offsite habitat improvements along the San Joaquin River, such as restoration of other areas in the corridor that provide limited habitat for terrestrial wildlife. In addition, habitat improvements in Paradise Cut may serve as compensation because they would enhance its function as a wildlife corridor connecting the San Joaquin River to the Old River system.

3.2.3.2 Alternative 2—No Alteration of Paradise Cut

Under Alternative 2, all alterations to Paradise Cut would be avoided. Alterations to the Paradise Cut levee would entail construction of an interior setback levee along Paradise Cut. No restoration or creation of riparian or shallow-water habitat as described for the proposed action would take place in Paradise Cut. Because the remaining activities conducted under this alternative would be predominantly the same as those under the proposed action, the effects would also be the same. The individual effects are summarized below; for those effects that are identical to those under the proposed action, the reader is directed to the analysis presented for Alternative 1.

Effects on common upland biological communities (less than significant)

Direct and indirect effects on upland biological communities would be less than significant.

Effects on special-status plant species (significant)

There is potential for a significant direct effect on special-status plant species. No indirect effects were identified.

Effects on waters of the United States (significant)

Avoiding Paradise Cut would result in less temporary and permanent effects on jurisdictional waters under Alternative 2 than under the proposed action. Under Alternative 2, temporary effects on jurisdictional waters would be reduced by 16 acres (12.73 acres of wetland and 3.27 acres of other waters) and permanent effects would be reduced by 0.04 acre of wetland compared to the proposed action. However, Alternative 2 would still result in a total of 10.55 acres of effects on waters of the United States (5.35 acres of temporary effects and 5.20 acres of permanent effects) (Table 3-11).

Table 3-11. Effects on Waters of the United States—Alternative 2

	Temporary Effects[a]			Permanent Effects		
Activity	Total	Wetland[b]	Other Waters[b]	Total	Wetland[b]	Other Waters[b]
Central drainage ditch converted to Inner Lake	4.49	–	4.49	–	–	–
Central drainage ditch converted to Paradise Cut Waters	Effect eliminated: 0.36	–	Effect eliminated: 0.36	–	–	–
Fill/borrow excavation, central drainage ditch	–	–	–	4.39	–	4.39
Fill of pond for extension of Paradise Cut levee				3.61	0.84	2.77
Excavation of wetland to lower terrace bench near Paradise Weir	Effect eliminated: 9.03	Effect eliminated: 9.03	–	–	–	–
Dredging to connect Paradise Cut Canal with Old River	Effect eliminated: 0.25	–	Effect eliminated: 0.25	–	–	–
Breaching of existing Paradise Cut levee after new levee complete	Effect eliminated: 6.36	Effect eliminated: 3.70	Effect eliminated: 2.66	–	–	–
Fill to install riparian brush rabbit crossings connecting Paradise Cut islands	–	–	–	Effect eliminated: 0.04	Effect eliminated: 0.04	–
Fill to install maintenance Bridge connecting Paradise Cut islands	–	–	–	–	–	–
Trestle and falsework construction for Golden Valley Parkway bridge over Paradise Cut	0.14	–	0.14	–	–	–

Activity	Temporary Effects[a] Total	Temporary Effects[a] Wetland[b]	Temporary Effects[a] Other Waters[b]	Permanent Effects Total	Permanent Effects Wetland[b]	Permanent Effects Other Waters[b]
Footings for Golden Valley Parkway bridge over Paradise Cut	–	–	–	0.52		0.52
Trestle and falsework construction for Paradise Road bridge over Paradise Cut	0.05	–	0.05	–	–	–
Footings for Paradise Road bridge over Paradise Cut	–	–	–	0.29		0.29
Dredging of San Joaquin River for Lathrop Landing back bay entrance	0.41	–	0.41	–	–	–
Cut for levee breach for Lathrop Landing back bay entrance	0.26	–	0.26	–	–	–
Total	5.35	–	5.35	8.81	0.84	7.97

Source: EDAW 2005; Ascent Environmental, Inc. 2011; ICF aerial photo interpretation.

[a] The *Temporary Effects* category includes recoverable disturbances as well as conversion to another type of jurisdictional waters.

[b] Extent of effects on wetland and other waters was derived by visually estimating the proportion of each category in the affected area.

The loss, disturbance, and/or alteration of jurisdictional waters of the United States under Alternative 2 would be a significant direct effect. No indirect effects were identified. Mitigation Measure BIO-2 would address this direct effect.

Effects on riparian habitat (significant)

As shown in Table 3-7, it is estimated that 49.98 acres of riparian vegetation would be removed under the proposed action. Under Alternative 2, the 40-acre bench in the PCIP area would not be lowered, and effects in this area would not occur. However, Alternative 2 would still result in a total of 9.98 acres of effects on riparian habitat along Old River (Table 3-7).

The loss, disturbance, and/or alteration of riparian habitat resulting from implementing Alternative 2 would be a significant direct effect. No indirect effects were identified. Mitigation Measure BIO-2 would address this direct effect.

Effects on valley elderberry longhorn beetle habitat (significant)

Although Alternative 2 would not result in effects in Paradise Cut, elderberry shrubs (habitat for valley elderberry longhorn beetle) are present in the RID Area along Old River, resulting in the potential for direct effects on VELB. No indirect effects were identified. These effects would be reduced under Alternative 2 by the elimination of construction activities within Paradise Cut, but the potential for a significant direct effect still remains. Mitigation Measure BIO-3 would address this effect.

Effects on western pond turtle (less than significant)

Avoiding all alterations of Paradise Cut under Alternative 2 would reduce the likelihood of disturbance or mortality of western pond turtles in aquatic and upland habitat from levels possible under the proposed action because no levee breaching or weir alterations would occur at Paradise Cut.

Although the effects on western pond turtle upland nesting habitat would be unlikely to occur, the potential for a significant direct effect on aquatic habitat remains. While permanent losses of aquatic habitat would be only 0.02 acre less than under the proposed action, temporary losses would be reduced by 5.97 acres, because no existing levies would be breached and there would be no disturbance associated with dredging the confluence of the Paradise Cut Canal and Old River. Although this would be a less-than-significant effect, Mitigation Measure BIO-4 is available to address this direct effect. No indirect effects were identified.

Effects on giant garter snake (significant)

Temporary disturbance of GGS in aquatic and upland habitat would be reduced under Alternative 1, since no construction activity would occur within Paradise Cut under this alternative. Moreover, no dredging would occur in Paradise Cut under this alternative. However, because suitable habitat occurs in the RID Area (drainage ditches, pond, and river edges along Old River), there would still be potential for mortality during construction. Mitigation Measures BIO-5 and BIO-6 would address this effect. Although no loss of riparian habitat would take place along Paradise Cut under Alternative 1, the habitat restoration and creation described for Paradise Cut would also not take place. There would be significant direct and indirect effects on giant garter snake.

Effects on riparian brush rabbit (significant)

Temporary disturbance and possible mortality of riparian brush rabbits resulting from construction activities would not occur under Alternative 2, since activities affecting riparian brush rabbits (creation of Paradise Cut Canal; breaching of existing Paradise Cut levees to create levee remnants; and alterations to Paradise Cut floodway, Paradise Weir, and PCC and PCIP Areas) would not take place. Suitable habitat for riparian brush rabbit also exists in the vicinity of the UPRR alignment (west of I-5) near the portion of the cross levee still to be built, construction of which has the potential to affect approximately 0.32 acre of riparian brush rabbit habitat. Consequently, Alternative 2 would have significant direct effects on riparian brush rabbit. Although minimal loss of riparian brush rabbit habitat would take place along Paradise Cut (a reduction of 1.07 acres for this direct effect), the habitat restoration and creation in the PCC and PCIP Areas under the proposed action would also not take place. Moreover, the increased presence of domestic pets, feral cats, and rats associated with establishment of a large mixed-use development adjoining a known population of riparian brush rabbit would result in significant indirect effects on the species.

Effects on bats (less than significant)

Direct effects on bats are anticipated to be less than significant. No indirect effects were identified.

Effects on tricolored blackbird (less than significant)

Direct effects on tricolored blackbird are anticipated to be less than significant. No indirect effects were identified.

Effects on western burrowing owl (significant)

Loss of potential foraging habitat would be a significant indirect effect. Loss or disturbance of occupied burrows would be a significant direct effect. Mitigation Measure BIO-8 would address this effect.

Effects on Swainson's hawk (significant)

Swainson's hawks have been known to nest in the RID, PCC, and PCIP Areas. Under Alternative 2, no effects on Swainson's hawk foraging or nesting habitat would occur in the PCC and PCIP Areas; however, foraging and potential nesting habitat in the RID Area would still be affected. This would constitute a significant direct effect. No indirect effects were identified. Mitigation Measure BIO-9 would address this direct effect.

Effects on northern harrier (significant)

Suitable nesting habitat for northern harrier occurs in the PCIP Area. Because no modifications would be undertaken in Paradise Cut under this alternative, there would be no significant direct effect in this area; however, the loss of foraging habitat in the RID Area would constitute a significant direct effect. No indirect effects were identified.

Effects on white-tailed kite (significant)

The significant direct effects on white-tailed kite would be the same under Alternative 3 as under the proposed action.

Effects on greater sandhill crane (less than significant)

Direct effects on greater sandhill crane would be less than significant. No indirect effects were identified.

Effects on loggerhead shrike (significant)

The potential for significant direct effects throughout the proposed action area would be considerably less than under the proposed action, because vegetation removal would not take place in Paradise Cut. Nevertheless, the potential for loss of nesting habitat along the UPRR tracks remains. Mitigation Measure BIO-12 would address this significant direct effect. No indirect effects were identified.

Effects on American white pelican (less than significant)

Direct effects on American white pelican would be less than significant. No indirect effects were identified.

Effects on yellow-breasted chat, yellow warbler, and other migratory bird species (significant)

The potential for significant direct and indirect effects on migratory bird species would be the same under Alternative 3 as under the proposed action.

Effects on wildlife corridors (significant)

The significant direct effect on the wildlife corridor along the San Joaquin River would be the same under Alternative 3 as under the proposed action.

3.2.3.3 Alternative 3—Avoidance of Central Drainage Ditch

Alternative 3 proposes construction of all the components of proposed action, but would avoid and retain the central drainage ditch in the RID Area, which provides potential suitable habitat for giant garter snake and western pond turtle. The individual effects are summarized below; for those effects that are identical to those under the proposed action, the reader is directed to the analysis presented for Alternative 1.

Effects on common upland biological communities (less than significant)

Direct and indirect effects on upland biological communities would be less than significant.

Effects on special-status plant species (significant)

There is potential for a significant direct effect on special-status plant species. No indirect effects were identified.

Effects on waters of the United States (significant)

Avoiding the central drainage ditch under Alternative 3 would reduce effects on waters of the United States. Permanent effects on jurisdictional waters would be reduced by 4.39 acres of other waters. Alternative 3 would still result in a total of 17.35 acres of effects on waters of the United States (16.50 acres of temporary effects and 0.85 acre of permanent effects) (Table 3-12).

Table 3-12. Effects on Waters of the United States (acres)—Alternative 3

	Temporary Effects[a]			Permanent Effects		
Activity	Total	Wetland[b]	Other Waters[b]	Total	Wetland[b]	Other Waters[b]
Central drainage ditch converted to Inner Lake	Effect eliminated: 4.49	–	Effect eliminated: 4.49	–	–	–
Central drainage ditch converted to Paradise Cut waters	Effect eliminated: 0.36	–	Effect eliminated: 0.36		–	
Fill/borrow excavation, central drainage ditch	–	–	–	Effect eliminated: 4.39	–	Effect eliminated: 4.39
Excavation of wetland to lower terrace bench near Paradise Weir	9.03	9.03		–	–	–
Dredging to connect Paradise Cut Canal with Old River	0.25		0.25			–
Breaching of existing Paradise Cut levee after new levee complete	6.36	3.70	2.66	–	–	–

	Temporary Effects[a]			Permanent Effects		
Activity	Total	Wetland[b]	Other Waters[b]	Total	Wetland[b]	Other Waters[b]
Fill to install riparian brush rabbit crossings connecting Paradise Cut islands	–	–	–	0.04	0.04	
Fill to install maintenance bridge connecting Paradise Cut islands	–	–	–	–	–	–
Trestle and falsework construction for Golden Valley Parkway bridge over Paradise Cut	0.14		0.14	–	–	–
Footings and roadway for Golden Valley Parkway bridge over Paradise Cut	–	–	–	0.52	–	0.52
Trestle and falsework construction for Paradise Road bridge over Paradise Cut	0.05		0.05	–	–	–
Footings for Paradise Road bridge over Paradise Cut	–	–	–	0.29	–	0.29
Dredging of San Joaquin River for Lathrop Landing back bay entrance	0.41		0.41	–	–	–
Breaching existing San Joaquin River levee for Lathrop Landing back bay entrance	0.26		0.26	–	–	–
Total	16.50	12.73	3.77	0.85	0.04	0.81

Source: EDAW 2005; Ascent Environmental, Inc. 2011.

[a] The *Temporary* category includes recoverable disturbances as well as conversion to another type of jurisdictional water.

[b] Acres of effect for wetland and other waters was derived by visually estimating the proportion of each category in the proposed action area.

The loss, disturbance, and alteration of jurisdictional waters of the United States under Alternative 2 would be a significant direct effect. No indirect effects were identified. Mitigation Measure BIO-2 would address this direct effect.

Effects on riparian habitat (significant)

The loss, disturbance, and/or alteration of riparian habitat under Alternative 3 would be a significant direct effect. No indirect effects were identified. Mitigation Measure BIO-2 would address this direct effect.

Effects on valley elderberry longhorn beetle habitat (significant)

The potential for significant direct effects under Alternative 3 is the same as that under the proposed action. No indirect effects were identified. Mitigation Measure BIO-3 would address this direct effect.

Effects on western pond turtle (significant)

The potential for significant effects under Alternative 3 would be similar to that under the proposed action; however, while there would be no loss of habitat associated with the fill and conversion of the central drainage ditch, neither would the potential increase of suitable aquatic habitat associated with creation of the internal lake system take place. Loss of aquatic habitat would constitute a significant direct effect. No indirect effects were identified. Mitigation Measure BIO-4 would address this direct effect.

Effects on giant garter snake (significant)

Temporary disturbance of GGS and aquatic habitat for GGS would be reduced under Alternative 3, because the central drainage ditch would be avoided. While the aquatic habitat in the central drainage ditch would remain intact, development would likely encroach on the surrounding upland habitat. The other effects—those associated with associated with improvements in the PCC Area and the PCIP Area—would remain the same under Alternative 3 as under the proposed action; accordingly, there would be significant direct and indirect effects. Mitigation Measures BIO-5 and BIO-6 would address this effect.

Effects on riparian brush rabbit (significant)

Significant direct and indirect effects on riparian brush rabbit would be the same as under the proposed action.

Effects on bats (less than significant)

Direct effects on bats would be less than significant. No indirect effects were identified.

Effects on tricolored blackbird (less than significant)

Direct effects on tricolored blackbird would be less than significant. No indirect effects were identified.

Effects on western burrowing owl (significant)

Loss of potential foraging habitat and loss or disturbance of occupied burrows would be significant direct effects. No indirect effects were identified. Mitigation Measure BIO-8 would address these direct effects.

Effects on Swainson's hawk (significant)

The significant direct effects on Swainson's hawk foraging and nesting habitat in the RID, PCC, and PCIP Areas would be similar under Alternative 3 to those under the proposed action. No indirect effects were identified. Mitigation Measure BIO-9 would address these effects.

Effects on northern harrier (significant)

The significant direct effects on northern harrier would be the same under Alternative 3 as under the proposed action. No indirect effects were identified.

Effects on white-tailed kite (significant)

The significant direct effects on white-tailed kite would be the same under Alternative 3 as under the proposed action. No indirect effects were identified.

Effects on greater sandhill crane (less than significant)

Direct effects on greater sandhill crane would be less than significant. No indirect effects were identified.

Effects on loggerhead shrike (significant)

The potential for significant direct effects throughout the proposed action area would be the same as under the proposed action. No indirect effects were identified. Mitigation Measure BIO-12 would address this direct effect.

Effects on American white pelican (less than significant)

Direct effects on American white pelican would be less than significant. No indirect effects were identified.

Effects on yellow-breasted chat, yellow warbler, and other migratory bird species (significant)

The potential for significant direct and indirect effects on migratory bird species would be the same under Alternative 3 as under the proposed action. Mitigation Measure BIO-1 would address this effect.

Effects on wildlife corridors (significant)

The significant direct effect on the wildlife corridor along the San Joaquin River would be the same under Alternative 3 as under the proposed action. Mitigation Measure BIO-14 would address this effect.

3.2.3.4 Alternative 4—Proposed Action with Expanded Flood Risk Reduction

Alternative 4 would involve all the effects described above under the proposed action, with additional effects related to increased flood risk reduction projects. Construction of a new Paradise Cut Canal flood bypass west of the existing Paradise Cut bypass would create a single shallow channel (less than 10 feet deep) with high levees (15–20 feet) that would likely not create upland habitat for giant garter snakes. The majority of land in this area is agricultural, but a portion of the land adjacent to the new flood bypass could be converted into riparian and/or upland habitat. Under Alternative 4, a variety of flood risk reduction measures could occur (see Chapter 6, *Water Resources and Flood Risk Management*), including construction of a new weir about 2 miles upstream of the existing Paradise Weir on the San Joaquin River or immediately adjacent to the south side of the widened Paradise Weir. If the latter location were selected, widening of Paradise Weir from 180 feet to 400 feet would affect riparian habitat. This could lead to habitat loss for riparian brush rabbit, giant garter snake, and northern harrier. Additional evaluation at the project level would be required before implementation of this alternative. However, all effects in the proposed action area under this alternative would be the same as those under the proposed action. Project-level assessment and review of the portions of the action area that are specific to this alternative would be necessary prior to conducting a meaningful effects analysis. The effects likely to result from Alternative 4 are discussed below. For effects that are the same as under the proposed action, the reader is directed to the discussion of Alternative 1.

Effects on common upland biological communities (less than significant)

Direct and indirect effects on upland biological communities would be less than significant.

Effects on special-status plant species (significant)

There is potential for a significant direct effect on special-status plant species. Although no botanical surveys have been conducted in areas that could be involved in expanded flood risk reduction features, populations of special-status plant species could be present in those areas. Mitigation Measure BIO-1 would address the significant direct effects of loss of such plants if any are found to be present. No indirect effects were identified.

Effects on waters of the United States (significant)

In addition to the effects on jurisdictional waters associated with the proposed action, Alternative 4 would entail widening Paradise Weir, constructing an additional weir, and dredging Salmon Slough and Doughty Cut. These actions could result in additional effects on waters of the United States; however, the exact acreage of permanent and temporary effects associated with this alternative cannot be determined until the project is more clearly defined. Nevertheless, this would constitute a significant direct effect. Mitigation Measure BIO-2 would address this direct effect. No indirect effects were identified.

Effects on riparian habitat (significant)

Expanded flood risk reduction under Alternative 4 would likely increase temporary and permanent effects on riparian habitat because of the additional footprint of the project. However, the exact acreage of permanent and temporary effects associated with this alternative cannot be determined until the project is more clearly defined. Nevertheless, this would constitute a significant direct effect. No indirect effects were identified. Mitigation Measure BIO-2 would address this directeffect.

Effects on valley elderberry longhorn beetle habitat (significant)

It is possible that additional elderberry shrubs are present in areas that would be affected by activities specific to Alternative 4. If this proves to be the case, this would constitute a significant direct effect. No indirect effects were identified. Mitigation Measure BIO-3 would address this direct effect.

Effects on western pond turtle (significant)

Western pond turtles are known to occur along the San Joaquin River and Paradise Cut. Disturbance of aquatic habitat for western pond turtle would likely be greater under Alternative 4 than under the proposed action as a result of activities associated with widening Paradise Cut and additional weir construction. Additional disturbance may result from increased long-term management and flood risk management activities. This would be a significant direct effect. No indirect effects were identified. Mitigation Measure BIO-4 would address this direct effect.

Effects on giant garter snake (significant)

Suitable habitat for GGS occurs in the proposed action area. Disturbance to aquatic and upland GGS habitat would likely be greater under Alternative 4 than under the proposed action as a result of activities associated with widening Paradise Cut and additional weir construction. Additional disturbance may result from increased long-term management and flood risk management activities. This would be a significant direct effect. Significant indirect effects associated with domestic pets and feral animals would be the same as under the proposed action. Mitigation Measures BIO-5 and BIO-6 would address these effects.

Effects on riparian brush rabbit (significant)

Riparian brush rabbits are known to occur in the proposed action area. Disturbance and possible mortality of riparian brush rabbits would likely be greater under Alternative 4 than under the proposed action as a result of activities associated with widening Paradise Cut and additional weir construction. Additional disturbance may result from increased long-term management and flood risk management activities. Moreover, additional loss of habitat could result if the site adjacent to Paradise Weir is selected for additional weir construction. This would be a significant direct effect. Significant indirect effects associated with domestic pets and feral animals would be the same as under the proposed action. Mitigation Measures BIO-6 and BIO-7 would address these effects.

Effects on bats (significant)

Surveys for potential roost sites would need to be conducted subsequent to design of expanded flood risk reduction features. Consequently, this alternative carries the potential for significant direct effects. No indirect effects were identified.

Effects on tricolored blackbird (less than significant)

Direct effects on tricolored blackbird would be less than significant. No indirect effects were identified.

Effects on western burrowing owl (significant)

Loss of potential foraging habitat and loss or disturbance of occupied burrows would be significant direct effects. Mitigation Measure BIO-8 would address these effects. No indirect effects were identified.

Effects on Swainson's hawk (significant)

In addition to the effects on Swainson's hawk disclosed in the discussion of the proposed action, a broader extent of direct effects could occur under Alternative 4 due to the expanded footprint of the additional construction activities. This would constitute a significant direct effect. No indirect effects were identified. Mitigation Measure BIO-9 would address this direct effect.

Effects on northern harrier (significant)

In addition to the effects on northern harrier disclosed in the discussion of the proposed action, a broader extent of significant effects could occur under Alternative 4 due to the expanded footprint of the additional construction activities. This would constitute a significant direct effect. No indirect effects were identified. Mitigation Measure BIO-10 would address this direct effect.

Effects on white-tailed kite (significant)

In addition to the effects on white-tailed kite disclosed in the discussion of the proposed action, a broader extent of significant effects could occur under Alternative 4 due to the expanded footprint of the additional construction activities. This would constitute a significant direct effect. No indirect effects were identified. Mitigation Measure BIO-11 would address this direct effect.

Effects on greater sandhill crane (less than significant)

Direct effects on greater sandhill crane would be less than significant. No indirect effects were identified.

Effects on loggerhead shrike (significant)

In addition to the effects on loggerhead shrike disclosed in the discussion of the proposed action, a broader extent of significant effects could occur under Alternative 4 due to the expanded footprint of the additional construction activities. This would constitute a significant direct effect. No indirect effects were identified. Mitigation Measure BIO-12 would address this direct effect.

Effects on American white pelican (less than significant)

Direct effects on American white pelican would be less than significant. No indirect effects were identified.

Effects on yellow-breasted chat, yellow warbler, and other migratory bird species (significant)

In addition to the effects on migratory birds disclosed in the discussion of the proposed action, a broader extent of significant effects could occur under Alternative 4 due to the expanded footprint of the additional construction activities. This would constitute a significant direct effect. Mitigation Measure BIO-13 would address this effect.

At the same time, the potential for enhanced riparian creation/restoration opportunities in association with the expanded flood risk reduction components could constitute a beneficial effect for riparian-dependent species. However, until the details of this alternative are further developed through the acquisition and design phases, the extent of both adverse and beneficial effects cannot be quantified. Accordingly, in addition to the significant direct effects described above, Alternative 4 would result in the same significant indirect effects as the proposed action.

Effects on wildlife corridors (significant)

The direct effect on the wildlife corridor along the San Joaquin River would be the same under Alternative 4 as under the proposed action. Additionally, expansion of the weir or construction of a new weir upstream of Paradise Weir could interfere with the wildlife corridor along the San Joaquin River. This would be a significant direct effect.

3.2.3.5 Alternative 5—No Action

Under the No Action Alternative, no improvements would be undertaken in Paradise Cut, an interior levee system would be constructed inside the existing federal project levees, and the central drainage ditch would be avoided. Regional flood risk reduction benefits, as well ecosystem restoration and enhancement activities associated with the PCIP and SRA habitat plantings, would not be realized. The effects of Alternative 5 are discussed below. For effects that are the same as those under the proposed action, the reader is directed to the analysis of Alternative 1.

Effects on common upland biological communities (less than significant)

Direct and indirect effects on upland biological communities would be less than significant.

Effects on special-status plant species (less than significant)

Under the No Action Alternative, earthwork and construction activities would not occur in riparian and wetland habitats. The RID Area is largely agricultural, and special-status plant species are very unlikely to occur in the area. Consequently, direct effects on special-status plant species would be less than significant under the No Action Alternative, and No indirect effects were identified.

Effects on waters of the United States (no effect)

Under the No Action Alternative, no effects on waters of the United States would occur. The interior levee system would avoid effects on the surrounding rivers, the pond, and the central drainage ditch. There would be no effect on jurisdictional waters.

Effects on riparian habitat (less than significant)

There would be no immediate effects on riparian habitat under the No Action Alternative. However, vegetation removal pursuant to the Corps' vegetation guidelines would eventually be conducted by the appropriate reclamation districts pursuant to the CVFPP. This would not be part of the project under the No Action Alternative, and is accordingly considered a less-than-significant direct effect.

Effects on valley elderberry longhorn beetle habitat (less than significant)

Under the No Action Alternative, an interior setback levee would be constructed, and elderberry shrubs along the riparian corridor would be avoided. However, elderberry shrubs along Old River would have to be removed pursuant to the Corps' levee vegetation guidelines. This would not be part of the project, and is accordingly considered a less-than-significant direct effect. No indirect effects were identified.

Effects on western pond turtle (less than significant)

Because the No Action Alternative would avoid all alterations of Paradise Cut and internal jurisdictional waters, direct effects on western pond turtle would be less than significant. No indirect effects were identified.

Effects on giant garter snake (significant)

Because the No Action Alternative would avoid all alterations of Paradise Cut and internal jurisdictional waters, direct effects on GGS would be less than significant. However, significant indirect effects could still result from the presence of domestic pets and feral animals associated with the River Islands at Lathrop development.

Effects on riparian brush rabbit (significant)

The No Action Alternative would have limited effects on riparian brush rabbit because no improvements would be made either in Paradise Cut or along the portion of the cross levee yet to be constructed; instead, the current southwestern end of the cross levee would be connected to the end of the interior setback levee that characterizes the No Action Alternative. Moreover, the presence of a large mixed-use development adjacent to one of two known populations of riparian brush rabbit would be likely to result in significant indirect effects, such as increased exposure to predation by domestic animals.

Effects on bats (less than significant)

Direct effects on bats would be less than significant. No indirect effects were identified.

Effects on tricolored blackbird (less than significant)

Direct effects on tricolored blackbird would be less than significant. No indirect effects were identified.

Effects on western burrowing owl (significant)

Loss of potential foraging habitat and loss or disturbance of occupied burrows would be significant direct effects. No indirect effects were identified. Mitigation Measure BIO-8 would address these direct effects.

Effects on Swainson's hawk (significant)

The significant direct effects on Swainson's hawk foraging and nesting habitat in the RID, PCC, and PCIP Areas would be similar under the No Action Alternative to those under the proposed action. No indirect effects were identified. Mitigation Measure BIO-9 would address these effects.

Effects on northern harrier (significant)

The significant direct effects on northern harrier would be the same under the No Action Alternative as under Alternative 2. No indirect effects were identified.

Effects on white-tailed kite (significant)

The significant direct effects on white-tailed kite would be the same under the No Action Alternative as under the proposed action. No indirect effects were identified.

Effects on greater sandhill crane (less than significant)

Direct effects on greater sandhill crane would be less than significant. No indirect effects were identified.

Effects on loggerhead shrike (significant)

The potential for significant direct effects on loggerhead shrike under the No Action Alternative would be similar to that under Alternative 2. No indirect effects were identified.

Effects on American white pelican (less than significant)

Direct effects on American white pelican would be less than significant. No indirect effects were identified.

Effects on yellow-breasted chat, yellow warbler, and other migratory bird species (significant)

The potential for significant direct and indirect effects on migratory bird species would be less under Alternative 5 than under the proposed action because no habitat in Paradise Cut would be disturbed; however, disturbance could still result from construction activities. Mitigation Measure BIO-1 would address this effect.

Effects on wildlife corridors (no effect)

Construction of the Lathrop Landing back bay on the San Joaquin River conflicts with the SJMSCP prohibition against development in the San Joaquin River Wildlife Corridor. Because this activity would not occur under the No Action Alternative, there would be no effect.

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Chapter 4
Fish Resources

This chapter analyzes the proposed action's potential effects related to fish resources. Related discussions are found in Chapter 3, *Terrestrial Biology;* Chapter 6, *Water Resources and Flood Risk Management;* and Chapter 21, *Cumulative Effects*.

The key sources of data listed below were used in the preparation of this chapter.

- *Draft Subsequent Environmental Impact Report for the River Islands at Lathrop Project* (City of Lathrop 2002).
- *National Marine Fisheries Biological Assessment for the River Islands at Lathrop Project* (Ascent Environmental, Inc. 2011).

Specific reference information is provided in the text.

4.1 Affected Environment

4.1.1 Regulatory Framework

4.1.1.1 Federal Regulations

ESA and the Magnuson-Stevens Fishery Conservation and Management Act are the principal federal laws relevant to fish resources in the study area. The CWA, which regulates effects on wetlands, is discussed in Chapter 6, *Water Resources and Flood Risk Management*.

Endangered Species Act

ESA protects fish and wildlife species that are listed as threatened or endangered and their habitats. *Endangered* refers to species, subspecies, distinct population segments, or environmentally significant units (ESUs) that are in danger of extinction in all or a significant portion of their range. *Threatened* refers to species, subspecies, distinct population segments, or ESUs that are considered likely to become endangered in the future. ESA is administered by USFWS for terrestrial and freshwater species and by NMFS for marine species and anadromous fishes.

ESA prohibits "take" of any fish or wildlife species listed by the federal government as endangered or threatened. (*Take* is defined as harassment, harm, pursuit, hunting, shooting, wounding, killing, trapping, capture, or collection, or the attempt to engage in any such conduct.) However, ESA Section 10[a][1][B] establishes a process through which a "non-federal entity" (a business or individual) can apply for a permit allowing take of federally listed species under certain, restricted circumstances. To be permissible under Section 10[a][1][B], take must occur as a corollary of otherwise lawful activities, and may not be the purpose of the activities; this is referred to as *incidental take*. Permits authorizing incidental take are issued by the USFWS and/or NMFS, depending on the species involved. A key requirement for issuance of a permit under Section 10[a][1][B] is preparation of an HCP that fully analyzes the effects of the proposed take and describes the measures that will be taken to avoid, minimize, and compensate for it.

Under ESA, NMFS and USFWS can designate critical habitat that has been determined to be pivotal for the survival and recovery of federally listed species. Designated critical habitat must be considered for any actions with federal involvement. NMFS defines critical habitat as:

> the specific areas within the geographical area occupied by the species, at the time it is listed, on which are found those physical or biological features (I) essential to the conservation of the species and (II) which may require special management considerations or protection; and specific areas outside the geographical area occupied by the species at the time it is listed that are determined by the Secretary to be essential for the conservation of the species (National Marine Fisheries Service 2005).

Magnuson-Stevens Fishery Conservation and Management Act

The Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) establishes a management system for national marine and estuarine fishery resources. This legislation requires all federal agencies to consult with NMFS regarding all actions or proposed actions permitted, funded, or undertaken by federal agencies that may adversely affect essential fish habitat (EFH). EFH is defined as “waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity.” The legislation states that migratory routes to and from anadromous fish spawning grounds should also be considered EFH. The phrase *adversely affect* refers to the creation of any impacts that reduce the quality or quantity of EFH. Federal activities that occur outside an EFH but that may, nonetheless, have an impact on EFH waters and substrate must also be considered in the consultation process. Under the Magnuson-Stevens Act, effects on habitat managed under the Pacific Salmon Fishery Management Plan must also be considered.

4.1.1.2 State Regulations

In addition to CEQA, the principal state law protecting fish resources is CESA. Although the Corps is not subject to state law, description of relevant state law is provided to describe the context for protection of sensitive species in California.

CESA protects wildlife and plants listed as *threatened* and *endangered* by the California Fish and Game Commission, as well as species identified as candidates for such listing. It is administered by CDFW. CESA requires state agencies to conserve threatened and endangered species (Section 2055) and thus restricts all persons from taking listed species except under certain circumstances. CESA defines *take* as any action or attempt to “hunt, pursue, catch, capture, or kill.” Under certain circumstances, CDFW may authorize limited take. The requirements for an application for an incidental take permit under CESA are described in Section 2081 of the California Fish and Game Code and in final adopted regulations for implementing Sections 2080 and 2081.

4.1.1.3 Local Plans and Regulations

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

The SJMSCP provides a strategy for balancing the need to conserve open space with the need to develop open space while providing for the long-term management of nearly 100 plant, fish, and wildlife species, especially those that are listed or may become listed under ESA or CESA. It was developed to avoid, minimize, and mitigate effects on plant and wildlife habitat that would result from the conversion up to 109,302 acres of open space land to non–open space uses, projected to occur in San Joaquin County between 2001 and 2051 (San Joaquin County 2000). Participation in the SJMSCP provides mitigation for affected covered special-status plant and wildlife species and take authorization for effects on most of the species covered by the plan. The SJMSCP relies on minimization of potential take through implementation of take avoidance and minimization measures and compensation for incidental take and loss of habitat through payment of fees (or in-lieu land dedication) for conversion of open space lands. These fees are used for preservation and creation of habitats to be managed in perpetuity through the establishment of preserves.

Participation in the SJMSCP is voluntary for local jurisdictions and project proponents. The City of Lathrop adopted the SJMSCP on January 16, 2001, and has signed the implementation agreement. USFWS issued a Section 10(a)(1)(B) incidental take permit to the City in 2002. CDFW issued a Section 2081 permit to the City, also in 2002. As a result of the City's participation in the SJMSCP and issuance of these permits, project proponents within the City's jurisdiction have the opportunity to seek coverage under the SJMSCP.

4.1.1.4 Special-Status Species

Special-status species are species that are legally protected under ESA or other regulations, as well as species considered sufficiently rare by the scientific community to qualify for such listing. For this analysis, special-status species are defined as species meeting any of the conditions listed below.

- Species listed or proposed for listing as threatened or endangered under ESA (50 CFR 17.11 [listed wildlife], and various notices in the FR [proposed species]).
- Species that are candidates for possible future listing as threatened or endangered under the ESA (CFR 71:53756-53835, September 12, 2006).
- Species listed or proposed for listing by the State of California as threatened or endangered under CESA (14 CCR 670.5).
- Animal species of special concern to CDFW (California Department of Fish and Game 2010).
- Species of concern to NMFS (National Marine Fisheries Service 2011).
- Species determined to meet the definitions of rare or endangered under CEQA (State CEQA Guidelines, Section 15380).

4.1.2 Existing Conditions

4.1.2.1 Methods Used to Identify Existing Conditions

Literature Review and Reconnaissance-Level Survey

Key sources of data used in the preparation of this chapter are listed below.

- *South Delta Improvements Program Draft Environmental Impact Statement/Environmental Impact Report* (Jones & Stokes 2005).
- *Draft Subsequent Environmental Report for the River Islands at Lathrop Project* (City of Lathrop 2002).
- *Biological Assessment for the River Islands at Lathrop Project* (EDAW 2005).
- *Draft Environmental Impact Report North Delta Flood Control and Ecosystem Restoration Project* (Jones & Stokes 2006a).

Information on the existing conditions at the site was obtained largely from the City's SEIR (City of Lathrop 2002) and was supplemented by information from related reports/documents that address biological resources in the project area (see list of key sources). A reconnaissance-level survey was conducted by ICF biologists on February 26, 2009, to verify that the habitat evaluations prepared for the Draft SEIR were still accurate.

The study area for fish resources comprises the south Delta, San Joaquin River, Old River, and Paradise Cut near Stewart's Tract. All these water bodies would be directly affected by the proposed action and action alternatives.

Monitoring Surveys

Numerous programs to monitor the occurrence and relative abundance of fish species in the Delta have, or continue to be, implemented by several resource agencies. These programs, summarized below, include mid-water trawl surveys, beach seine surveys, townet surveys, and realtime monitoring. Although some of the monitoring programs discussed below are intended to monitor a single species (e.g., the summer townet survey provides an index of striped bass abundance), their capture data, when viewed in aggregate, provide meaningful information relevant to the species' timing of occurrence and abundance relative to other species (especially nonnative species). Fish occurrence information for the study area was gathered from, but not limited to, the following monitoring programs or surveys.

- CDFW's 20 mm Delta Smelt Survey.
- CDFW's Summer Townet Survey.
- CDFW's Fall Midwater Trawl Survey.
- CDFW, DWR, and U.S. Bureau of Reclamation Fish Salvage Monitoring (Tracy Fish Facility and Skinner Fish Facility).

The 20 mm Delta Smelt Survey monitors postlarval and juvenile delta smelt distribution and relative abundance throughout their historical spring range in the Delta and San Francisco estuary. Sampling surveys occur every 2 weeks, averaging 8–10 surveys annually and using stations throughout the Delta and downstream to the eastern portion of San Pablo Bay and Napa River. The closest sampling station to the study area is at Old River northwest of Coney Island, about 10 linear miles from the study area. Samples are collected using an egg and larval net with a very fine mesh.

CDFW initiated the Summer Townet Survey in 1959 to provide an index of striped bass abundance. This survey uses oblique tows in mid-channel sites throughout the Delta, Suisun Bay, and San Pablo Bay to sample young-of-year (i.e., production from spawning in the current year) fish. Sampling is conducted twice monthly in the summer. The closest sampling site to the study area is at Old River, northwest of Coney Island. Since 1990, data have typically been collected at this sampling site in June and July or in July and August. Data were not collected at this location in 1993 and from 1996 through 1998. From 1999 through 2002, data were collected in only one month (June or August).

The Midwater Trawl Survey was initiated by CDFW in 1967 to sample striped bass. CDFW has recorded the occurrence of other species in most years. This monitoring program currently samples 100 sites extending from San Pablo Bay to Rio Vista on the lower Sacramento River and to Stockton on the San Joaquin River. Three sites are sampled near the study area: Old River on the east side of Fay Island, Old River near Victoria Island, and Old River northwest of Coney Island. Data are collected during September–December; however, from 1991 through 2001 data were also collected during January–March and occasionally in April, May, June, and August.

The State Water Project (SWP), operated by DWR, and the Central Valley Project (CVP), operated by the U.S. Bureau of Reclamation (Reclamation), export water out of the San Francisco Bay Delta for urban and agricultural use in California. Since 1957, Reclamation has salvaged fish at the Tracy Fish Collection Facility (TFCF). CDFW's Fish Facilities Unit, in cooperation with DWR, began salvaging fish at the Skinner Delta Fish Protective Facility (SDFPF) in 1968. The salvaged fish are trucked daily and released at several sites in the western Delta. Salvage of fish at both facilities is conducted 24 hours a day, 7 days a week at regular intervals. Sampling of entrained fish at the SDFPF and TFCF is the source of CDFW's daily salvage and loss estimates for the monitoring of incidental take of listed fish species (California Department of Fish and Game n.d.). Both facilities are near the study area.

4.1.2.2 Environmental Setting

The Delta is a complex network of more than 700 miles of tidally influenced channels and sloughs (Simi and Ruhl 2004:1). The Delta area includes tidally influenced areas from the Sacramento River at the confluence with the American River and the San Joaquin River at Vernalis downstream to Chipps Island (CALFED Bay-Delta Program 2000:6.1-7). The bulk of the total freshwater inflow to the Delta originates from the Sacramento River to the north, and most of the total inflow occurs during winter and early spring (CALFED Bay-Delta Program 2000:6.1-8). From the southeast side of the Delta, the San Joaquin River contributes a high percentage of inflowing nutrients and food resources (CALFED Bay-Delta Program 2000:6.1-11). Numerous distributaries flow through the low-lying tidal area of the Delta.

Aquatic habitats have changed in the Delta over the years. Historically, wetlands dominated the Delta; these included backwater areas, tidal sloughs, and channels that drained wetland complexes (CALFED Bay-Delta Program 2000:6.1-7). Currently, the Delta consists of islands surrounded by leveed channels. Most of the islands are below sea level and are used primarily for agriculture. The land surfaces on many of the islands have subsided up to 30 feet below sea level because of compaction, oxidation, and erosion of the peat soils (Jassby and Cloern 2000). Levees are maintained to prevent flooding (Moyle 2002:32). Vegetation is removed from levees, primarily to facilitate inspection, repair, and flood fighting when necessary (CALFED Bay-Delta Program 2000:6.1-7–6.1-8). Aquatic habitats in the Delta consist of areas of deep water, sloughs, and shallow lakes. Some channel sections have been deepened and straightened by dredging either for shipping or for more efficient water conveyance. The shallow-water habitats are limited to areas of backwater sloughs and narrow margins of channels and lakes (Kimmerer 2004:7). The amount of shallow water and shaded riverine aquatic (SRA) habitat throughout the Delta is much less now than it was historically (CALFED Bay-Delta Program 2000:6.1-7–6.1-8).

Water Bodies

San Joaquin River

The San Joaquin River flows north into the Delta through the south-central portion of San Joaquin County. San Joaquin River flow (measured at the Vernalis Bridge at San Joaquin River Mile [RM] 72) enters the upstream end of the Old River channel at the head of Old River, downstream of Mossdale at San Joaquin RM 53.5.

Fishes of the San Joaquin River are predominantly introduced species, including striped bass (*Morone Saxatilis*), catfishes (*Ictalurus* sp.), sunfishes (*Lepomis cyanellus*), crappie (*Pomoxis nigromaculatus*), threadfin shad (*Dorosoma petenense*), and carp (*Cyprinus carpio*) (Herbold et al. 1992). Common native fish include Chinook salmon (*Oncorhynchus tshawytscha*) and steelhead (*O. mykiss*) (including hatchery fish), Sacramento splittail (*Pogonichthys macrolepidotus*), Sacramento blackfish (*Orthodon microlepidotus*), lamprey (*Lampetra* sp.), Sacramento sucker (*Catostomus occidentalis*), and tule perch (*Hysterocarpus traski*).

Old River

Old River forms a portion of San Joaquin County's western boundary and defines the southern boundary of the Primary Delta within the County. The Old River channel flows west about 4 miles to the upstream end of Middle River and continues past Doughty Cut (which connects with the upstream end of Grant Line Canal) toward Tracy. Old River channel continues north past the western edge of Victoria Island, Woodward Island, and Bacon Island and along the eastern edge of Holland Tract and the eastern edge of Franks Tract, which is a flooded island, to the Old River mouth (i.e., downstream end) at the San Joaquin River.

Paradise Cut

Paradise Cut, a dead-end tidal slough connected to Old River by Sugar Cut (north of Tracy), is about 6 miles long with a surface area of 165 acres. During storm flows greater than 18,000 cfs at Vernalis, Paradise Weir diverts some of the flow at San Joaquin RM 60 into Paradise Cut toward Grant Line Canal, reducing the San Joaquin River flow at Mossdale and the head of Old River. Paradise Weir diverts 5,000 cfs when the Vernalis flow is 25,000 cfs and diverts 10,000 cfs when the Vernalis flow is 35,000 cfs (Jones & Stokes 2006b).

Aquatic Communities

Aquatic habitats in the South Delta and the San Joaquin River consist of perennial, intertidal, and seasonal habitats. Fish and other species use these habitats for growth, survival, and reproduction. Fish use these habitats differently depending on species and life stage. Many aquatic habitats exist in the study area and can be characterized more broadly as nearshore, open water, and floodplain. These habitats are briefly described below.

Riverbank

Past levee construction, channel realignment, and bank protection projects in the Delta have reduced the structural and hydraulic diversity of natural riverbanks by eliminating overhanging and submerged woody vegetation (living and dead); undercut banks; and variation in water depths, velocities, and substrates. As a result, unvegetated banks with riprap support lower densities of juvenile Chinook salmon (U.S. Fish and Wildlife Service 1993:8).

Nearshore

Nearshore areas support large and diverse fish and wildlife populations. These areas are important to fish for rearing and migration; they create attachment sites for aquatic insects (a food source for fish) and provide fish with shelter from predators. For example, juvenile Chinook salmon and steelhead rely on nearshore habitats as fry, smolt, or yearlings and to some extent as adults. In addition, vegetated nearshore habitat can provide spawning areas for species such as Sacramento splittail, delta smelt, black bass, and sunfish.

Open Water

Open water habitat includes areas of channels and sloughs that are free of instream structure, such as vegetation and woody material, and away from the riverbank. Typically, open water habitats have greater water depths and water velocities than nearshore habitat.

Delta smelt, striped bass, American shad, and longfin smelt are found primarily in open water habitat. Adult and juvenile salmonids use mid-channel areas for migration.

Floodplain

Recognition is growing that naturally functioning floodplains provide many benefits, including direct economic benefits, ecosystem services, and habitat for a wide diversity of species (Bayley 1991; Ahearn et al. 2006). Floodplains provide freshwater habitat for the migration, reproduction, and rearing of native fishes (Moyle et al. 2003; Crain et al. 2004), and they mitigate flood damage to human settlements (Moyle et al. 2005).

Floodplains are highly productive habitats that flood during high flows in the winter and spring. Floodplains are important habitats for young fish, especially Chinook salmon and splittail (Moyle et al. 2005:21). Chinook salmon, which spawn in freshwater rivers and streams upstream of the Delta, use inundated floodplain habitats (when available) for rearing. Chinook salmon growth has been shown to be faster in floodplain habitat than in river systems (Sommer et al. 2001). Sacramento splittail, which spawn in inundated floodplains, produce the highest numbers of young when flows are high and floodplain habitat is inundated (Moyle 2002:148).

Riparian Vegetation

Riparian vegetation is present along the waterways that surround the proposed action area, including Paradise Cut, Old River, and San Joaquin River. Riparian vegetation directly influences the quality of fish habitat, affecting cover, food, in-stream habitat complexity, streambank stability, and temperature regulation. Large woody debris usually originates from riparian trees and provides cover and habitat complexity in aquatic environments, an essential component of fish habitat. The roots of riparian vegetation at the land-water interface and on adjacent berms provide streambank stability and cover for rearing fish (Meehan and Bjornn 1991). Fine tree branches submerged in flowing water also provide habitat and are believed to provide greater value than large logs that create deadwater zones. Low-hanging branches are used by fish for escape cover from avian and terrestrial predators. Overhead riparian vegetation and instream woody material, including tree roots, woody material, and undercut banks, are important elements of SRA cover.

Riparian vegetation also provides shade and an insulating canopy that moderates water temperatures in both summer and winter. While the influence of shade on regulating river temperatures decreases as rivers become larger, the moderating effects of shade on nearshore water temperatures may be important to some fish species, including juvenile salmonids, during the growing season.

Riparian vegetation influences the food chain of a stream, providing organic detritus and terrestrial insects. Sunken logs and root systems provide stable substrates for attachment of aquatic organisms. Terrestrial organisms falling from overhanging branches contribute to the food base of the aquatic community. Salmonids in particular are primarily insectivorous and feed mainly on drifting food organisms. River productivity is increased at all trophic levels by inputs of logs, branches, leaves, and detritus from overhanging vegetation and flooded streambanks and terraces. Input of vegetative debris provides substrates and foods for many species of aquatic invertebrates, which are eaten in turn by several fish species, including salmonids.

Because of its unique biological attributes and its increasing scarcity throughout the San Joaquin River systems, SRA cover has been designated a Resource Category 1 by USFWS (U.S. Fish and Wildlife Service 1992). A Category 1 habitat classification is defined by USFWS as "unique and irreplaceable on a national basis or in the ecoregion." Accordingly, USFWS recommends that project proponents actively seek avoidance and mitigation measures that result in no loss of existing SRA cover habitat value.

4.1.2.3 Fish Resources

This assessment addresses species in aquatic environments potentially affected by the proposed action—the Delta, the San Joaquin River, Old River, and Paradise Cut. The effects of the proposed action on habitat conditions common to multiple species and life stages were evaluated in detail. Available information was used to identify relationships between species and their habitats, as well as current species distributions in the study area and the potential effects of the various action alternatives on important local fish species.

Approximately 40 fish species—comprising freshwater, estuarine, and euryhaline marine species—are found in the Delta; about half these species are introduced (Moyle 2002:35). The introduced fishes tend to be the most abundant, while native species constitute an increasingly minor proportion of the fish fauna (Moyle 2002:35). This analysis is limited to species that support important sport and commercial fisheries, species that are unique to the Bay-Delta environment, species that may be in danger of extinction, and species that, when considered as a group, encompass the range of potential responses to the effects of construction and operation of the proposed action.

A mixture of fresh- and saltwater fish historically composed the fish fauna of the Delta, including purely freshwater species (e.g., thicktail chub [now extinct], hitch, blackfish, pikeminnow); an endemic species (delta smelt); anadromous species that spend part of their life cycles in the Delta (Chinook salmon, steelhead, sturgeon, longfin smelt, and lamprey); marine species (starry flounder [*Platichthys stellatus*], staghorn sculpin [*Leptocottus armatus*]) that spend their juvenile stages in the Delta; and freshwater species tolerant of moderate salinities (e.g., Sacramento perch, tule perch, splittail, and prickly sculpin [*Cottus asper*]) (Moyle 2002). Presently, the Delta continues to have a mixture of fresh- and saltwater fish; however, some native species are extinct, and many others are reduced in numbers. Further changes in the species composition in the Delta have resulted from intended and accidental species introductions, as many introduced species compete with or prey on the native species. As a consequence of these introductions and physical changes to the Delta environment, nonnative species now dominate the fish community in many locations.

Numerous programs have been and continue to be implemented to monitor the status of Delta species. These surveys are described above in *Methods for Identification of Existing Conditions*.

Species Composition

The Sacramento–San Joaquin River system and Delta supports more than 40 species of anadromous, freshwater, and estuarine fish. Table 4-1 lists fish species expected to occur, or that may occur, in the study area.

Table 4-1. Central Valley Species Potentially Affected by the Proposed Action

Common Name—Origin	Scientific Name	Distribution
Lamprey (two species)—native	*Lampetra* spp.	Central Valley rivers; Delta; San Francisco Bay estuary
Chinook salmon (winter, spring, fall, and late fall runs)—native	*Oncorhynchus tshawytscha*	Central Valley rivers; Delta; San Francisco Bay estuary
Chum salmon—rare	*Oncorhynchus keta*	Central Valley rivers; Delta and San Francisco Bay estuary
Steelhead/rainbow trout—native	*Oncorhynchus mykiss*	Central Valley rivers; Delta and San Francisco Bay estuary
White sturgeon—native	*Acipenser transmontanus*	Central Valley rivers; Delta; San Francisco Bay estuary
Green sturgeon—native	*Acipenser medirostris*	Central Valley rivers; Delta; San Francisco Bay estuary
Longfin smelt—native	*Spirinchus thaleichthys*	Delta and San Francisco Bay estuary
Delta smelt—native	*Hypomesus transpacificus*	Delta and San Francisco Bay estuary
Wakasagi—nonnative	*Hypomesus nipponensis*	Central Valley rivers and reservoirs; Delta
Sacramento sucker—native	*Catostomus occidentalis*	Central Valley rivers; Delta
Sacramento pikeminnow—native	*Ptychocheilus grandis*	Central Valley rivers; Delta
Splittail—native	*Pogonichthys macrolepidotus*	Central Valley rivers; Delta and San Francisco Bay estuary
Sacramento blackfish	*Orthodon microlepidotus*	Central Valley rivers; Delta
Hardhead—native	*Mylopharodon conocephalus*	Central Valley rivers; Delta
Speckled dace—native	*Rhinichthys osculus*	Sacramento River and tributaries
California roach—native	*Lavinia symmetricus*	Central Valley rivers
Hitch—native	*Lavinia exilicauda*	Central Valley rivers; Delta
Golden shiner—nonnative	*Notemigonus crysoleucas*	Central Valley rivers and reservoirs; Delta
Fathead minnow—nonnative	*Pimephales promelas*	Central Valley rivers and reservoirs; Delta
Goldfish—nonnative	*Carassius auratus*	Central Valley rivers and reservoirs; Delta
Carp—non native	*Cyprinus carpio*	Central Valley rivers and reservoirs; Delta
Threadfin shad—nonnative	*Dorosoma petenense*	Central Valley rivers and reservoirs; Delta
American shad—nonnative	*Alosa sapidissima*	Central Valley rivers; Delta; San Francisco Bay estuary
Black bullhead—nonnative	*Ictalurus melas*	Central Valley rivers and reservoirs; Delta
Brown bullhead—nonnative	*Ictalurus nebulosus*	Central Valley rivers and reservoirs; Delta
White catfish—nonnative	*Ictalurus catus*	Central Valley rivers; Delta
Channel catfish—nonnative	*Ictalurus punctatus*	Central Valley rivers and reservoirs; Delta

Common Name—Origin	Scientific Name	Distribution
Mosquito fish—nonnative	*Gambusia affinis*	Central Valley rivers and reservoirs; Delta
Inland silverside—nonnative	*Menidia audena*	Central Valley rivers; Delta
Threespine stickleback—native	*Gasterosteus aculaetus*	Central Valley rivers; Delta; San Francisco Bay estuary
Striped bass—nonnative	*Morone saxatilis*	Central Valley rivers and reservoirs; Delta; San Francisco Bay estuary
Bluegill—nonnative	*Lepomis macrochirus*	Central Valley rivers and reservoirs; Delta
Green sunfish—nonnative	*Lepomis cyanellus*	Central Valley rivers and reservoirs; Delta
Redear sunfish—nonnative	*Lepomis microlophus*	Central Valley rivers and reservoirs; Delta
Warmouth—nonnative	*Lepomis gulosus*	Central Valley rivers and reservoirs; Delta
White crappie—nonnative	*Pomoxis annularis*	Central Valley rivers and reservoirs; Delta
Black crappie—nonnative	*Pomoxis nigromaculatus*	Central Valley rivers and reservoirs; Delta
Largemouth bass—nonnative	*Micropterus salmoides*	Central Valley rivers and reservoirs; Delta
Redeye Bass—nonnative	*Micropterus coosae*	Central Valley rivers and reservoirs
Spotted bass—nonnative	*Micropterus punctulatus*	Central Valley rivers and reservoirs; Delta
Small mouth bass—nonnative	*Micropterus dolomieui*	Central Valley rivers and reservoirs; Delta
Bigscale logperch—nonnative	*Percina macrolepida*	Central Valley rivers; Delta
Yellowfin goby—nonnative	*Acanthogobius flavimanus*	Delta and San Francisco Bay estuary
Chameleon goby—nonnative	*Tridentiger trigonocephalus*	Delta and San Francisco Bay estuary
Starry flounder	*Platichthys stellatus*	Delta and San Francisco Bay estuary
Staghorn sculpin—native	*Leptocottus armatus*	Delta and San Francisco Bay estuary
Prickly sculpin—native	*Cottus asper*	Central Valley rivers
Tule perch—native	*Hysterocarpus traskii*	Central Valley rivers; Delta

Anadromous Species

Anadromous species are species that live in the ocean as adults and return to freshwater rivers and streams to spawn. After the young hatch, fry and juveniles of anadromous species spend a variable amount of time in fresh water (depending on species and race), where they rear before emigrating to the ocean as juveniles. Anadromous fish species include Chinook salmon, Central Valley steelhead, green and white sturgeon, American shad, striped bass, and lamprey. Most of these species are native to the Sacramento–San Joaquin River system, with the exception of striped bass and American shad, which were introduced to California from the East Coast during the late 1800s. Although American shad and striped bass are not protected species in California, they support important recreational fisheries.

Freshwater Species

Freshwater species are those fish species that spend their entire life in fresh water. As such, these species often have low tolerances for saltwater. In the Delta, introduced freshwater species outnumber native species. Catfish (channel and white), black bass (e.g., largemouth, smallmouth, spotted, and redeye bass), and sunfish (e.g., green sunfish, bluegill) have dispersed to most habitats in the Delta and Central Valley rivers and streams following their introduction many years ago.

Estuarine Species

Estuarine species are those fish species that spawn in fresh water and are able to tolerate variable levels of salinity during their juvenile and adult life stages. These species include delta smelt, longfin smelt, and Sacramento splittail.

Special-Status Species

Special-status species are species that are legally protected or that are otherwise considered sensitive by federal and state agencies. They include species that are listed as threatened or endangered under ESA or CESA, those considered candidates for such listing, and species identified by CDFW, NMFS, or USFWS as species of concern.

Special-status species known or with the potential to occur in the study area are: Central Valley fall-/late fall–run Chinook salmon, Central Valley winter-run Chinook salmon, Central Valley spring-run Chinook salmon, Central Valley steelhead, delta smelt, Sacramento splittail, longfin smelt, and green sturgeon. Most of these species only occur in the South Delta seasonally; splittail is the only species likely to be a year-round resident in the vicinity of the project area.

The special-status species that could potentially occur in the study area and that are considered in this analysis are listed below.

- Central Valley (San Joaquin) fall-/late fall–run Chinook salmon (NMFS species of concern; state species of special concern).
- Sacramento River winter-run Chinook salmon (endangered under ESA and CESA).
- Central Valley spring-run Chinook salmon (threatened under ESA and CESA).
- Central Valley steelhead (threatened under ESA).
- Delta smelt (threatened under ESA and CESA).
- Green sturgeon (*Acipenser medirostris*) (threatened under ESA; state species of special concern).
- Sacramento splittail (state species of special concern).
- Longfin smelt (threatened under CESA).

Critical habitat has been designated for Central Valley steelhead, green sturgeon, and delta smelt in the San Joaquin and Old Rivers adjacent to the proposed action area.

In addition to the special-status species potentially occurring in the study area, two important sport fish are also considered in the assessment.

- White sturgeon (*Acipenser transmontanus*).
- Striped bass.

The occurrence, life history, and status of the above species are discussed below.

Central Valley Chinook Salmon

General Life History

Four ESUs of Chinook salmon occur in the Central Valley. The names of the Chinook salmon runs (i.e., fall, late fall, winter, and spring) reflect the variability in timing of migration and spawning of the adult life stage (Table 4-2). Central Valley fall-/late fall–run is identified as a NMFS species of concern and a California species of special concern. Sacramento River winter-run and Central Valley spring-run Chinook salmon are listed as endangered and threatened, respectively, under ESA and CESA.

Although the four ESUs of Chinook salmon have the same physical appearance and similar habitat requirements, some subtle yet important differences exist among them and among the different spawning runs. Chinook salmon can be classified into two generalized freshwater life history types (Healey 1991). Ocean-type Chinook salmon spawn soon after entering fresh water and migrate to the ocean as fry or juveniles within the first year. Fall-/late fall–run Chinook salmon exhibit an ocean-type life history. In contrast, stream-type Chinook salmon enter fresh water months before spawning, and the young reside in fresh water for a year or more before emigrating to the ocean. Spring-run Chinook salmon exhibit a stream-type life history. Winter-run Chinook salmon have characteristics of both stream- and ocean-type life histories: adults exhibit a stream type characteristic of delayed spawning following freshwater entry, while juveniles migrate to the ocean within about 7 months following emergence from the gravel (an ocean-type characteristic).

Generally, adult Chinook salmon spend 2–5 years in the ocean before migrating upstream in the Sacramento and San Joaquin Rivers. They spawn in the cool reaches of the Central Valley rivers that are downstream of the terminal dams and in tributary streams. Spawning generally occurs in swift-flowing riffles or along the edges of runs containing clean, loose gravel. After the eggs hatch, juvenile Chinook salmon remain in fresh water for 3–14 months (depending on the ESU) before emigrating to the ocean.

Cover, space, and food are necessary components of Chinook salmon rearing habitat. Suitable habitat includes areas with instream and overhead cover in the form of cobbles, rocks, undercut banks, downed trees, and large, overhanging tree branches. The organic materials forming fish cover also support sources of food in the form of both aquatic and terrestrial insects.

Juvenile Chinook salmon move downstream in response to many factors, including inherited behavior, habitat availability, flow, competition for space and food, and water temperature. The number of juveniles that migrate and the timing of movements are highly variable. Storm events and the resulting high flows appear to trigger movement of substantial numbers of juvenile Chinook salmon to downstream habitats. In general, juvenile abundance in the Delta appears to be higher in response to increased flow (U.S. Fish and Wildlife Service 1993).

Whether entering the Delta and estuary as fry or juveniles (including smolts), Central Valley Chinook salmon must pass through the Delta on their way to the ocean. Fall-run Chinook salmon adults and juveniles of all four ESUs occur, or have the potential to occur, in the south Delta at one time or another. Winter, spring, and fall-run juveniles are salvaged at TFCF and SDFPF. In 2007, wild spring-run juveniles comprised 52% of the catch of Chinook salmon at SDFPF and 39% of the annual salvage at TCFC. Wild winter-run juveniles were the next most abundant, followed by fall-run juveniles. Wild fall-run juveniles were captured from February through June (Aasen and Gartz 2008). More specific information on the timing of the different ESUs and life stages of Chinook salmon is provided below.

Table 4-2. Life Stage Timing and Distribution of Selected Species Potentially Affected by Proposed Phase 2B

Species/ESU/Life Stage	Distribution	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Fall-Run Chinook Salmon													
Adult migration/holding	San Francisco Bay to Upper Sacramento River/Tributaries; San Joaquin River Tributaries												
Spawning[a]	Upper Sacramento River/Tributaries; San Joaquin River Tributaries												
Egg incubation[a]	Upper Sacramento River/Tributaries; San Joaquin River Tributaries												
Juvenile rearing	Upper Sacramento River/Tributaries; San Joaquin River Tributaries												
Juvenile movement	Upper Sacramento River/Tributaries; San Joaquin River Tributaries to San Francisco Bay												
Late Fall–Run Chinook Salmon													
Adult migration	San Francisco Bay to Upper Sacramento River/ Tributaries												
Spawning	Upper Sacramento River/Tributaries												
Egg incubation	Upper Sacramento River/Tributaries												
Juvenile rearing	Upper Sacramento River/Tributaries												
Juvenile movement/rearing	Upper Sacramento River/Tributaries												
Winter-Run Chinook Salmon													
Adult migration/holding	San Francisco Bay to Upper Sacramento River												
Spawning	Upper Sacramento River												
Egg incubation	Upper Sacramento River												
Juvenile rearing	Upper Sacramento River to San Francisco Bay												
Juvenile movement/rearing	Upper Sacramento River to San Francisco Bay												
Spring-Run Chinook Salmon													
Adult migration/holding	San Francisco Bay to Upper Sacramento River/ Tributaries												
Spawning	Sacramento River/Tributaries												
Egg incubation	Sacramento River/Tributaries												
Juvenile rearing	Sacramento River/Tributaries												

Species/ESU/Life Stage	Distribution	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Juvenile movement	Sacramento River/Tributaries to SF Bay												
Steelhead													
Adult migration	San Francisco Bay to Sacramento River/Tributaries; San Joaquin River Tributaries												
Spawning	Upper Sacramento River/Tributaries; San Joaquin River Tributaries												
Egg incubation	Upper Sacramento River/Tributaries; San Joaquin River Tributaries												
Juvenile rearing	Upper Sacramento River/Tributaries; San Joaquin River Tributaries to San Francisco Bay												
Juvenile movement	Upper Sacramento River/Tributaries; San Joaquin River Tributaries to San Francisco Bay												
Delta Smelt													
Adult migration	Delta												
Spawning	Delta, Suisun Marsh												
Larval/early juvenile rearing	Delta, Suisun Marsh												
Estuarine rearing: juvenile/adults	Lower Delta, Suisun Bay												
Sacramento Splittail													
Adult migration	Suisun Marsh, Upper Delta, Yolo/Sutter Bypasses, Sacramento/San Joaquin Rivers												
Spawning	Suisun Marsh, Upper Delta, Yolo/Sutter Bypasses, Lower Sacramento/San Joaquin Rivers												
Larval/early juvenile rearing/movement	Suisun Marsh, Upper Delta, Yolo /Sutter Bypasses, Lower Sacramento/San Joaquin Rivers												
Adult/juvenile rearing	Delta, Suisun Bay												

Sources: Hallock 1989; Brown and Moyle 1993; Wang and Brown 1993; U.S. Fish and Wildlife Service 1996; McEwan 2001; Moyle 2002; Moyle et al. 2008.

[a] Spawning and incubation occur from October to February in the Feather, American, and Mokelumne Rivers.

= Low probability of occurrence, not included in the assessment of the project effect.

= Primary occurrence included in the assessment of project effects.

Fall-Run Chinook Salmon

Adult fall-run Chinook salmon enter the Sacramento and San Joaquin River systems from July through December and spawn from late September through December, with a peak in October and November (Table 4-2). Newly emerged fry remain in shallow, lower-velocity edgewaters (California Department of Fish and Game 1998). Shortly after emergence from the redds (nests), most fry disperse downstream toward the Delta and into the San Francisco Bay estuary. Juveniles migrate to the ocean from February to June (Table 4-2). Natural spawning populations of fall-run Chinook salmon occur in the Sacramento River, most tributaries of the Sacramento and San Joaquin Rivers, and tributaries of the eastern Delta.

Only fall-run Chinook salmon occur in the San Joaquin River. They enter the San Joaquin River and tributaries (Stanislaus, Merced, and Tuolumne) from October to December, with most spawning occurring in November (Baker and Morhardt 2001:164). San Joaquin smolts emigrate mainly in April and May, but can occur from late February to June (Baker and Morhardt 2001:165).

Late Fall–Run Chinook Salmon

Adult late fall–run Chinook salmon enter the river from October through February, with a peak in December. Like fall-run Chinook salmon, late fall–run Chinook salmon spawn soon after entering their natal streams. Spawning occurs from December through April (peak in late December and January), and emergence begins in April and extends through May. Late fall–run Chinook salmon migrate downstream as juveniles or yearlings during October through June. Natural spawning populations of late fall–run Chinook salmon occur in the Sacramento River between Keswick Dam and just below Red Bluff.

Winter-Run Chinook Salmon

Adult winter-run Chinook salmon leave the ocean and migrate through the Delta into the Sacramento River from December through July (Table 4-2). Spawning takes place from mid-April through August, and incubation continues through October (Table 4-2). Juvenile winter-run Chinook salmon rear and migrate in the Sacramento River from July through April (Hallock and Fisher 1985). Juveniles have been observed in the Delta during October through December, especially during high Sacramento River discharge in response to fall and early-winter storms. Winter-run juveniles migrate through the Delta to the ocean from December through as late as May (Stevens 1989). Natural spawning populations of winter-run Chinook salmon occur in the upper Sacramento River and Battle Creek.

Spring-Run Chinook Salmon

Historical records indicate that adult spring-run Chinook salmon enter the mainstem Sacramento River in March and continue to their spawning streams where they hold in deep cold pools until September (Table 4-2). Unlike fall-and late fall–run ESUs, spring-run Chinook salmon are sexually immature during their spawning migration. Spawning occurs in gravel beds in late August through October, and emergence begins in December. Spring-run Chinook salmon migrate downstream as young-of-year or yearling juveniles. Young-of-year juveniles move between February and June, and yearling juveniles migrate from October to May, with peak migration in November (Cramer and Demko 1996). Data from the CVP and SWP salvage records indicate that most spring-run Chinook salmon smolts are present in the Delta from mid-March through mid-May, depending on flow conditions (California Department of Fish and Game 2000). Natural spawning populations of Central

Valley spring-run Chinook salmon are presently restricted to the accessible portions of the upper Sacramento River, Antelope Creek, Battle Creek, Beegum Creek, Big Chico Creek, Butte Creek, Clear Creek, Deer Creek, Feather River, Mill Creek, and Yuba River (California Department of Fish and Game 1998).

Central Valley Steelhead

Central Valley steelhead was federally listed as threatened on January 5, 2006 (71 FR 834). Critical habitat for this ESU, designated on September 2, 2005, includes the Sacramento, Feather, and Yuba Rivers; the Delta; the San Joaquin River and its tributaries; and the upper Sacramento River tributaries (70 FR 52596 2005).

Steelhead have one of the most complex life histories of any salmonid species. Steelhead are anadromous, but some individuals may complete their life cycle within a given river reach. Freshwater residents typically are referred to as rainbow trout, while anadromous individuals are called steelhead.

Historical records indicate that adult steelhead enter the mainstem Sacramento River in July, peak in abundance in September and October, and continue migrating through February or March (Table 4-2) (Hallock 1989; McEwan and Jackson 1996). Like Chinook salmon, steelhead spawn in mainstem rivers and tributary streams well upstream of the Delta. Most steelhead spawn from December through April (Table 4-2), with most spawning occurring from January through March. In the San Joaquin River system, steelhead migrate into tributaries (Calaveras, Tuolumne, and Stanislaus Rivers) from September to February, and spawn from January to March (National Marine Fisheries Service 2008). Unlike Pacific salmon, some steelhead may survive to spawn more than once, returning to the ocean between spawning migrations.

Steelhead fry usually emerge from the gravel 2–8 weeks after hatching (Barnhart 1986; Reynolds et al. 1993). Newly emerged fry move to shallow, protected areas along streambanks and move to faster, deeper areas of the river as they grow. Most juveniles occupy riffles in their first year of life and some of the larger steelhead live in deep fast runs or in pools. Juvenile steelhead remain in fresh water from 1 to 3 years (McEwan 2001:5) and feed on a variety of aquatic and terrestrial insects and other small invertebrates.

Juvenile migration to the ocean generally occurs from December through August (Table 4-2). Most Sacramento River steelhead migrate in spring and early summer (Reynolds et al. 1993). Sacramento River steelhead generally migrate as 1-year-olds at a length of 6–8 inches (Barnhart 1986; Reynolds et al. 1993). San Joaquin steelhead generally migrate as yearlings from February to May (National Marine Fisheries Service 2008). Juvenile steelhead from both river populations may occur in the Delta in any month. Wild steelhead have been collected at the state and federal pumping plants in the Delta from January through June, and peak numbers salvaged at these facilities occur in March and April (Aasen and Gartz 2008). After 2–3 years of ocean residence, adult steelhead return to their natal stream to spawn as 3- or 4-year-olds.

Green Sturgeon

Green sturgeon is listed as threatened under ESA (71 FR 17757; April 7, 2006). Critical habitat has been designated for green sturgeon (74 FR 52300–52351); The waterways surrounding Stewart Tract are part of the designated critical habitat.

Although green sturgeon are anadromous, they are the most marine-oriented species of sturgeon and are found in nearshore marine waters from Mexico to the Bering Sea (70 FR 17386). In fresh water, green sturgeon occur in the lower reaches of large rivers from British Columbia south to the San Francisco Bay. The southernmost spawning population of green sturgeon occurs in the Sacramento River system (Moyle 2002).

Green sturgeon has been divided into the northern and southern distinct population segments (DPSs). The northern DPS consists of populations from the Eel River northward, while the southern DPS consists of populations from south of the Eel River to the Sacramento River. Spawning populations have only been confirmed in the Rogue (Oregon), Klamath, and Sacramento Rivers (70 FR 17386). In the Central Valley, spawning occurs well upstream of the Delta in the Sacramento River upstream of Hamilton City, perhaps as far upstream as Keswick Dam (Adams et al. 2002), and possibly in the lower Feather River (Moyle 2002). Although no green sturgeon have ever been documented in the San Joaquin River upstream of the Delta, it is unclear whether they use this system for spawning; however, no efforts have been made to document sturgeon spawning in the San Joaquin River system (70 FR 17386).

Adults migrate upstream into rivers between late February and late July and spawn between March and July, when the water temperature is 46–57°F. Peak spawning occurs from mid-April to mid-June. Green sturgeon are believed to spawn every 3–5 years (Tracy 1990), although recent evidence indicates that spawning may be as frequent as every 2 years (70 FR 17386).

Larval green sturgeon begin feeding 10 days after hatching, and metamorphosis to the juvenile stage is complete within 45 days of hatching. Larvae grow quickly, reaching almost 3 inches in the first 45 days after hatching and 12 inches by the end of the their first year. Juveniles spend 1–3 years in fresh water before they enter the ocean (70 FR 17386).

Little is known about the movements and habits of green sturgeon. They have been salvaged at the state and federal fish collection facilities in every month, indicating that they are present in the Delta year-round. Between January 1993 and February 2003, a total of 99 green sturgeon were salvaged at the state and federal fish salvage facilities; no green sturgeon were salvaged in 2004 or 2005. In 2006, 363 green sturgeon were salvaged, mostly during June–December. In 2007, two green sturgeon were salvaged, and in 2008 eight were salvaged (Bay Delta and Tributaries Project n.d.). Although it is assumed that green sturgeon are present throughout the Delta and rivers during any time of the year, salvage numbers probably indicate that their abundance, at least in the south Delta, is low.

The diet of adult green sturgeon seems to consist mostly of bottom invertebrates and small fish (Ganssle 1966). Juveniles in the Delta feed on opossum shrimp and amphipods (Radtke 1966).

Green sturgeon have not been documented historically or currently in the San Joaquin River or its tributaries. While they are known to occur in the Delta, it is assumed that these fish probably originate from the Sacramento River (Beamesderfer et al. 2004:12).

Delta Smelt

Delta smelt is listed as threatened under ESA and CESA. The species is currently in review by the state to be reclassified as endangered. Critical habitat for delta smelt is designated as all water and all submerged lands below ordinary high water and the entire water column bounded by and contained in the existing contiguous waters within Suisun Bay and the Delta (59 FR 852; January 6, 1994). The channels and sloughs surrounding Stewart Tract are within the boundaries of designated critical habitat.

Estuarine rearing habitat for juvenile and adult delta smelt is typically found in the waters of the lower Delta and Suisun Bay where salinity is between 2 and 7 parts per thousand (ppt). Delta smelt tolerate 0–19 ppt salinity. They typically occupy open shallow waters but also occur in the main channel in the region where fresh and brackish water mix. The zone may be hydraulically conducive to their ability to maintain position and metabolic efficiency (Moyle 2002).

Adult delta smelt begin their spawning migration into the upper Delta in December or January (Table 4-2). Migration may continue over several months. Spawning occurs between January and July, peaking in April through mid-May (Moyle 2002). Spawning occurs along the channel edges in the upper Delta, including the Sacramento River above Rio Vista, Cache Slough, Lindsey Slough, and Barker Slough. Spawning has been observed in the Sacramento River up to Garcia Bend during drought conditions, possibly attributable to adult movement farther inland in response to saltwater intrusion (Wang and Brown 1993). Eggs are broadcast over the bottom, where they attach to firm substrate, woody material, and vegetation. Hatching takes approximately 9–13 days, and larvae begin feeding 4–5 days later. Newly hatched larvae contain a large oil globule and are semi-buoyant. Larval smelt feed on rotifers and other zooplankton. As their fins and swim bladder develop, they move higher into the water column. Larvae and juveniles gradually move downstream toward rearing habitat in the estuarine mixing zone (Wang 1986).

Since 2002, delta smelt salvage numbers have declined. In 2007, low numbers continued to be salvaged, following the current trend. At both facilities delta smelt were salvaged in February and April through July. Highest numbers of salvaged fish occurred in June (Bay Delta and Tributaries Project n.d.).

Longfin Smelt

CDFW has listed longfin smelt as threatened. Historically, longfin smelt populations were found in the Klamath, Eel, and San Francisco estuaries and in Humboldt Bay. Currently, longfin smelt occur in the mouth of the Klamath and Russian River estuaries, the Delta, the San Francisco Bay, and local coastal areas north of the Bay. In the Central Valley, longfin are rarely found upstream of Rio Vista in the Sacramento River or Medford Island in the Delta. Adults concentrate in Suisun, San Pablo, and North San Francisco Bays (Moyle 2002).

Longfin smelt are anadromous, euryhaline (adaptable to varying levels of salinity), and nektonic (free-swimming). Smelt are found in estuaries and can tolerate salinities from 0 ppt to pure seawater. The salinity tolerance of longfin smelt larvae and early juveniles ranges from 1.1 to 18.5 ppt. After the early juvenile stage, they prefer salinities in the 15–30 ppt range (Moyle 2002). Longfin smelt in the San Francisco estuary spawn in fresh or slightly brackish water (Moyle 2002:236). Prior to spawning, they aggregate in deepwater habitats in the northern Delta, primarily the channel habitats of Suisun Bay and the Sacramento River (Rosenfield and Baxter 2007). Catches of gravid adults and larval longfin smelt indicate that the primary spawning locations are in or near the Suisun Bay channel, the Sacramento River channel near Rio Vista, and (at least historically) Suisun Marsh (Wang 1991; Moyle 2002; Rosenfield and Baxter 2007). Moyle (2002) indicated that longfin smelt may spawn in the San Joaquin River as far upstream as Medford Island. Two sampling programs operated by CDFW during the spawning season—the Fall Mid-Water Trawl and the Bay Study—found that most of the juveniles were caught in the lower Sacramento River and Suisun Bay. In the Delta, longfin smelt spend most of their life cycle in deep, cold, brackish-to-marine waters of the Delta and nearshore environments (Moyle 2002; Rosenfield and Baxter 2007). They are capable of living their entire life cycle in fresh water, as demonstrated by landlocked populations.

Longfin smelt move throughout the San Francisco Estuary and the Delta over their life cycle. In the San Francisco Bay–Delta system, habitat for estuarine fish species is often related to X2—the location of the 2.0 ppt salinity zone in relation to the Golden Gate Bridge. High inflows move X2 westward, while during periods of low inflow X2 can move eastward even into the Sacramento River. During the summer months, high densities of smelt are found in the South Bay (Bay Institute 2007:11). Prespawning adults are generally restricted to brackish (2–35 ppt) or marine habitats. In fall and winter, yearlings move upstream through the Delta into fresh water to spawn and are mostly found in Suisun Bay and the western Delta, but some are also found in San Pablo Bay and the South Bay. Spawning may occur as early as November, and larval surveys indicate it may extend into June (Moyle 2002). The exact nature and extent of spawning habitat are still unknown for this species (Moyle 2002), although major aggregations of gravid adults occur in the northwestern Delta and eastern Suisun Bay (Rosenfield and Baxter 2007).

Embryos hatch in 40 days at 45°F and are buoyant. They move into the upper part of the water column and are carried into the estuary. High outflows transport the larvae into Suisun and San Pablo Bays. In low outflow years, larvae move into the western Delta and Suisun Bay. According to the 20 mm Larval Survey conducted by CDFW, longfin smelt larvae are within the central and south Delta primarily during March and April. Historical salvage of longfin smelt at the state and federal fish collection facilities has occurred during all months, with most salvage occurring April–June. Higher outflows are reflected positively in juvenile survival and adult abundance. Rearing habitat is highly suitable in Suisun and San Pablo Bays in part because juveniles require brackish water in the 2–18 ppt range.

Longfin smelt are pelagic foragers that feed extensively on copepods, amphipods, and shrimp (U.S. Fish and Wildlife Service 1996; Moyle 2002). Severe alterations in the composition and abundance of the primary producer and primary/secondary consumer assemblages in the Delta have been implicated in the recent decline of longfin smelt and other native fish species (U.S. Fish and Wildlife Service 1996; Kimmerer 2002).

Salvage at the state and federal fish collection facilities in 2007 continued on the downward trend set in 2003. The SDFPF captured 59 longfin smelt during the months of May, June, and August, with May having the highest numbers. The TFCF captured 48 smelt during the months of January, February, May and December (Aasen and Gartz 2008).

Sacramento Splittail

Sacramento splittail is a California species of concern. Adult splittail migrate from Suisun Bay and the Delta to upstream spawning habitat during December–April (Table 4-2). Both male and female splittail become sexually mature by their second winter at about 3.9 inches in length. Female splittail are capable of producing more than 100,000 eggs per year (Daniels and Moyle 1983; Moyle et al. 1989). Adhesive eggs are deposited over flooded terrestrial or aquatic vegetation when the water temperature is between 48 and 68°F (Moyle 2002; Wang 1986). Splittail spawn in late April and May in Suisun Marsh and between early March and May in the upper Delta and lower reaches and flood bypasses of the Sacramento and San Joaquin Rivers (Moyle et al. 1989). Past surveys indicate that the Yolo and Sutter Bypasses provide important spawning habitat (Sommer et al. 1997). Spawning has been observed to occur as early as January and may continue through early July (Table 4-2) (Wang 1986; Moyle 2002).

The diet of adults and juveniles includes decayed organic material; earthworms, clams, insect larvae, and other invertebrates; and fish. The mysid *Neomysis mercedis* is a primary prey species, although decayed organic material constitutes a larger percentage of the stomach contents (Daniels and Moyle 1983).

Larval splittail are commonly found in shallow, vegetated areas near spawning habitat. Larvae eventually move into deeper and more open water habitat as they grow and become juveniles. During late winter and spring, young-of-year juveniles are found in sloughs, rivers, and Delta channels near spawning habitat (Table 4-2). Juvenile splittail gradually move from shallow, nearshore areas to deeper, open water habitat of Suisun and San Pablo Bays (Wang 1986). In areas upstream of the Delta, juvenile splittail can be expected to be present in the flood bypasses when these areas are inundated during the winter and spring (Jones & Stokes Associates 1993; Sommer et al. 1997).

Splittail salvage at the state and federal fish collection facilities was much lower in 2007 than 2006. The 2007 annual salvage was 538 at the SDFPF, contrasted with 417,859 in 2006. The 2007 annual salvage at the TFCF was 780; a major decrease from the record high value of 5,002,611 in 2006 (Aasen and Gartz 2008).

Other Species

The assessment of effects of the proposed action focuses mainly on the special-status fish species described above. However, Central Valley rivers and the Delta support many other native and nonnative fish species that may be affected by the proposed action (Table 4-1). In general, the effects of the proposed action on other fish species are assumed to be encompassed in the assessment of effects on the selected species.

In general, native species such as Sacramento pikeminnow, hardhead, Sacramento sucker, and California roach spawn early in spring. With some exceptions, nonnative species such as green sunfish, bluegill, white and channel catfish, and largemouth bass spawn later in spring and in summer. Nonnative species are more successful than native species in disturbed environments. In general, they are adapted to warm, slow-moving, and nutrient-rich waters (Moyle 2002). Nonnative species dominate the fish communities in the Delta and lower reaches of the Sacramento and San Joaquin Rivers and their tributaries, and these species are known to prey on smaller resident and migratory fishes, including juvenile Chinook salmon and steelhead (Moyle 2002).

Introduced species account for more than 85% of the catch at monitoring sites in the Delta. In general, the proportion of the catch comprising nonnative species is highest during summer, when water temperatures are at their warmest and many of the juveniles of native species (e.g., Chinook salmon, steelhead) have emigrated. Of the introduced species, American and threadfin shad, largemouth and spotted bass, sunfish, and striped bass appear to be the most abundant in the Delta, based on the fish survey data. Striped bass, black bass, and sunfish are important sport fish that support a popular recreational fishery year-round.

White Sturgeon

White sturgeon ranges in salt water from Mexico north to the Gulf of Alaska (Moyle 2002:107). Adults migrate to freshwater spawning areas in the Sacramento and Feather Rivers (winter through spring) (Moyle 2002:107). Larvae and young juveniles migrate to the lower parts of estuaries from early spring through mid-summer (Schafter 1997; Moyle 2002). They are most abundant in the San Francisco estuary (Moyle 2002:107).

Spawning migrations appear to be triggered by high flow of cold water associated with runoff from winter storms and spring snowmelt (Schafter 1997; Moyle 2002). White sturgeon spawn in fresh water, presumably in deep, fast currents of major rivers (Moyle 2002). Most of the white sturgeon life cycle is spent in the lower portions of the estuary and the Pacific Ocean. In the San Francisco estuary, white sturgeon most commonly spawn in the Sacramento River; juveniles have also been found in the Feather River, suggesting that white sturgeon may also use the Sacramento River's major tributaries for spawning (Schafter 1997; Moyle 2002).

White sturgeon spawning migrations may be dependent on the availability of cool water as these fish typically overwinter in fresh water between 45 and 54°F. Egg production in white sturgeon requires that females be exposed to cold (~50°F) water. The hatching success of white sturgeon eggs decreases at water temperatures above 68ºF, and no eggs hatch after incubation at and above 73°F (Cech and Doroshov 2004). Larval white sturgeon showed a marked decline in survivorship at temperatures above 50°F.

Sturgeon are benthic foragers that have been reported to consume opossum shrimp, amphipods, small fish, clams, and crabs (Moyle 2002).

White sturgeon have been caught throughout the Sacramento River and Delta sampling areas. The majority of fish have been caught in the Chipps Island midwater trawl, the Putah Creek Sinks fyke net, and the state and federal fish facilities (Bay Delta and Tributaries Project n.d.). Population sizes vary from year to year (Moyle 2002:108). A total of 326 white sturgeon have been salvaged at both facilities during all months from 1993 to 2004 (Bay Delta and Tributaries Project n.d.).

As noted above, most white sturgeon reside in Suisun and San Pablo Bays and San Francisco Bay. White sturgeon may occur in the Delta during their upstream spawning migration to the Sacramento River.

Striped Bass

Striped bass is one of the most abundant fish in the San Francisco estuary and is widely distributed along the Pacific coast (Moyle 2002:367). It is the most important sportfish in the estuary.

Striped bass spend most of their lives in San Pablo and San Francisco Bays and move upstream to spawn. Spawning can occur as early as April but peaks in May and early June when water temperatures range from 57 to 68°F. Spawning occurs in the Delta and in the Sacramento and San Joaquin Rivers. In the Sacramento River, striped bass spawn from below the mouth of the Feather River upstream to Colusa (Moyle 2002). During wet years, spawning may occur in the Sacramento River portion of the Delta and in the San Joaquin River upstream of the Delta. In low-flow years, spawning may occur in the Delta. The exact location and timing of spawning is dependent on water temperature, flow, and salinity conditions. For this reason, there are two main spawning areas in the Delta: in the Sacramento River as far downstream as Isleton and in the San Joaquin River and its sloughs from Venice Island downstream to Antioch (Moyle 2002).

Striped bass spawn in open water, and their eggs must remain suspended in the current to prevent mortality. Embryos and larvae in the Sacramento River are carried into the Delta and Suisun Bay where rearing appears to be best (Moyle 2002). Larval and juvenile striped bass feed mainly on invertebrates, including copepods and opossum shrimp. Fish become a more important part of their diet as they grow in size (Moyle 2002). Young striped bass tend to accumulate in or just upstream of the estuary's freshwater/saltwater mixing zone, and this region is critical nursery habitat (California Department of Fish and Game 1991). Striped bass reach maturity at 4–6 years. Adult striped bass are open-water predators and opportunistic feeders and in the Delta feed mostly on threadfin shad and smaller striped bass (Moyle 2002:366).

Striped bass populations in the Delta have been in steady decline since the late 1970s. A changing atmospheric-oceanic climate may be at the root of this decline. The decline in striped bass abundance may be related to increasing ocean temperatures (Bennett and Howard 1999). Hatchery-raised striped bass were planted in the Delta between 1981 and 1992 to supplement wild populations (Moyle 2002). However, this practice was temporarily halted in 1992 because of concerns over striped bass predation on listed species. Since 1993, a pen-rearing program has been implemented that raises striped bass salvaged from the state fish trap at the SWP pumps. The striped bass are raised to a larger size before being released; they account for approximately 2% of the adult population (Moyle 2002).

Striped bass have been salvaged at the state and federal fish collection facilities during most months. In 2007, salvage increased from 2006, although overall numbers have been low since 2001 (Aasen and Gartz 2008). Young-of-year, juveniles, and adults are collected frequently by the various surveys. Striped bass are often the most numerous species in the catch.

Other Nonlisted Species

The species discussed above are explicitly included in the assessment of effects for the proposed action. Other unlisted species are not afforded legal protection and are therefore are not discussed beyond this section. In general, the effects of the proposed action on other fish species are assumed to be similar to those discussed for the selected species.

Factors That Affect Abundance of Fish Species

Information relating abundance with environmental conditions is most available for special-status species, especially Chinook salmon and steelhead. This section focuses on factors that have potentially affected the abundance of special-status species in the Central Valley. Although not all species are discussed, many of the factors affecting the special-status species have also affected the abundance of other native and nonnative species.

Spawning Habitat Area

Spawning habitat area may limit the production of juveniles and subsequent adult abundance of some species. Spawning habitat area for fall-/late fall–run Chinook salmon, which constitutes more than 90% of the Chinook salmon returning to the Central Valley streams, has been identified as limiting this ESU's abundance. Spawning habitat area has not been identified as a limiting factor for the less abundant winter-run and spring-run Chinook salmon (National Marine Fisheries Service 1996; U.S. Fish and Wildlife Service 1996), although habitat may be a limiting factor in some streams (e.g., Butte Creek) during years of high adult abundance.

Spawning habitat area is defined by a number of factors, such as gravel size and quality and water depth and velocity. Although maximum usable gravel size depends on fish size, a number of studies have determined that Chinook salmon require gravel ranging from approximately 0.1 inch to 5.9 inches in diameter (Raleigh et al. 1986). Steelhead prefer substrate no larger than 3.9 inches in diameter (Bjornn and Reiser 1991). Water depth criteria for spawning vary widely, and there is little agreement among studies about the minimum and maximum values for depth (Healey 1991). Salmonids spawn in water depths that range from a few inches to several feet. A minimum depth of 0.8 foot for Chinook salmon and steelhead spawning has been widely cited in the literature. In general, water should be at least deep enough to cover the adult fish during spawning. Minimum water depth for steelhead spawning has been observed to be enough to cover the fish (Bjornn and Reiser 1991). Many fish spawn in deeper water. Velocity that supports spawning ranges from 0.8 to 3.8 feet/second (U.S. Fish and Wildlife Service 1994). Spawning habitat area has not been identified as a factor affecting delta smelt abundance (U.S. Fish and Wildlife Service 1996), but little is known about specific spawning areas and requirements within the Delta.

Longfin smelt may spawn in or near the Suisun Bay channel, the Sacramento River channel near Rio Vista, and (at least historically) Suisun Marsh (Wang 1991; Moyle 2002; Rosenfield and Baxter 2007). Little is known about the precise locations where longfin smelt spawn or the type of substrate they use for spawning. Existing information does not indicate that spawning habitat is a limiting factor. However, because so little is known about the species' spawning habitat needs, assuming that spawning habitat is not a limiting factor would be speculative.

Sacramento splittail spawn over flooded vegetation and debris on floodplains that are inundated by high flows from February to early July in the Sacramento and San Joaquin river systems. A lack of sufficient seasonally flooded vegetation may limit splittail spawning success (Young and Cech 1996; Sommer et al. 1997), particularly in dry years. The onset of spawning appears to be associated with rising water levels, increasing water temperature, and day length (Moyle 2002). The Sutter and Yolo Bypasses along the Sacramento River are important spawning habitat areas during high flow.

Green sturgeon spawn in deep, fast water. Spawning substrate can range from clean sand to bedrock, although the preferred substrate is probably large cobble. Currently, spawning takes place in the Sacramento, Klamath, and Rogue (Oregon) Rivers; these may be the only spawning populations left in North America (Moyle 2002). Spawning habitat area has not been defined as a factor affecting abundance for green sturgeon. However, little is known about specific habitat requirements for wild spawning green sturgeon.

Rearing Habitat Area

Rearing habitat area may limit the production of juveniles and subsequent adult abundance of some species. USFWS (1996) has indicated that rearing habitat area in Central Valley streams and rivers limits the abundance of juvenile fall-run and late fall–run Chinook salmon and juvenile steelhead. Rearing habitat for salmonids is defined by environmental conditions such as water temperature, dissolved oxygen (DO), turbidity, substrate, water velocity, water depth, and cover (Bjornn and Reiser 1991; Healey 1991; Jackson 1992). Chinook salmon also rear along the shallow vegetated edges of Delta channels (Grimaldo et al. 2000).

Environmental conditions and interactions between individuals, predators, competitors, and food sources determine habitat quantity and quality and the productivity of the stream (Bjornn and Reiser 1991). Everest and Chapman (1972) found juvenile Chinook salmon and steelhead of the same size using similar in-channel rearing areas. Rearing area varies with flow. High flow increases the area available to juvenile Chinook salmon because they extensively use submerged terrestrial vegetation on the channel edge and the floodplain. Deeper inundation provides more overhead cover and protection from avian and terrestrial predators than shallow water (Jackson 1992).

Rearing habitat for larval and early juvenile delta smelt encompasses the lower reaches of the Sacramento River below Isleton and the San Joaquin River below Mossdale. Estuarine rearing by juveniles and adults occurs in the lower Delta and Suisun Bay. USFWS (1996) has indicated that loss of rearing habitat area would adversely affect the abundance of larval and juvenile delta smelt. The area and quality of estuarine rearing habitat is assumed to be dependent on the downstream location of approximately 2 ppt salinity (Moyle et al. 1992). Conditions under which 2 ppt salinity occurs in the Delta is assumed to provide less habitat area and lower quality than the habitat provided by the occurrence of 2 ppt salinity farther downstream in Suisun Bay. During years of average and high outflow, delta smelt may concentrate anywhere from the Sacramento River around Decker Island to Suisun Bay (Moyle 2002). This geographic distribution may not always be a function of outflow and 2 ppt isohaline position. Outflow and the position of the 2 ppt isohaline may account for only about 25% of the annual variation in abundance indices for delta smelt (California Department of Water Resources and Bureau of Reclamation 1994).

Longfin smelt juveniles require brackish water in the 2–18 ppt range, which is found in Suisun and San Pablo Bays. When X2 is located at 25 miles (i.e., 25 miles east of the Golden Gate Bridge), rearing habitat for longfin smelt is maximized (Unger 1994). High outflows transport the larvae into Suisun and San Pablo Bays, reflecting positively in juvenile survival and adult abundance.

Rearing habitat has not been identified as a limiting factor in splittail population abundance, but as with spawning, a lack of sufficient seasonally flooded vegetation may limit population abundance and distribution (Young and Cech 1996). Rearing habitat for splittail encompasses the Delta, Suisun Bay, Suisun Marsh, the lower Napa River, the lower Petaluma River, and other parts of San Francisco Bay (Moyle 2002). In Suisun Marsh, splittail concentrate in the dead-end sloughs that have small streams feeding into them (Daniels and Moyle 1983; Moyle 2002). As splittail grow, salinity tolerance increases (Young and Cech 1996).

Juvenile green sturgeon prefer deeper areas with rock structures to hide in during the day; they forage and migrate at night (Kynard et al. 2005). Little is known about rearing habitat requirements for juvenile green sturgeon, and rearing habitat area has not been identified as a limiting factor in sturgeon population abundance.

Migration Habitat Conditions

The San Joaquin River and the Delta provide a migration pathway between freshwater and ocean habitats for adult and juvenile steelhead and adult and juvenile Chinook salmon. Migration habitat conditions include streamflows that provide suitable water velocities and depths to support successful passage. Flows in the San Joaquin River and the Delta provide the necessary depth, velocity, and water temperature. Within the Delta, the channel pathways affect migration of juvenile Chinook salmon. Juvenile Chinook salmon survival is lower for fish migrating through the central Delta (i.e., diverted into the Delta Cross Channel and Georgiana Slough) than for fish continuing down the Sacramento River (Newman and Rice 1997). Similarly, juvenile Chinook salmon entering the Delta from the San Joaquin River appear to have higher survival if they remain in the San Joaquin River channel instead of moving into Old River and the south Delta (Brandes and McLain 2001).

Larval and early juvenile delta smelt are transported by currents that flow downstream into the upper end of the mixing zone of the estuary where incoming saltwater mixes with outflowing fresh water (Moyle et al. 1992). Reduced flow may adversely affect transport of larvae and juveniles to rearing habitat.

Existing information does not indicate clear relationships between migration habitat conditions and adult, larval, and juvenile survival for longfin smelt. Effects of environmental conditions (e.g., net and tidal flow) on adult migration are unknown. The assessment of larval and juvenile entrainment in CVP and SWP exports is assumed to reflect the potential effect of changes in Delta flow conditions on movement and survival of larval and early juvenile longfin smelt.

Adult splittail gradually move upstream during the winter and spring months to spawn. Year class success of splittail is positively correlated with wet years, high Delta outflow, and floodplain inundation (Sommer et al. 1997; Moyle 2002). Low flow impedes access to floodplain areas that support rearing and spawning.

Green sturgeon adults and juveniles seem to prefer deeper water habitat such as pools. Lower flows could impede upstream migration of adults if low-flow conditions cause barriers for migration.

Water Temperature

Fish species have different responses to water temperature conditions depending on their physiological adaptations. Salmonids in general have evolved under conditions in which water temperatures need to be relatively cool. Delta smelt and splittail can tolerate warmer temperatures. In addition to species-specific thresholds, different life stages exhibit different water temperature requirements. Eggs and larval fish are the most sensitive to warm water temperature.

Unsuitable water temperatures for adult salmonids such as Chinook salmon and steelhead during upstream migration lead to delayed migration and potentially diminished reproduction. Elevated summer water temperatures in holding areas cause mortality of spring-run Chinook salmon (U.S. Fish and Wildlife Service 1996). Warm water temperature and low DO also increase egg and fry mortality. USFWS (1996) cited elevated water temperatures as limiting factors for fall- and late fall–run Chinook salmon.

Juvenile salmonid survival, growth, and vulnerability to disease are affected by water temperature. In addition, water temperature affects prey species abundance and predator occurrence and activity. Juvenile salmonids alter their behavior depending on water temperature; this tendency is reflected in movements to take advantage of local water temperature refugia (e.g., movement into stratified pools, shaded habitat, and subsurface flow) and to improve feeding efficiency (e.g., movement into riffles).

Water temperatures in Central Valley rivers frequently exceed the tolerance of Chinook salmon and steelhead life stages. Based on a literature review, conditions supporting adult Chinook salmon migration are assumed to deteriorate as temperature warms between 54 and 70°F (McCullough 1999). For Chinook salmon eggs and larvae, survival during incubation is assumed to decline with increasing temperature between 54 and 61°F (Myrick and Cech 2001). For juvenile Chinook salmon, survival is assumed to decline as temperature warms from 64 to 75°F (Myrick and Cech 2001; Rich 1987). Relative to rearing, Chinook salmon require cooler temperatures to complete the parr-smolt transformation and to maximize their saltwater survival. Successful smolt transformation is assumed to deteriorate at temperatures ranging from 63 to 73°F (Baker et al. 1995).

For steelhead, successful adult migration and holding is assumed to deteriorate as water temperature warms between 52 and 70°F. Adult steelhead appear to be much more sensitive to thermal extremes than are juveniles (National Marine Fisheries Service 1996; McCullough 1999). Conditions supporting steelhead spawning and incubation are assumed to deteriorate as temperature warms between 52 and 59°F (Myrick and Cech 2001). Juvenile rearing success is assumed to deteriorate at water temperatures ranging from 63 to 77°F (Raleigh et al. 1984; Myrick and Cech 2001). Relative to rearing, smolt transformation requires cooler temperatures, and successful transformation occurs at temperatures ranging from 43 to 50°F. Juvenile steelhead, however, have been captured at Chipps Island in June and July at water temperatures exceeding 68°F (Nobriega and Cadrett 2001). Juvenile Chinook salmon have also been observed to migrate at water temperatures warmer than expected based on laboratory experimental results (Baker et al. 1995).

Delta smelt and splittail populations are adapted to water temperature conditions in the Delta. Delta smelt may spawn at temperatures as high as 72°F (U.S. Fish and Wildlife Service 1996) and can rear and migrate at temperatures as warm as 82°F (Swanson and Cech 1995). Splittail may withstand temperatures as warm as 91°F but prefer temperatures between 66 and 75°F (Young and Cech 1996).

Green sturgeon prefer cool water temperatures for spawning, embryonic development, and rearing. Spawning typically occurs when water temperatures are 46–57°F and embryonic development is optimal when water temperatures are 52–66°F. Temperatures above 68°F are lethal for embryos (Cech et al. 2000). Overwintering juveniles stop migrating downstream when temperatures reach 46°F (Kynard et al. 2005).

Entrainment

All fish species are entrained to varying degrees by the SWP and CVP Delta export facilities and other diversions in the Delta. Fish entrainment and subsequent mortality is a function of the size of the diversion, the location of the diversion, the behavior of the fish, and other factors, such as fish screens, presence of predatory species, and water temperature. Low approach velocities are assumed to minimize stress and protect fish from entrainment.

Juvenile striped bass populations have steadily declined since the mid-1960s partially because of entrainment losses of eggs and young fish at water diversions (Foss and Miller 2001). The CVP and SWP fish facilities indicate entrainment of adult delta smelt during their spawning migration from December through April (California Department of Water Resources and Bureau of Reclamation 1994). Juveniles are entrained primarily from April through June. Longfin smelt adults and yearlings are entrained in the CVP and SWP pumps from November to February. Juveniles are entrained at the CVP and SWP pumps from March to October, although densities during the months of July to November are very low. The highest entrainment numbers of juveniles occur from April to June (Bay Delta and Tributaries Project n.d.). Young-of-year splittail are entrained between April and August when fish are moving downstream into the estuary (Moyle 2002). Juvenile Chinook salmon are entrained in all months but primarily from November through June when juveniles are migrating downstream. Green and white sturgeon are rarely entrained at the CVP and SWP fish facilities; however, entrainment has occurred in every month (Bay Delta and Tributaries Project n.d.).

Contaminants

In the Sacramento and San Joaquin River basins, industrial and municipal discharge and agricultural runoff introduce contaminants into rivers and streams that ultimately flow into the Delta. Organophosphate insecticides, such as carbofuran, chlorpyrifos, and diazinon, are present throughout the Central Valley and are dispersed in agricultural and urban runoff. These contaminants enter rivers in winter runoff and enter the estuary in concentrations that can be toxic to invertebrates (CALFED Bay-Delta Program 2000.) Because they accumulate in living organisms, they may become toxic to fish species, especially those life stages that remain in the system year-round and spend considerable time there during the early stages of development, such as Chinook salmon, steelhead, splittail, delta smelt, longfin smelt, and green sturgeon.

Predation

Nonnative species cause substantial predation mortality in native species. Studies at Clifton Court Forebay estimated predator-related mortality of hatchery-reared fall-run Chinook salmon from about 60% to more than 95%. Although the predation contribution to mortality is uncertain, the estimated mortality suggests that striped bass and other predatory fish—primarily nonnatives—pose a threat to juvenile Chinook salmon moving downstream, especially where the stream channel has been altered from natural conditions (California Department of Water Resources 1995). Turbulence after passing over dams and other structures may disorient juvenile Chinook salmon and steelhead, increasing their vulnerability to predators. Predators such as striped bass, largemouth bass, and catfish also prey on delta smelt and splittail (U.S. Fish and Wildlife Service 1996). However, the extent to which these predators may affect delta smelt and splittail populations is unknown. Predation is not a known cause for decline in green sturgeon populations (Adams et al. 2002).

Food

Food availability and type affects survival of fish species. Species such as threadfin shad and wakasagi, an introduced species related to delta smelt, may affect delta smelt survival through competition for food. Introduction of nonnative food organisms may also have an effect on the survival of delta smelt and other species. Nonnative zooplankton species are more difficult for small smelt and striped bass to capture, increasing the likelihood of larval starvation (Moyle 2002). Splittail feed on opossum shrimp, which in turn feed on native copepods that have shown reduced abundance, potentially due to the introduction of nonnative zooplankton and the Asiatic clam *Potamorcorbula amurensis*. In addition, flow affects the abundance of food in rivers, the Delta, and Suisun Bay. In general, higher flows result in higher productivity, including the higher input of nutrients from channel margin and floodplain inundation and higher production resulting when low salinity occurs in the shallows of Suisun Bay. Higher productivity increases the availability of prey organisms for delta smelt and other fish species.

4.2 Environmental Consequences

This section examines the effects of the project alternatives on fish resources. This analysis is based on the results of previous environmental studies.

4.2.1 Methods for Analysis of Effects

The assessment of effects considers the occurrence and potential occurrence of species and species' life stages relative to the magnitude, timing, frequency, and duration of project activities, including construction and operation of the water features that are part of the River Islands at Lathrop development project. The assessment links project-related actions to changes in environmental correlates, where environmental correlates are environmental conditions or suites of environmental conditions that individually or synergistically affect the survival, growth, fecundity, and movement of a species.

The assessment of a species' response to such actions begins with statements of the hypothetical relationships between changes in environmental correlates and the expected species' response. The underlying principles, specific methods, and available scientific support are discussed. Additional supporting information relative to species occurrence, life history, biology and physiology, and factors that have affected the historical and current species' abundance is provided in *Affected Environment*.

4.2.2 Definition of Significant Effects

Significant effects on selected fish species may occur at the individual, population, or ecosystem level. For special-status fish species, effects on individuals would be considered significant. For common species, significant effects would be associated with substantial changes in species populations or ecosystem conditions. Significant effects for this analysis are listed below.

- Substantial interference with the movement of any resident or migratory fish species.
- Substantial long- or short-term loss of habitat quality or quantity.
- Substantial effects on rare or endangered species or habitat of the species that could affect population abundance or distribution.
- Substantial effects on fish communities or species that are protected by applicable plans or goals.
- Permanent change in an environmental correlate that would substantially reduce the average abundance of the population over a range of weather conditions (e.g., water year types).
- Change in an environmental correlate that would permanently limit the geographic range and the seasonal timing of any life stage.
- Reduction in population abundance, distribution, and production during deficient environmental conditions.

Implementation of some components of the proposed action could have short- and long-term (e.g., permanent) effects. *Short-term* effects are temporary and are primarily associated with the potential for disturbance or direct injury and mortality of fish and temporary loss of habitat. *Long-term* refers to effects that likely continue to affect species over several generations, well after completion of the relevant activities.

4.2.3 Effects and Mitigation Approaches

This assessment addresses species that occur or have the potential to occur in aquatic environments potentially affected by the proposed action—that is, the Delta, the San Joaquin and Old Rivers, and Paradise Cut. Although many fish species occur or have the potential to occur in the study area, the assessment focuses on special-status and important game fish species: Central Valley fall-/late fall–run Chinook salmon, Sacramento River winter-run Chinook salmon, Central Valley spring-run Chinook salmon, Central Valley steelhead, delta smelt, green sturgeon, Sacramento splittail, longfin smelt, white sturgeon, and striped bass. In the assessment of construction activities, pile driving is treated separately because of the specific character of effects associated with that activity.

4.2.3.1 Alternative 1—Proposed Action

Temporary disturbance and possible mortality of fish, including special-status species, as a result of construction and operations activities (less than significant)

Sediment and Turbidity

Construction and operations activities and techniques under this alternative have the potential to increase sedimentation and turbidity in the San Joaquin River, Old River, and Paradise Cut, and consequently could affect fish and their habitat. Specific actions that could result in sedimentation and turbidity effects include all work on the waterside faces of levees, dredging activities for construction and operations,[1] in-stream activities such as bridge construction and modification, activities associated with Paradise Cut floodwater conveyance improvements, and construction of the Lathrop Landing back bay. It is expected that turbidity resulting from construction and maintenance activities would be intense in the vicinity of the activity but would attenuate with time and distance from the activity.

Increases in sedimentation and turbidity have been shown to adversely affect photosynthesizing plants and attached organisms, benthic invertebrates, and fish (Waters 1995). Disturbance and mobilization of finer particles (e.g., clay, silt, sand) are of most concern because of their potential to adversely affect aquatic plants and animals. The combination of the abundance of fine material (the Delta's geology and sediment transport regime results in a sediment composition that is dominated by finer sized substrates) and the proposed operation of heavy equipment in or near aquatic habitats could result in the mobilization of fine sediments if BMPs and other measures intended to protect water quality are not implemented. In addition to increasing sedimentation in aquatic habitats, fine sediments entering aquatic habitats have the potential to remain in suspension for long periods of time, thereby elevating the duration and extent of turbidity levels.

Increases in sedimentation and turbidity can adversely affect aquatic plants both mechanically and by impeding photosynthesis, as well as damaging and smothering macroinvertebrates, an important fish food item.

High concentrations of suspended sediment can have both direct and indirect effects on fish. In general, larger fish tend to be more tolerant than smaller fish, while eggs and fry are the least tolerant. Deposition of excessive fine sediment on the stream bottom could eliminate habitat for aquatic insects; reduce density, biomass, number, and diversity of aquatic insects and vegetation; and reduce the suitability of spawning habitat for estuarine species that spawn in the South Delta (e.g., delta smelt, splittail). Substantial sediment input could adversely affect the migration of migratory species. Migrating adult salmonids have been reported to avoid high silt loads or cease migration when such loads are unavoidable (Bjornn and Reiser 1991). Juvenile salmonids tend to avoid streams that are chronically turbid (Lloyd 1987) or move laterally or downstream to avoid turbidity plumes (Sigler et al. 1984).

[1] In general, hydraulic or suction dredging (assumed to be the method used for the proposed action) has less potential to cause excessive sedimentation and turbidity in the channel than clamshell and dragline dredging. Initial breaching of levees would take place in the San Joaquin River and Paradise Cut when Lathrop Landing back bay and the Paradise Cut Canal are connected to the waterways. Additional dredging to preserve boat access in Lathrop Landing back bay and Paradise Cut Canal is anticipated to be necessary every 5–10 years. Because it is difficult to predict siltation rates, and because some locations may require more frequent dredging than others, specific locations and schedules for dredging are unknown at this time.

In-water construction activities are not likely to cause direct mortality of fish because the expected increases in turbidity and suspended sediment would be of short duration, limited in extent, and monitored for compliance with regulatory standards. In addition, any localized increases in suspended sediment and turbidity would likely be diluted quickly as a result of the mixing potential associated with channel currents. Potential effects on fish species would likely be limited to indirect effects resulting from the behavioral response of fish to turbid water and suspended sediment in the affected portion of aquatic habitats. Such responses include avoidance of high turbidity, changes in foraging ability, increased predation risk, and reduced territoriality (Meehan and Bjornn 1991; Bash et al. 2001). However, most increases in turbidity and suspended sediment would occur during approved work windows in the summer period when fewer individuals of migratory species (e.g., Chinook salmon, steelhead, splittail, sturgeon) are likely to be present in the south Delta.

Although elevated turbidity levels typically have a negative effect on fish, moderate levels of turbidity (e.g., 35–150 nephelometric turbidity units [NTUs]) have been shown to have beneficial effects through increased foraging rates, presumably in response to reduced vulnerability to sight-feeding predators (Gregory and Northcote 1993).

When suspended particles settle from the water column, they contribute to sedimentation, which can bury or suffocate eggs and developing embryos, displace prey, degrade spawning habitat, and bury or smother aquatic vegetation and structural cover. Smothering of submerged aquatic vegetation may reduce the spawning habitat available for species such as splittail, delta smelt, and longfin smelt. Chinook salmon and steelhead spawning habitat (and, therefore, eggs and yolk-sac fry) will not be affected by the proposed action because the action area is downstream of all spawning areas in the San Joaquin River and its tributaries. Potential effects on the spawning success of warmwater game species are also considered minor because only small portions of these populations would be potentially affected by construction activities and because most spawning is believed to occur in slow-moving backwater areas or sloughs away from the main river channel.

Although construction-related effects of the proposed action associated with increased sedimentation and turbidity have the potential to affect native and resident fish species, including anadromous species, direct and indirect effects would be less than significant for the reasons summarized below.

- Environmental Commitments as set forth in Chapter 2, *Proposed Action and Alternatives*—especially those outlined in *Measures to Protect Fish and Fish Habitat* and *Measures to Protect Water Quality*—have been incorporated into the project description to avoid and minimize potential effects associated with increased sediment load and turbidity. These include constraining all in-water work to authorized work windows, installing silt curtains, and disposing of dredged spoils on land rather than in the water.
- Any increases in turbidity and sedimentation that may occur during construction and maintenance would be temporary and would be diluted quickly because of river currents and tidal flushing.
- Migratory and resident fish would likely move upstream, downstream, or laterally to an unaffected portion of the river in response to in-channel work and would therefore be unaffected by any increases in turbidity or sedimentation should they occur.
- If present, migratory species, such as adult and juvenile salmonids, would be expected to bypass channel reaches with elevated turbidity and sediment levels because a sufficient portion of the channel's width (i.e., zone of passage) would remain unaffected. In addition, the Central Valley

Water Board regulates turbidity in the channel; the Basin Plan requires projects to not exceed 20% of ambient turbidity conditions. This threshold combined with slow flow/mixing of the channel would allow for adequate ambient water fish passage.

- Because the study area is downstream of all salmon, steelhead, lamprey, and sturgeon spawning areas, no effects on spawning success or habitat suitability in the context of spawning substrate for these anadromous fish species would occur.

Accidental Spills of Construction Materials

Implementing the proposed action would require common construction materials and supplies that may be toxic to fish and other aquatic organisms. The operation of heavy equipment, cranes, dredges, and other construction equipment in or near water bodies can result in accidental spills and leakage of fuel, lubricants, hydraulic fluids, and coolants. Asphalt, wet concrete, and other construction materials used during construction may fall directly into water bodies or enter aquatic habitats in surface water runoff. Other sources of contaminants include the discharges from vehicle and concrete washout facilities. Situations that could result in the accidental or unintentional runoff or discharge of toxic materials and other harmful substances to aquatic environments are listed below.

- Accidental spill of petroleum product.
- Storage of pavement, petroleum products, concrete, and other construction materials.
- Accidental spill of lubricant.
- Discharge of water from construction areas.

An accidental spill or inadvertent discharge of these materials adjacent to or in a water body could affect water quality in the San Joaquin River, Old River, or Paradise Cut, thereby impairing the health and survival of fish and the quality of fish habitat. The potential magnitude of biological effects resulting from accidental or unintentional actions depends on a number of factors, including the proximity to the water body; the type, amount, concentration, and solubility of the contaminant; and the timing and duration of the discharge. Contaminants can affect survival and growth rates, as well as the reproductive success, of fish and other aquatic organisms. Petroleum products also tend to form oily films on the water surface that can reduce DO levels available to aquatic organisms. The severity of the effect depends on species and life stage sensitivity, duration and frequency of exposure, condition or health of individuals (e.g., nutritional status), and physical or chemical properties of the water (e.g., temperature, DO).

Potential effects can range from habitat avoidance in or near the study area to mortality, which could result from exposure to lethal concentrations of contaminants or exposure to nonlethal levels that cause physiological stress and increase susceptibility to other sources of mortality (e.g., predation, disease).

Environmental Commitments as set forth in Chapter 2, *Proposed Action and Alternatives,* especially those outlined in *Measures to Protect Fish and Fish Habitat* and *Measures to Protect Water Quality,* have been incorporated into the project description to avoid and minimize potential effects associated with potential accidental discharges of construction materials. The potential for accidental spills during proposed action construction is not expected to result in a significant effect on fish populations because the relevant environmental commitments would reduce the probability for substantial release of toxic or hazardous materials to adjacent waterways, establish measures to contain any accidental spills quickly, and constrain construction activities to periods when the relative abundance of sensitive fish species is low (i.e., during summer). Accordingly, the proposed action would result in less-than-significant direct and indirect effects relating to accidental discharge of construction materials.

Resuspension of Contaminated Sediments

Contaminants associated with dredged sediments may be resuspended in the water column. Resuspended contaminants could be transported by river flow and tidal action to other parts of the Delta, thereby exposing aquatic organisms and humans through bioaccumulation and biomagnification in the food web. (Nightingale and Simenstad 2001:67.)

Resuspension of contaminated sediments may adversely affect fish that encounter the sediment plume, even at low concentrations. Lipophilic compounds in the fine organic sediment, such as polyaromatic hydrocarbons, can be preferentially absorbed through the lipid membranes of the gill tissues, thus providing an avenue of exposure to fish in contact with the sediment plume (Newcombe and Jensen 1996). Similarly, heavy metals (e.g., copper) may interfere with ion exchange channels in the gills. Increases in ammonia from the sediment may create toxic conditions for special-status fish species (Thurston and Russo 1983; Thurston et al. 1984; Hansen et al. 2002). Sediments tested in dredge sites in the Delta had elevated concentrations of copper and ammonia (Ascent Environmental, Inc. 2011).

Under the proposed action, a sampling and analysis plan for proposed dredging areas will be prepared within 1 year of proposed dredging activities. If sampling indicates any layer of toxic materials above applicable standards, contractors will dredge so that either the layer is not disturbed or the entire layer is removed (see Chapter 6, *Water Resources and Flood Risk Management*). In addition, the environmental commitments specify use of sediment curtains to contain turbidity plumes during dredging. There would be less-than-significant direct and indirect effects because the potential for the release of pollutants during dredging would be minimized through implementation of the environmental commitments.

Construction-Related Disturbance

Noise, vibrations, artificial light, and other physical disturbances can harass fish, disrupt or delay normal activities, or cause injury or mortality. The potential magnitude of effects depends on a number of factors, including the type, intensity, frequency, and duration of the disturbance; proximity of the action to the water body; and timing of actions relative to sensitive life stages. For most activities, the effects on fish would be limited to avoidance behavior in response to movements, noises, and shadows caused by construction personnel and equipment operating in or adjacent to the water body. However, survival may be impaired if the disturbance causes fish to leave protective habitat (e.g., increasing exposure to predators) or if the disturbance is of sufficient duration and magnitude to affect growth and spawning success. Injury or mortality may result from direct and indirect contact with humans and machinery and from physiological stress.

Physical disturbance and injury is most likely to occur during in-water work. Construction-related activities that involve in-water work include breaching levees and related dredging, installing cofferdams, and installing boat docks and fishing piers.

Construction elements of the proposed action would involve using heavy equipment and other techniques that could result in direct injury, including mortality, to fish in the work area. In-water construction associated with levee breaching and dredging, bridge construction, boat dock installation, and other construction-related actions could directly kill or injure fish through direct contact with construction equipment. Resident fish, such as bass and sunfish that use nearshore habitats, are most likely to be affected because these species would be most abundant in these habitats during time of construction (i.e., summer and early fall). In contrast, sensitive native species, such as delta smelt, longfin smelt, sturgeon, splittail, and juvenile salmonids, would be less likely to be affected because these species typically occur in the study area only seasonally (fall, winter, and spring); consequently, their relative abundances in the study area at the time of construction would be low.

Direct injury and mortality associated with direct contact with construction equipment and placement of riprap during construction would constitute a less-than-significant direct effect on fish species occurring in the study area. No indirect effects were identified. The number of fish potentially injured during construction would likely be small because of the reasons listed below.

- Environmental Commitments as set forth in Chapter 2, *Proposed Action and Alternatives*—especially those outlined in *Measures to Protect Fish and Fish Habitat* and *Measures to Protect Water Quality*—have been incorporated into the project description to avoid and minimize potential effects associated with construction activities.
- Migratory and resident fish would likely move upstream, downstream, or laterally to an unaffected portion of the river in response to in-channel work.
- In-water construction activity would occur over relatively short periods (i.e., discontinuous construction seasons).
- Aquatic habitat that would be directly affected by construction equipment represents a small percentage of the total stream habitat available, thereby limiting the number of fish potentially exposed to direct injury and mortality.

Effects of entrainment on fish, including special-status species, and other biota from entrainment during dredging (significant)

Dredging may disturb and injure or kill fish. In addition, fish that come within the “zone of influence” of the suction pipe of the hydraulic dredge may be drawn into the dredge along with water and the dredged sediments.

The potential for direct injury and entrainment of juvenile salmonids from dredging would largely be avoided because the project proponent would limit dredging to the approved work window (August 1–September 15) when juvenile salmonids in the south Delta are least abundant. In the unlikely event that juvenile salmonids are present at the time of dredging, the potential for injury or entrainment of juveniles would likely be small because dredging would occur in mid-channel areas away from the near-shore areas where juvenile salmonids are typically found; migrating juveniles (smolts) are typically found in the upper portion of the water column and are less likely to be associated with the channel bottom.

Direct injury and entrainment effects on delta smelt and longfin smelt associated with dredging are also likely to be minimal because delta smelt and longfin smelt abundance in the south Delta is relatively low, and both species are more strongly associated with the upper portion of the water column than the channel bottom.

The lack of reliable estimates of green sturgeon abundance in the study area and information on the behavioral response of green sturgeon to dredging activities make it difficult to estimate with certainty the number of green sturgeon that could be entrained during dredging activities. However, it is likely that dredging would have minimal effect on sturgeon for three reasons.

- Dredging would be conducted only during authorized work windows (August 1–September 15) over several years, thereby limiting the magnitude of the effect in any given year.
- Fish sampling data suggest that sturgeon abundance in the south Delta is low, although low abundance of sturgeon in the catch may reflect sampling error and not true abundance. Low abundances of sturgeon in the south Delta study area would mean that the potential for entrainment from dredging also is probably low.
- Fish in general are known to avoid areas of disturbance. Juvenile sturgeon would likely exhibit avoidance behavior in the immediate vicinity of dredging operations as a result of the associated noise and disturbance, although the degree to which sturgeon would avoid these areas is unknown. The relatively slow progress of dredging operations increases the likelihood that sturgeon would have opportunities to avoid dredging areas.

Susceptibility of fish to entrainment is influenced by the type of dredging equipment employed. For example, fish entrainment rates generally have been shown to be greater for hydraulic dredges than for mechanical dredges, because of the strong suction field associated with hydraulic dredges (Nightingale and Simenstad 2001:51). The potential for entrainment also depends on many other factors, including those listed below.

- The abundance, swimming ability (which is positively related to size), and behavioral response of fish to dredging activities.
- The total area dredged.
- The speed at which dredging is conducted.

While the incremental effects of dredging on individual populations of fish are anticipated to be relatively small, the cumulative effects of repeated dredging over time on fish populations, many of which are rare or declining in number, could contribute to present and ongoing effects on these species. For this reason, this constitutes a significant direct effect. No indirect effects were identified. Mitigation Measure FISH-1 is available to address this direct effect.

Mitigation Measure FISH-1. Incorporate best management practices and other minimization measures into the dredging sampling and analysis plan

The project proponent will reduce the severity of this effect by incorporating BMPs and other minimization measures. The dredging sampling and analysis plan will be prepared following completion of detailed engineering specifications that define the specific volume and area to be dredged and will be submitted to CDFW, NMFS, and USFWS for review prior to initiation of dredging activities. Specific BMPs and other minimization measures in the plan will include those listed below.

- Limit dredging to approved work windows (August 1–September 15).
- Minimize the volume of material that must be dredged and the frequency of dredging, whenever possible.

- Use dredge types and methods that result in the least adverse effect on fish and their habitat (i.e., hydraulic dredging should be used in areas where sedimentation and turbidity issues are of most concern).
- Operate hydraulic dredges with the intake at or below the surface of the material being dredged to reduce the potential for entrainment of fish (the intake will be raised above the channel bed only for brief periods of purging or flushing of the intake system as necessary for the safe and efficient operation of the dredge).
- Monitor turbidity at 100 feet upstream and downstream of the dredge—dredging will immediately cease when turbidity levels downstream of the dredge are elevated by more than 10% of ambient turbidity levels (as determined from upstream measurements).
- If a fish kill occurs or fish are observed in distress, immediately cease dredging and notify CDFW, NMFS, and USFWS.
- Where practicable, use excluder devices or similar equipment on hydraulic dredge equipment to cause fish to leave areas affected by the dredging equipment. Dredges equipped with excluder devices have been shown to substantially reduce fish entrainment, especially for benthic species (Nightingale and Simenstad 2001).
- Minimize ambient light changes caused by nighttime artificial lighting on dredging structures that may alter prey-predator relationships and increase predation risks for special-status species.

Removal of Bottom Substrates and Benthic Organisms

Dredging would lower the channel bed. Sediments removed from the channel bed provide habitat for benthic invertebrates, which constitute an important food source for many species of fish. The effects on invertebrate communities from dredging can range from negligible to severe, with effects ranging from short to long term (Nightingale and Simenstad 2001:73–74). Generally, benthic communities are affected less by short-term, small-scale dredging projects than by long-term, large-scale projects.

Benthic communities often recolonize dredged areas quite rapidly. Recolonization has been hypothesized to occur as organisms are introduced to disturbed areas along with immigration of sediments associated with slumping of channel walls adjacent to dredged areas or from the migration of organisms from more distant areas (e.g., from upstream). Substantial recovery of benthic communities has been shown to occur within 3–6 months (Flemer et al. 1997; Nightingale and Simenstad 2001:74).

Because the loss of food items is limited, and because benthic invertebrates can recolonize dredged locations rapidly, long-term effects associated with project-related dredging activities would be less than significant. Moreover, the areas of dredging and deposition at any one time are small fractions of the total area. Additionally, benthic communities normally subject to wave scour, high turbidity, and sediment redeposition rapidly recover from dredging and sediment disposal because the residents are rapidly reproducing, opportunistic species with short life cycles (Oliver et al. 1977).

Initial dredging in the Lathrop Landing back bay area would temporarily affect 0.414 acre of habitat during the connection of the San Joaquin River with the back bay. Dredging to connect Paradise Cut Canal with Old River would temporarily affect 0.25 acre in Old River. Subsequent dredging would occur in the back bay and Paradise Cut Canal to keep the channels open for boating. Dredging is expected to have minimal effects on prey availability for fish, especially over the long term, for the reasons listed below.

- The area being dredged periodically to keep the channels open for boats is limited.
- Vegetated areas and bottom substrates in adjacent channel reaches (both laterally and longitudinally) would be unaffected and would continue to support habitat for benthic invertebrates, supporting populations available to support recolonization.
- Invertebrate drift from upstream areas would continue to provide a prey base for fish in areas affected by dredging.
- Benthic invertebrates are expected, based on changes in benthic invertebrate abundance observed in response to dredging, to fairly quickly recolonize bottom substrates disturbed by dredging.
- Disposal of material in land-based settling basins would avoid the effects of sedimentation on the benthic community that are often associated with in-water disposal of dredged spoils.

Dredging would result in less-than-significant direct effects on benthic organisms. No indirect effects were identified.

Possible injury or mortality of special-status fish species due to pile driving (significant)

The proposed action includes three new bridge crossings to provide improved access between the RID Area and neighboring portions of Lathrop as detailed in Chapter 2, *Proposed Action and Alternatives*. Docks providing a total of 675 new boat berths would be included in the proposed action.

Noise, vibrations, and other physical disturbances can harass fish, disrupt or delay normal activities, or cause injury or mortality. In fish, the hearing structures and the swim bladder and surrounding tissues are particularly vulnerable to high-pressure sounds (Popper et al. 2006) The type and severity of effects depends on several factors, including the intensity and characteristics of the sound, the distance of the fish from the source, the timing of actions relative to the presence of sensitive life stages, and the frequency and duration of the noise-generating activities. The range of effects potentially includes behavioral effects, physiological stress, physical injury (including hearing loss), and death.

Underwater pile-driving noise may reach levels sufficient to cause injury or fatality of fish. Potential exposure of adult and juvenile salmonids to pile driving sounds would be minimized by conducting all in-water pile-driving activities to the approved work window (August 1–September 15) when the lowest numbers of Chinook salmon and steelhead are likely to be present in the study area. Juvenile and adult green sturgeon may be present in the south Delta at this time.

Since 2000, transportation agencies, resource agencies, ports, and other entities have been developing criteria for determining effects and appropriate mitigation measures to protect fish from underwater pile-driving sounds. In 2004, the Caltrans established a Fisheries Hydroacoustic Working Group (FHWG) to facilitate the development of interim criteria based on best available scientific information. The FHWG includes participants from Caltrans, Washington Department of Transportation, Oregon Department of Transportation, NMFS, USFWS, CDFW, and the Corps. The FHWG is supported by a panel of hydroacoustic and fisheries experts and is overseen by a steering committee composed of managers with decision-making authority from each of the member organizations.

In June 2008, the member agencies of the FHWG agreed in principle to interim criteria for assessing injury to fish from underwater pile-driving noise. These criteria identify sound pressure levels of 206 decibels (dB) peak and 187 dB accumulated sound exposure level (SEL) as thresholds for the onset of physical injury to fish ≥ 2 grams. For fish < 2 grams, the accumulated SEL is 183 dB. Physical injury to fish is expected if either of these thresholds is exceeded. These criteria apply to impact pile driving and are not considered appropriate for assessing the effects of vibratory pile driving, which likely has a higher threshold for injury. Based on previous research using continuous wave sound on gouramis and goldfish, Popper et al. 2006 recommended a threshold of 220 dB for accumulated SEL as a reasonable starting point for identifying a threshold for vibratory driving. The ultimate threshold will likely be between 187 and 220 dB. There has been no formal agreement on the criteria that should be applied to vibratory pile driving (California Department of Transportation 2009).

There is also no formal agreement on the thresholds that should be used to evaluate the potential for adverse behavioral effects from underwater pile-driving noise. NMFS and USFWS generally use 150 dB root mean squared as the threshold for behavioral effects on listed salmonids. Although no scientific support for this criterion is available, it is considered a general threshold for identifying potential behavioral responses (e.g., avoidance or alarm response) that could disrupt normal activity patterns or decrease the ability of fish to avoid predators.

Cumulative sound levels sufficient to cause potential injury to fish would occur within 72 feet of pile-driving activities. This is considered the maximum radius of the potential zone of effect based on the assumption that injury thresholds for vibratory pile driving are probably higher than those for impact pile driving. This also assumes that fish would remain in this zone for an entire day of pile-driving operations. However, any green sturgeon, Chinook salmon, or steelhead present in the project area during the time of pile driving (August 1–September 15) would likely be large juveniles and adults, and therefore capable of readily moving out of this zone before harmful levels are reached. Once pile driving begins, individual fish approaching the project area from upstream or downstream are likely to detect the sounds and avoid or bypass the potential zone of effect, which would extend only partway across the channel. Fish will also have opportunities to avoid pile-driving sounds during periods when pile driving ceases (e.g., repositioning of equipment) and at night when pile driving will be suspended.

There is a lack of significant cover or other important habitat features in the immediate project area that could attract juvenile fish and increase their likelihood of exposure to pile-driving sounds. However, juvenile fish, including green sturgeon, that may be residing in the detection range of pile-driving sounds (1,000 meters) may respond in ways (e.g., leaving protective cover) that increase their vulnerability to predators. Therefore, the potential for possible injury or mortality of special-status species from bridge-related pile driving is considered a significant direct effect. There would be less-than-significant indirect effects associated with noise. Mitigation Measure FISH-2 is available to address this effect.

Mitigation Measure FISH-2. Reduce noise effects on special-status fish species

The following measures are intended to reduce potential adverse effects on special-status fish species and their habitat.

- All in-water construction activities will be limited to the period August 1–October 15 to avoid the primary migration periods of listed salmonids and delta smelt.
- In-water pile driving will be restricted to the period August 1–October 15 to avoid or minimize exposure of adults and juvenile salmonids to underwater pile-driving sounds.
- Vibratory hammers will be used initially to install the sheet piles and other pilings as soil conditions allow; impact hammers would be used to drive the piles/pilings/casings deeper as necessary to reach bearing capacity.
- Impact hammer–related sound will be kept to within criteria set by CDFW and NMFS.
- To attenuate noise impacts, bubble curtains (a type of nonphysical barrier [NPB]) will be used near impact hammers during pile driving whenever practicable and if necessary. In accordance with CDFW's direction to the City of the construction of Bradshaw's Crossing, the NPB will consist of four steel piles 8–9 inches in diameter suspended below the water surface, with a perforated pipe placed over the casing/piling for the injection of air. Debris floats and warning buoys will extend around the perimeter of the NPB to delineate the NPB above the surface,
- Cofferdams will be used to isolate pile-driving areas and attenuate sound.
- A qualified fisheries biologist will be onsite during cofferdam installation and dewatering to remove fish from the cofferdam area.

Potential for increased mortality of native fish from predation or entrainment at SWP/CVP pumps associated with diversion into Paradise Cut (less than significant)

Under existing conditions, water in the San Joaquin River flows over Paradise Weir into Paradise Cut when flows exceed 18,000 cfs (roughly equivalent to the 4-year flood event).

Special-status fish in the San Joaquin River system (Chinook salmon, steelhead, splittail, delta smelt, and longfin smelt) are at risk of diversion when high-flow events overtop Paradise Weir. The number of fish diverted is dependent on a number of variables, such as the proportion of river flow diverted; the coincidence of flood flow diversion with the migration timing of adult and juvenile fish; the abundance of fish in the San Joaquin River moving past the Paradise Weir during flood events; and the behavior of adult and juvenile fish during flood events.

Under the proposed action, flood conveyance and storage capacity in Paradise Cut would be expanded and the existing flow constriction at Paradise Weir would be remedied. Other than improvements to the rock riprap on the downstream face of Paradise Weir to reduce the potential for injury of fish that are diverted from the San Joaquin River to Paradise Cut, no other changes to Paradise Weir are proposed.

These proposed modifications would result in more flow being diverted into Paradise Cut, compared to existing conditions. However, because no changes to the height of the existing Paradise Weir are proposed, these modifications would not affect the frequency or duration that San Joaquin River flows are diverted into Paradise Cut (see Chapter 6, *Water Resources and Flood Risk Management*).

Because the proposed PCIP would increase the proportion of San Joaquin River flow that is diverted into Paradise Cut during flood events, it is reasonable to assume that a greater number of fish in the river would be diverted into Paradise Cut when flows overtop Paradise Weir. The additional number of fish that would be diverted is difficult to predict and would depend on a number of variables, as discussed above. However, because fish entrainment is largely influenced by the proportion of flow diverted, it is assumed for purposes of this analysis that the incremental increase in the number of fish that would be diverted into Paradise Cut would be proportional to the additional amount of flow that is diverted.

Fish that are diverted into Paradise Cut would enter Old River where they then may migrate up Old River and rejoin the San Joaquin River, or migrate down Old River where they would be susceptible to entrainment by the SWP and CVP pumping facilities. Studies have shown that survival is greater for juvenile Chinook salmon that migrate down the mainstem San Joaquin River than for those passing through upper Old River (Brandes and McLain 2001). Hence, the proposed modifications to flood conveyance and storage capacity in Paradise Cut could potentially increase mortality of native fish that are diverted into Paradise Cut.

However, the proposed changes to the riprap surfaces on the downstream face of Paradise Weir could reduce injury and mortality of fish passing over Paradise Weir compared to existing conditions. In addition, the expected increases in cover and habitat expansion that would occur as a result of proposed modifications in the PCC Area could increase the growth and survival of fish that are diverted into Paradise Cut. These proposed actions could ameliorate, at least in part, potential increases in mortality associated with diverting additional fish into Paradise Cut.

While the potential exists for Paradise Cut flood conveyance modifications to cause additional mortality of San Joaquin River fish, the potential for significant effects is low because of the reasons listed below.

- Flood events that result in overtopping of the Paradise Weir occur, on average, only about once every 4 years.
- Modifications to Paradise Cut would increase flows from 13,000 cfs to 13,500 cfs (a 4% increase) during the design flow (52,000 cfs at Vernalis), thought to represent the 2% (50-year) flood event. These modifications would thus reduce flows in the San Joaquin River by approximately 1% at design flow.
- The proposed habitat improvements in Paradise Cut are expected to benefit fish while they are in Paradise Cut through increases in habitat availability, food, and in-stream cover.
- Some fish diverted into Paradise Cut are expected to migrate up Old River and rejoin the San Joaquin River and avoid passing the intakes to the SWP and CVP pumps.

Consequently, the potential for increased entrainment in SWP and CVP pumps from Paradise Cut modifications is considered to be a less-than-significant indirect effect.

Potential effects of entrainment on special-status fish species as a result of diversions into Stewart Tract (less than significant)

Under existing conditions, agricultural lands in the action area are irrigated with water diverted from the San Joaquin River, Old River, and Paradise Cut through 14 agricultural intakes. None of these intakes is equipped with fish screens.

As the River Islands development project proceeds and agricultural lands are converted to project features, the existing agricultural pumps would be abandoned. These would be replaced by two new 4,000 gallons per minute (GPM) intakes—one on the San Joaquin River and one on Old River near the sites of existing intakes—to regulate the internal lake system's water level and to provide irrigation water to urban landscaping areas. Generally, water would be pumped into the lake during dry periods, using existing riparian water rights, and discharged from the lake to Paradise Cut during extreme rainfall events. Fish screens would be installed at the intakes; these would be designed to meet agency criteria to prevent entrainment of fish at all life stages. Because the new pumps would be screened and entrainment effects would be less than under existing conditions, River Islands at Lathrop could result in beneficial effects associated with fish entrainment. However, some entrainment would still occur with the new screened pumps. Accordingly, there would be a less-than-significant direct effects associated with entrainment through diversions into Stewart Tract. No indirect effects were identified.

Water quality effects on fish in Paradise Cut, Old River, and the San Joaquin River associated with increased urban runoff (less than significant)

Currently, most of Stewart Tract is used for agricultural production, and excess irrigation runoff and storm drainage is collected in a drainage ditch and pumped untreated into Paradise Cut. Under the proposed action, the interior lake system would be used to collect and store onsite drainage. The increase in new impervious surfaces combined with the runoff from urbanized areas would result in a change from agricultural runoff to urban type runoff. As with many artificial lake systems, one concern would be the potential for eutrophication of the onsite water features from increases in urban runoff, which could result in low DO levels, elevated water temperatures, and increased pollutant constituents (e.g., toxic metals) that could ultimately be discharged to the adjacent waterways. The potential for effects would likely be greatest during the initial storm event or "first flush," when pollutant constituents would be concentrated.

Although the potential exists for degradation of water quality associated with urbanization, the project would result in a tradeoff of pollutant constituents, which under existing conditions are related to agricultural production.

In the absence of treatment, stormwater originating from new impervious surfaces on Stewart Tract could increase pollutants entering local waterways, resulting in reduced growth or mortality of the egg, larval, and juvenile life stages of fish. Furthermore, if these pollutants enter the river they could adversely affect special-status species, which use the San Joaquin River and Old River for migration, spawning, and rearing.

The internal lake system and the constructed wetlands along its edges are intended to treat stormwater runoff from the RID Area. Before runoff enters the wetlands and lake system, it would run through continuous deflective separation (CDS) "debris collector" units, which will capture and remove larger particles, such as litter, leaves, twigs, and other debris common in urban storm runoff. Runoff would be further slowed by passage through the wetland areas, allowing sediment to settle out and providing some contaminant removal. Stormwater would then collect and be stored in the lake, where further settling and passive filtration would occur. Discharges from the lake into Paradise Cut are expected to occur primarily during the winter and early spring storm season (December through March), when storm runoff into the lake would be at its peak.

Because runoff from impervious surfaces would be filtered and allowed to settle in the internal lake system, and because stormwater discharges from Stewart Tract would be required to comply with the discharge permit (see Chapter 6, *Water Resources and Flood Risk Management*, for a complete description), potential water quality effects associated with urban development would be minimized or avoided. The treatment of stormwater, combined with the reduction in agricultural discharges from Stewart Tract, could result in a net benefit to water quality in receiving waters through a reduction in the discharge of pollutants.

To address the issue of the effectiveness of the stormwater filtering mechanism and the interior lake system, Hydrologic Systems, Inc. (HSI) developed a water quality model using relevant water quality data collected from a large variety of sources. The results of the HSI model were used to determine the potential impacts of stormwater discharge and lake drainage on the water quality parameters that could affect listed fish species. It was concluded that, as a result of the BMPs that would be employed for the River Islands project, the final concentrations of heavy metals and organophosphates would be within safe limits for aquatic organisms, including the listed fish species and the aquatic organisms on which they feed (Ascent Environmental, Inc. 2011).

Under existing conditions, mean annual discharge from the RID Area—primarily agricultural runoff—is 8,712 acre-feet. Discharge under the River Islands at Lathrop development scenario—that is, managing the internal lake system's water elevation—mean annual discharge is anticipated to range between 292 and 4,287 acre-feet. Moreover, the timing would shift from the late spring and summer growing season to the winter and early spring months. Because receiving water levels are typically higher during this period, the dilution of discharges would increase. Accordingly, discharges would result in less-than-significant direct and indirect effects (Ascent Environmental 2011).

Disturbance and possible mortality of fish, including special-status species, associated with boat and marina operation (significant)

Release of Nonpoint Source Pollution

Petroleum products can be released from the operation of boat engines, spills during boat fueling, and cleaning and maintenance of boats and engines. The release of petroleum products from the operation of boats has been shown to adversely affect aquatic organisms, including salmonids. Direct effects of exposure to petroleum products include physical coating of fish gills (reduction in oxygen uptake efficiency), disruption of food absorption, and toxicological effects that can cause sickness or death in exposed fish. Indirect effects are less visible and may result in increased susceptibility to pathogens and parasites or adverse effects on prey organisms. Consequently, introducing additional petroleum products into the San Joaquin River, Old River, and Paradise Cut could adversely affect listed fish species both directly and indirectly.

Boat operation could also contribute to water contamination through the illegal pumping of sewage from boats with bathrooms/heads. This is an existing concern in Delta waterways. It is also likely that recreational boating would lead to some trash enter the surrounding waterways (Ascent Environmental, Inc. 2011).

During maintenance and repair of boats and boat docks, pollutants could be introduced into the waterways from the docks themselves. Such pollutants include petroleum hydrocarbons from fuel, oil, and organic solvents; toxic metals from antifouling materials and metal components of hulls and engines; and liquid and solid waste from boating and shoreside activities (Ascent Environmental, Inc. 2011). However, no refueling stations or boat maintenance facilities would be included as part of the Lathrop Landing Marina or Paradise Cut facilities, and marina and fishing pier facilities would include fish cleaning stations that provide for the proper disposal of wastes. Accordingly, characteristics would be incorporated into the design of these facilities to minimize these adverse effects.

Nevertheless, the release of nonpoint source pollution would be considered a significant direct and indirect effect. Implementation of environmental commitments detailed in Chapter 2, *Proposed Action and Alternatives*, would address this effect.

Water Temperature Changes Associated with Marina and Boat Docks

Using the results from HSI's water temperature modeling effort, Rich and Associates analyzed the potential impacts of water temperature conditions on the listed species in the proposed project area (Ascent Environmental, Inc. 2011). The analysis reached the following conclusions.

- River Islands at Lathrop would not result in additional thermal stress on listed fish species in the San Joaquin River, Old River, and Lathrop Landing back bay.
- The existing habitat in Paradise Cut is not suitable for salmonids and green sturgeon because current water temperatures are in the stressful-to-lethal range for these species. Paradise Cut is a dead-end slough fed by Old River, except when flood flows in the San Joaquin River overtop the Paradise Cut Weir. The higher water temperatures are a result of less water exchange and larger surface area to volume in Paradise Cut than in the other river systems. Modeling results showed that the expected water temperatures in Paradise Cut following installation of boat docks would be slightly higher than under existing conditions.

Because of the unsuitable conditions extant in Paradise Cut, the slightly elevated water temperatures that could result from the installation of boat docks would be considered a less-than-significant direct and indirect effect.

Boating Activities

Boat engine noise has the potential to adversely affect fish directly and indirectly by affecting hearing sensitivity and by causing behavioral changes as a result of disturbance. General effects on fish associated with increases in noise and disturbance have been addressed above in the assessment of the effects of construction-related activities.

Boating activity and associated disturbances (increased noise and turbidity) may disrupt normal behavior patterns of fish and potentially increase their stress levels depending on the frequency, duration, and proximity of exposure. Limited experimental studies have also shown that boat engine noise can cause temporary losses of hearing sensitivity in some species (e.g., fathead minnow, [Scholik and Yan 2002]). The loss of hearing sensitivity may adversely affect a fish's ability to orient itself (due to vestibular damage), detect predators, locate prey, or sense its acoustic environment (Hastings and Popper 2005). Fish may also exhibit noise-induced avoidance behavior that causes them to move away from protective cover and increase their vulnerability to predators.

Limited data are available to evaluate the effects of boating activity and noise on Chinook salmon, steelhead, and green sturgeon. However, it can be reasonably assumed that increased boating activities associated with the new marina may increase the frequency of disturbance of fish and aquatic habitat in the study area. Additional boat traffic associated with the marina could result in more frequent disturbance of fish, potentially increasing the frequency of avoidance behavior and reducing or impairing the ability of fish to feed, migrate, and detect or avoid predators.

In addition to noise, boating activity has the potential to result in injury and mortality of fish, including individuals of listed species, as a result of propeller strike. Juvenile salmonids would probably be the most susceptible because of their limited swimming ability (Ascent Environmental, Inc. 2011).

The new docks are expected to increase the number of boats that are operating in the Stewart Tract vicinity at any given time. It is anticipated that the potential for adverse effects associated with noise and disturbance would decrease with distance from the marina area because the density of boat traffic would approach existing levels as boaters disperse throughout the south Delta region.

The majority of boating traffic associated with the docks is expected to occur during the summer, when the abundance of sensitive fish species in the south Delta is naturally low. Enforcement of a no-wake zone (as set forth in *Environmental Commitments* in Chapter 2, *Proposed Action and Alternatives*) will also limit the magnitude of disturbances and will reduce noise levels in areas where boat traffic would be most concentrated. Additional environmental commitments (implementation of a fish monitoring plan) would address these effects. Nevertheless, increased boating activities associated with the proposed action could result in significant direct and indirect effects on fish, both as a result of disturbance and direct mortality, and as a result of modifications to behavior that could impair survival and sustained health.

Increased Sedimentation and Turbidity

Increased boating associated with marina and boat dock development would increase the frequency of boat wakes that could lead to additional channel and riverbank erosion of waterways around Stewart Tract. Such erosion could in turn increase sedimentation and turbidity of surrounding surface waters in Paradise Cut, San Joaquin River, and Old River. Increases in sedimentation and turbidity have been shown to adversely affect fish physiology, behavior, and habitat, as disclosed in the discussion of construction-related effects.

While the potential exists for boat and marina operation to increase sedimentation and turbidity, minimal effects on sensitive fish species and aquatic habitats are expected for the reasons listed below.

- Boating activity is most likely to increase during summer, and any resultant increases in sedimentation and turbidity would coincide with low abundance of sensitive native fish species in area waterways.
- The establishment of no-wake zones, characterized by 5 mph boat speeds in marinas and adjacent to boat docks and slips in Paradise Cut, San Joaquin River, and Old River, would minimize the potential for boat wakes to cause additional erosion of riverbank habitats.

Increased sedimentation and turbidity are expected to result in less-than-significant direct and indirect effects.

Predation and altered habitat function associated with overwater structures and modification of stream morphology (significant)

Overwater structures can cause long-term effects on the biological community by altering predator-prey relationships, fish behavior, and habitat function. Fish migratory behavior is altered by the creation of sharp contrasts in underwater light conditions such as shade cast under ambient daylight conditions. Furthermore, shading can reduce the abundance of aquatic plants and benthic macroinvertebrates, an important food source for fish.

The presence of piers and shade from floating docks can create favorable conditions for predatory fish species, such as largemouth bass and striped bass, to ambush migrating juvenile fish (e.g., juvenile Chinook salmon and steelhead) and sensitive native species such as delta smelt and Sacramento splittail.

The proposed action would entail construction of Lathrop Landing back bay, Paradise Cut Canal, and new shallow-water habitat. Backwater habitat would be created in the back bay, which would be hydraulically connected to the San Joaquin River. Paradise Cut Canal would contain low-velocity water with hydraulic connectivity to Old River. In addition to these waterways, docks would be installed in the Lathrop Landing back bay, San Joaquin River, Old River, and Paradise Cut Canal. Increased shallow-water habitat and low-velocity water in and around Stewart Tract could lead to greater predation of sensitive fish species, such as Chinook salmon, delta smelt, longfin smelt and splittail. The following mechanisms of effect could result from these conditions.

- Loss of native fish in backwater, low-velocity, and shallow-water habitat from predation as a result of increased abundance of invasive predatory fish species.
- Loss of native fish under docks from predation as a result of increased abundance of invasive predatory fish species.
- Increased predator habitat.

Predation in Shallow Water

Shallow-water habitat provides spawning habitat for delta smelt, longfin smelt, and Sacramento splittail. In addition, according to USFWS (1996), shallow water habitat encourages production of phytoplankton and zooplankton and, thus, larval fish have become adapted to rear in this type of habitat. The additional shallow-water habitat proposed in Paradise Cut would provide areas for delta smelt and other fishes to spawn and rear (Rich 2009). Benefits associated with floodplain inundation include increased habitat diversity and area, input of large quantities of terrestrial material into the aquatic food web, and decreased competition (Sommer et al. 2001:326). Improved habitat conditions occurring in inundated floodplains are believed to be responsible for faster growth and migration rates of Chinook salmon in the Yolo Bypass (Sommer et al. 2001:330–331). Similarly, it is believed that the creation of large areas of rearing habitat (i.e., floodplain, or seasonally inundated shallow-water habitat) results in the creation of refuges for young fish and decreases the probability that young fish will encounter a predator (Sommer et al. 2005:1502). In contrast, the creation of permanent shallow-water habitat may result in an increase in predator habitat. In general, shallow-water habitat that is seasonally inundated in winter and spring and then dewatered during summer and fall (e.g., floodplain habitat) tends to favor native floodplain-spawning and-rearing fish species over alien species that might otherwise thrive at the expense of native species.

Data collected from the Fall Midwater Trawl Survey and the Summer Townet Survey in Old River found that nonnative predatory fish such as striped bass make up large percentages of the catch each year (Bay Delta and Tributaries Project n.d.). As striped bass are already abundant in the waters adjacent to Stewart Tract, it is reasonable to assume that they will colonize any new suitable habitat that becomes available. Perennial water such as sloughs mainly support invasive fish such as bass and sunfish that may be significant predators on native fish species (Feyrer et al. 2004:335).

Under the proposed action, the modifications in the PCC Area would create approximately 48 acres of perennial shallow-water habitat around the levee remnants created by breaching the existing levee. The creation of shallow-water habitats could increase availability of habitat for predators during periods when these habitats are inundated. Native fish voluntarily or involuntarily drawn into inundated floodplain areas and the tidal shallow-water habitats may experience reduced survival through increased predation by piscivorous fish and birds.

The abundance of nonnative fish species could increase in response to an increase in the abundance or quality of spawning and rearing habitat associated with operation of River Islands at Lathrop. However, the response of nonnative fish species to the increase in habitat availability would depend on a number of factors, including the depth of water (many species spawn at depths of less than 3 feet) and the timing and duration of inundation relative to the needs of these species. Perennial shallow-water habitat is also likely to be colonized by invasive aquatic weeds such as *Egeria densa*. Invasive aquatic weeds are believed to have led to further increases in habitat for nonnative fish species in the Delta (Moyle 2002:401).

Native fish species occupying perennial shallow-water habitat may also experience reduced survival from predation by fish-eating birds that are attracted to shallow water. Birds such as grebes, herons, egrets, and white pelicans are commonly observed feeding in flooded agricultural fields and inundated floodplain habitats. The rate of predation would depend on several factors, including the depth and transparency of the water (predation rates would be lower in water having greater depths and low transparency), the density and behavior of fish and birds in flooded habitats, and the presence of submerged and overhanging vegetation that fish can use as cover. However, Sommer et al. (2005:13) suggested that wading birds are not likely to have a significant population-level effect because of their low density in relation to the overall extent of available floodplain rearing habitat in the Yolo Bypass. Predation from birds would be limited when the floodplain is fully inundated, abundant flooded vegetation is available, or water turbidity is high.

Increases in predators or predator habitat associated with the addition of shallow-water habitat could cause an increase in mortality of native fish species. However, effects of increased predation on native species associated with floodplain inundation and shallow-water habitat may be offset, to some degree, by the benefits of shallow-water habitat described above (e.g., increased food supply and growth rates). In the absence of suitable quantities of cover, shallow-water habitat may provide greater benefits to predatory alien species and piscivorous birds at the expense of native fish species. This is considered a significant indirect effect.

Predation under Overwater Structures

Overwater structures can alter underwater light conditions and provide potentially favorable holding conditions for adult fish, including species that prey on juvenile fish. Permanent shading from the addition of floating docks and other structures could increase the number of predatory fishes (e.g., striped bass, largemouth bass) holding in the marina areas and their ability to prey on juvenile salmonids and other fishes.

The marina and other docks would provide up to 1.6 acres of overwater structure from the floating docks and boats (at 100% occupancy). Docks in the rivers would be oriented parallel to the riverbank and would be connected to the bank by strongarms and gangways. Gangways would be attached to pilings, allowing them to move up and down as the water surface elevation changes seasonally and with the tides. The pilings would be installed above the ordinary high water mark (OHWM). Although dock sizes would vary somewhat, the average dimensions of the floating dock platform are expected to be approximately 36 feet by 92 feet, with an open footprint of 1,188 square feet. Each dock would provide five berths. In some locations, two docks could be placed in close proximity, offering a total of 10 berths in one location. Total coverage would typically be less than the maximum possible because of an anticipated 80% boat occupancy at full operation at any given time. The presence of floating docks and boats may result in localized increases in predation rates on juvenile salmon and steelhead relative to existing conditions. This could constitute a significant indirect effect. Mitigation Measure Fish-3 would address this effect.

Mitigation Measure FISH-3. Develop and implement a detailed fishery resources mitigation and monitoring plan

Existing data on fish populations and fisheries habitat in the San Joaquin River, Old River, and Paradise Cut will be analyzed before construction to assess the presence of anadromous fish species, delta smelt, and Sacramento splittail; these species will be monitored during and after project construction. Ongoing fish population sampling conducted by CDFW, River Islands, and USFWS will be used as a source of fish population data and will be incorporated into the fisheries monitoring program. Water quality data collected by various agencies will be evaluated as an additional indicator of habitat quality for special-status fish species.

River Islands, in consultation with CDFW, NMFS, and USFWS, will prepare a monitoring plan to ensure that ecosystem restoration benefits for fish species are maximized, while minimizing the potential for adverse effects on native fish species from habitat creation and modification (e.g., creation of predator habitat). The plan will provide the Corps and the resource agencies with sufficient information to determine the adequacy of the proposed mitigation and to issue a Section 404 permit. The Corps will approve the plan prior to construction activities that affect the Corps jurisdictional areas in the study area.

The plan will be prepared to meet or exceed the specifications and mitigation requirements pertaining to Corps jurisdictional areas as specified by resource agency requirements. The plan will also be provided to the State Water Board to determine the adequacy of the proposed mitigation with respect to water quality and to issue a Section 401 water quality certification for River Islands at Lathrop.

The goal of the mitigation effort is to avoid and minimize adverse effects on native species from creation of predator habitat, as well as maximizing benefits to native fish species through ecosystem restoration. To support this goal, the monitoring plan will be designed to achieve the following objectives.

- To the extent practicable, design shallow-water tidal marsh habitats to maximize potential benefits to native fish species, while minimizing the creation of habitat favoring predatory fish species.
- Facilitate early development of shallow-water tidal marsh habitats so that potential benefits are maximized as soon after construction as is practicable.
- Integrate design features for special-status species (e.g., delta smelt, splittail, Chinook salmon) into the habitat restoration design to the maximum degree practicable.
- Design the shallow-water habitats so that, once established, they will require little or no maintenance.

River Islands will submit a performance monitoring report to the Corps at the end of each monitoring year. The report will summarize monitoring methods, results, progress toward meeting the final performance standards, and corrective actions taken.

Mitigation Measure FISH-4. Minimize the extent of, and shading by, overwater structures

The extent of overwater structures will be minimized and docks and other marina structures will be designed, where practicable, to maximize the amount of light penetration.

Mitigation Measure FISH-5. Contribute to nearshore cover habitat in vicinity of marina

The project proponent will plant SRA cover vegetation (outside the vegetation-free zone) and install biotechnical features such as brush piles, logs, and rootwads to replace habitat affected by marina construction and to compensate for potential effects associated with increased predation around floating docks. Where practicable, such actions will be carried out in and in the immediate vicinity of the marina to increase the potential for the survival of juvenile fish. The precise amount and relative value of affected riparian and SRA cover habitat will be determined during project-level analysis of proposed activities in the water-related commercial program area.

Potential for stranding of fish, including special-status species, in Paradise Cut (significant)

Physical alterations to Paradise Cut resulting from proposed modifications would create shallow-water habitat. Fluctuating water levels in this area could potentially lead to increased mortality of fish if these alterations lead to the formation of isolated pool habitats. Fish could become stranded during receding flow events where they would be subject to mortality through predation from avian and other predators, competition for resources (such as food), and declining water quality conditions (e.g., elevated water temperatures). Determinants of stranding potential on floodplains include the rate of stage reduction during floodplain drainage, topography, and possibly other factors. Although birds may benefit from stranded fish, entrapment of fish in isolated habitats in Paradise Cut is considered a significant indirect effect.

Mitigation Measure FISH-6. Fill or grade low-lying areas in Paradise Cut to reduce fish-stranding risks

To eliminate the potential stranding of fish in Paradise Cut, the project proponent will ensure that any large expanses of low-lying areas designed to increase flood conveyance and storage capacity in Paradise Cut are contoured during construction to reduce the potential for isolated pools to form following overtopping of Paradise Weir or other fluctuations in water level.

Mitigation Measure FISH-7. Monitor for and fill any scour pools formed following inundation of Paradise Cut by floodwaters

The potential exists for fish, including migratory juvenile fish, to become trapped in new scour holes and other depressions that may form following overtopping of Paradise Weir. River Islands will monitor the PCC Area and Paradise Cut Canal following flood events that result in overtopping of Paradise Weir to identify areas that have scoured and pose a stranding risk to fish. If monitoring indicates that fish stranding has occurred, River Islands will use appropriate methods (e.g., seining, electrofishing) as soon as possible following isolation of the water body to remove stranded fish. Rescued fish will be released to the nearest main channel area. Qualified fish biologists will conduct monitoring and fish rescue operations. To reduce the potential for further fish stranding, the project proponent will then use appropriate methods (e.g., grading, rock placement) to fill in new scour holes to reduce their potential to strand fish in the future. Scour areas and depressions that are identified to be potential stranding sites will be filled that year before the beginning of the next winter season.

Effect on shaded riverine aquatic cover as a result of construction and compliance with the Corps' levee vegetation guidelines (significant)

The proposed action would require the removal of riparian vegetation in several areas along existing levees. Compliance with the Corps levee vegetation guidelines would also necessitate vegetation removal along the San Joaquin River adjacent to earlier phases of the project. Removal of riparian vegetation would expose soils to erosive forces such as wind and rain and could reduce overhead and instream cover (e.g., SRA cover) in scattered areas of waterways adjacent to federal project levees.

Because of the numerous ways riparian vegetation influences the stream ecosystem, the effects of altering riparian vegetation are highly variable, ranging from increased sedimentation and warmer localized stream temperatures to decreased food production and habitat complexity. The loss of riparian vegetation and shade is not expected to have a significant effect on overall water temperature in the San Joaquin River, Old River, or the south Delta; however, increases in solar radiation in nearshore areas currently shaded could cause water temperatures to increase along the channel margins, thereby adversely affecting habitat conditions in localized areas.

Under the proposed action, riparian habitat would be restored or enhanced on a no-net-loss basis in accordance with Corps and CDFW regulations. The majority of this restoration is proposed for the vicinity of the existing 40-acre bench that would be returned to its current vegetated state following the earthwork proposed to reduce its elevation. Also, as described in Chapter 2, there is a potential to contour the setback levees along Old River (and also potentially along Paradise Cut) to create additional acreage for vegetation restoration. Approximately 19 acres of existing riparian habitat could be revegetated and retained on benches along the San Joaquin and Old River levees, and initial estimates indicate approximately 16 acres of planting benches could be created if the Old River extended levee was set farther back. However, the loss of SRA cover to comply with the Corps' levee vegetation policies would still be considered a significant indirect effect. Mitigation Measure FISH-8 is available to address this effect. This issue is addressed in greater detail in Chapter 3, *Terrestrial Biology*.

Mitigation Measure FISH-8. Replace affected riparian and SRA cover length, area, and habitat value

River Islands will replace the affected length (i.e., linear distance along waterways), area, and habitat value of removed riparian and SRA cover habitat. SRA cover is a Resource Category 2 habitat. USFWS's mitigation goal for Resource Category 2 habitat is no net loss of linear feet, area, or habitat value. Replacement ratios often exceed the required 1:1 replacement ratio, however, to compensate for temporal losses in habitat value. The precise amount and relative value of affected riparian and SRA cover habitat will be determined during project-level analysis of proposed activities in the water-related commercial program area and in consultation with the resource agencies.

Elimination of agricultural water diversion and discharges (no effect)

Additional supply of water to maintain lake levels would be delivered through one new intake structure on the San Joaquin River and one new intake structure on Old River. The new intakes would be fitted with fish screens and would replace the existing unscreened intakes that are currently used to supply irrigation water for agricultural operations. With the exception of the intakes, the new lakes would not be directly connected to the San Joaquin River, Old River, or Paradise Cut—instead, water would be expected to percolate into the subsurface through the permeable lakebed, with excess water discharged from the lake into the new Paradise Cut Canal at outfalls near the locations of the existing agricultural tailwater discharges. Each intake and outfall would be equipped with a pump capable of delivering approximately 4,000 GPM. Pumps would be screened to prevent fish entrainment and to ensure that nonnative species stocked in the lake system are not transferred to waterways surrounding the proposed action area.

Under existing conditions, pumped water volumes (i.e., acre-feet per month) vary by diversion and month. Various species of resident and migratory fish, including special-status species, are likely entrained by these unscreened diversions. However, it is not known to what degree these unscreened agricultural diversions entrain fish because the entrainment rate is dependent on many factors, such as species, fish size, life stage, swimming performance, fish behavior, fish abundance, diversion rate, and diversion configuration.

The existing pumps and water management infrastructure would be selectively decommissioned or reused to facilitate habitat development. The decommissioning of multiple existing diversion pumps and installation of fish screens on new intakes would result in a significant decrease in potential for fish entrainment.

As set forth in the environmental commitments described in Chapter 2, *Proposed Action and Alternatives*, River Islands would screen the remaining agricultural diversions in accordance with current CDFW and NMFS screening guidelines. The net effect of implementing the proposed action and screening the remaining pumps would be a reduction in total diversion and fish entrainment associated with in-river diversions to Stewart Tract and improved water quality conditions in adjacent waterways from reduced discharge of agricultural runoff. Although it is difficult to quantify, the net consequences on fish resources of adding fish screens to existing agricultural diversions and eliminating agricultural pumping and discharge is considered to be beneficial overall. No direct or indirect adverse effect is expected to result.

4.2.3.2 Alternative 2—No Alteration of Paradise Cut

This section identifies potential construction- and operation-related effects and mitigation for Alternative 2.

Alternative 2 has the same components as the proposed action, except for those listed below.

- No alterations to the Paradise Cut floodway would be undertaken and the existing Paradise Weir would not be altered.
- The existing Paradise Cut levee would be enhanced to provide the level of performance to address a 0.5% (200-year) flood event, and it would not be breached or altered.
- There would be no alterations to the PCC Area, including habitat restoration and creation of shallow-water habitat and riparian habitat.
- There would be no alteration of existing features or habitat in the PCIP area. Riparian habitat slated for restoration under the proposed action would not be created.

- Because no levee breaching would occur under Alternative 1, no new or increased dredging in jurisdictional waters would be necessary.
- The pond near the existing Paradise Cut levee would be filled as part of the levee enhancement.

The effects of Alternative 2 would be generally similar to those of the proposed action, with several exceptions. However, because Paradise Cut alterations would not be implemented, the creation and restoration of riparian and shallow-water habitat in the PCC—a beneficial effect of the proposed action—would not take place.

The effects are summarized below.

Temporary disturbance and possible mortality of fish, including special-status species, as a result of construction and operations activities (less than significant)

Construction- and operations-related effects on fish, though a less-than-significant direct and indirect effects under the proposed action, would be of lesser extent under Alternative 2 because of the reduced extent of construction activities on the levees surrounding Stewart Tract (i.e., the Paradise Cut levee).

Effects of entrainment on fish, including special-status species, and other biota from entrainment during dredging (significant)

Because no dredging would occur in Paradise Cut, there would be no risk of fish entrainment in that area. However, dredging activities that would still be necessary in the Lathrop Landing back bay would constitute a significant direct effect. No indirect effects were identified. Mitigation Measure FISH-1 would address this direct effect.

Possible injury or mortality of special-status fish species due to pile driving (significant)

The significant direct effects of pile driving associated with bridge construction would be the same under Alternative 2 as under the proposed action. Indirect effects would be less than significant.

Potential for increased mortality of native fish from predation or entrainment at SWP/CVP pumps associated with diversion into Paradise Cut (no effect)

Because no changes would be made to flood conveyance and storage capacity in Paradise Cut, there would be no potential for increased levels of entrainment at the SWP/CVP pumps. Consequently, there would be no effect related to the potential for increased mortality associated with predation or entrainment at SWP/CVP pumps.

Potential effects of entrainment on special-status fish species as a result of diversions into Stewart Tract (less than significant)

The effects of fish entrainment associated with diversions into Stewart Tract would be the same as under the proposed action. There would be a less-than-significant direct effect. No indirect effects were identified.

Water quality effects on fish in Paradise Cut, Old River, and the San Joaquin River associated with increased urban runoff (less than significant)

The effects on water quality associated with increased urban runoff would be the same as under the proposed action. There would be less-than-significant direct and indirect effects.

Disturbance and possible mortality of fish, including special-status species, associated with boat and marina operation (significant)

The disturbance and possible mortality of fish associated with boat and marina operation would be eliminated in Paradise Cut because no modifications would be made. This effect would remain unchanged for the Lathrop Landing back bay. While this would be a significant direct and indirect effect, it would be of lesser magnitude than under the proposed action.

Predation and altered habitat function associated with overwater structures and modification of stream morphology (significant)

Predation and altered habitat function associated with overwater structures and modification of stream morphology would be a significant indirect effect in the Lathrop Landing back bay, but because the Paradise Cut modifications would not be made, there would be no effect in this area.

Potential for stranding of fish, including special-status species, in Paradise Cut (no effect)

Because Paradise Cut modifications would not be made under Alternative 2, there would be no effect related to the potential stranding of fish.

Effect on shaded riverine aquatic cover as a result of construction and compliance with the Corps' levee vegetation guidelines (significant)

Under Alternative 2, no modifications or restoration activities would be undertaken in Paradise Cut; accordingly, less restoration of riparian habitat would take place than under the proposed action. Loss of SRA cover in compliance with the Corps' levee vegetation policies would be a significant indirect effect.

Elimination of agricultural water diversion and discharges (no effect)

The elimination of agricultural water diversions and discharges and the improved conditions of new pumps would be the same as under the proposed action. No direct or indirect adverse effects would result.

4.2.3.3 Alternative 3—Avoidance of Central Drainage Ditch

Alternative 3 would avoid the central drainage ditch. Because this avoidance would not result in any effects on waterways surrounding Stewart Tract, the effects of Alternative 3 on fish resources would be the same as those of the proposed action. These effects are summarized below.

Temporary disturbance and possible mortality of fish, including special-status species, as a result of construction and operations activities (less than significant)

Construction- and operations-related effects on fish would be the same as under the proposed action. There would be less-than-significant direct and indirect effects.

Effects of entrainment on fish, including special-status species, and other biota from entrainment during dredging (significant)

Dredging-related effects would be the same as under the proposed action. This would be a significant direct effect. No indirect effects were identified. Mitigation Measure FISH-1 would address this direct effect.

Possible injury or mortality of special-status fish species due to pile driving (significant)

The direct effects of pile driving associated with bridge construction would be the same under Alternative 3 as under the proposed action. This would be a significant direct effect. Indirect effects would be less than significant.

Potential for increased mortality of native fish from predation or entrainment at SWP/CVP pumps associated with diversion into Paradise Cut (less than significant)

The flood conveyance and storage characteristics of Paradise Cut would be the same under Alternative 3 as under Alternative 1; accordingly, the effects of predation or entrainment at SWP/CVP pumps associated with diversion into Paradise Cut would be the same. This would be a less-than-significant indirect effect.

Potential effects of entrainment on special-status fish species as a result of diversions into Stewart Tract (less than significant)

The effects of fish entrainment associated with diversions into Stewart Tract would be the same as under the proposed action. This would be a less-than-significant direct effect. No indirect effects were identified.

Water quality effects on fish in Paradise Cut, Old River, and the San Joaquin River associated with increased urban runoff (less than significant)

The effects on water quality associated with increased urban runoff would be the same as under the proposed action. There would be less-than-significant direct and indirect effects.

Disturbance and possible mortality of fish, including special-status species, associated with boat and marina operation (significant)

The disturbance and possible mortality of fish associated with boat and marina operation would be the same as under the proposed action. There would be significant direct and indirect effects.

Predation and altered habitat function associated with overwater structures and modification of stream morphology (significant)

Predation and altered habitat function associated with overwater structures and modification of stream morphology would be the same as under the proposed action. This would be a significant indirect effect.

Potential for stranding of fish, including special-status species, in Paradise Cut (significant)

The indirect effects of potential stranding of fish in Paradise Cut modifications would be the same as under the proposed action. This would be a significant indirect effect.

Effect on shaded riverine aquatic cover as a result of construction and compliance with the Corps' levee vegetation guidelines (significant)

The effects on SRA cover would be the same as under the proposed action. This would be a significant indirect effect.

Elimination of agricultural water diversion and discharges (no effect)

The elimination of agricultural water diversions and discharges and the improved conditions of new pumps would be the same as under the proposed action. No direct or indirect adverse effects would result.

4.2.3.4 Alternative 4—Proposed Action with Expanded Flood Risk Reduction

Under Alternative 4, the proposed action would be constructed as described, but the flood risk reduction component would be altered to include the following additional elements.

- A new bypass channel or channels southwest of the existing Paradise Cut flood bypass.
- More extensive widening in Paradise Cut.
- Widening Paradise Weir and constructing an additional weir upstream of the existing Paradise Weir.
- Creation of new flood storage areas.
- Dredging of Salmon Slough and Doughty Cut
- Creation and restoration of habitat.
- Operation and maintenance of flood conveyance features.

The northwestern end of Paradise Cut connects to Salmon Slough. Salmon Slough enters Doughty Cut, which connects to Grant Line Canal. Both Salmon Slough and Doughty Cut have riparian trees along the banks. Both watercourses may provide migratory habitat for some fish species such as salmonids, but it is unknown if they provide rearing or spawning habitat for delta smelt, longfin smelt, or splittail. While most of the effects of Alternative 4 would be similar to those under the proposed action, there would be some differences associated with the additional flood risk management measures. The effects of this alternative are summarized below.

Temporary disturbance and possible mortality of fish, including special-status species, as a result of construction and operations activities (significant)

Because additional construction work in and around watercourses in the vicinity of Paradise Cut would be conducted, there is an increased potential for construction-related disturbances such as sediment transport, turbidity, discharge of construction-related materials, resuspension of contaminants, and direct disturbance of fish. It is assumed that BMPs and other measures would be incorporated into project design and specifications; however, because this alternative has only been developed at a broad conceptual level, it is impossible to quantify specific levels of potential effects. Nevertheless, there is an increased potential for significant direct and indirect effects associated with additional construction.

Effects of entrainment on fish, including special-status species, and other biota from entrainment during dredging (significant)

Because additional dredging could be conducted in Salmon Slough and Doughty Cut, there is increased risk of entrainment of fish and other biota during dredging activities. Because no final designs are available, it is not possible to quantify the extent or duration of dredging activities under this alternative; however, there is a potential for a significant direct effect from additional dredging. No indirect effects were identified. Mitigation Measure FISH-1 would address this direct effect.

Although loss of benthic invertebrates as a result of dredging would not constitute a significant effect for the reasons presented in the analysis of the proposed action, Alternative 4 could result in a higher level of loss than the proposed action because of additional dredging that may be conducted in Salmon Slough and Doughty Cut.

Possible injury or mortality of special-status fish species due to pile driving (significant)

The effects of pile driving associated with bridge construction would be the same under Alternative 4 as under the proposed action. This would be a significant direct effect. Indirect effects would be less than significant.

Potential for increased mortality of native fish from predation or entrainment at SWP/CVP pumps associated with diversion into Paradise Cut (significant)

Because of the increased capacity of the Paradise Cut floodway bypass, it is possible that larger numbers of fish could be diverted into Paradise Cut through the expanded weirs under this alternative. Fish that are so diverted face the risk of mortality from entrainment in the SWP/CVP pumps. Although in the absence of any project-level design it is not possible to quantify the increase of diversion that could ensue, this increase could constitute a significant indirect effect.

Potential effects of entrainment on special-status fish species as a result of diversions into Stewart Tract (less than significant)

The effects of fish entrainment associated with diversions into Stewart Tract would be the same as under the proposed action. This would be a less-than-significant direct effect. No indirect effects were identified.

Water quality effects on fish in Paradise Cut, Old River, and the San Joaquin River associated with increased urban runoff (less than significant)

The effects on water quality associated with increased urban runoff would be the same as under the proposed action. There would be less-than-significant direct and indirect effects.

Disturbance and possible mortality of fish, including special-status species, associated with boat and marina operation (significant)

The disturbance and possible mortality of fish associated with boat and marina operation would be the same as under the proposed action. There would be significant direct and indirect effects.

Predation and altered habitat function associated with overwater structures and modification of stream morphology (significant)

Effects of overwater structures that are part of the proposed action would be the same under Alternative 4. However, loss of SRA cover as a result of construction would be more than that under the proposed action. Construction of new bypass channels could result in a greater loss of riparian vegetation. However, additional riparian habitat could be created along the proposed new bypass channels and could also be created on the levee remnants along the additional segment of Paradise Cut that would be widened. It is not possible to quantify these effects until project components reach the design phase, but removal of riparian vegetation could constitute a significant indirect effect.

Potential for stranding of fish, including special-status species, in Paradise Cut (significant)

The effects of potential stranding of fish in Paradise Cut modifications would be the same as under the proposed action. This would be a significant indirect effect.

Effect on shaded riverine aquatic cover as a result of construction and compliance with the Corps' levee vegetation guidelines (significant)

The effects on SRA cover associated with compliance with the Corps' levee vegetation guidelines would be the same as under the proposed action in the context of Stewart Tract. This would be a significant indirect effect. As discussed above, additional effects on SRA cover could be associated with expanded flood risk reduction features, but until such features are designed it is not possible to quantify the nature or extent of these effects.

Elimination of agricultural water diversion and discharges (no effect)

The beneficial elimination of agricultural water diversions and discharges and the improved conditions of new pumps would be the same as under the proposed action. No direct or indirect adverse effects would result.

Impedance of upstream migration of special-status fish in the San Joaquin River (significant**)**

Activities associated with construction of an additional weir(s) could impede migration of salmonids and other special-status fish up the San Joaquin River. Because no details are available regarding the location of a new weir, it is not possible to assess the potential effects of such in-stream work. However, any interference with migration would constitute a significant direct effect. Mitigation Measure FISH-9 would address this effect.

Mitigation Measure FISH-9. Incorporate passage for fish around in-stream work

If the project proponent constructs a new weir on the San Joaquin River, fish passage for all fish species will be incorporated into the workplan. The project proponent will consult with USFWS, NMFS, and CDFW in the design phase of the weir and final plans will be approved by the resource agencies before construction of the weir begins.

4.2.3.5 Alternative 5—No Action

Under the No Action Alternative, none of the water features affecting the San Joaquin River, Paradise Cut, or Old River would be built, except for the Golden Valley Parkway and Paradise Road bridges, which would be constructed under authority of the City of Lathrop. Therefore, there would no effects associated with pile driving and there would be no increased predation on native fish species due to boat dock construction, connection of the San Joaquin River with the Lathrop Landing back bay, and connection of Paradise Cut Canal with Old River. Also, increased entrainment of fish into Paradise Cut associated with increased flood conveyance would not occur. Effects on SRA cover, however, would still be significant under the No Action Alternative, due to requirements to comply with the Corps' levee vegetation guidelines.

Temporary disturbance and possible mortality of fish, including special-status species, as a result of construction and operations activities (no effect)

There would be no effects because no work would be undertaken in waterways or on the waterside of existing levees.

Effects of entrainment on fish, including special-status species, and other biota from entrainment during dredging (no effect)

There would be no effects because no dredging activities would be undertaken.

Possible injury or mortality of special-status fish species due to pile driving (no effect)

There would be no effects associated with pile driving because pile-driving activities would be conducted under authority of the City of Lathrop rather than as part of the proposed action.

Potential for increased mortality of native fish from predation or entrainment at SWP/CVP pumps associated with diversion into Paradise Cut (no effect)

There would be no effect because no changes would be made to the conveyance or storage capacity of Paradise Cut.

Potential effects of entrainment on special-status fish species as a result of diversions into Stewart Tract (less than significant)

The effects of fish entrainment associated with diversions into Stewart Tract would be the same as under Alternative 3. This would be a less-than-significant direct effect. No indirect effects were identified.

Water quality effects on fish in Paradise Cut, Old River, and the San Joaquin River associated with increased urban runoff (less than significant)

The effects on water quality associated with increased urban runoff would be the same as under the proposed action. There would be less-than-significant direct and indirect effects.

Disturbance and possible mortality of fish, including special-status species, associated with boat and marina operation (no effect)

There would be no effects from boat and marina operation because no boat facilities would be constructed.

Predation and altered habitat function associated with overwater structures and modification of stream morphology (no effect)

There would be no effect because no overwater structures would be constructed and no work would be conducted in surrounding watercourses.

Potential for stranding of fish, including special-status species, in Paradise Cut (no effect)

There would be no potential for stranding of fish in Paradise Cut because no alterations of Paradise Cut would be undertaken.

Effect on shaded riverine aquatic cover as a result of construction and compliance with the Corps' levee vegetation guidelines (significant)

SRA cover would presumably be removed in compliance with the Corps' levee vegetation guidelines; however, it is unclear when such actions would be conducted, because development of River Islands at Lathrop would not entail encroachment on existing levees. This would be a significant indirect effect.

Elimination of agricultural water diversion and discharges (no effect)

The elimination of agricultural water diversions and discharges and the improved conditions of new pumps would be the same as under the proposed action. No direct or indirect adverse effects would result.

4.3 References

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Chapter 5
Geology, Soils, and Mineral Resources

This chapter analyzes the proposed action's potential effects related to geology and geologic hazards, including earthquake and landslide hazards. It also discusses the proposed action's potential effects on soil and mineral resources. Related discussions are found in Chapter 6, *Water Resources and Flood Risk Management;* Chapter 8, *Paleontological Resources*; Chapter 16, *Public Health and Environmental Hazards*; and Chapter 21, *Cumulative Effects*.

The key sources of data listed below were used in the preparation of this chapter.

- *Preliminary Geotechnical Study River Islands at Lathrop, Phase I* (ENGEO 2002).
- Maps, reports, and websites by the U.S. Department of Agriculture (USDA) Soil Conservation Service (now called the Natural Resources Conservation Service [NRCS]), the California Geological Survey (CGS), and the U.S. Geological Survey (USGS).

5.1 Affected Environment

5.1.1 Regulatory Framework

5.1.1.1 Federal Regulations

Clean Water Act Section 402[p]

Certain aspects of the CWA are relevant to erosion and sediment control measures during and after project earthwork. More specifically, amendments to the CWA in 1987 added Section 402[p], which created a framework for regulating municipal and industrial storm water discharges under the National Pollutant Discharge Elimination System (NPDES) program. In California, the State Water Resources Control Board (State Water Board) is responsible for implementing the NPDES program. Pursuant to the state's Porter-Cologne Water Quality Control Act, it delegates implementation responsibility to the state's nine regional water quality control boards (see Chapter 6, *Water Resources and Flood Risk Management*).

Under the NPDES Phase II Rule, any construction project disturbing 1 acre or more must obtain coverage under the state's General Permit for Storm Water Discharges Associated with Construction Activity (Construction General Permit). The purpose of the Phase II rule is to avoid or mitigate the effects of construction activities, including earthwork, on surface waters. To this end, Construction General Permit applicants are required to file a Notice of Intent to Discharge Storm Water with the Regional Water Quality Board that has jurisdiction over the construction area, and to prepare a Stormwater Pollution Prevention Plan (SWPPP) stipulating BMPs that will be in place to avoid adverse effects on water quality.

Additional information on other aspects of the CWA is provided in Chapter 6, *Water Resources and Flood Risk Management*.

5.1.1.2 State Regulations and Policies

Alquist-Priolo Earthquake Fault Zoning Act

California's Alquist-Priolo Earthquake Fault Zoning Act (Public Resources Code [PRC] Sec. 2621 et seq.), originally enacted in 1972 as the Alquist-Priolo Special Studies Zones Act and renamed in 1994, is intended to reduce the risk to life and property from surface fault rupture during earthquakes. The Alquist-Priolo Earthquake Fault Zoning Act (Alquist-Priolo Act) prohibits the location of most types of structures intended for human occupancy[1] across the traces of active faults and strictly regulates construction in the corridors along active faults (*earthquake fault zones*). It also defines criteria for identifying active faults, giving legal weight to terms such as *active*, and establishes a process for reviewing building proposals in and adjacent to Earthquake Fault Zones.

Under the Alquist-Priolo Act, faults are zoned and construction along or across them is strictly regulated if they are *sufficiently active* and *well defined*. A fault is considered *sufficiently active* if one or more of its segments or strands shows evidence of surface displacement during Holocene time (defined for purposes of the Alquist-Priolo Act as referring to approximately the last 11,000 years). A fault is considered *well defined* if its trace can be clearly identified by a trained geologist at the ground surface or in the shallow subsurface, using standard professional techniques, criteria, and judgment (Hart and Bryant 1997).

Seismic Hazards Mapping Act

Like the Alquist-Priolo Act, the Seismic Hazards Mapping Act of 1990 (PRC Sections 2690–2699.6) is intended to reduce damage resulting from earthquakes. While the Alquist-Priolo Act addresses surface fault rupture, the Seismic Hazards Mapping Act addresses other earthquake-related hazards, including strong ground shaking, liquefaction,[2] and seismically induced landslides. Its provisions are similar in concept to those of the Alquist-Priolo Act: the state is charged with identifying and mapping areas at risk of strong ground shaking, liquefaction, landslides, and other corollary hazards, and cities and counties are required to regulate development within mapped Seismic Hazard Zones.

Under the Seismic Hazards Mapping Act, permit review is the primary mechanism for local regulation of development. Specifically, cities and counties are prohibited from issuing development permits for sites within Seismic Hazard Zones until appropriate site-specific geological or geotechnical investigations have been carried out and measures to reduce potential damage have been incorporated into the development plans.

California Surface Mining and Reclamation Act

In accordance with the Surface Mining and Reclamation Act of 1975, the state has established a mineral land classification system to identify and protect mineral resources in areas that are subject to urban expansion or other irreversible land uses that would preclude mineral extraction.

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[1] With reference to the Alquist-Priolo Act, a *structure for human occupancy* is defined as one "used or intended for supporting or sheltering any use or occupancy, which is expected to have a human occupancy rate of more than 2,000 person-hours per year" (California Code of Regulations, Title 14, Div. 2, Section 3601[e]).

[2] *Liquefaction* is a phenomenon in which the strength and stiffness of a soil are reduced by earthquake shaking or other rapidly applied loading. Liquefaction and related types of ground failure are of greatest concern in areas where well-sorted sandy unconsolidated sediments are present in the subsurface and the water table is comparatively shallow.

Protected mineral resources include construction materials, industrial and chemical mineral materials, metallic and rare minerals, and nonfluid mineral fuels. The act directs the state geologist to classify (identify and map) the nonfuel mineral resources of the state to show where economically significant mineral deposits occur and where they are likely to occur based on the best available scientific data. Nonfuel mineral resources include metals such as gold, silver, iron, and copper; industrial minerals such as boron compounds, rare-earth elements, clays, limestone, gypsum, salt, and dimension stone; and construction aggregate, which includes sand, gravel, and crushed stone. Many areas of the state have been mapped using the California Mineral Land Classification System to identify areas with known mineral resources. This system provides guidance for identifying mineral resources zones (MRZs) based on four general categories.

- **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 exists for their presence.
- **MRZ-3.** Areas containing mineral deposits, the significance of which cannot be evaluated.
- **MRZ-4.** Areas where available information is inadequate for assignment to any other zone.

5.1.1.3 Local Regulations

Many cities and counties include geologic hazards as a factor in their land use planning, with the result that their general plans or zoning ordinances reflect policies specifically aimed at reducing risk to life and property as a result of seismic and other types of geologic hazards.

In California, earthwork and construction activities are regulated at the local jurisdiction level through a multi-stage permitting process—grading permits are required for most types of earthwork, and additional permits are typically needed for various types of construction (Chapter 15.04 Lathrop Municipal Code).

The purpose of local jurisdiction permit review is to ensure that proposed earthwork will meet the jurisdiction's adopted codes and standards. Most jurisdictions in California have adopted either the Uniform Building Code (UBC) or the California Building Code (CBC) as a minimum standard. The City of Lathrop has adopted the CBC (Chapter 15.04 Lathrop Municipal Code). The UBC was specifically developed to foster consistency in building laws across the nation by offering local jurisdictions, agencies, and organizations adequate minimum standards to guide local regulation of design and construction. The CBC expands on the UBC by providing more stringent standards addressing reduction of earthquake risk to structures in this seismically active state.

Depending on the extent, nature, and location of proposed earthwork and construction, the local jurisdiction permit process may require preparation of a site-specific geotechnical investigation, sometimes called a soils report. In some cases, this is required by state regulations (see the discussions of the Alquist-Priolo Act and the Seismic Hazards Mapping Act). It may also be required by the UBC or CBC. The purpose of a site-specific geotechnical investigation is to provide a geologic basis for the development of appropriate project design. Geotechnical investigations typically assess bedrock and Quaternary geology, geologic structure, soils, and previous history of excavation and fill placement. As appropriate, they may also include information specifically addressing the stipulations of the Alquist-Priolo Act, the Seismic Hazards Mapping Act, or local regulations. As required by the CBC and the City's General Plan, the geotechnical assessment for the proposed action was prepared by ENGEO Incorporated in 2002.

City of Lathrop General Plan

The Hazard Management Element of the *City of Lathrop General Plan* (City of Lathrop 2004) includes several policies related to geology and soils. The geology and soils policies excerpted here are applicable to the proposed action.

> **Policy 2:** All new building construction shall conform to the latest seismic requirements of the Uniform Building Code as a minimum standard.
>
> **Policy 4:** Facilities necessary for emergency service should be capable of withstanding a maximum credible earthquake and remain operational to provide emergency response.
>
> **Policy 6:** Soil compaction tests, and geotechnical analysis of soil conditions and behavior under seismic conditions shall be required of all subdivisions and of all commercial, industrial and institutional structures over 6,000 square feet in area
>
> **Policy 7:** A preliminary soils report is to be prepared by a registered geo-technical engineer for any residential development project, based upon adequate test borings. If the report indicates the presence of critically expansive soils or other soil problems which, if not corrected, would lead to structural defects, the developer shall provide for and submit the findings of a soil investigation of each non-residential lot or housing site proposed. The soil investigation shall be prepared by a state-registered civil engineer and shall recommend corrective action likely to prevent structural damage to each dwelling to be constructed. Prior to the issuance of a building permit, any recommended action approved by the Building Official shall be incorporated into the construction of each dwelling.
>
> **Policy 8:** A preliminary geologic report, prepared by a state-certified engineering geologist and based on adequate test borings, shall be submitted to the Building Official for every subdivision, planned development or other residential project at the time of submitting a tentative map or other type of development application to the City.
>
> **Policy 9:** If the preliminary geologic report indicates the presence of critically expansive soils or other soil problems (e.g., potential for liquefaction which if not corrected could lead to structural defects), the developer shall provide such additional soils investigation for each development site as may be requested by the Building Official. The geologic investigation shall be prepared by a state-certified engineering geologist and shall, recommend further corrective action likely to prevent structural damage to dwelling units. Prior to the issuance of a building permit, any recommended action approved by the Building Official shall be incorporated into site preparation and the construction of each dwelling.

The Resource Management Element of the General Plan includes several policies related to mineral resources. The mineral resources policies excerpted here are applicable to River Islands at Lathrop.

> **Policy 1:** Lands classified by the State Department of Conservation as MRZ-2 as shown on Figure V-1 [of the general plan] and as designated by the State Mining and Geology Board as shown on Figure V-1.5 [of the general plan], are urged for protection to assure their availability for mining under applicable provisions of State Law and local ordinance. If determined practical and feasible, these lands are to be mined and reclaimed in accordance with the provisions of the California Surface Mining and Reclamation Act of 1975, as amended, prior to their being utilized for the various urban purposes depicted on the General Plan Diagram and described in this document.
>
> **Policy 2:** While the depth of the known sand deposits of regional significance is considerable, the potential for mining to this depth is recognized only for the lands between the I-5/SR 120 merge and the Union Pacific Railroad. Lands classified MRZ-2 and designated on Stewart Tract may be mined to a much lesser depth, or not at all, because of the potential of this site location for Regional Commercial and Highway Commercial development.

Policy 3: Lands classified MRZ-2 and designated as described above shall be zoned by the City with a combining “mineral resource open space zone” to identify the presence of known mineral deposits and which may restrict the encroachment of incompatible land uses in those areas for which mineral conservation is urged. As an alternative, such restriction may be included in any Specific Plan applicable to the affected property.

Policy 4: In consideration of mineral policy #2, above, lands classified MRZ-2 and designated may be developed for urban use without first being mined only if compelling reasons can be stated by the City in writing in support of such action and upon fulfilling the requirements of Section 2762(d) and Section 2796(a) of the Surface Mining and Reclamation Act of 1975, as amended. Action by the City shall consider the need to balance mineral values against alternative land uses, and the importance of these mineral deposits to the regional market demand for their use.

West Lathrop Specific Plan

The WLSP (City of Lathrop 2003) establishes objectives to meet the goals of the City’s General Plan. One objective is related to seismic events.

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

5.1.2 Existing Conditions

5.1.2.1 Methods Used to Identify Existing Conditions

Information used to prepare this overview of existing conditions was collected from the City’s General Plan, the WLSP, and the SEIR. Much of the information used for the existing conditions section was taken from the Preliminary Geotechnical Study prepared for the River Islands at Lathrop project. The following sections describe the physiographic setting, geomorphology, and geology of the proposed action area, with an emphasis on Quaternary geology and geologic hazards.

5.1.2.2 Physical Setting

Physiography

Lathrop is situated in the northern portion of the San Joaquin Valley, which lies between the Coast Ranges to the west and Sierra Nevada to the east. The valley floor is nearly level with elevations ranging from near sea level to a few hundred feet above sea level. The topography of the proposed action area slopes gently to the west, ranging from a high of approximately +16 feet National Geodetic Vertical Datum (NGVD) in the northeastern corner to +3 feet NGVD in the southwestern corner, which is approximately 5.5 miles away (ENGEO 2002).

Levees around Stewart Tract extend to elevations of approximately +19 to +32 feet NGVD. The levees bordering the proposed action area range from approximately 9 feet above the adjacent ground surface along portions of Paradise Cut to approximately 16 feet above ground level at the northeastern corner of the proposed action area. The project levees have slopes ranging from approximately 1.5:1 to 3:1 (horizontal to vertical) (ENGEO 2002).

Geologic Framework

The proposed action area is located in the Great Valley Geomorphic Province of California (California Geological Survey 2002). The Great Valley is an asymmetric trough consisting of a thick sequence of sediments from Jurassic to recent age. Erosion of the Sierra Nevada has contributed to most of the 5- to 10-kilometer-thick sediments of the Great Valley (Hackel 1966).

The sediments of the Delta accumulated in marine environments between 175 million and 25 million years ago (mya). Younger sediments (25 mya to recent) are considered non-marine. The depositional history of the Delta during the late Quaternary (past 1 million years) was likely controlled by several cycles related to fluctuations in regional and global climate where periods of deposition and nondeposition/erosion alternated. Thus the Delta region during the late Quaternary had stages of wetlands 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 expansive sand dunes, and alluvial fan deposition from streams emanating from the adjacent mountain ranges (Shlemon and Begg 1975; Atwater et al. 1977).

Site-Specific Geologic Conditions

The proposed action area is immediately west of the margin between alluvial fan deposits derived from glaciated drainage basins (Qm) and alluvial floodplain deposits (Qpf) (ENGEO 2002). The surface deposits at the proposed action area are mapped as Holocene (12,000 years ago to present), supratidal (above mean high tide level) alluvial floodplain deposits (Qpf) (ENGEO 2002). ENGEO (2002) also mapped waterways “subject chiefly or wholly to non-tidal flow” with general probable flow directions that trend to the northwest. Based on a study by Roger Foott and Associates (1993), a mapped area of clay soil is also present in the vicinity of the proposed action area. Due to the proximity of the proposed action area to the mapped alluvial fan deposits (Qm), it is likely that these deposits extend to the subsurface. The geomorphology of the proposed action area in relation to the path of the San Joaquin River suggests that the site was previously the outfall location of the San Joaquin River into a deltaic environment of braided streams and marshlands (ENGEO 2002).

Sediments underlying the site documented in earlier studies consist of unconsolidated and discontinuous layers and lenses of silt, sand, clay, and gravel. Interpretive geologic cross sections of the proposed action area based on available boring data indicate that the subsurface of the site is highly variable in both thickness and distribution of deposits (ENGEO 2002).

Soils

Soils west of the San Joaquin River on most of Stewart Tract are Delta/floodplain of the Merritt-Grangeville-Columbia Associations, with Peltier-Egbert Associations appearing in the west, as shown in Figure 5-1.

Soils of the alluvial and fan terrace classification comprise sand and silty clay. They are moderately well drained with slow to rapid permeability. Shrink-swell potential (soil expansiveness) is low to moderate, water erosion potential is moderate, and limitation for onsite sewage systems is considered moderate to severe. All soils of this class and association are subject to high wind erosion (McElhiney 1992).

Soils of the Delta floodplain classification have a dominant texture of silty clay or sandy clay. They are poorly drained with slow permeability, and are deeply developed organic soils. Their shrink-swell potential is moderate (Merritt-Grangeville-Columbia) and moderate to high (Peltier-Egbert); water erosion potential is low to moderate; soils are subject to a high water table; and limitation for onsite sewage systems is severe. All soils of the class may contain hydric components (capability of supporting wetlands habitat) (McElhiney 1992).

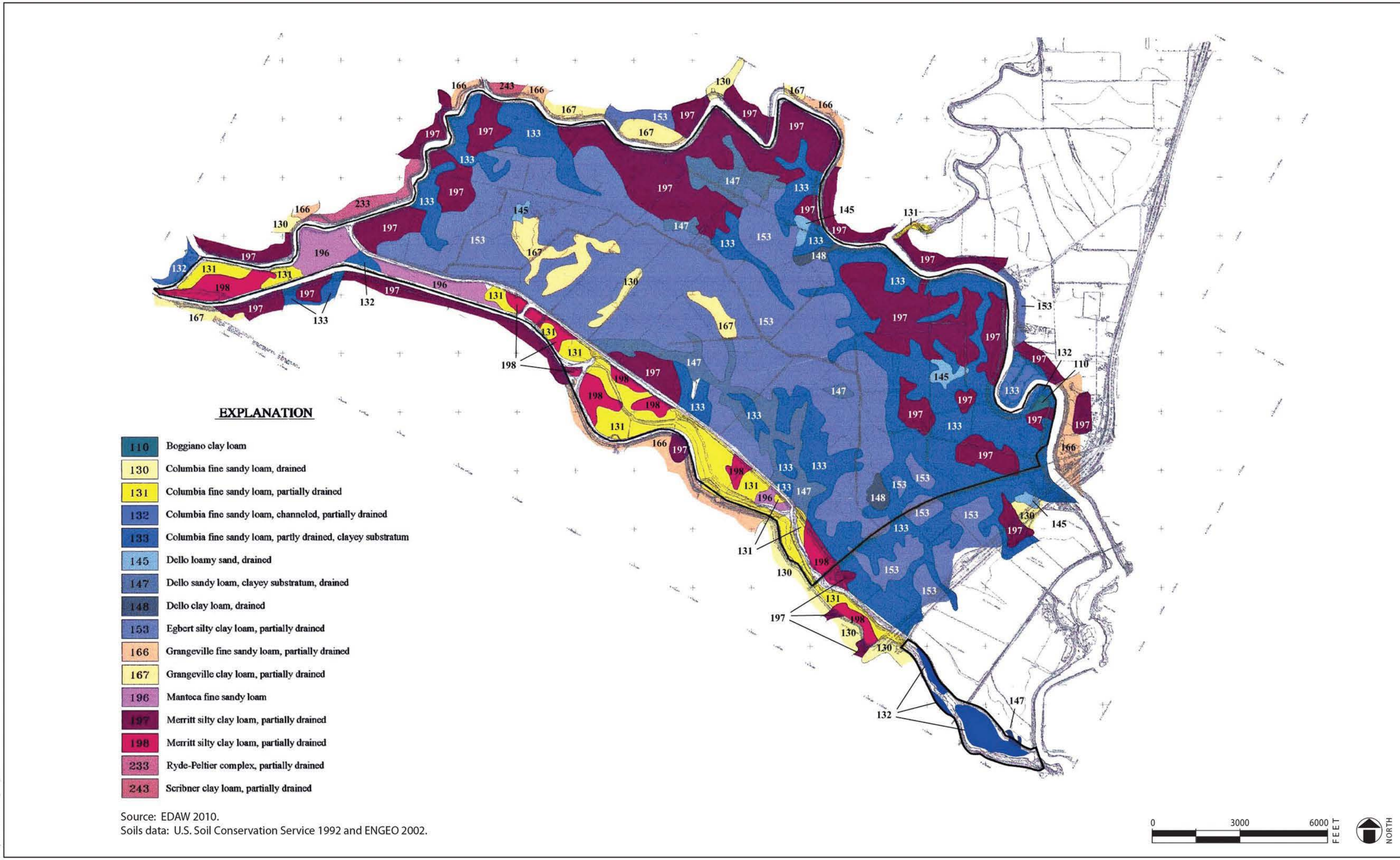

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Figure 5-1
Action Area Soils

The site soils as mapped by the U.S. Soil Conservation Service are USDA 133, 153, and 197. Generally, soils are silty clays to silty sands. Soil 133 is a Columbia fine sandy loam, clayey substratum, partially drained; 153 is an Egbert silty clay loam, partially drained; and 197 is a Merritt silty clay loam, partially drained (McElhiney 1992).

Soils have also been mapped in geotechnical investigations as silty sands, clayey to sandy silts, and two areas of moderately to highly plastic clays. Underlying soils have been described as silty sands, poorly to well-graded sands, clayey to sandy silts and moderately to highly plastic clays. The proposed action area is sandier in the eastern portion with localized clayey pockets. The center of the proposed action area is generally siltier with less amounts of clay and sand and localized clayey zones. The western portion of the site is sandy with localized clays and silts. The soil stratigraphy of the levees generally consists of a highly variable mixture of loose to medium-dense sands and medium stiff silts (ENGEO 2002).

Expansive soils shrink when dry and swell when wet as a result of moisture changes. Soils with higher clay content exhibit this behavior. The soils at the proposed action area display a plasticity index ranging from low (non-plastic) to high (expansive soils). The Columbia soil has a moderate shrink-swell potential and low erosion potential. The Egbert soil has a high shrink-swell potential, a moderate erosion potential for wind, and a low erosion potential for water. The Merritt soil has a moderate shrink-swell potential and a low erosion potential. The shrinking and swelling of soils can cause differential movement and settlement of structures constructed on these soils unless proper engineering techniques are used (McElhiney 1992; ENGEO 2002).

Mineral Resources

The proposed action area lies in either MRZ-3, which is classified as “areas containing mineral deposits, the significance of which cannot be evaluated from existing data,” or in an unclassified zone. Lands requiring preservation for the extraction of valuable mineral resources are located outside the proposed action area on Stewart Tract, south of SR 120 and east of I-5/I-205/SR 120, as shown in Figure 5-2. These lands include deposits of sand, which have high value for use in the making of high-quality Portland Cement Concrete used in building construction. These lands have been classified by the State Department of Conservation as MRZ-2, and have also been designated by the State Mining and Geology Board.

Geologic Hazards

Primary Seismic Hazards—Surface Fault Rupture and Ground Shaking

Surface Fault Rupture Hazard

Lathrop is located east of the active North American–Pacific Plate boundary. As a result, the proposed action area is near the seismically active San Francisco Bay region (Bay region). Many earthquakes of low magnitude occur every year throughout the Bay region. Most of the region’s seismic activity is concentrated west along the San Andreas, Hayward, and Calaveras faults, which are 60, 40, and 35 miles west of the proposed action area, respectively (Jennings 1994).

No active faults are mapped across the proposed action area by the CGS or USGS (Hart and Bryant 1997; U.S. Geological Survey 2009). The closest known active fault to the site that is zoned by the State of California as an Alquist-Priolo Earthquake fault is the Greenville fault, about 22 miles west of the proposed action area (Figure 5-3).

Recent geologic studies have indicated that a tectonic boundary exists along the western margin of the San Joaquin Valley, referred to as the Great Valley fault system (ENGEO 2002). The magnitude 6.7 Coalinga earthquake in 1983 and an earthquake of a magnitude of more than 6.0 in 1892 near Vacaville and Winters occurred on segments of the Great Valley fault system. Because of this relatively recent earthquake activity, this zone is considered seismically active. These earthquakes likely occurred due to blind thrust faults, which do not intersect the ground surface and thus do not result in surface rupture (ENGEO 2002).

Ground-Shaking Hazard

An earthquake of moderate to high magnitude generated within the Great Valley fault system or the Bay region could cause ground shaking at the proposed action area. The highest known ground acceleration experienced at Stewart Tract was 0.16 g (*g* being the acceleration of gravity) as a result of the 1906 San Francisco earthquake (magnitude 8.25). Because of the closer presence of the Great Valley Fault, it is conceivable that the proposed action area may experience ground shaking higher than the code-specified ground shaking, produced by the more distant Greenville fault. However, the probability of occurrence is lower (ENGEO 2002) (see *Estimates of Ground Shaking* below).

The Great Valley fault system is still not entirely understood. Based on preliminary segmentation, a 30-kilometer (19-mile) segment with a characteristic earthquake magnitude of 6.7 is indicated approximately 10 miles to the west of Stewart Tract (ENGEO 2002). The recurrence intervals for the average Great Valley fault segments, as estimated by historical seismicity, are 360–440 years (ENGEO 2002).

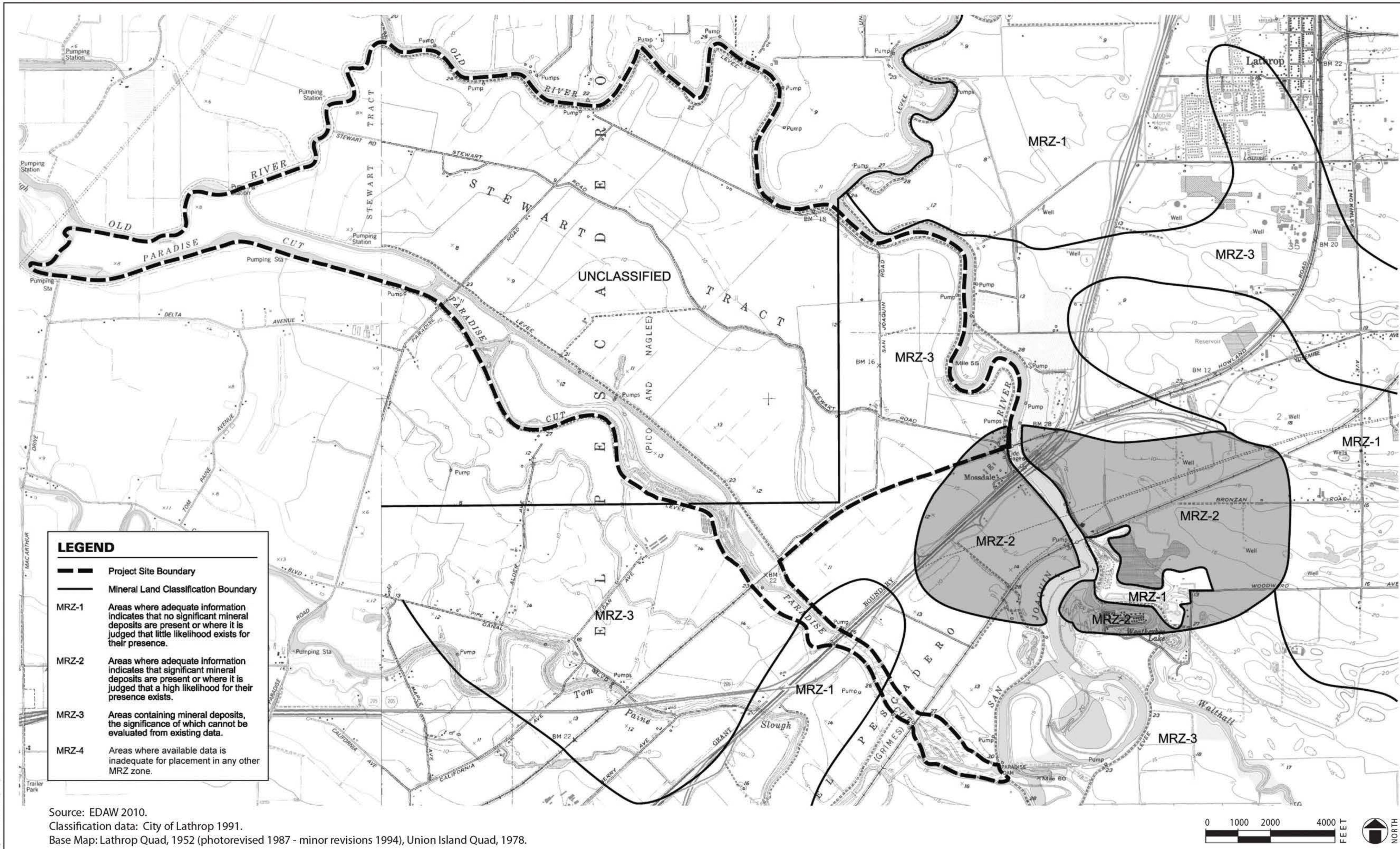
Ground-Shaking Hazard Dynamics

The measurement of the energy released at the point of origin, or epicenter, of an earthquake is referred to as the magnitude, which is generally expressed in the Richter Magnitude Scale or as moment magnitude. The scale used in the Richter Magnitude Scale is logarithmic: each successively higher Richter magnitude reflects an increase in the energy of an earthquake of about 31.5 times. Moment magnitude is the estimation of an earthquake magnitude using seismic moment, which is a measure of an earthquake size utilizing rock rigidity, amount of slip, and area of rupture.

The greater the energy released from the fault rupture, the higher the magnitude of the earthquake. Earthquake energy is most intense at the fault epicenter. The farther an area from an earthquake epicenter, the less likely that ground shaking will occur there. Geologic and soil units comprising unconsolidated, clay-free sands and silts can reach unstable conditions during ground shaking, which can result in extensive damage to structures built on them (see *Liquefaction Susceptibility*).

Ground shaking is described by two methods: ground acceleration as a fraction of the acceleration of gravity (g) and the Modified Mercalli scale, which is a more descriptive method involving 12 levels of intensity denoted by Roman numerals. Modified Mercalli intensities range from I (shaking that is not felt) to XII (total damage).

The intensity of ground shaking that would occur in the proposed action area as a result of an earthquake is related to the size of the earthquake, its distance from the proposed action area, and the response of the geologic materials within the proposed action area. As a rule, the greater the earthquake magnitude and the closer the fault rupture to the site, the greater the intensity of ground shaking. When various earthquake scenarios are considered, ground-shaking intensities will reflect both the effects of strong ground accelerations and the consequences of ground failure.



Source: EDAW 2010.
Classification data: City of Lathrop 1991.
Base Map: Lathrop Quad, 1952 (photorevised 1987 - minor revisions 1994), Union Island Quad, 1978.

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Figure 5-2
Mineral Land Classification

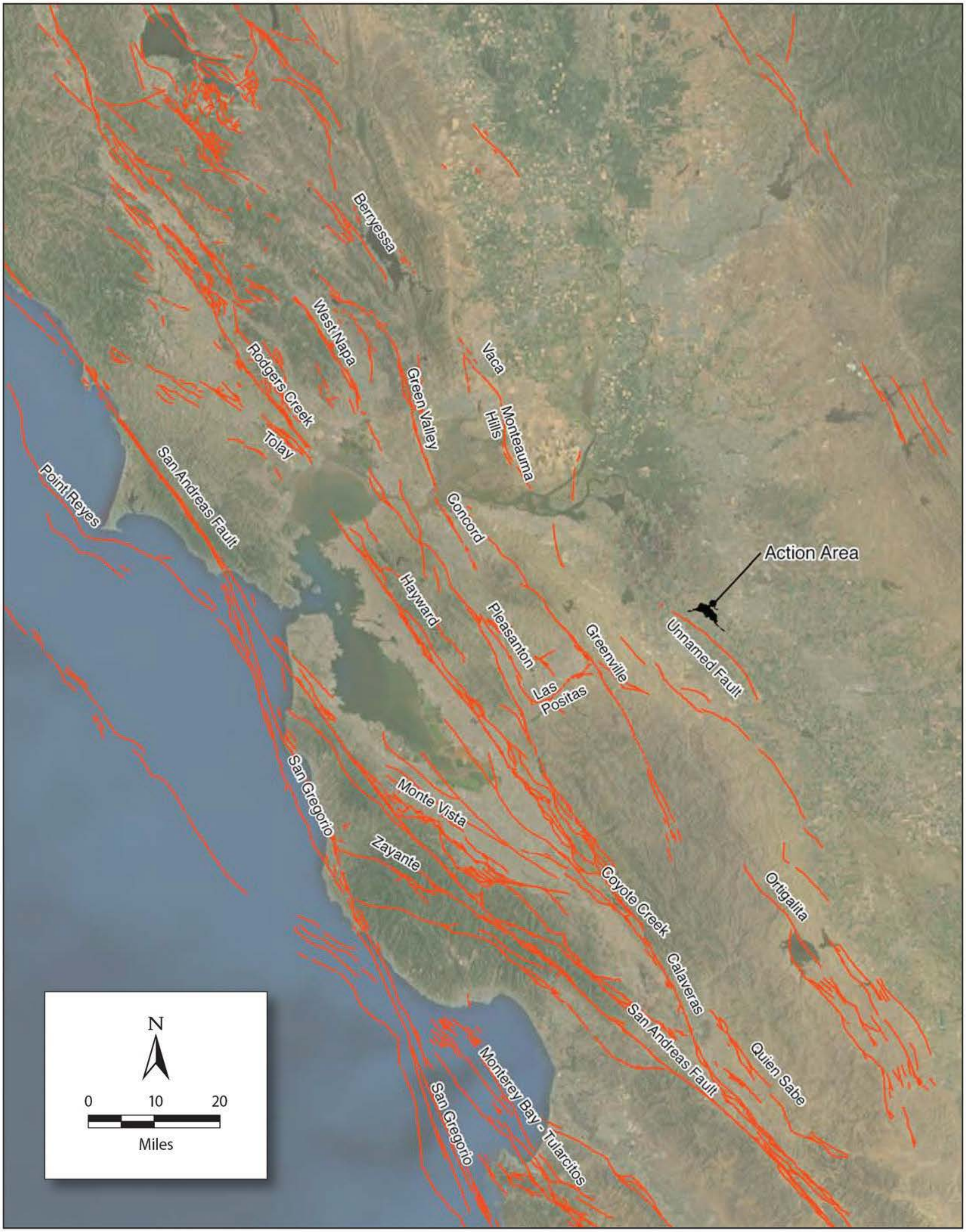

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Figure 5-3
Regional Fault Lines

Estimates of Earthquake Shaking

Estimates of earthquake shaking were developed by ENGEO (2002). As part of the study, a probabilistic ground-shaking analysis was performed based on faults classified as active and potentially active[3] by the CGS. For the probabilistic analysis, the computer program EZ-FRISK was used to model the seismic setting of the region and was able to explicitly account for uncertainty relating to the factors below.

- Earthquake magnitude.
- Rupture length.
- Location of rupture.
- Maximum possible earthquake magnitude.
- Recurrence interval of earthquake events.

Based on modeling results performed by ENGEO (2002), a probabilistic horizontal ground surface acceleration of 0.23 g is predicted to have a 10% probability of being exceeded in a 50-year design life, thus indicating that the ground-shaking hazard in the vicinity of the proposed action area is low to moderate.

Furthermore, based on a probabilistic seismic hazard map that depicts the peak horizontal ground acceleration values exceeded at a 10% probability in 50 years (California Geological Survey 2003; Cao et al. 2003), the probabilistic peak horizontal ground acceleration values in the proposed action area range from 0.2 g to 0.3 g, thus confirming that the possibility of the proposed action area experiencing strong ground shaking may be considered generally low to moderate.

Secondary Seismic Hazards—Seismically Induced Landsliding and Liquefaction

Based on topographic and lithologic data, the risk of seismically induced landslides is considered low for the levees and negligible for the rest of the site (ENGEO 2002).

Liquefaction is a phenomenon in which the strength and stiffness of unconsolidated sediments (silts and sands) are reduced by earthquake shaking or other rapid loading. Poorly consolidated, water-saturated fine sands and silts having low plasticity and being within 50 feet of the ground surface are typically considered to be the most susceptible to liquefaction. Soils and sediments that are not water saturated and that consist of coarser or finer materials are generally less susceptible. Geologic age also influences the potential for liquefaction. Sediments deposited within the past few thousand years are generally much more susceptible than older Holocene sediments; Pleistocene sediments are even more resistant, and pre-Pleistocene sediments are generally immune (California Division of Mines and Geology 1997).

Because the proposed action area has relatively high groundwater and areas of clean sands which are loose to medium dense, it is expected that localized areas within the proposed action area are susceptible to liquefaction and subsequent settlement should a seismic event with sufficient ground motion occur.

The liquefaction risk was also evaluated on a levee-specific basis by ENGEO in 2002. Penetration resistance of levee sand was recorded in cone penetration tests (CPT) and exploratory borings. The

[3] The term *potentially active* is no longer used in the geologic literature; rather, the term *early Quaternary* is employed.

existing levee soils included loose to medium-dense sandy soils subjected to a potentially fluctuating groundwater elevation. The preliminary evaluation determined that existing levee soils could experience liquefaction and a reduction in shear strength as a result of design-level earthquake accelerations (10% probability of exceedance in 50 years).

Two potential ground failure types associated with liquefaction are lateral spreading and differential settlement (Association of Bay Area Governments 2001). Lateral spreading involves a layer of ground at the surface being carried on an underlying layer of liquefied material over a nearly level surface toward a river channel or other open face. Differential settlement occurs when the layers that liquefy are not of uniform thickness, a common problem when the liquefaction occurs in artificial fills. Settlement can range from 1% to 5%, depending on the cohesiveness of the sediments (Tokimatsu and Seed 1984).

Due to relatively low strength of the soil of existing levees, the lateral spreading and differential settlement potential for the un-modified levees may be considered moderate under the design seismic event. If levees are modified in accordance with the appropriate recommendations, the risk of lateral spreading is considered low (ENGEO 2002).

Hazards not Associated with Seismicity—Shrink-Swell Potential, Corrosion, Seepage, and Subsidence

Expansive soils shrink and swell with moisture changes. Expansion occurs with increased moisture and contraction occurs when soils are dry. Soils with higher clay content will display this behavior to a higher degree. As described above in *Soils*, the shrink/swell potential for the soils in the proposed action area is moderate to high. Shrinking and swelling of soils can cause differential movement and settlement of structures constructed on these soils unless proper engineering techniques are used.

Corrosion is the gradual degradation of materials due to electrochemical currents. Electrical resistivity and pH also contribute to soil corrosion of steel and concrete. Site-specific corrosion testing for concrete and buried metals has not yet been performed at the proposed action area. Chemical testing on soil indicated that the soils may have moderate chlorides and sulfates, which may result in moderate to low potential for corrosion of buried metals. Electrical resistivities ranged from 4,020 to 26,800 ohms centimeter (ohm-cm), which is considered moderately corrosive to buried metals. Soil pH ranged from 6.4 to 8.6, which is considered slightly acidic to neutral (ENGEO 2002).

Permeability of soil in existing levees and seepage could result in levee failure. Geotechnical studies concluded that a levee crown width of 25 feet would be sufficient to reduce potential detrimental seepage. This conclusion was based on assumptions that landside levee side slopes are 3:1 with a flood-stage head differential of 19 feet (water level on one side of the levee is 19 feet above ground level on the opposite side) and appropriate onsite soils will be used for construction. Clay soils are desirable fill for levees due to their lower permeability (ENGEO 2002).

Subsidence can result from compaction or loss of surface materials; oxidation of organic soils; or extraction of groundwater, gas, or oil. Subsidence is occurring in various Delta areas in San Joaquin County. Subsidence rates vary based on site-specific conditions (California Department of Water Resources 1980, 1986, 1995). Potentially compressible layers of clay were encountered in portions of existing levees. Localized, shallow subsidence is related primarily to a reduction in the thickness of the alluvium by oxidation of organic peaty soils, wind erosion, and consolidation of soft clays following the lowering of the water table or placement of fill. No areas of significant organic peaty soils were encountered in the proposed action area. However, potentially compressible layers of clay were encountered in the existing levees (ENGEO 2002).

5.2 Environmental Consequences

5.2.1 Methods for Analysis of Effects

Effects related to geology, soils, and associated hazards were analyzed qualitatively, based on a review of soils and geologic information for the proposed action area and on professional judgment. Analysis focused on the proposed action's potential to increase the risk of personal injury, loss of life, and damage to property, including new or upgraded facilities, as a result of existing geologic conditions in the proposed action area. A few general assumptions were made in support of the analysis.

- Levee embankment slopes will be no steeper than 3:1 (horizontal to vertical).
- Existing waterside levee slopes will remain in their current configuration.
- Actual final designs will depend on the proposed slope height, results of future exploration, and analysis and specific liquefaction mitigation chosen.
- SEIR mitigation measures will be implemented as part of the proposed action.

Because the proposed action area is located within a mineral resource zone that is either unclassified or where the significance of the mineral deposits cannot be evaluated, no effects on mineral resources are anticipated. Likewise, no effects resulting from project operation and maintenance were identified; they are therefore not discussed further in this section.

5.2.2 Definition of Significant Effects

Significant effects related to geology typically involve the exposure of persons or facilities to geologic hazards such as surface fault rupture, seismic ground shaking, liquefaction, and landslides such that the overall level of personal safety risk or the risk of structural damage and associated losses is increased.

Two principal types of adverse effects relate to soils. The first type focuses on the potential for unmitigated soil conditions to result in damage to facilities. For example, buildings constructed on expansive soils are likely to experience foundation or structural damage unless expansive soil conditions are appropriately addressed through the design and construction process. This type of outcome represents a significant effect. The second type of adverse effect related to soils focuses on the potential for accelerated erosion and—a related but separate issue—loss or depletion of an area's existing topsoil resource.

Adverse effects on mineral resources relate to their importance and availability. Actions that would reduce the availability of important mineral resources are generally considered to have significant effects.

5.2.3 Effects and Mitigation Approaches

5.2.3.1 Alternative 1—Proposed Action

Effects on structures and personal safety as a result of seismic ground shaking, seismically induced liquefaction, and related types of ground failure (significant)

Seismic activity in the area resulting from motion along the San Andreas, Hayward, and Calaveras faults and the Great Valley fault system could generate strong ground shaking in the proposed action area. Ground shaking is thus an unavoidable hazard for structures and facilities in the San Joaquin Valley. The intensity of the ground shaking would depend on the magnitude of the earthquake, distance of the structure from the epicenter, and duration of shaking. The degree of damage would be due in part to the type of seismic hazard, type of structure, the quality of the structure's building materials, and construction quality. The proposed action involves residential and commercial uses as well as associated site and utility improvements. The proposed action is expected to experience at least one major earthquake during its operational lifetime. While fault-related surface rupture is not likely, ground shaking could cause structural damage to levees, the extended levees, buildings, pipelines, bridges, and other developments that constitute the proposed action.

The proposed action area is located in Seismic Zone 3 according to the 1997 UBC. The proposed action area has relatively high groundwater and clean sands that are loose to medium density. The potentially liquefiable soils are relatively shallow. Due to the potentially active blind thrust fault (Great Valley fault system) along the western margin of the San Joaquin Valley, it is possible that higher ground accelerations would be produced that have not occurred in the region since 1800. Based on liquefaction analysis conducted by ENGEO (2002), portions of the proposed action area may be expected to experience liquefaction if a probabilistic seismic event with a ground acceleration of 0.23 g occurred. The geologic hazards and potential structural damage resulting from a major seismic event would be a significant indirect effect. No direct effects were identified.

However, the proposed action would be required to comply with provisions of the UBC. When built to UBC standards, structures are anticipated to resist minor earthquakes without damage; resist moderate earthquakes without structural damage; and resist major earthquakes without collapse but with some structural damage. It is reasonable to expect that a well-designed, well-constructed structure would not collapse or cause loss of life in a major earthquake. Further, the proposed action would be required to implement and comply with Mitigation Measures GEO-1, GEO-2, and GEO-3, which were included as part of the SEIR for River Islands at Lathrop.

Mitigation Measure GEO-1. Implement geotechnical design recommendations to minimize or avoid damage from ground shaking

The proposed action facilities will be designed for maximum horizontal ground surface accelerations of at least 0.23 g. Geotechnical reports completed by ENGEO in 2002 for the proposed action (*Baseline Geotechnical Assessment: River Islands, Lathrop, California* and *Preliminary Levee Evaluation: River Islands, Lathrop, California*) predict that a horizontal ground surface acceleration of 0.23 g at the River Islands site would have a 10% probability of being exceeded in a 50-year project design life. This estimate incorporates the possibility of a seismic event associated with the Great Valley fault system. A surface acceleration of 0.23 g exceeds the maximum ground surface accelerations previously recorded in the area (estimated at 0.16 g), which occurred during the 1906 San Francisco earthquake.

Mitigation Measure GEO-2. Implement geotechnical design recommendations to minimize or avoid damage from liquefaction

A design-level geotechnical study will be completed for the proposed action before a grading permit is issued, focusing on the liquefaction potential in the area and identifying appropriate means to minimize/avoid damage from liquefaction. Geotechnical design recommendations will be implemented during project construction. Potential recommendations may include over-excavating and recompacting the area with engineered fill or in-place soil densification. In-place densification measures may include deep dynamic compaction, compaction grouting, vibro-compaction, and the use of non-liquefiable caps. Where existing levee soils cannot be densified, the potential liquefaction-induced settlement will be accounted for in the final design grades and setbacks for the proposed action.

Mitigation Measure GEO-3. Implement geotechnical design recommendations to minimize or avoid effects on levee slope stability resulting from lateral spreading and landslides

A design-level geotechnical study will be completed for the proposed action before a grading permit is issued. The geotechnical studies for levees and levee modifications will include additional site explorations and a laboratory testing program to more accurately determine subsurface stratigraphy and soil strength characteristics for slope stability analyses. Final levee designs will be analyzed for various stability conditions using the strength parameters developed from the additional exploration and testing. Levee designs will address issues such as long-term slope stability under static and seismic conditions, lateral spreading, and potential effects of seepage on levee stability. Measures to address levee slope instability where it could occur will be implemented during project construction and may include the construction of keyways beneath levee toes, removal and replacement of all surface soils beneath the new levee footprint, in-place soil densification, widening the levee to address seepage, or placement of geotextile stabilization fabrics. The appropriate mitigation methods and extent of required mitigation will depend on the actual subsurface soils encountered at the levee location. Where existing levee soils cannot be altered, designs for modifications to the existing levee will address deficiencies in the existing levee.

Effects on structures and infrastructure as a result of construction on expansive or corrosive soils (significant)

Expansive soils shrink and swell with fluctuation in moisture content, leading to volume changes. Damage to foundations, buildings, underground utilities, and other subsurface facilities could occur if these facilities are not designed and constructed appropriately to resist changes in soil conditions. Ground subsidence occurs when volume changes in expansive soils results in consolidation in soft clays subsequent to lowering of the water table or placement of fill, which is common in the Delta. The soils in the proposed action area display a Plasticity Index ranging from low (non-plastic) to high (expansive soils) (ENGEO 2002). Potentially compressible layers of clay were encountered in portions of the existing levees (ENGEO 2002). These soils could lead to consolidation settlements, and ground subsidence could result in structural damage. Therefore, expansive soils would have a significant indirect effect on structures and infrastructure in the proposed action area. No direct effects were identified.

Site-specific corrosion testing for concrete and buried metals has not yet been performed; however, based on previous studies conducted by ENGEO (2002), it appears that the proposed action area soils may have a moderate to low potential for corrosion of buried metals (ENGEO 2002). Corrosion of buried concrete could also be a possibility. Corrosive soils could cause failures of underground structures over the long term; this would be a significant indirect effect. No direct effects were identified. As required by the SEIR, Mitigation Measures GEO-4 and GEO-5 would be implemented to address expansive or corrosive soils in the proposed action area. Design-level geotechnical studies would be completed for the proposed action area before a grading permit would be issued. The studies would determine if expansive soils are present in the proposed action area and the potential for soil corrosion, and would include measures to address these soils where they occur. Appropriate measures identified in each geotechnical study would be implemented during project construction.

Mitigation Measure GEO-4. Implement geotechnical design recommendations to minimize or avoid soil expansion effects

A design-level geotechnical study will be completed for the proposed action before a grading permit is issued. The study will specifically address whether expansive soils are present in the proposed action area and include measures to address these soils where they occur. Methods to address expansive soils include regrading areas with appropriate soils and adding special design features to foundations and other underground facilities. Measures included in the report will be implemented as appropriate, based on the specific soil conditions and the type of facility being constructed.

Mitigation Measure GEO-5. Implement geotechnical design recommendations to minimize or avoid effects of corrosive soils

A design-level geotechnical study will be completed for the proposed action area before a grading permit is issued. The study will specifically address corrosion potential and include measures to address corrosive soils where damage to underground facilities may occur. Potential methods to address corrosive soils include the use of cathodic protection or sacrificial anodes for buried metals, use of concrete with a lower water-to-cement ratio or sulfate-resistant concrete, and the use of Type I or Type II Modified cement. Appropriate measures identified in each geotechnical study will be implemented during project construction.

Effects due to failure of cut-and-fill slopes, including but not limited to levee slopes (significant)

Preliminary levee embankment stability analysis conducted by ENGEO (2002) indicated that minimum factors of safety against slope failure could be achieved. Design slopes are typically analyzed for end-of-construction conditions, long-term slope stability under static and seismic conditions, and other stability conditions such as lateral spreading.

Based on a study of past performance of a large number of earth embankments subjected to strong ground shaking, embankments constructed of compacted soils that neither build up large pore pressures nor show more than 15% strength loss would survive earthquake shaking with no major damage (ENGEO 2002). The majority of earth embankments located within 5 miles of the San Andreas fault exhibited satisfactory performance during the 1906 earthquake (8.25 Richter magnitude).

Lateral spreading and earthquake-induced landslides involve lateral ground movements resulting from vibrations in the ground during an earthquake. Weakening or failure of an embankment or soils mass overlying a layer of liquefied sands or weak soils is typically a result of lateral ground movement. Preliminary lateral spreading analysis indicated a maximum lateral deformation of 12–18 inches that could occur along the top of the levee slope at the existing levee locations. Water seepage through the levees could increase the potential for lateral spreading and landslides along the levee perimeter. The potential for lateral spreading appears to be high in portions of the site underlain by liquefiable sands. The lateral spreading potential for the un-modified levees could be considered moderate under a design seismic event due to the relatively low strength of the soil materials combined with levee slope angles. If levees are modified in accordance with the appropriate recommendations, the risk of lateral spreading is considered low.

The proposed action proposes new levees, new extended levees, and modifications to existing levees, all of which could be adversely affected by earthquake-induced lateral spreading and landslides. The modified levees and high ground perimeter would incorporate the existing levees, which contain potentially liquefiable soils that can experience a temporary reduction in strength because of cyclic stresses and increased pore pressure as a result of strong ground shaking. Therefore, temporary reduction in soil strength induced by liquefaction could result in significant indirect effects on levee stability. No direct effects were identified. As required by the SEIR, Mitigation Measures GEO-2 and GEO-3 would be implemented. Final levee designs would address issues such as long-term slope stability for static and seismic conditions, lateral spreading, and potential effects of seepage on levee stability.

Mitigation Measure GEO-2. Implement geotechnical design recommendations to minimize or avoid damage from liquefaction

Mitigation Measure GEO-3. Implement geotechnical design recommendations to minimize or avoid effects on levee slope stability resulting from lateral spreading and landslides

Potential for seepage and associated detrimental effects (less than significant)

The results of preliminary analysis indicate that a suitable levee section for retrofitting the existing levees and construction of new levees could be designed, under the proposed action, in conformity with current standards and practical construction constraints. A minimum levee section with a 25-foot-wide crown and 3:1 side slopes should provide the minimum required seepage protection. This preliminary design would minimize seepage in the levee face and the potential development of a quick condition at the landside levee toe. Moreover, because of the cross section of the extended levees and their engineered slope toward the internal lake system, the stormwater management system would accommodate any runoff or seepage. The indirect effects would be less than significant. No direct effects were identified.

Potential for construction-related erosion (less than significant)

Construction activities under the proposed action would involve substantial excavation, hauling, filling, and temporary stockpiling of soil in the proposed action area. The proposed action would disturb soils during reconstruction and expansion of approximately 5.6 miles of the existing Old River levee, in addition to construction of 6,716 residential units, commercial space, boat docks and other recreational facilities. The extensive earthwork to support project development could expose soils to erosion during construction. However, because topography at the proposed action area (with the exception of the levees) is flat, the potential for water erosion would be minimal. Furthermore, the levees surrounding the RID area create a closed system and contain sediments in the levees. Construction contractors would be required to comply with a SWPPP and implement

BMPs, as described in the Environmental Commitments section of Chapter 2, *Proposed Action and Alternatives*. Consequently, direct and indirect effects would be less than significant. Potential effects of erosion on other resources, such as fisheries and water quality, are discussed separately in Chapter 4, *Fish Resources,* and Chapter 6, *Water Resources and Flood Risk Management*.

5.2.3.2 Alternative 2—No Alteration of Paradise Cut

Effects on structures and personal safety as a result of seismic ground shaking, seismically induced liquefaction and related types of ground failure (significant)

Alternative 2 would eliminate all alterations of Paradise Cut. Instead, to provide the needed flood risk reduction measures, the Paradise Cut levee would be augmented on the landside. Under Alternative 2, proposed development would be the same as the under proposed action, with a slight increase in the density single-family dwellings. The significant indirect effects on structures and personal safety of seismic ground shaking, seismically induced liquefaction, and related types of ground failure would be similar to those under the proposed action. The entirety of the proposed development would be subject to the same degree of damage in a seismic event, and would be required to comply with the provisions of the CBC. The environmental commitments and mitigation associated with the proposed action would apply to this alternative.

Effects on structures and infrastructure as a result of construction on expansive or corrosive soils (significant)

Under Alternative 2, the significant indirect effects on structures and infrastructure from constructing on expansive or corrosive soils would be similar to those under the proposed action. The only major difference under Alternative 2 is the elimination of alterations of Paradise Cut. No direct effects were identified. The environmental commitments and mitigation associated with the proposed action would apply to this alternative.

Effects due to failure of cut-and-fill slopes, including but not limited to levee slopes (significant)

Under Alternative 2, significant indirect effects associated with the potential for lateral spreading and earthquake-induced landslides would be the same as those under the proposed action. No direct effects were identified. The environmental commitments and mitigation associated with the proposed action would apply to this alternative. Measures to address levee slope instability would be implemented during project construction and could include the construction of keyways beneath levee toes, removal and replacement of all surface soils beneath the new levee footprint, in-place soil densification, widening the levee to address seepage, and placement of geotextile stabilization fabrics.

Potential for seepage and associated detrimental effects (less than significant)

The potential for seepage under Alternative 2 would be the same as that under the proposed action. A minimum levee section with a 25-foot wide crown and 3:1 side slopes would provide the minimum required seepage protection, and the indirect effects would be less than significant. No direct effects were identified.

Potential for construction-related erosion (less than significant)

Under Alternative 2 the potential for construction-related erosion would be similar to that under the proposed action. Extensive earthwork activities to support this alternative could expose soils to erosion. Compliance with the SWPPP and implementation of BMPs identified in Chapter 2, *Proposed Action and Alternatives*, would ensure that there would be no significant direct and indirect effects.

5.2.3.3 Alternative 3—Avoidance of Central Drainage Ditch

Effects on structures and personal safety as a result of seismic ground shaking, seismically induced liquefaction, and related types of ground failure (significant)

Under Alternative 3, the central drainage ditch would be protected by a no-development buffer zone. The buffer would extend at least 100 feet on either side of the ditch in keeping with CDFW standards. The significant indirect effects on structures and personal safety of seismic ground shaking, seismically induced liquefaction, and related types of ground failure would be the same as under the proposed action. The entirety of the proposed development would be subject to the same degree of damage in a seismic event, and would be required to comply with the provisions of the CBC. No direct effects were identified. The environmental commitments and mitigation associated with the proposed action would apply to this alternative.

Effects on structures and infrastructure as a result of construction on expansive or corrosive soils (significant)

Significant indirect effects under Alternative 3 would be the same as those under the proposed action because construction would occur on soils with the same expansive and corrosive properties. No direct effects were identified. Mitigation Measure GEO-4 would require a design-level geotechnical study completed for the proposed action area before a grading permit is issued. The study would determine if expansive or corrosive soils are present in the proposed action area and include appropriate measures to address these soils where they occur.

Effects due to failure of cut-and-fill slopes, including but not limited to levee slopes (significant)

The significant indirect effects associated with the potential for lateral spreading and earthquake-induced landslides under Alternative 3 would be the same as under the proposed action. No direct effects were identified. Mitigation Measure GEO-3, which addresses levee slope instability, would be implemented during project construction and could include the construction of keyways beneath levee toes, removal and replacement of all surface soils beneath the new levee footprint, in-place soil densification, widening the levee to address seepage, and placement of geotextile stabilization fabrics.

Potential for seepage and associated detrimental effects (less than significant)

The potential for seepage under Alternative 3 would be the same as that under the proposed action. A minimum levee section with a 25-foot wide crown and 3:1 side slopes would provide the minimum required seepage protection, and the indirect effects would be less than significant. No direct effects were identified.

Potential for construction-related erosion (less than significant)

Under Alternative 3 the potential for construction-related erosion would be similar to that under the proposed action; extensive earthwork activities to support this alternative could expose soils to erosion. However, compliance with the SWPPP and implementation of BMPs identified in Chapter 2, *Proposed Action and Alternatives*, would ensure that the direct and indirect effects would be less than significant.

5.2.3.4 Alternative 4—Proposed Action with Expanded Flood Risk Reduction

Effects on structures and personal safety as a result of seismic ground shaking, seismically induced liquefaction, and related types of ground failure (significant)

Alternative 4 would include additional flood risk reduction components (e.g., construction of a new bypass channel, widening of Paradise Cut and Paradise Weir, construction of an additional weir upstream of the existing Paradise Weir, creation of new flood storage areas); however, development (e.g., residential units, recreational facilities) would be the same as under the proposed action. Therefore, the significant indirect effects of seismic activity on structures and personal safety would be the same as those under the proposed action. No direct effects were identified. Any proposed development would be required to comply with the CBC. The environmental commitments and mitigation associated with the proposed action would apply to this alternative.

Effects on structures and infrastructure as a result of construction on expansive or corrosive soils (significant)

Alternative 4 would entail construction on soils with the same properties as those under the proposed action. The significant indirect effects would be the same, and the same mitigation measures would apply. No direct effects were identified.

Effects due to failure of cut-and-fill slopes, including but not limited to levee slopes (significant)

Alternative 4 would entail construction of a new flood bypass channel, widening of Paradise Cut and Paradise Weir, construction of an additional weir upstream of the existing Paradise Weir, and creation of new flood storage. The combined footprint of the new bypass channel and levee segments would be slightly greater than those under the proposed action, resulting in a slightly greater potential for failure of cut-and-fill slopes. This potential would constitute a significant indirect effect. No direct effects were identified. The environmental commitments and mitigation associated with the proposed action would apply to this alternative.

Potential for seepage and associated detrimental effects (less than significant)

The potential for seepage under Alternative 4 would be the same as under the proposed action. A minimum levee section with a 25-foot-wide crown and 3:1 side slopes would provide the minimum required seepage protection, and the indirect effects would be less than significant. No direct effects were identified.

Potential for construction-related erosion (less than significant)

Under Alternative 4 the potential for construction-related erosion would be greater than that under the proposed action; extensive earthwork activities to support this alternative could expose soils to erosion. However, compliance with the SWPPP and implementation of BMPs identified in Chapter 2, *Proposed Action and Alternatives*, would ensure that the direct and indirect effects would be less than significant.

5.2.3.5 Alternative 5—No Action

Effects on structures and personal safety as a result of seismic ground shaking, seismically induced liquefaction and related types of ground failure (significant)

Under the No Action Alternative, the federal review and permitting under CWA Section 404 and federal review and permission under Section 408 would not take place. This alternative would include an interior levee system rather than the use of extended levees for flood risk reduction. The significant indirect effects on structures and personal safety as a result of geologic hazards would be similar to those described for the proposed action, and the same environmental commitments and mitigation would apply. No direct effects were identified.

Effects on structures and infrastructure as a result of construction on expansive or corrosive soils (significant)

The No Action Alternative would involve construction on soils with the same properties as those described for the proposed action. The significant indirect effects would be the same, and the same mitigation measures would apply. No direct effects were identified.

Effects due to failure of cut-and-fill slopes, including but not limited to levee slopes (significant)

An interior levee system rather than extended levees would be constructed under the No Action Alternative for flood risk reduction. Nevertheless, the significant indirect effects of failure of cut-and-fill slopes would be similar to those described for the proposed action, and the same environmental commitments and mitigation would apply. No direct effects were identified.

Potential for seepage and associated detrimental effects (less than significant)

The potential for seepage under Alternative 3 would be the same as under the proposed action. A minimum levee section with a 25-foot wide crown and 3:1 side slopes would provide the minimum required seepage protection, and the indirect effects would be less than significant. No direct effects were identified.

Potential for construction-related erosion (less than significant)

Under the No Action Alternative, the potential for construction-related erosion would be similar to that under the proposed action. Extensive earthwork activities to support this alternative could expose soils to erosion. Compliance with the SWPPP and implementation of BMPs identified in Chapter 2, *Proposed Action and Alternatives*, would ensure that the direct and indirect effects would be less than significant.

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Chapter 6
Water Resources and Flood Risk Management

This chapter analyzes the proposed action's effects related to surface water and groundwater resources (i.e., hydrology), including effects on water quality, as well as its effects on flood risk management. The water quality aspects of the stormwater management facilities for River Islands at Lathrop are described in this chapter. However, water supply and water conservation (including water recycling), as well as the facilities and protocols for urban stormwater management and wastewater treatment and discharge, are described in Chapter 17, *Public Services and Utilities*, and are accordingly not discussed further in this chapter. Chapter 21, *Cumulative Effects*, describes the effects on regional water resources in the broader context of other foreseeable regional projects.

The specific changes in flood risk management in the vicinity of the proposed action are described in this chapter, while Chapter 21, *Cumulative Effects*, describes the effects on regional flood risk management along the lower San Joaquin River (downstream of Vernalis). The Corps's interest in federal flood risk management projects in the lower San Joaquin River basin and the Delta are discussed both in this chapter and in Chapter 21.

Key sources of data used in the preparation of this chapter are listed below. Several hydraulic modeling reports prepared by MBK Engineers were used to provide the summary of hydraulic effects of the proposed action along the San Joaquin River, Old River, and Paradise Cut.

- *Draft Subsequent Environmental Impact Report for the River Islands at Lathrop Project* and addenda (City of Lathrop 2002, 2005, 2007).
- *River Islands at Lathrop Hydraulic Impact Analysis*. Includes Appendix A: Lower San Joaquin River and Stewart Tract UNET Model Calibration and Verification, July 2002 (MBK Engineers 2002).
- Lower San Joaquin River (LSJR) HEC-RAS Hydraulic Computer Simulation Model Development, Calibration, and Verification (MBK Engineers 2006a).
- River Islands at Lathrop Analysis of Hydraulic Impacts on Federal Flood Control Project Design Capacity (MBK Engineers 2006b).
- River Islands at Lathrop Determination of [200-year] Design Water Surface (MBK Engineers 2006c).
- *River Islands at Lathrop Hydraulic Impact Analysis* (MBK Engineers July 2014) (included in this Draft EIS as Appendix D).
- Central Valley Flood Protection Plan: Framework for Early Implementation Projects and Section 408 Approval in California's Central Valley (California Department of Water Resources and Central Valley Flood Protection Board 2008).
- *Water Supply Study* (City of Lathrop 2009).

Specific reference information is provided in the text.

6.1 Affected Environment

6.1.1 Regulatory Framework

This section describes the regulations that pertain to the protection and management of water resources and water quality, watershed hydrology, river hydraulics, levee construction, and flood risk management issues within the proposed project area. These regulatory programs provide guidance for evaluating the environmental and flood risk management effects of development or infrastructure improvement projects (e.g., levees, floodways, stormwater drainage). Several of the federal regulations require Corps involvement for permitting or approval. Many of these regulatory programs include standardized procedures and guidelines for minimizing effects of construction activities and urban development within flood-prone areas and of operational discharges from wastewater treatment facilities.

6.1.1.1 Federal Regulations

Clean Water Act

The CWA is the primary federal law that protects the quality of the nation's surface waters, including lakes, rivers, and coastal wetlands. It operates on the principle that all discharges into the nation's waters are unlawful unless specifically authorized by a permit. Permit review—including the evaluation of any required monitoring data—is the CWA's primary regulatory tool. Temporary construction-related disturbances (e.g., dredging, filling, soil erosion, pollutant spills) as well as long-term discharges from soil erosion, stormwater drainage, or treated wastewaters are potentially regulated.

The State Water Board is the state agency with primary responsibility for implementing the CWA, which establishes regulations relating to water resource issues. Typically, all regulatory requirements are implemented by the State Water Board through nine RWQCBs established throughout the state. The Central Valley Water Board is responsible for regulating discharges to the San Joaquin River and its tributaries.

The following sections provide additional details on specific sections of the CWA.

Section 404: Permits for Fill Placement in Waters and Wetlands

CWA Section 404 regulates the discharge of dredged and fill materials into "waters of the United States," which include oceans, bays, rivers, streams, lakes, ponds, and wetlands. Project proponents must obtain a permit from the Corps for all discharges of dredged or fill material into waters of the United States before proceeding with a proposed activity. Before any actions that may affect surface waters are implemented, a delineation of jurisdictional waters of the United States must be completed, following Corps protocols, to determine if the project area contains wetlands or other waters of the United States that qualify for CWA protection. Such areas are identified below.

- Sections within the OHWM of a stream, including non-perennial streams with a defined bed and bank and any stream channel that conveys natural runoff, even if it has been realigned.
- Seasonal and perennial wetlands, including coastal wetlands.

Wetlands are defined for regulatory purposes as areas "inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions" (33 CFR 328.3, 40 CFR 230.3).

Applicants must obtain a permit from the Corps for all discharges of dredged or fill material into waters of the United States, including wetlands, before proceeding with a proposed activity. As stated by the Counsel for the EPA on January 19, 2001, nonnavigable, isolated waters may not be regulated by the Corps. As part of the wetland delineation and verification process, the Corps will determine whether the wetlands in the proposed action area are isolated and therefore not subject to regulation under Section 404.

The Corps may issue either an individual permit evaluated on a case-by-case basis or a general permit evaluated at a program level for a series of related activities. General permits are preauthorized and are issued to cover multiple instances of similar activities expected to cause only minimal significant environmental effects. Nationwide permits (NWPs) are a type of general permit issued to cover particular fill activities. Each NWP specifies particular conditions that must be met for the NWP to apply to a particular project. Potential waters of the United States in the proposed action area are under the jurisdiction of the Corps's Sacramento District.

Compliance with Section 404 requires compliance with several other environmental laws and regulations. The Corps cannot issue an individual permit or verify the use of a general permit until the requirements of NEPA, ESA, and the National Historic Preservation Act (NHPA) have been met. In addition, the Corps cannot issue or verify any permit until a water quality certification has been issued pursuant to CWA Section 401.

The activities listed below are exempt from the Section 404 permitting process.

- Farming, ranching, and forestry activities that are considered normal and ongoing (as of 1985 conditions), such as plowing, harvesting, and minor drainage of upland areas to waters of the United States.
- Construction and maintenance of stock ponds and irrigation ditches.
- Maintenance of drainage ditches.
- Construction of temporary sedimentation basins in upland areas.
- Construction and maintenance of farm, forest, and mining roads in accordance with BMPs.
- Other activities regulated by an approved program of BMPs authorized by CWA Section 208(b)(4).

Section 404 permits may be issued for only the least environmentally damaging practical alternative (i.e., authorization of a proposed discharge is prohibited if there is a practical alternative that would have fewer adverse effects and lacks other significant consequences). Section 404 may apply to the proposed action if construction would occur within waters of the United States.

Section 402: Permits for Discharge to Surface Waters

CWA Section 402 regulates discharges to surface waters through the NPDES program, administered by EPA. In California, the State Water Board is authorized by EPA to oversee the NPDES program through the RWQCBs (see related discussion of the Porter-Cologne Water Quality Control Act). The

NPDES program provides for both general permits (those that cover a number of similar or related activities) and individual permits.

Construction Activities

Most construction activities that disturb 1 acre or more of land are required to obtain coverage under the NPDES General Construction Permit, which requires the applicant to file an NOI to discharge stormwater and to prepare and implement a SWPPP. The SWPPP includes a site map and a description of proposed construction activities, a demonstration of compliance with relevant local ordinances and regulations, and an overview of the BMPs that would be implemented to prevent soil erosion and discharge of other construction-related pollutants that could contaminate nearby water resources. Permittees are further required to conduct annual monitoring and reporting to ensure that BMPs are correctly implemented and effective in controlling the discharge of stormwater-related pollutants. The City will need to file an NOI with the Central Valley Water Board to obtain coverage under the General Construction Permit before any construction activities begin.

Dewatering Activities

While small amounts of construction-related dewatering are covered under the General Construction Permit, the Central Valley Water Board has also adopted a General Order for Dewatering and Other Low Threat Discharges to Surface Waters (General Dewatering Permit). This permit applies to various categories of dewatering activities and likely would apply to the proposed action area if construction would require dewatering in greater quantities than that allowed by the General Construction Permit and if the effluent would be discharged to surface waters. The General Dewatering Permit contains waste discharge limitations and prohibitions similar to those in the General Construction Permit. To obtain coverage, the applicant must submit an NOI and a pollution prevention and monitoring program (PPMP) to the Central Valley Water Board. The PPMP must include a description of the discharge location, discharge characteristics, primary pollutants, receiving water, treatment systems, spill prevention plans, and other measures necessary to comply with discharge limits. The permittee must prepare and implement a representative sampling and analysis program, and must comply with recordkeeping and quarterly reporting requirements during dewatering activities. For dewatering activities that are not covered by the General Dewatering Permit, an individual NPDES permit and waste discharge requirements (WDRs) must be obtained from the Central Valley Water Board. However, the amount of dewatering needed for the proposed action would likely fall under the General Dewatering Permit.

CWA Permits for Stormwater Discharge

CWA Section 402 regulates wastewater, stormwater runoff during construction, and urban stormwater discharges to surface waters through the NPDES program. The NPDES program is officially administered by EPA or delegated state agencies. In California, EPA has delegated its authority to the State Water Board; the State Water Board in turn delegates implementation responsibility to the nine RWQCBs, as discussed in *Porter-Cologne Act and State Implementation of CWA Requirements* below.

The NPDES program provides for *general permits* that cover a number of similar or related activities and *individual* activity- or project-specific permits. The construction-related and future development urban stormwater permits are fully described in the City's SEIR (City of Lathrop 2002).

All point source discharges to waters of the United States not covered by a general permit are required to apply for an individual NPDES permit with the local RWQCB. As conditions of permit issuance, the RWQCB issues WDRs and monitoring provisions to ensure compliance with CWA standards. The WDRs and permits are reviewed and updated if necessary on a 5-year review cycle by the RWQCB. The stormwater and wastewater from River Islands at Lathrop would be permitted under existing and future City of Lathrop NPDES permits for stormwater and wastewater.

Section 401: Water Quality Certification

Under CWA Section 401, applicants for a federal license or permit to conduct activities that may result in the discharge of a pollutant into waters of the United States must obtain certification from the state in which the discharge would originate or, if appropriate, from the interstate water pollution control agency with jurisdiction over affected waters at the point where the discharge would originate. Therefore, all projects that have a federal component and may affect the quality of the state's waters (including projects that require federal agency approval, such as the issuance of a Section 404 permit) also must comply with Section 401.

Section 303: Impaired Waters

Under Section 303(d) of the CWA, states, territories, and authorized tribes are required to develop a list of water quality–limited segments. In California, the State Water Board develops the list of water quality–limited segments; EPA approves each state's list. Waters on the list do not meet water quality standards, even after point sources of pollution have installed the minimum required levels of pollution control technology. Section 303(d) also establishes the total maximum daily load (TMDL) process to guide the application of state water quality standards.

Safe Drinking Water Act

The Safe Drinking Water Act of 1974 is the principal federal law that protects the quality of the nation's drinking water. It empowers EPA to set drinking water standards and to oversee the water providers—cities, water districts, and agencies—who actually implement those standards. It also includes provisions for the protection of surface waters and wetlands in support of drinking water quality.

In California, EPA delegates some of its implementation authority to the California Department of Health Services' (DHS') Division of Drinking Water and Environmental Management. DHS administers a wide range of regulatory programs that include components aimed at drinking water quality and safety, such as permits for water well installation; potable water supply monitoring requirements for public drinking water systems and new domestic wells; regulations for septic and sewer systems; regulations governing generation, handling, and discharge/disposal of hazardous materials and wastes; and regulations for underground storage tanks (USTs) and solid waste disposal facilities.

National Flood Insurance Program

The National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973 were intended to reduce the need for large, publicly funded flood risk reduction structures and disaster relief by restricting development on floodplains. FEMA manages the National Flood Insurance Program (NFIP) to subsidize flood insurance to communities that comply with FEMA regulations limiting development in floodplains. FEMA issues Flood Insurance Rate Maps (FIRMs) for communities participating in the NFIP. These maps delineate flood hazard zones in the community. The maps are designed for flood insurance purposes only and do not necessarily show all areas subject to flooding. The maps designate lands likely to be inundated during a 1% (100-year) storm event and elevations of the base flood. They also depict areas between the limits affected by 1% (100-year) and 0.2% (500-year) events and areas of minimal flooding. FIRMs are often used to establish building pad elevations to reduce the risk to new development from flooding effects.

Federal Levee Standards

Requirements for FEMA Accreditation

In order for a levee to be accepted by FEMA under the NFIP, the community must provide evidence demonstrating that adequate design and operation and maintenance systems are in place to provide reasonable assurance that the structures will meet 1% [100-year] flood level of performance. These specific requirements are summarized below.

- **Levee height.** River levees must provide a minimum freeboard (the height of the top of a levee above a given level of water in a river) of 3 feet above the water surface elevation of the base flood. An additional 1 foot above the minimum is required within 100 feet of either side of structures (such as bridges) or wherever the flow is constricted.
- **Closures.** All levee openings must be provided with closure devices that are structural parts of the system during operation and designed according to sound engineering practice.
- **Embankment protection.** Engineering analyses must be submitted that demonstrate that no appreciable erosion of the levee embankment can be expected during the base flood as a result of either currents or waves, and that anticipated erosion will not result in failure of the levee embankment or foundation directly or indirectly through reduction of the seepage path and subsequent instability.
- **Embankment and foundation seepage.** Engineering analyses must be submitted that evaluate expected seepage during the base flood and demonstrate that seepage into or through the levee foundation and embankment will not jeopardize embankment or foundation stability.
- **Settlement.** Engineering analyses must be submitted that assess the potential and magnitude of future losses of levee height as a result of levee settlement and demonstrate that freeboard will be maintained within the minimum standards.
- **Local drainage.** An analysis must be submitted that identifies the source(s) of local flooding, the extent of the flooded area and, if the average depth is greater than 1 foot, the water surface elevation(s) of the base flood.
- **Operation plans.** For a levee system to be recognized, a formal plan of operation must be provided to FEMA. All closure devices or mechanical systems for internal drainage, whether manual or automatic, must be operated in accordance with an officially adopted operational manual.
- **Maintenance plans.** The maintenance plan must document the formal procedure that ensures that the stability, height, and overall integrity of the levee and its associated structures and systems are maintained. Maintenance plans must specify the maintenance activities to be performed, the frequency of their performance, and the agency and staff responsible for their performance.

U.S. Army Corps of Engineers Levee Design Criteria

The Corps, as the primary federal flood risk management agency, manages the flood risk management water operations (i.e., storage and release rules) for several federal reservoirs upstream of Vernalis. The Corps has built (in cooperation with the State of California) and oversees the maintenance of many miles of federal-state project levees along the lower San Joaquin River.

Most of the levees providing flood risk reduction for the proposed action area are federally authorized and are under Corps jurisdiction. The levee evaluation for the proposed action area conforms to the engineering criteria established by the Corps for the assessment and repair of levees. The Corps' technical criteria documents in the following list should be used as guidance unless noted otherwise.

- Overtopping of Flood Control Levees and Floodwalls (Publication ETL 1110-2-299, August 22, 1986)
- Structural Design of Closure Structures for Local Flood Protection Projects (Publication EM 1110-2-2705, March 31, 1994)
- Design of Coastal Revetments, Seawalls, and Bulkheads (Publication EM 1110-2-1614, June 30, 1995)
- Design Guidance on Levees (Publication ETL 1110-2-555, November 30, 1997)
- Conduits, Culverts, and Pipes (Publication EM 1110-2-2902, March 31, 1998)
- Guidelines on Ground Improvement for Structures and Facilities (Publication ETL 1110-1-185, February 1, 1999)
- Engineering and Design for Civil Works Projects (Publication ER 1110-2-1150, August 31, 1999)
- Design and Construction of Levees (Publication EM 1110-2-1913, April 30, 2000)
- Geotechnical Investigations (Publication EM 1110-1-1804, January 1, 2001)
- USACE CESPK Levee Task Force, Recommendations for Seepage Design Criteria, Evaluation and Design Practices (2003)
- Slope Stability (Publication EM 1110-2-1902, October 31, 2003)
- Geotechnical Levee Practice (Publication SOP EDG-03, June 28, 2004)
- Engineering and Design—Design Guidance for Levee Underseepage (Publication ETL 1110-2-569, May 1, 2005)
- Quality Management (Publication ER 1110-1-12, September 30, 2006)
- ETL 1110-2-583 Guidelines for Landscape Planting and Vegetation Management at Levees, Floodwalls, Embankment Dams, and Appurtenant Structures (April 30, 2014)

Section 408 Levee Improvement Approval

Section 408 requires approval from the Chief of Engineers, or designee, for alterations to certain public works, including federal project levees, so long as the alteration would not be injurious to the public interest and does not impair the usefulness of the work. Section 408 alterations include actions that change the hydraulic capacity of the floodway or change the authorized geometry of the federal project. This law generally requires Corps evaluation and approval for any alteration of federally authorized levees (or other water control structures). It prohibits any encumbrance of federally constructed facilities, unless specifically approved by the Corps. Improvements (i.e., strengthening, raising, buttressing, seepage reduction) are generally encouraged and approval is expected, so long as these alterations do not cause any changes in the flood risks of adjacent or downstream levee-served areas.

6.1.1.2 State Regulations

Porter-Cologne Act and State Implementation of CWA Requirements

The Porter-Cologne Water Quality Control Act, passed in 1969, established the State Water Board and divided the state into nine regions, each overseen by an RWQCB. The State Water Board is the primary state agency responsible for protecting the quality of the state's surface and groundwater supplies, but much of its daily implementation authority is delegated to the nine RWQCBs, which are responsible for implementing CWA Sections 401, 402, and 303[d] as discussed above. In general, the State Water Board manages water rights and regulates statewide water quality, while the RWQCBs focus on water quality in their respective regions.

The Porter-Cologne Act requires the RWQCBs to develop water quality control plans (Basin Plans) that designate beneficial uses of California's major surface water bodies and groundwater basins and establish specific narrative and numerical water quality objectives for those waters. *Beneficial uses* represent the services and qualities of a water body—that is, the reasons why the water body is considered valuable. *Water quality objectives* reflect the standards necessary to protect and support those beneficial uses. Basin Plan standards are primarily implemented by using the NPDES permitting system to regulate waste discharges so that water quality objectives are met. Under the Porter-Cologne Act, Basin Plans must be updated every 3 years.

Central Valley Regional Water Quality Control Board

The Central Valley Water Board is responsible for implementing its Basin Plan for the Sacramento and San Joaquin Rivers and their tributaries. The Basin Plan identifies beneficial uses of the river and its tributaries and water quality objectives to protect those uses. Numerical and narrative criteria are contained in the Basin Plan for several key water quality constituents, including DO, water temperature, trace metals, turbidity, suspended material, pesticides, salinity, radioactivity, and other related constituents (California Regional Water Quality Control Board 2009).

The methods the Central Valley Water Board uses to implement the Basin Plan criteria include issuing WDRs. WDRs are issued to any entity that discharges to a surface water body and does not meet certain water quality criteria, such as those related to sediment. The WDR/NPDES permit also serves as a federally required NPDES permit (under the CWA) and incorporates the requirements of other applicable regulations.

State and Local Flood Control Regulations

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

Central Valley Flood Protection Board

The CVFPB (formerly the California Reclamation Board) regulates the alteration and construction of levees and floodways in the Central Valley defined as part of the Sacramento Valley and San Joaquin Valley flood control projects. Rules promulgated in Title 23 of the CCR (Title 23, Division 1, Article 8 [Section 111 through 137]) regulate the alteration and construction of levees to ensure public safety. The rules state that existing levees may not be excavated or left partially excavated during the flood season, which is generally November 1 through April 15 for the San Joaquin River. The following CVFPB guidance requires that Corps levee criteria be used:

> The California Reclamation Board has primary jurisdiction approval of levee design and construction. Section 120 of the CCR directs that levee design and construction be in accordance with the USACE's Engineer Manual EM 1110-2-1913, Design and Construction of Levees. This document is the primary Federal standard applicable to this project, as supplemented by additional prescriptive standards contained in Section 120 of the CCR. These additional standards prescribe minimum levee cross-sectional dimensions, construction material types, and compaction levels.

Central Valley Flood Protection Act of 2008

FloodSAFE California is the statewide initiative to reduce flood risks across the entire state, not just those in the Central Valley. FloodSAFE California is a multifaceted initiative to improve public safety through integrated flood management activities. The goals include decreased flood risk, improved preparedness and response, support for a growing economy, enhanced ecosystems, and economic sustainability (California Department of Water Resources and Central Valley Flood Protection Board 2008).

In November 2006, the voters of California approved two bonds that provide major funding for flood risk management improvements: Proposition 1E ($4 billion), and Proposition 84 ($800 million). The most comprehensive and far-reaching legislation related to flood risk management was the Central Valley Flood Protection Act of 2008 (Senate Bill [SB] 5). The Act requires that DWR and the CVFPB implement new policies, standards, and flood risk reduction measures in the Central Valley. Because of the potentially catastrophic consequences of flooding, the Act recognizes that the federal government's current 1% (100-year) level of performance standard is not sufficient to protect urban and urbanizing areas within flood-prone areas throughout the Central Valley and declares that the minimum standard for these areas is a 0.5% (200-year) level of performance. It also establishes a deadline of 2025 to achieve 0.5% (200-year) level of performance if the urban area is served by federal project levees. The Act recognizes that modifications to earthen levees reduce but do not eliminate the risk of flooding. Accordingly, the Act calls for the state to provide annual notification of flood risks to property owners (California Department of Water Resources and Central Valley Flood Protection Board 2008).

The Central Valley Flood Protection Plan was adopted on June 29, 2012. This plan is a system-wide approach for the protection of lands currently protected from flooding by the existing Sacramento River Flood Control Project (SRFCP) and the San Joaquin River Flood Control System (SJRFCS). This strategic plan requires DWR to examine and evaluate local and non-project levee systems, together with the 1,600 miles of federal project levees and upstream reservoirs, in developing the plan. The planning process will involve three major elements.

- Mapping of the 100-year and 200-year floodplains based on information from the Sacramento–San Joaquin River Basins Comprehensive Study (Comprehensive Study) and updated hydrologic and levee evaluations.

- Identification of the existing and proposed performance standards for all facilities within the system.
- Proposals for additional structural and nonstructural facilities that may become part of the flood management system, including bypasses, floodway corridors, floodplain storage, or other projects that expand the capacity of the system; minimize the flood management system operation and maintenance requirements; and increase and improve the quantity, diversity, and connectivity of riparian, wetland, floodplain, and SRA habitats (California Department of Water Resources and Central Valley Flood Protection Board 2008).

It is generally understood that the original flood risk reduction planned for much of the valley contemplated that rural agricultural areas would be provided flood risk reduction to allow reclamation of the land for farming. At the same time, occasional flooding would be expected, and this was an accepted premise of the system's design. Occasional flooding, however, is not acceptable for urbanized areas in deep floodplains. Providing improved flood risk reduction for some rural areas will need to be part of the Central Valley Flood Protection Plan. Repairing rural levees to provide the original design level of performance might be appropriate. However, repairing rural levees using the same engineering design criteria applied to urban levees may not be justified based on the risk reduction achieved. Another issue for rural levees is whether such repairs would provide FEMA 100-year level of performance, which could lead to additional urbanization and substantial increases in residual flood risk damage (California Department of Water Resources and Central Valley Flood Protection Board 2008).

Floodplain mapping studies are specifically identified for funding in the two bond measures and are needed to identify floodplain boundaries and depth of flooding for various frequency events. The studies will be performed according to FEMA mapping standards, but will include floodplains for more events than FEMA requires or utilizes. FEMA will display the 1% (100-year) and 0.2% (500-year) floodplains. DWR has also mapped Levee Flood Protection Zones, potential state maintenance area boundaries, the 0.5% (200-year) floodplain, and the area of the 0.5% (200-year) floodplain within Levee Flood Protection Zones that exceeds 3 feet in depth. Most of the work performed will help the mapping program under the federal levee evaluations and the federal flood risk management system evaluations (see previous sections). The floodplain studies that evaluate levee-break flooding for the above flood events will be performed as mapping studies using Proposition 84 and Proposition 1E funds. Mapping of floodplains served by federal levees requires that DWR perform geotechnical evaluations of the non-project levees serving the same areas. There are approximately 1,800 miles of non-project levees that serve the same areas as federal levees. Most of the San Joaquin Valley is already mapped by FEMA as within the 1% (100-year) floodplain (because the levees were designed for 50-year level of performance). Most of the Sacramento Valley was assumed to have 1% (100-year) level of performance and is not mapped in the 1% (100-year) floodplain by FEMA. The first FEMA maps have been scheduled for completion in 2012, but they were not available at the time of this draft—the entire program is planned to last 5 years (California Department of Water Resources and Central Valley Flood Protection Board 2008).

6.1.1.3 Local

Reclamation Districts (RDs) are local agencies that have the primary responsibility for inspecting, maintaining, and improving levees and pumping facilities located within the districts. They receive general oversight and guidance from DWR and the Corps. The RID Area and the eastern portion of

Union Island (immediately northwest of Stewart Tract) comprise RD 2062; remaining Stewart Tract constitutes RD 2107.

6.1.2 Existing Conditions

6.1.2.1 Methods Used to Identify Existing Conditions

Information on existing water resources and water quality for the proposed action area was gathered from the City's SEIR and addenda and other published reports about the San Joaquin River and the Delta region.

Information on existing flood risk management conditions and existing levees along the San Joaquin River and surrounding the proposed action area was gathered from the City's SEIR and addenda and several MBK modeling reports prepared for the River Islands at Lathrop development project.

6.1.2.2 Environmental Setting

Climate and Precipitation

Stewart Tract is in a part of the San Joaquin Valley that is characterized by a semi-arid climate. Summers are hot and dry while winters are cool and moist. In general, the site is heavily influenced by northwest winds averaging 10 miles per hour and marine breezes. These westerly winds flow through the Carquinez Strait and follow the San Joaquin River. Easterly winds, which are cool, and northerly winds, which are warm or hot, also run through site and affect the climate of Stewart Tract (City of Lathrop 2003). West of the site, the Coast Ranges create a buffer between the City and the Pacific Ocean, moderating the influence of the marine environment. On average, Lathrop receives approximately 13 inches of precipitation per year. Ninety percent of the precipitation occurs during the winter months (November–April) (City of Lathrop 2003).

Hydrology

Surface Water Hydrology

The San Joaquin River Basin is subjected to two types of floods: those attributable to prolonged rainstorms during the late fall and winter and those attributable to snowpack melting in the Sierra Nevada during the spring and early summer, particularly during years of heavy snowfall. Major flooding has occurred in the lower San Joaquin River, where flood flows sometimes exceed channel capacities within project levees that were designed for a peak flow of 52,000 cfs at Vernalis.

San Joaquin River flows are measured at the USGS flow station at Vernalis. Table 6-1 shows the distribution of daily flows for each month based on data collected in the 1972–1992 period. A review of historical daily flows for the San Joaquin River at Vernalis indicates that Vernalis flows have exceeded 1,000 cfs about 80–90% of the time each month. Flows greater than 10,000 cfs occur only about 10–20% of the time in January–May. The effects of the existing agricultural diversions to Stewart Tract and the potential effects of agricultural drainage or stormwater discharges can be evaluated in reference to these monthly flows. Because flood damage is most likely to occur during the peak flows from large storms, the expected frequency of high flow events is used for flood risk management planning and evaluation.

The historical daily or peak flows from a river flow gage station (e.g., Vernalis) can be processed to estimate the annual peak flow–frequency curve. The peak flow records are often summarized with the annual exceedance probability (AEP) flows. Common AEP peak flow values are 100% AEP (1-year, expected every year); 10% AEP (10-year, expected once every 10 years); 2% AEP (50-year, expected once every 50 years); 1% AEP (100-year, expected once every 100 years); 0.5% AEP (200-year, expected once every 200 years); and 0.2% (500-year, expected once every 500 years). These expected peak flows for the San Joaquin River at Vernalis were evaluated in the Comprehensive Study and have been used in the flood hydrology evaluations and modeling studies completed by MBK for the proposed action area.

Table 6-1. Historic Monthly Flow (cfs) in the San Joaquin River at Vernalis 1972–1992

Percentile	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	TAF/yr
0%	246	430	506	816	758	524	212	400	118	93	124	179	416
10%	993	1,115	918	1,091	1,234	1,470	1,168	892	568	481	537	635	696
20%	1,274	1,274	1,278	1,255	1,389	1,779	1,309	1,049	798	671	1,033	1,067	1,059
30%	1,386	1,548	1,381	2,060	2,115	2,023	1,915	1,781	1,499	1,082	1,067	1,353	1,166
40%	1,992	1,646	2,205	2,305	2,701	2,736	2,466	1,967	1,711	1,284	1,269	1,471	1,765
50%	2,253	2,216	2,487	3,251	3,241	3,415	2,867	2,178	1,990	1,357	1,451	1,597	2,108
60%	2,790	2,311	2,812	3,766	6,212	5,685	3,957	2,937	2,297	1,636	1,615	1,925	2,614
70%	3,497	2,822	3,586	4,059	7,138	7,611	4,285	3,972	3,860	1,904	1,680	2,730	2,815
80%	3,814	3,498	3,745	5,233	7,988	10,062	10,249	8,764	5,708	2,557	2,179	2,917	5,227
90%	4,543	3,906	4,771	13,069	10,833	25,035	20,030	18,654	7,069	3,384	3,183	4,181	5,954
100%	13,316	10,675	19,126	25,632	31,604	40,035	36,447	31,771	26,083	19,227	9,035	11,310	15,406

Note: average flow = 4,394 cfs. TAF = thousand acre-feet.

Because of the large reservoir storage capacity in the San Joaquin River basin and because the dominant use of this water is for irrigation within the basin, the Vernalis flows during the summer and fall are relatively low and largely independent of the total runoff index for the year (i.e., water year classification). Vernalis flows are sometimes maintained by Reclamation with releases from New Melones Reservoir to provide the 1995 Water Quality Control Plan salinity (EC) objective of 700 micrograms per cubic meter ($\mu g/m^3$) during the April–August irrigation season. This objective requires a flow of about 1,500 cfs. The salinity objective for the remainder of the year is 1,000 $\mu g/m^3$, an objective that requires a flow of about 1,000 cfs.

There are some irrigation diversions (e.g., Banta-Carbona) between Vernalis and Stockton. During flood conditions (more than 18,000 cfs at Vernalis), some flow is diverted into Paradise Cut at the upstream margin of Stewart Tract to provide incremental flood relief to a portion of the San Joaquin River. The Paradise Cut flood bypass directs excess flow to Old River near the Grant Line Canal. At the design flow of 52,000 cfs at Vernalis, about 13,000 cfs (25%) of the river flow is diverted into Paradise Cut, based on MBK simulation of the design flow (MBK Engineers 2006b).

Old River flow is diverted from the San Joaquin River near Mossdale Landing. The San Joaquin River channel turns north, perpendicular to the Stewart Tract levee, and flows north past Lathrop toward Stockton. Old River flows along the northern levee of Stewart Tract to the western tip of Stewart Tract, formed by the confluence of Old River and Paradise Cut. Some flow is diverted from Old River at the head of Middle River on the northern edge of Stewart Tract into Middle River, which flows north toward the central Delta. Because about 22,000 cfs (42.5% of the design flow of 52,000 cfs and 56% of the San Joaquin River flow of 39,000 cfs at Mossdale) was simulated to be diverted into Old River, flow in the San Joaquin River downstream of the head of Old River was reduced to about 17,000 cfs (32.5% of the design flow of 52,000 cfs). Both Old River and Paradise Cut serve to divert flood flow away from the urban levees that protect Lathrop and Stockton.

The potential for flooding under conditions of a 1% (100-year) peak flow event is high for Stewart Tract. Levee breaks occurred on Stewart Tract in 1938, 1950, and 1997. The 1950 failure was just north of Paradise Weir, at the juncture of Paradise Cut and the San Joaquin River. This failure caused the eastern part of Stewart Tract to become flooded to the western UPRR embankment. In time, the railroad embankment also failed, leading to flooding in the rest of Stewart Tract. In 1997, flooding again occurred when the Paradise Cut levee failed just upstream of the eastern UPRR bridge. The floodwaters entered the remaining Stewart Tract and were retained by the western UPRR embankment until it failed, allowing the floodwaters to pass onto the rest of the island.

The design flow in the San Joaquin River between Vernalis and Paradise Cut was 52,000 cfs, which at the time (1955) was thought to represent the 2% (50-year) flood event. USGS estimated that the instantaneous peak flow at the Vernalis gage in the January 1997 flood event (the most recent flood event) was 75,600 cfs, with a peak mean daily flow of 54,300 cfs. Numerous levee failures occurred downstream of Vernalis during this event, including one on Stewart Tract; however, no levee failures have ever occurred in the RID Area.

Groundwater Hydrology

Most of the soils in the Lathrop area are alluvial fan terraces, which consist of loamy sands and silty clays, over varied hardpan substratum (City of Lathrop 2003). Permeability and drainage varies throughout Lathrop, and may range from slow to rapid and from poor to moderate, respectively (City of Lathrop 2003).

Groundwater levels in Lathrop vary with season and annual precipitation. Groundwater level depths have ranged from approximately 7 to 21 feet below the surface (City of Lathrop 2003). However, in extremely wet years, such as 1983, groundwater has surfaced (City of Lathrop 2003), although there is no evidence of this occurring on Stewart Tract. In the fall, after high-use summer months, groundwater elevations are about 3 feet lower than in the spring (City of Lathrop 2009).

According to DWR's Bulletin 118, Lathrop groundwater is pumped from the Eastern San Joaquin Sub-Basin of the Eastern San Joaquin County Groundwater Basin (City of Lathrop 2009). Fresh groundwater from this basin is estimated to be at depths of less than 1,000 feet (City of Lathrop 2009).

The City currently uses local groundwater as a major source of water supply. Four groundwater wells supply potable water to residents. The City began receiving water from the South San Joaquin Irrigation District (SSJID) South County Surface Water Supply Project (SCSWSP) in 2005, causing a decrease in the amount of groundwater that was pumped. In 2004, the City pumped 3,475 af of groundwater, but in 2005 the City pumped 2,530 af. Excessive groundwater use throughout the Eastern San Joaquin County Groundwater Basin has resulted in overdraft conditions in the aquifer. The Eastern San Joaquin County Groundwater Basin is currently in a "critical" condition of overdraft. Extraction rates that exceed the rate of aquifer recharge and safe yield have resulted in an overdraft estimate of approximately 113,000 acre-feet per year (AFY) (City of Lathrop 2009).

Shallow groundwater in the project area is maintained below the land surface for crops by the agricultural drainage ditches and pumping of excess water to Paradise Cut near Old River.

Drainage and Stormwater Runoff

On Stewart Tract, surface drainage occurs in natural and artificial ditches. Currently all storm drainage, as well as irrigation runoff, is collected into a central drainage ditch and is pumped into Paradise Cut. The central drainage ditch traverses the site from southeast to northwest, bifurcating most of Stewart Tract. A pumping station on Paradise Cut discharges water using automatic pumps that are activated at a specified water elevation (City of Lathrop 2003).

Water Quality

Surface Water

The water quality of the San Joaquin River is characterized by low minerals and high suspended sediment concentrations during periods of high rainfall and runoff (i.e., storms) that can occur between November and April. The streamflow is much lower and the mineral concentrations (i.e., salinity) are much higher during the irrigation season. The total dissolved solids (TDS) concentrations are always less than 100 milligrams per liter (mg/l) in the tributaries, but TDS concentrations increase to more than 500 mg/l at Vernalis during the low-flow period, when a majority of the flow originates from agricultural return flow and groundwater seepage from irrigated lands adjacent to the river.

Nutrient concentrations are generally high throughout the year. Nitrate concentrations at Vernalis are generally 2 mg/l, while orthophosphate concentrations are about 0.2 mg/l (Kratzer et al. 2004). The nutrient concentrations are higher upstream, because the high concentrations from agricultural runoff and groundwater drainage are somewhat diluted by the eastside tributary flows of the Merced, Tuolumne, and Stanislaus Rivers.

Table 6-2 shows the cumulative distribution of monthly suspended sediment concentrations for the San Joaquin River at Vernalis for the period 1961–2008. Suspended sediment concentrations are often greater than 100 mg/l in the winter months (associated with storm runoff) and remain relatively high during the summer period (perhaps from riverbank erosion). Many of the metals and agricultural chemicals are adsorbed to the particulate materials. Because the suspended sediment concentrations are high throughout the year, concentrations of metals and many organic chemicals are also relatively high throughout the year. Because of the high suspended sediment and adsorbed chemical concentrations, San Joaquin River water is not used directly for water supply. However, most of the San Joaquin River is mixed into the south Delta channels and transported to the south Delta intakes for the SWP and CVP pumps. Because Old River is a diversion from the San Joaquin River and Paradise Cut Canal is connected to Old River, the water quality in these channels is similar to the measured water quality at Vernalis.

Table 6-2. Cumulative Distribution of Monthly Average Suspended Sediment Concentration (mg/l) in the San Joaquin River at Vernalis for 1961–2008

Percentile	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
10%	34	43	48	53	53	59	67	65	49	44	34	27
20%	42	49	55	57	56	66	71	70	56	50	39	32
30%	48	55	63	61	62	74	79	77	62	54	42	38
40%	52	60	66	64	67	88	94	91	67	56	45	43
50%	60	68	68	74	84	98	111	97	75	64	47	47
60%	76	83	77	80	90	105	121	102	79	67	51	49
70%	83	92	82	87	100	109	131	111	87	71	55	51
80%	101	124	95	91	110	115	149	125	93	74	58	71
90%	136	167	100	99	123	136	162	153	103	77	64	83
100%	280	189	196	116	164	194	253	172	143	103	95	154
Average	**75**	**86**	**74**	**74**	**84**	**96**	**111**	**98**	**75**	**62**	**49**	**52**

Source: U.S. Geological Survey 2010.

Groundwater

Declining groundwater quality in the City has raised several concerns throughout the region. Local groundwater wells are currently closed due to necessary upgrades and improvements or public health hazards and safety. Recently, the California Department of Health required one of the local groundwater wells to be shut down and not used for public consumption due to the presence of coliform bacteria. Contamination of groundwater, mainly due to industrial processes, has been identified in several locations throughout the City (City of Lathrop 2009). There is also a growing concern that groundwater west of the City with high concentrations of TDS may migrate into Lathrop's groundwater supply over time, degrading the groundwater. The City has installed several monitoring wells. The City also plans to install a treatment system for arsenic removal in the drinking water supply wells (City of Lathrop 2009). No water quality issues are associated with the shallow groundwater on Stewart Tract.

Beneficial Uses for San Joaquin River and Old River

Beneficial uses of the San Joaquin River and the Delta comprise municipal, industrial, and agricultural water supply; recreation; groundwater recharge; freshwater replenishment; and preservation and enhancement of fish, wildlife, and other aquatic resources provided by freshwater habitat.

The San Joaquin River is not currently a source of municipal water supply for the City or for the proposed River Islands at Lathrop project. The City currently uses groundwater and plans to obtain municipal water supplies to serve future growth through a combination of additional groundwater and surface water from the SSJID SCSWSP, which does not rely on the San Joaquin River (see Chapter 17, *Public Services and Utilities*).

Diversions from the Delta for municipal water supplies are made by Antioch (at the Antioch Water Works); Contra Costa Water District (intakes at Rock and Mallard sloughs, and the intake for the Los Vaqueros Reservoir from Old River near SR 4); the SWP's North and California Aqueducts (at Barker Slough and Clifton Court Forebay, respectively); and the CVP's Delta-Mendota Canal (intake near

Tracy). Current Delta diversions by SWP and CVP systems for municipal and industrial use are approximately 2.5 million acre-feet (MAF) per year. Diversions for industrial uses are scattered throughout the San Joaquin River and Delta areas, with the major industrial diversions in the Pittsburg-Antioch area. A portion of the CVP and SWP diversions are also used for industrial purposes.

Extensive use is made of San Joaquin River and Delta waters for agricultural purposes. In addition to the SWP and CVP diversions (near Tracy) for agriculture outside the Delta, there are about 2,000 privately owned diversions for agricultural water supply scattered throughout the Delta, including several within the proposed action area. Most of the individual diversions are riverside siphons or small pumping stations.

Water-dependent recreation uses of the San Joaquin River and the Delta include swimming, wading, water-skiing, sportfishing, and a variety of other activities that involve contact with the water. Noncontact (water-enhanced) recreation uses include picnicking, camping, pleasure boating, hunting, bird watching, education, and aesthetic enjoyment. The San Joaquin River and the waterways of the Delta provide important habitat to a diverse variety of aquatic life and terrestrial wildlife. This includes temporary habitat and migration routes for anadromous and other migratory species, as well as permanent habitat for resident species (see Chapter 3, *Terrestrial Biological Resources*, and Chapter 4, *Fish Resources*).

San Joaquin Flood Control System Levees

Much of the San Joaquin levee system was originally constructed by farmers and later incorporated into the lower San Joaquin River Tributary Project. When levees were first modified or constructed by the Corps, the river channel and bypass levees were designed to provide a standard geometry (3:1waterside slope and 2:1 landside slope [horizontal:vertical]) with a 10-foot top width and a predetermined freeboard of 3 feet above a set of water surface profiles generally matched to observed conditions during the 1907 and 1909 floods. Over time, because of numerous levee failures, the standard levee section was enlarged from a 10-foot top width to a 20-foot top width. The performance of the levees has been improved by construction of upstream reservoirs, which have reduced the peak flows in the San Joaquin River.

Completion of Friant Dam on the San Joaquin River near Fresno in 1947 led to reduced peak flows, but contributed to sedimentation problems along the river. Over time, sediment buildup reduced the river's flow capacity and increased the potential for flooding and erosion problems. Sedimentation also led to vegetation encroachment in the San Joaquin River, further accelerating channel constrictions.

The Lower San Joaquin River Flood Control Project was designed and constructed by DWR between 1959 and 1966. The project's purpose was to provide flood protection along the San Joaquin River and tributaries in Merced, Madera, and Fresno Counties. It covers 108 river miles, contains 195 miles of levees, and serves more than 300,000 acres of urban and agricultural lands. The project has a series of flood bypasses to divert San Joaquin flood flows, as well as floodwater from the Kings River system, which connects with the San Joaquin River near Mendota. The bypasses divert flows around stretches of the San Joaquin River where constrictions have impaired its capacity (California Department of Water Resources and Central Valley Flood Protection Board 2008).

The 1986 flood considerably exceeded the magnitude of the 1907 and 1909 floods, but because of the reservoir storage added during the decades preceding the flood, water surface elevations in the river channels and bypass systems generally did not exceed the design flows. Nevertheless, many levees suffered significant stress and some failed, mostly due to seepage through poorly compacted levee soil materials or poor foundations. Following the flood, the state, the Corps, and their local partners completed a comprehensive evaluation of the flood risk management system and initiated a flood risk management program aimed at (1) repairing identified levee design deficiencies in both urban and rural areas evidenced principally by through-levee seepage; and (2) raising and strengthening urban area levees and, where possible, increasing the reservoir storage space available for flood risk management to achieve the CVFPB's objective of providing the urban areas with a higher level of performance (i.e., 200-year or greater) in view of the changes in watershed hydrology brought to light by the 1986 flood.

The flood of 1997 exceeded the intensity of the flood of 1986. Progress in the post-1986 levee repair and urban area modification efforts reduced the damages associated with the flood; however, many levees showed seepage problems. In the San Joaquin Valley, more than 30 levee failures occurred, many associated with overtopping.

Sacramento–San Joaquin River Basins Comprehensive Study

In response to the flooding in January 1997, the Comprehensive Study was initiated to formulate comprehensive plans for flood risk reduction and environmental restoration in the lower Sacramento and San Joaquin Valleys. An interim report was released by the Comprehensive Study team. The report identified the comprehensive plan as an approach to developing projects in the future to reduce damages from flooding and restore the ecosystem in the Sacramento–San Joaquin River basins. The comprehensive plan has three parts: (1) a set of principles to guide future projects, (2) an approach to developing projects with consideration for system-wide effects, and (3) an organization to consistently apply the guiding principles in maintaining the flood management system and developing future projects.

The Comprehensive Study produced a new set of analytical tools, including hydrologic and hydraulic data for modeling extreme floods, and a series of recommendations for structural and nonstructural modifications to the flood risk management system that could be pursued on a regional basis. A new set of engineering criteria for urban levees was adopted that increased the level of performance of urban levees. Accordingly, in May 2004, the CVBFPB sent a letter to the Corps requesting federal participation in a new evaluation of the federal flood risk management system in the Central Valley.

San Joaquin River Levees and Flood Elevations

The San Joaquin River channel and federal/state project levees constructed between Vernalis and Stewart Tract determine the existing hydraulic conditions of water surface elevation (and depth), surface width (and area), and velocity that correspond to a given river flow. As the river flow at Vernalis increases, the river hydraulic conditions also change. MBK simulated these river hydraulic changes using UNET or HEC-RAS models to evaluate the existing flood flow conditions as well as the effects of the proposed action and alternatives on flood flow conditions. The river hydraulic conditions can be summarized by the water surface elevation profiles along the river channel length (e.g., river miles or distance along a levee segment). The changes in the hydraulic river profiles for the San Joaquin River, Old River, and Paradise Cut were used to identify and evaluate potential hydraulic effects of the proposed action and each action alternative.

The river hydraulic response can also be summarized at a location using the river flow–water elevation curve (i.e., also called the stage-discharge rating table). Table 6-3 shows the measured water elevation at the Vernalis gage for a range of flows. The elevation increases at a slower rate as the flow increases: for example, the measured elevation is 8.4 feet (NGVD 29)[1] at a flow of 1,000 cfs and 9.9 feet at 2,000 cfs—an increase of 1.5 feet; however, the elevation is 12.3 feet at 4,000 cfs and 13.3 feet at 5,000 cfs—an increase of only 1 foot.

Table 6-3. River Flow–Water Elevation Relationship at Vernalis

Vernalis Flow (cfs)	Water Elevation (feet msl)
1,000	8.4
2,000	9.9
3,000	11.1
4,000	12.3
5,000	13.1
10,000	17.3
15,000	20.5
20,000	23.3
25,000	25.6
30,000	27.6
35,000	29.3
40,000	30.5
45,000	31.3
50,000	32.0
55,000	32.5
60,000	33.0
65,000	33.4
70,000	33.9
75,000	34.4
80,000	34.8

Source: U.S. Geological Survey 2010.

For flood risk management effects, the water elevations at much higher flows are of most interest. The USGS flow-elevation table for higher flows was estimated from the measured lower flows and there is more uncertainty for flows above 25,000 cfs. The HEC-RAS model simulated the water elevation at the design flow of 52,000 cfs to be about 32.3 feet. In 1955, the Corps estimated the design water elevation at about 34.2 feet; accordingly, the simulated elevation with the existing levees at 50,000 cfs is about 2 feet below the estimated design elevation. The estimated peak flow of about 75,000 cfs in the January 1997 flood had a measured elevation of 34.9 feet before several upstream levees failed. The simulated surface elevation was 35.8 feet, about 1 foot above the measured elevation, and very close to the top of the levees. The additional 25,000 cfs in excess of the design flow of 52,000 cfs raised the simulated peak elevation by about 3.5 feet, although the USGS flow-elevation table indicates an increase in water elevation of about 2.4 feet.

The top-of-levee elevation can be surveyed and shown with the river hydraulic profiles to indicate the low spots that are most likely to overtop and breach (fail). The actual levees at the Vernalis gage are at about 36 feet. Many houses (San Joaquin River Club) immediately downstream of Vernalis are served by the left bank levees. Most of the floodplain downstream of Vernalis is agricultural land.

[1] National Geodetic Vertical Datum of 1929. All water surface elevations in this chapter, except where otherwise noted, are given in NGVD 1929, and reflect the elevation above mean sea level.

Peak flows that are considerably higher than the design flow of 52,000 cfs (roughly equivalent to the 2% [50-year] event) will likely overtop the existing levees and may cause a levee breach that would flood a substantial volume in the floodplain. The HEC-RAS model of the lower San Joaquin River includes these floodplain volumes that are served by the existing levees. Higher flows can be simulated to overtop the levees without failure, or they can be simulated to breach the levees with a much larger opening and greater diversion into the floodplain volume.

Paradise Cut Flood Bypass

Paradise Cut is a bypass channel designed to divert excess flow from the San Joaquin River during flood events, thereby reducing downstream flood levels on the San Joaquin River. The flow in Paradise Cut joins the flow in Old River at the west end of Stewart Tract. Paradise Weir, which separates Paradise Cut from the San Joaquin River, has a crest elevation of approximately 13 feet, preventing water from entering Paradise Cut until the flow in the San Joaquin River exceeds approximately 18,000 cfs. Table 6-4 summarizes the number of days in the recent historical record on which flows were expected to flow across Paradise Weir (i.e., San Joaquin River flows exceeded 18,000 cfs). The review was limited to the period since 1979, when the last significant flood risk management project in the San Joaquin River Basin, New Melones Reservoir on the Stanislaus River, was completed (MBK Engineers 2002).

Table 6-4. Monthly Frequency of Flood Flows Entering Paradise Cut

Month	Number of Mean Daily Flow Records	Number of Days Water Would Flow across Paradise Weir	Percent of Days Water Would Flow across Paradise Weir
January	744	82	11.0%
February	678	100	14.7%
March	744	119	16.0%
April	720	130	18.1%
May	744	95	12.8%
June	720	54	7.5%
July	713	20	2.8%
August	713	0	0
September	690	0	0
October	713	0	0
November	690	0	0
December	713	31	4.3%

Source: City of Lathrop 2002.

Flows entered Paradise Cut on about 10–20% of the days in January through June, with some days in December and some days in July. The frequency of Paradise Cut diversions could possibly be increased by lowering the Paradise Weir elevation or by notching the weir to a lower elevation to allow diversion to begin at a lower Vernalis flow. There is uncertainty in the actual diversion flow over the Paradise Weir, because only the water elevation can be measured, and the flow depends on several estimated parameters (weir coefficient and Manning’s n values along Paradise Cut).

1997 San Joaquin River Flood Flows and Levee Failures

The January 1997 flood event produced record flows and river elevations on the San Joaquin River. Because this flood event occurred recently, many hydraulic measurements were available for calibrating the river hydraulic models (e.g., UNET and HEC-RAS). The calibration of the models with the 1997 flood event also provides an opportunity to describe the hydraulic performance of the federal flood risk management system. The flood risk management system was generally based on a design flow of 52,000 cfs at Vernalis, which was assumed to represent the 2% (50-year) flood event. The performance of the flood risk management system can be generally described by comparing the simulated river elevation profile for a given flood event with the corresponding right and left bank (looking downstream) levee profiles along the river from Vernalis (RM 72) to Stockton (RM 40). The river profiles for Paradise Cut and Old River are also considered, because these water bodies are part of the flood risk management system design. Paradise Weir and Paradise Cut were designed to divert about 15,000 cfs (roughly 30% of the Vernalis design flow of 52,000 cfs). The Old River diversion, at RM 53.5, was designed to divert about half the flow remaining in the San Joaquin River (19,000 cfs of the 37,000 cfs flowing past Paradise Weir). About 18,000 cfs would flow downstream toward Stockton under design flow conditions.

The initial hydraulic modeling for River Islands at Lathrop was conducted by MBK Engineers in 2002 using the UNET model of the lower San Joaquin River, which had originally been developed and calibrated by David Ford Consulting Engineers. The San Joaquin River flood modeling was updated by MBK in 2006 and the HEC-RAS model was used (MBK Engineers 2006c). More attention to the calibration data and levee breaching was included in this HEC-RAS modeling.

The peak flow conditions at Vernalis for a selected AEP must be estimated from hydrologic rainfall-runoff models of the watershed and upstream reservoir flood risk management operations. The sequence of actual inflows is important for matching the 1997 observed water surface elevations, levee failures, and floodplain flooding. But the basic performance of the levee and bypass system can be shown with simulated profiles of peak water elevations.

Figure 6-1 shows the MBK results for calibration of the 1997 flood along the San Joaquin River from Vernalis to Stockton. The simulated peak river elevation at Vernalis was about 35.8 feet, matching within 1 foot the measured peak elevation of 34.9 feet at the gage. The simulated peak elevation at Paradise Weir was about 26 feet (no measured elevation). The simulated peak river elevation was about 23.6 feet at Mossdale, matching within 0.5 foot the measured peak elevation of 23.2 feet. The simulated peak elevation in Old River (at the head) was about 20.9 feet, matching the measured peak elevation of 20.7 feet. There was a drop of almost 2 feet in the San Joaquin River downstream of the Old River diversion, demonstrating the value of this diversion for flood risk reduction along the downstream levees. The simulated elevation at Brandt Bridge was 15.0 feet, matching the measured peak elevations of 15.0 feet.

The estimated peak flow at Vernalis during the 1997 flood was 75,600 cfs. The peak simulated San Joaquin River flow at Paradise Weir was reduced to about 66,700 cfs by levee failures, the peak diversion simulated at Paradise Weir was 20,000 cfs, and the peak simulated flow below Paradise Weir at Mossdale was about 49,500 cfs. The peak simulated diversion into Old River was about 28,700 cfs, and the peak simulated flow below Old River was about 20,900 cfs. Although the peak flow of 75,000 cfs was 50% higher than the design flow at Vernalis, the peak flows at Paradise Weir and Old River were closer to the design flows because of downstream attenuation of the peak inflow at Vernalis and the effects of the levee failures (diversions to floodplains) along the river (MBK Engineers 2006b).

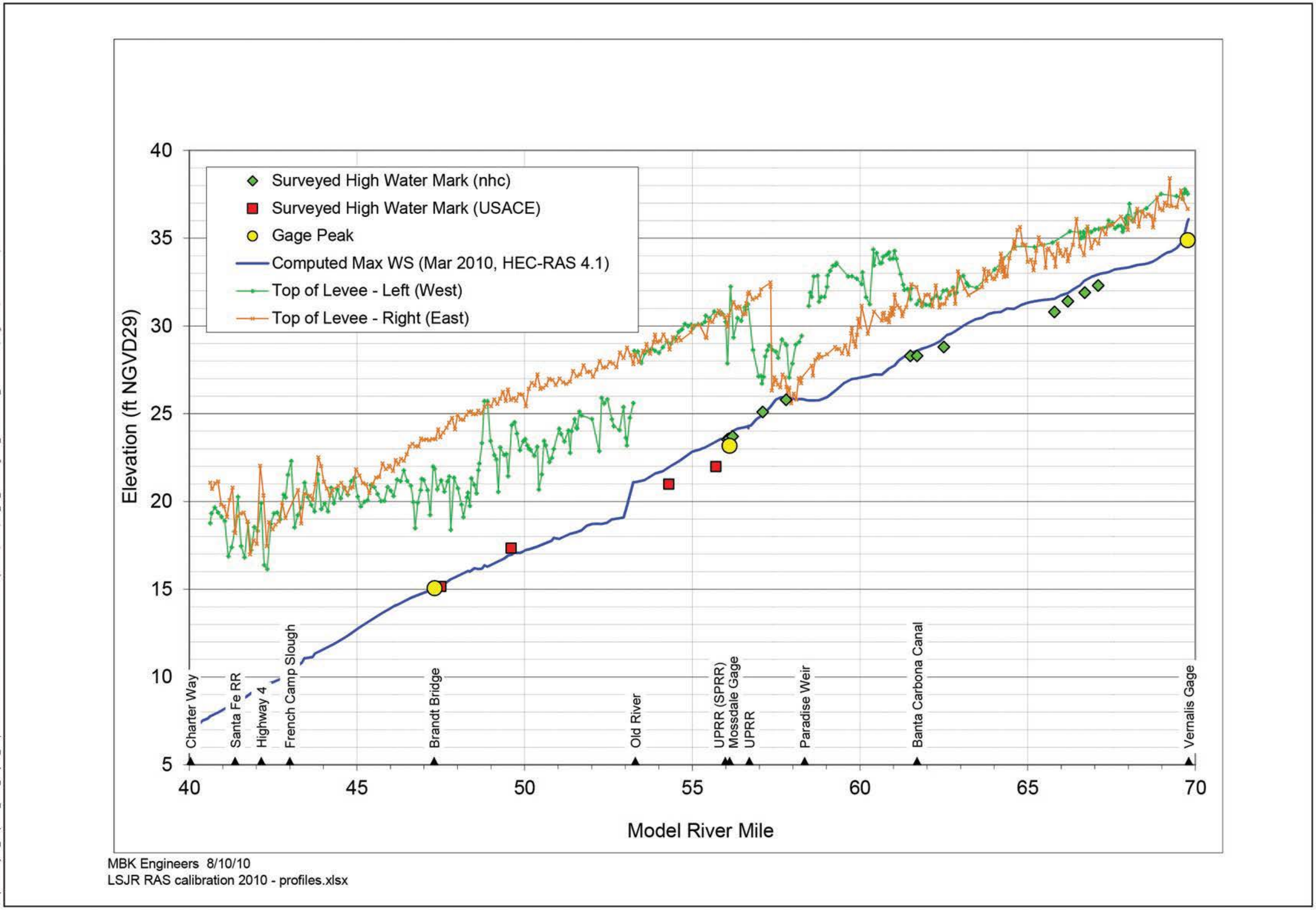

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Figure 6-1
Lower San Joaquin River HEC-RAS Model Calibration, January 1997 Flood Event
San Joaquin River – Maximum Water Surface Elevation Profile

Figure 6-2 shows the simulated and measured peak river elevation profile in Paradise Cut for the January 1997 flood event. The simulated water surface elevation decreased about 2 feet over Paradise Weir; the simulated river elevation was about 25.5 feet, while the simulated elevation in the upstream end of Paradise Cut was about 23.5 feet. Over a distance of about 3,300 feet, the simulated Paradise Cut peak elevation dropped about 4.5 feet from 22.5 feet at the eastern UPRR bridge to about 18 feet at the I-5 bridges. The simulated and measured peak elevations were about 14 feet at the downstream end of Stewart Tract and about 13 feet at Salmon Slough where Paradise Cut flows into Old River. This peak profile corresponds to a Paradise Cut diversion flow of about 20,000 cfs, considerably higher than the design flow of 15,000 cfs.

Figure 6-3 shows the simulated and measured river elevation profile in Old River for the January 1997 flood event. The simulated peak elevation in Old River at the head was 20.9 feet, matching the measured peak elevation of 20.7 feet. The simulated peak elevation at the mouth of Paradise Cut (northwest end of Stewart Tract) was about 14.3 feet, matching within about 0.5 foot the measured elevation of about 13.7 feet. The simulated peak elevation in Old River at Tom Paine Slough was 12.8 feet, matching the measured peak elevation of 12.8 feet. The simulated peak flow in Old River was about 28,700 cfs along Stewart Tract, decreasing to 24,600 cfs at Middle River (simulated diversion of 4,100 cfs). The simulated Old River flow increased to about 45,000 cfs at the western end of Stewart Tract where Paradise Cut flow joins Old River flow.

Stewart Tract Flood Risk Management

The Stewart Tract levees (under the jurisdiction of RD 2062 and RD 2107) are part of the federal/state San Joaquin River flood risk management system. A hydraulic modeling report was prepared by MBK to evaluate the effects of raising and strengthening the Stewart Tract levees to meet 0.5% (200-year) urban levee standards (MBK Engineers 2006b). Converting agricultural levees designed for a 2% (50-year) storm (peak flow of about 52,000 cfs at Vernalis) to urban levees designed for a 0.5% (200-year) storm (peak flow of about 125,000 cfs at Vernalis) would require raising the levee top to the simulated 200-year peak water elevation profile plus 3 feet of freeboard. However, the existing Stewart Tract levees are considerably higher than the design elevation needed for the 2% (50-year) flood risk management project; consequently, they would only require minor levee raising. The simulated 1% (100-year) storm (peak flow of about 78,000 cfs at Vernalis) and the simulated 0.2% (500-year) storm (peak flow of about 165,000 cfs at Vernalis) are also shown as reference flow conditions and to demonstrate the overall level of performance at Stewart Tract for this wide range of peak flood flow conditions.

The calibrated HEC-RAS model developed by MBK was used to simulate the San Joaquin River design flood of 52,000 cfs at Vernalis and to determine if increasing the levee height of the Stewart Tract levees to meet the 0.5% (200-year) peak flood profile (plus 3 feet of freeboard) would have any hydraulic effects (increased river elevations) in the channels surrounding Stewart Tract or in downstream channels. The simulated peak elevation at Vernalis for the 52,000 cfs design flow was about 32.4 feet. This was about 3.4 feet below the peak simulated elevation of 35.8 feet for the 1997 peak flow of about 75,000 cfs. The simulated peak river elevation at Vernalis for the estimated 0.5% (200-year) flood peak flow of 125,000 cfs was about 40.5 feet (4 feet above the levees at Vernalis). The model assumption that upstream levees would overtop without failing provides the highest possible downstream river flow condition, because actual levee failures would likely allow more of the peak flow to flood the floodplain and reduce the peak flow reaching Vernalis or Paradise Weir.

Figure 6-4 shows the HEC-RAS model simulated peak river elevation profile for the San Joaquin River, with the top elevations for the right (east) and left (west) levees shown for comparison. The HEC-RAS model was used to estimate the 0.5% (200-year) peak river elevation profiles. The simulated peak water elevation for the 0.5% (200-year) urban design flood (of 125,000 cfs at Vernalis) was about 30 feet at the downstream end of Paradise Weir, at the southern tip of remaining Stewart Tract. Downstream of the UPRR bridge near Mossdale, the simulated 0.5% (200-year) peak river elevation was 27 feet. At the head of Old River, the simulated 0.5% (200-year) peak river elevation was 24.5 feet. The simulated San Joaquin River peak water elevation profile drops about 2 feet downstream of the head of Old River to 22.5 feet. At Brandt Bridge (at the downstream end of Lathrop), the simulated peak river elevation was 18 feet.

The urban levee design height would be 3 feet above these simulated 0.5% (200-year) peak river elevations. The levees on the eastern part of remaining Stewart Tract are not high enough to meet this 0.5% (200-year) plus 3 feet design. However, the existing Stewart Tract levees along the San Joaquin River downstream of Mossdale are just at the 0.5% (200-year) urban levee height of 30 feet (i.e., 27 feet peak water elevation plus 3 feet freeboard). The RD 17 levees (on the east side of the San Joaquin River) are also at about 30 feet at the UPRR crossing near Mossdale. The levees on both sides of the San Joaquin River at Old River are at 28 feet. These meet the urban design standard, because the 0.5% (200-year) peak river elevation would be just below 25 feet. These urban levees would have 3 feet of freeboard during the simulated 0.5% (200-year) flood.

Figure 6-5 shows the HEC-RAS model simulated peak river elevation profile for Paradise Cut, with the top elevations for the right (east) and left (west) levees shown for comparison. The simulated peak water elevation for the 0.5% (200-year) urban design flood was about 27.5 feet at the downstream end of Paradise Weir, at the eastern tip of remaining Stewart Tract. The Stewart Tract levees along Paradise Cut are very high relative to the simulated 2% (50-year) or 1% (100-year) flood profile. But the simulated 0.5% (200-year) flood profile is above 26 feet—above the existing top elevation of the remaining Stewart Tract levees—between Paradise Weir and the eastern UPRR bridge (i.e., the levee is overtopped). The simulated river elevation at the I-5 bridges is about 22 feet, and the elevation at the UPRR bridge is about 21 feet. The Stewart Tract levees are about 1–2 feet above this simulated river profile. The simulated 0.5% (200-year) peak river elevation declines from 21 feet at the UPRR crossing to about 19 feet at Paradise Road and about 18 feet at Old River. The existing Paradise Cut levees along Stewart Tract are not high enough to provide 0.5% (200-year) urban levee level of performance. The existing levees vary between 18 feet and 23 feet. These existing levees are slightly above the simulated water elevations for the 1% (100-year) flood, which decline from 18 feet at the UPRR bridge to 15.5 feet at Old River. The existing levees have four low spots along Stewart Tract, with a freeboard above the 1% (100-year) river elevation profile of only about 2 feet. Levees will need to be raised and strengthened to become 1% (100-year) or 0.5% (200-year) accredited levees.

Figure 6-6 shows the HEC-RAS model simulated peak river elevation profile for Old River, with the top elevations for the right (east) and left (west) levees shown for comparison. The simulated peak water elevation for the 0.5% (200-year) urban design flood was about 24.5 feet at the head of Old River, 20 feet at the head of Middle River about 4 miles downstream, and about 18 feet at the confluence of Old River and Paradise Cut. The existing Stewart Tract levees along Old River are higher than the 0.5% (200-year) flood profile, but are not high enough to provide 3 feet of freeboard. The lowest levee section is near Paradise Cut. The existing Old River levees along Stewart Tract are high enough for the 1% (100-year) flood profile, but would need to be raised and strengthened to provide 3 feet of freeboard and meet the 0.5% (200-year) urban levee criteria.

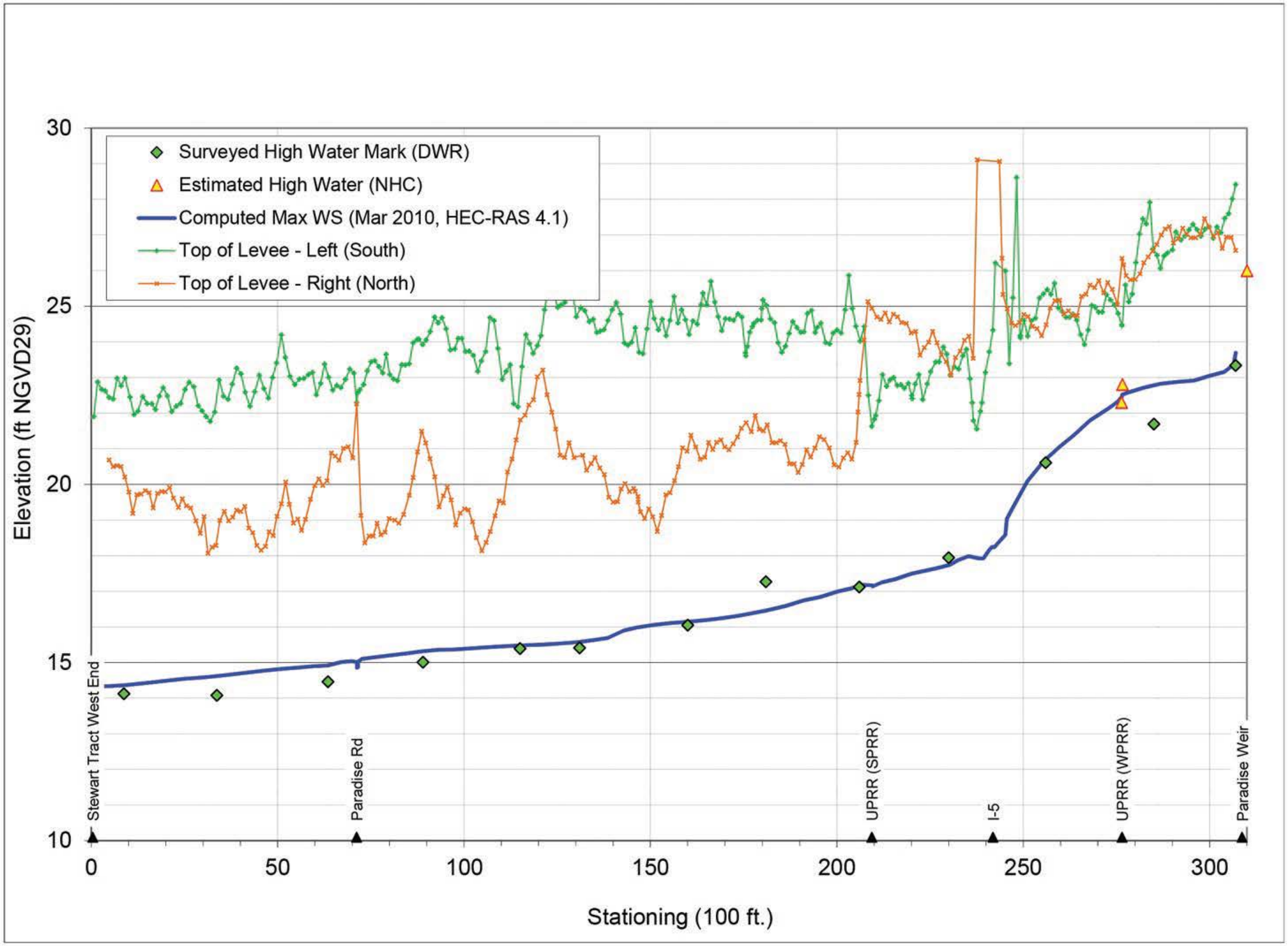

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Figure 6-2
Lower San Joaquin River HEC-RAS Model Calibration, January 1997 Flood Event
Paradise Cut – Maximum Water Surface Elevation Profile

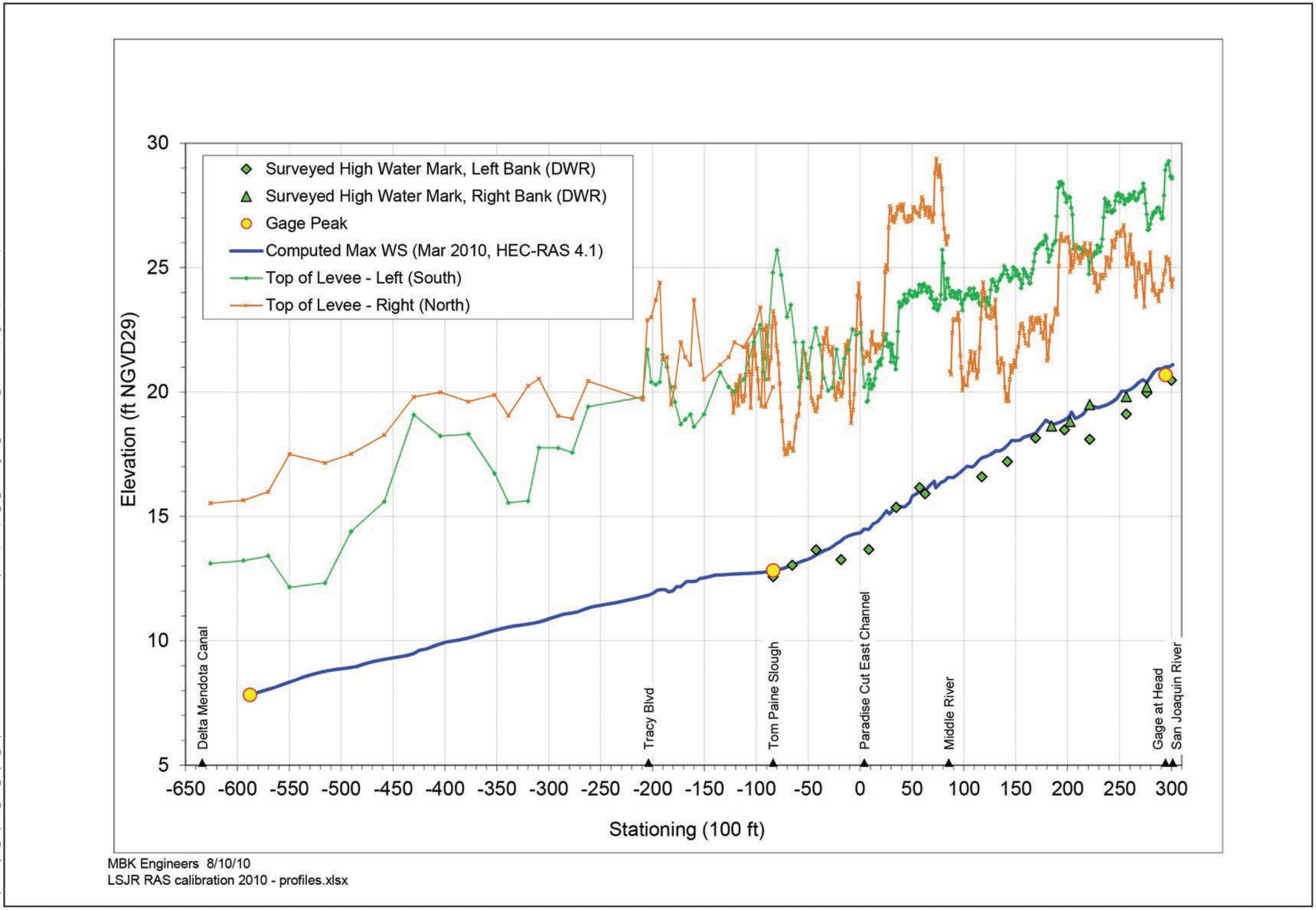
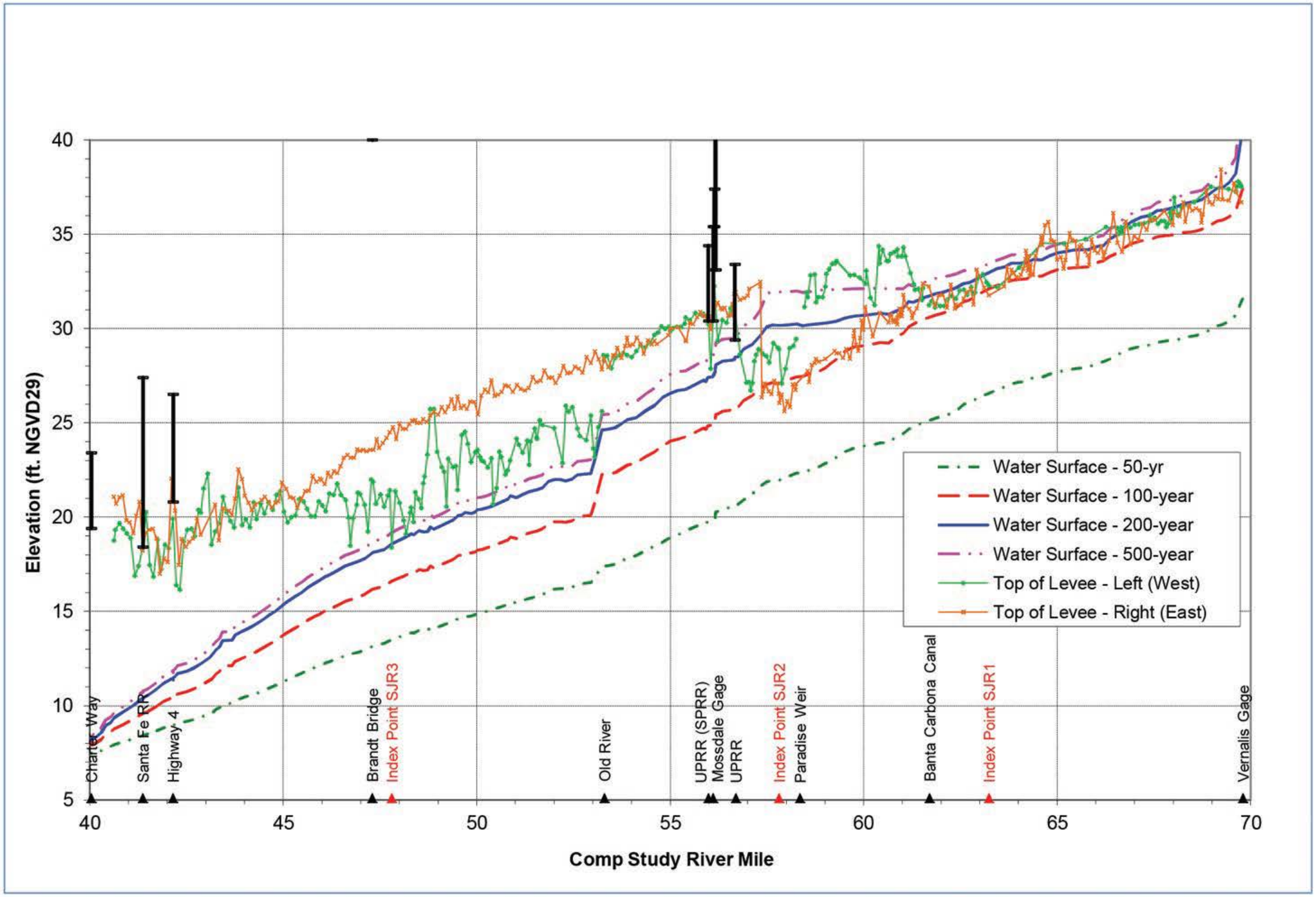


Figure 6-3
Lower San Joaquin River HEC-RAS Model Calibration, January 1997 Flood Event
Old River – Maximum Water Surface Elevation Profile



MBK Engineers 8/10/10
RivIslands R&U determinsitic impact results 2010-06.xlsx

Figure 6-4
Maximum Water Surface Elevation Profiles - San Joaquin River
Levees Overtop Without Failure, Existing Condition

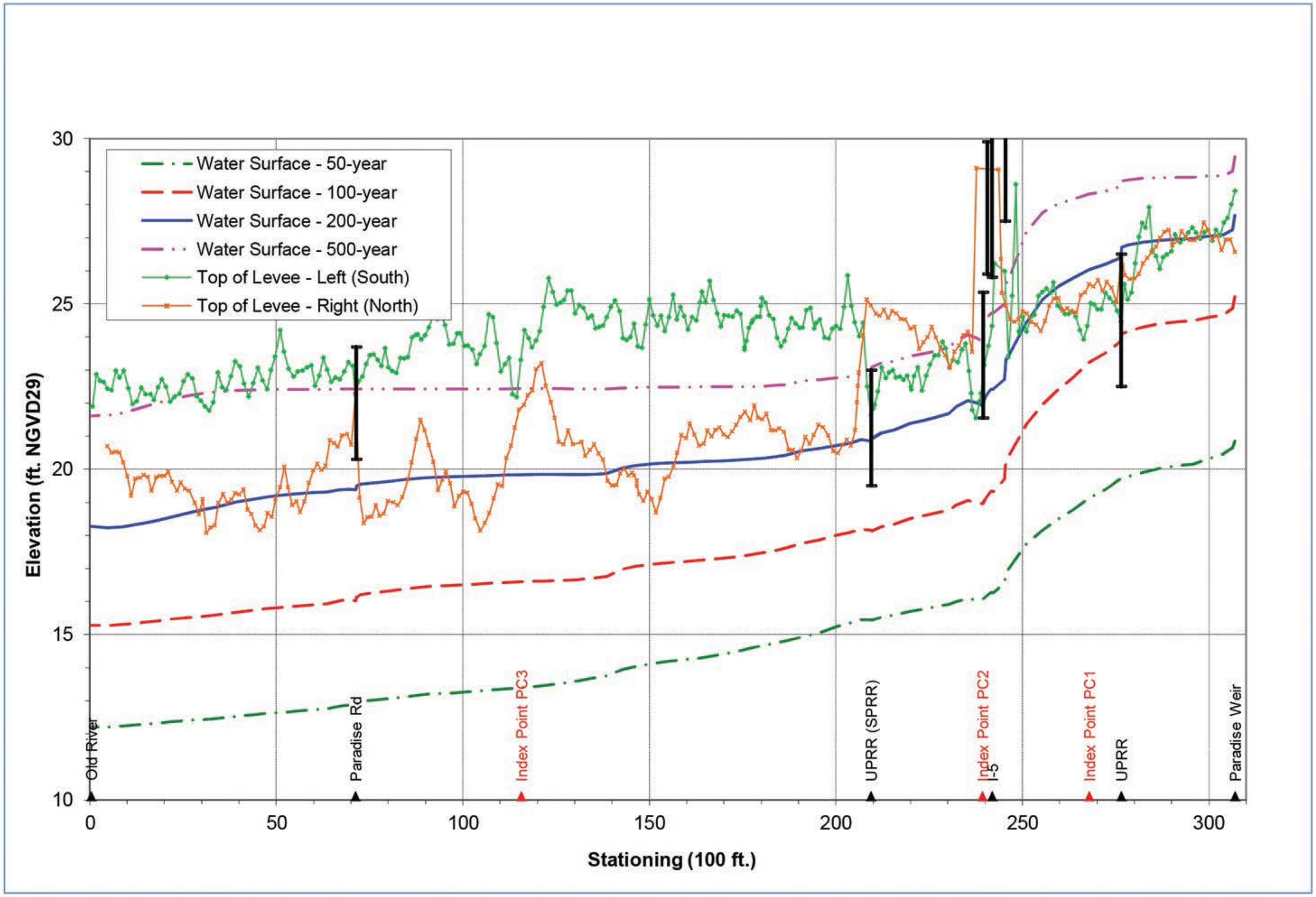


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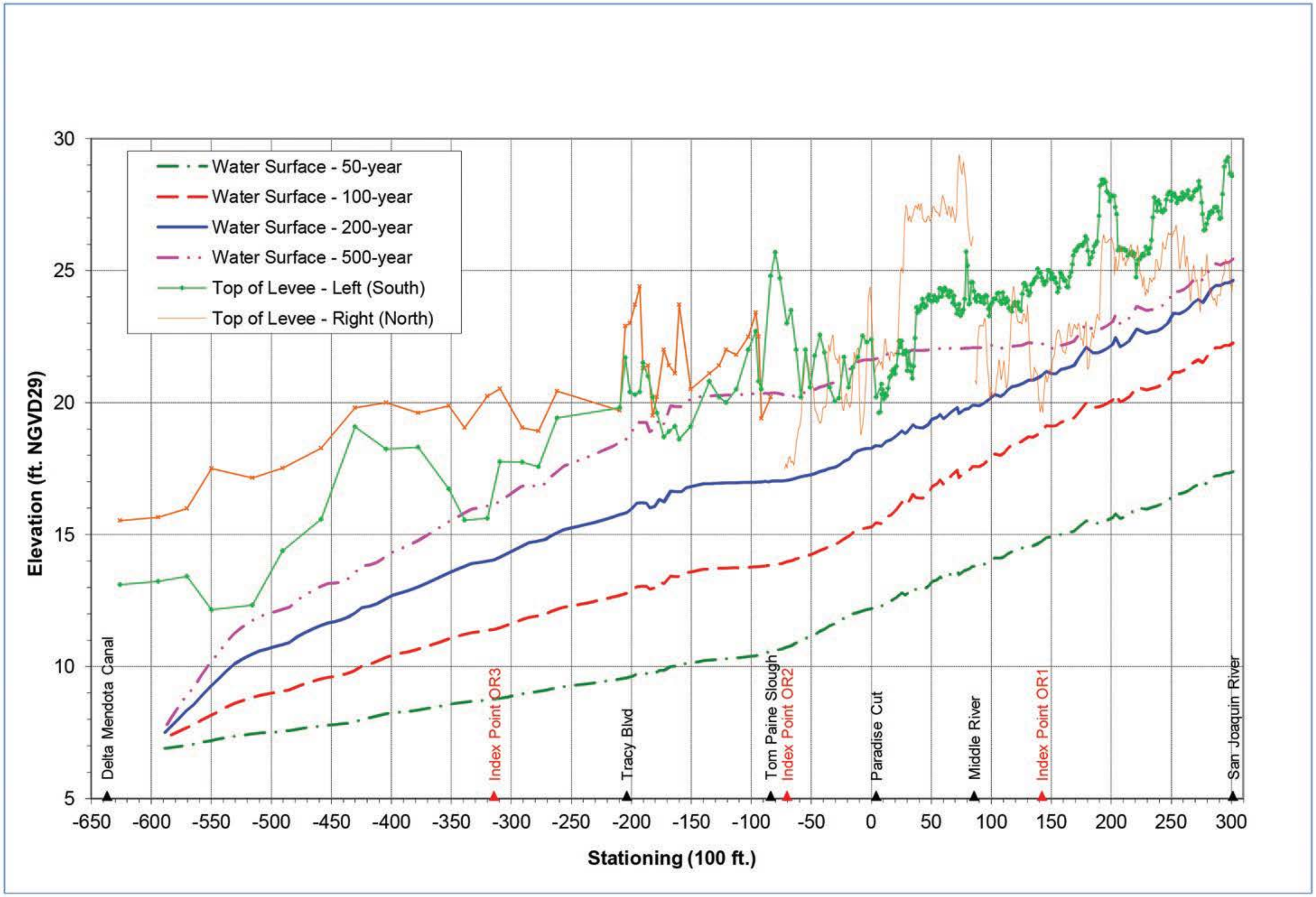
Figure 6-5
Maximum Water Surface Elevation Profiles – Paradise Cut
Levees Overtop Without Failure, Existing Condition



MBK Engineers 8/10/10
RivIslands R&U determinsitic impact results 2010-06.xlsx

Figure 6-6
Maximum Water Surface Elevation Profiles – Old River Levees Overtop Without Failure, Existing Condition

A new cross levee would be completed parallel to the western UPRR tracks. The southeastern toe of the cross levee would be outside the UPRR ROW (approximately 50 feet from the toe of the railroad berm) to allow UPRR to patrol the berm by vehicle and to avoid removing existing riparian brush rabbit habitat in the UPRR ROW. The levee height would equal the 0.5% (200-year) flood elevation plus 3 feet of freeboard (with a top elevation of about 30 feet) and would meet all applicable agency standards. All modified levees, new levees, and extended levees in the proposed action area would continue to be maintained by RD 2062 and RD 2107.

Earlier Phase Flood Risk Management Changes

The entire River Islands at Lathrop site was in the 100-year floodplain prior to levee strengthening associated with the initial phases of project development. Stewart Tract was surrounded by levees that provided a 2% (50-year) level of performance but did not meet 1% (100-year) urban standards as defined by FEMA. As required by various regulations and entitlement conditions, areas developed as part of River Islands at Lathrop must be taken out of the 100-year floodplain designation before occupancy of units is allowed. Current performance standards thus require a minimum 1% (100-year) level of performance. The overall plan to provide flood risk reduction for the RID Area is still the same as described in the SEIR. However, a revised phasing program for flood risk reduction was proposed in the Addendum to the SEIR (City of Lathrop 2005), the Second Addendum to the SEIR (City of Lathrop 2007), and the Third Addendum to the SEIR (City of Lathrop 2012). The SEIR described most flood risk reduction measures (levee modifications, setback levees, extended levees, Paradise Cut modifications) during Phase 1, while the revised phasing includes sufficient flood risk reduction activities during earlier phases of the project (completed) to remove developed areas from the 1% (100-year) floodplain, but delays additional levee modifications along Old River and Paradise Cut until the proposed action.

In 2005, new levees constructed under earlier phases of the project—along the San Joaquin River, internally across Stewart Tract, and along the UPRR berm (cross levee)—removed approximately 900 acres from the 1% (100-year) floodplain. Placement of fill in the southeastern section of the RID Area created approximately 415 acres of “high ground” above the 1% (100-year) floodplain. Excavation of the initial portions of the internal lake system provided a majority of the fill necessary to build these levees. These new levees are accredited by FEMA as providing the urban levee level of service for a 1% (100-year) storm, and are strong enough to reduce flood risk for a 0.5% (200-year) flood event plus 3 feet of additional levee freeboard (as simulated by MBK). Along the San Joaquin River, the new extended levees[2] were constructed adjacent to the existing federal project levees protecting Stewart Tract, requiring approval through an encroachment permit with the CVFPB in accordance with Title 23 CCR and subject to Corps technical review under Section 208.10 of 33 CFR 208.10.

By removing the entire RID Area from the 100-year floodplain, the flood storage capacity provided by the RID Area would be reduced if one of the remaining Stewart Tract levees were to breach during a large storm. Downstream peak elevations would be increased compared to the conditions under which the Stewart Tract levees would fail. Because floodwater that previously moved from southeast to northwest across Stewart Tract during a levee breach (e.g., January 1997) would be

[2] Extended levees are, in effect, levees that are several hundred feet wide. The crown of the extended levee is approximately 300 feet wide. From the landside of the levee crown, the extended levee descends gradually over a distance of roughly 1,000 feet or more. Because the extended levees are so wide, homes, roads, utilities, and other structures may be placed on/in portions of the corridor without affecting flood-risk reduction design standards.

stopped by the proposed cross levee, remaining Stewart Tract would be inundated to slightly higher levels and for longer periods than under current conditions. The total volume of floodwater in the RID Area of Stewart Tract in the 1997 flood is estimated to have been approximately 22,270 af, based on the inundation elevation of 15 feet at which floodwaters left the RID Area and entered lower Paradise Cut. During the January 1997 flood event, RD 2062 intentionally breached the Paradise Cut levee in the northwestern corner of Stewart Tract to allow floodwaters to drain into Paradise Cut at a lower elevation than if the waters had been allowed to reach the top of the levee. If the levee had not been breached, floodwaters would have had to overtop the levee to reach Paradise Cut or Old River at an elevation ranging from 21.6 to 23.9 feet (MBK Engineers 2014).

Alterations to San Joaquin River Levees

RD 17 is responsible for maintaining the levee on the east bank of the San Joaquin River that serves Lathrop and Mossdale Landing Village. This levee was raised and strengthened in the 1980s, resulting in the removal of most of RD 17 from the 100-year floodplain.

6.2 Environmental Consequences

6.2.1 Methods for Analysis of Effects

The proposed action area would be fully developed under each of the alternatives, including the No Action Alternative. Although all development-, construction-, and operations and maintenance-related effects would be similar for each of the alternatives, these potential effects are fully described here (based largely on the analysis conducted for the City's SEIR and addenda). The effects of development and operations on the perimeter water bodies (San Joaquin River, Old River, and Paradise Cut) were evaluated using the pre-project (i.e., agricultural uses) baseline as described in the SEIR. Required mitigation measures for identified effects were described in the SEIR. Mitigation measures that were approved through the CEQA process are so identified in this EIS.

The proposed action area would meet the 0.5% (200-year) urban levee design standard for each of the alternatives, including the No Action Alternative. Because all proposed alternatives would strengthen Stewart Tract levees to provide the RID Area with 0.5% (200-year) or 125,000 cfs level of performance, the flood risk reduction benefits to the RID Area are identical for each alternative.

The flood risk reduction and hydraulic effects were evaluated using the Corps's river and floodplain model HEC-RAS, applied to the lower San Joaquin River and calibrated by MBK Engineers (MBK Engineers 2006a) based on Corps (i.e., Comprehensive Study) estimated flood flows and detailed river cross-section geometry data. The potential hydraulic effects on downstream flood risk were initially described (i.e., simulated), and appropriate measures (PCIP) incorporated into the proposed action, as described in the SEIR (City of Lathrop 2002). Although these flood risk reduction effects were approved and/or permitted based on the SEIR, they are also fully described in this EIS to facilitate and coordinate the Section 408 review process and the CWA Section 404 and RHA Section 10 permitting process.

The primary effect evaluated through the Section 408 review process is the effects on levee performance associated with construction and alteration of levees as part of the proposed action and alternatives. Alteration of levees surrounding Stewart Tract could influence the hydraulic characteristics of downstream flood flows. Similarly, the removal of the RID Area as a potential floodwater reservoir during large flood events could increase the elevation of downstream flood flows. This potential effect prompted the development of two flood risk reduction measures.

- Increased floodwater diversion into Paradise Cut.
- Inclusion of a designed breach location in the new setback levee in the PCIP Area (to allow drainage of floodwater from remaining Stewart Tract back to Paradise Cut during flood recession).

6.2.2 Definition of Significant Effects

There are two types of adverse effects related to water resources and hydrology.

The first type involves changes in water quality. Water quality degradation generally constitutes an significant effect; this is particularly true if reduced water quality would jeopardize beneficial uses or violate existing water quality standards or waste discharge requirements.

The second is alteration of the natural hydrologic system, with two key categories of adverse effects.

- Substantial modification of existing drainage patterns that is likely to result in accelerated erosion or siltation, substantial increases in peak runoff, or increased flooding potential.
- Substantial reduction in groundwater recharge or depletion of groundwater supply (i.e., overdraft).

A significant hydraulic effect is identified in a two-step process.

- The HEC-RAS model is used to determine the hydraulic effects of a project's features (e.g., levee height, levee improvements) on peak water elevations in the surrounding and downstream channels for a specified storm event magnitude.
- The importance of a simulated hydraulic effect (increased elevation) on flood risk is determined on the basis of existing levee heights and freeboard. For example, because FEMA and Corps criteria specify a 3-foot freeboard for urban levees, the simulated hydraulic effect is not significant if the change in peak elevation is small (less than 0.3 foot or 10% of the design freeboard) and the levee freeboard is not reduced to less than 3 feet. For project levees protecting agricultural lands, only changes in the risk of levee failure for 2% (50-year) storms are evaluated because such levees are not designed to withstand larger storm events.

6.2.3 Effects and Mitigation Approaches

6.2.3.1 Alternative 1—Proposed Action

Project action elements and operational activities associated with this alternative that could have adverse or beneficial effects on hydrology and water quality are listed below.

- Alteration of existing federal project levees along the San Joaquin River, Old River, and Paradise Cut and construction of the cross levee parallel to the UPRR berm.
- Breaching of the existing Paradise Cut levee; removal of existing flow constriction at Paradise Weir.
- Development of roads and utilities to support construction of approximately 6,716 residential units, commercial areas, and associated schools.

- Fill placement for bridge footings and construction of bridges across river channels.
- Completion of internal lake system, constructed wetlands, retention areas, and storm drainage system.
- Construction of Lathrop Landing back bay, Paradise Cut Canal, and boat docks along the San Joaquin River and Old River.
- Breaching of the existing San Joaquin River levee to fill Lathrop Landing back bay.
- Contouring and planting of levee remnants along Paradise Cut to create shallow-water shelves and riparian brush rabbit habitat.
- Periodic maintenance dredging of Paradise Cut Canal and Lathrop Landing back bay.
- Construction and operation of boat docks.

Water Quality

Changes in Delta flow as a result of modified diversions and drainage (less than significant)

Under existing (agricultural) conditions, an average of approximately 13,700 af of water is diverted from the Delta to the RID Area for irrigation, with about 90% of diversions occurring during April–September. The average annual agricultural drainage from the RID Area to Paradise Cut is approximately 8,700 af, with approximately 80% of the drainage occurring during April–September (City of Lathrop 2002). Consequently, under existing (agricultural) conditions, water use on Stewart Tract causes an average annual net reduction in Delta flow of approximately 5,000 af. Paradise Cut, in turn, diverts water to Old River and Grant Line Canal.

Under the proposed action, there would be no diversions for agriculture, although there would still be diversions from San Joaquin River and Old River to the internal lake system to maintain the water surface elevation during the summer. During non-flood conditions, increased flow through the Delta is generally considered to be beneficial because it may enhance supply to water users or improve estuarine habitat conditions. For example, increased Delta outflow, particularly during periods of low flow, helps to prevent saltwater intrusion from the ocean. The proposed action has the potential to slightly increase flows into the Delta during non-flood conditions. Therefore, diversions would be lower than for existing agricultural uses, and the Delta inflow from the San Joaquin River would increase slightly. This would be a beneficial effect. In addition, Delta flow may also change if the extended levee along Old River were set farther back to reduce flow constriction and widen the channel reach between Paradise Cut and Middle River. Design of this reach has not yet been finalized.

Under existing agricultural conditions, rainfall runoff from Stewart Tract is relatively low because water is allowed to remain on the land to leach salt and percolate through the soil. Under the proposed action, drainage resulting from rainfall runoff would be greater than under existing conditions because of the increase in impervious surfaces. However, this runoff would occur during wet periods, when Delta flows would already be relatively high. Moreover, the internal lake system would provide some storage capacity to retain peak runoff and allow for some infiltration to groundwater and settling of particulates. Postproject peak biweekly rainfall runoff pumped from the internal lake system was estimated to be up to 3,800 af depending on lake regulating procedures, an average of approximately 140 cfs (City of Lathrop 2002). This discharge is relatively small compared to the flow in Old River. These direct and indirect effects on Delta flows would be less than significant.

Changes in Delta water quality associated with runoff (less than significant)

In general, drainage from agricultural and urban land has poor water quality as a result of contamination by inputs such as pesticides, herbicides, and fertilizer. The average annual agricultural drainage from the RID Area to Paradise Cut is approximately 8,700 af, with approximately 80% of the drainage occurring during April–September (City of Lathrop 2002).

A mass loading analysis for several water quality constituents indicated that contaminant loading is expected to decrease as a result of the proposed action (City of Lathrop 2002). A few water quality constituents, however, occur in greater concentrations in urban settings and are expected to have increased loading in Paradise Cut. These include nitrate, total copper, dissolved lead, total lead, total nickel, and total zinc. However, none of these constituents would be expected to be present in concentrations exceeding water quality standards (City of Lathrop 2002). Moreover, because the largest postproject discharges would generally occur during storm events, flows in the Delta and Paradise Cut would be elevated, resulting in relatively high dilution of the urban discharges. Consequently, changes in Delta water quality are expected to result in less-than-significant direct and indirect effects.

Decrease in water quality resulting from construction activities (less than significant)

General construction activities in the RID Area would be extensive, entailing construction of buildings, roadways, utilities, and internal water retention and conveyance structures. Project actions would require construction-related earth-disturbing activities that could potentially cause erosion and sedimentation of adjacent water bodies. Construction activities would involve the use of equipment (e.g., heavy machinery, cranes, compactors) that uses petroleum products (e.g., fuels, lubricants, hydraulic fluids, coolants). During construction activities, surface water pumped and discharged from the RID Area could be of poorer quality than the existing agricultural return flow due to sediment or contaminants entering the drainage system. Furthermore, any dewatering of the construction area (e.g., trenches may fill with water) could result in the release of contaminants to surface or groundwater.

The environmental commitment to use BMPs in accordance with the NPDES General Construction Permit (see *Environmental Commitments* described in Chapter 2) would reduce the likelihood that construction-related water quality effects would occur or would reduce any effect that does occur. In addition, because there is no direct runoff from the site, all runoff would be stored prior to discharge from Stewart Tract. With adherence to the BMPs, direct and indirect effects on water quality resulting from construction within the RID Area would be less than significant.

Decrease in water quality resulting from construction adjacent to Delta waterways (significant)

As part of the proposed project, there would be two types of construction adjacent to Delta waterways that would have the potential to reduce water quality in the Delta: earth movement work (construction and breaching of levees) and facility construction (bridges, docks, and utility crossings).

Earthwork has the potential to release sediment and spilled contaminants into adjacent waterways. Construction of levees, increasing the width and depth of Paradise Cut, and construction of the Lathrop Landing back bay and the Paradise Cut Canal would occur inland of existing levees, greatly reducing the potential for contamination of Delta waterways. However, several earth-moving activities (lowering the bench near Paradise Weir, construction of the designed breach location near I-5, and breaching levees) could cause temporary increases in turbidity of Delta waterways. Several facilities would be constructed adjacent to existing waterways, requiring some in-water construction activities. These include bridge construction and construction of docks along the perimeter waterways.

The operation of heavy equipment, cranes, dredges, and other construction equipment in or near water bodies can result in accidental spills and leakage of fuel, lubricants, hydraulic fluids, and coolants. Asphalt, wet concrete, and other construction materials used during construction may fall directly into water bodies or enter aquatic habitats in surface water runoff. Other sources of contaminants include discharges from vehicle and concrete washout facilities.

An accidental spill or inadvertent discharge of these materials adjacent to or in a water body could affect water quality in the San Joaquin River, Old River, or Paradise Cut. Such discharge would constitute a significant direct effect. No indirect effects were identified.

Environmental commitments (*Measures to Protect Water Quality*) as set forth in Chapter 2 have been incorporated into the proposed action to avoid and minimize potential effects associated with potential accidental discharges of construction materials. Any increases in turbidity and other contaminants that may occur during construction and maintenance would be temporary and would be diluted quickly because of river currents and tidal flushing.

The potential water quality effects associated with construction adjacent to or in the Delta waterways would be minimized by the environmental commitment to prepare a SWPPP and implement BMPs required by the NPDES General Permit. In addition, Mitigation Measures HYD-1 through HYD-3 would be implemented to further minimize construction-related effects associated with earth movement near Delta waterways.

Mitigation Measure HYD-1. Prepare and implement a SWPPP and an environmental monitoring and mitigation compliance and reporting plan

General construction activities in the RID Area could impair existing water bodies. In addition to the SWPPP (which will include an erosion control and construction plan) that must be prepared in accordance with the NPDES permit, River Islands will prepare and implement an environmental monitoring and mitigation compliance and reporting plan. Development and implementation of both plans will be coordinated with the City; plan specifics are described in further detail below.

Prior to any construction activities, River Islands will prepare and implement a SWPPP that meets the requirements of the General Construction Permit and includes specific BMPs to avoid and minimize effects on water quality during construction activities. The goals of the SWPPP will generally be to protect water quality; establish procedures to minimize accelerated soil erosion; minimize accelerated sedimentation into the internal drainage system, the San Joaquin River, Old River, and Paradise Cut; minimize non-stormwater runoff; and ensure long-term reestablishment of preconstruction site conditions where practical. The SWPPP will include measures to prevent, control, and minimize effects from a spill of hazardous, toxic, or petroleum substances during construction of the proposed action, as well as a description of potentially hazardous and nonhazardous materials that could be accidentally spilled, potential spill sources, potential spill causes, proper storage and transport methods, spill containment and recovery measures, agency notification, and responsible parties. All water quality, erosion, and sediment control measures included in the SWPPP will be implemented in accordance with the guidelines set forth in the SWPPP. The SWPPP will also identify responsibilities of all parties, contingency measures, agency contacts, and training requirements and documentation for those personnel responsible for installation, inspection, maintenance, and repair of BMPs, as well as those responsible for overseeing, revising, and amending the SWPPP.

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

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

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

Mitigation Measure HYD-2. Implement best management practices to avoid contamination of waterways

To avoid contamination, River Islands will comply with Mitigation Measure HYD-1 and implement the BMPs listed below.

- Ensure proper storage and handling of hazardous materials, chemicals, fuels, and oils during construction. No storage of such materials will be permitted within 150 feet of any drainage, wetland, water supply well, spring, or other water feature.
- No fueling of mobile construction equipment will be performed within 150 feet of any drainage, wetland, water supply well, spring, or other water feature. Stationary equipment (e.g., directional drilling rigs) may be refueled at the site of operation using proper BMPs and containment measures.
- Make efforts to store only enough product necessary to complete the job.
- Store onsite hazardous materials within double containment per Resource Conservation and Recovery Act (RCRA) requirements in a neat, orderly manner in their appropriate

containers and, if possible, under a roof or other enclosure to provide secondary containment.

- Keep products in their original containers with the original manufacturer's label.
- Do not mix substances unless recommended by the manufacturer.
- Do not dispose of containers with residual hazardous materials without proper sealing.
- Follow manufacturer's recommendations for proper use and disposal of a product. All pertinent information can be found on the Material Safety Data Sheets (MSDSs) for each product. The MSDSs should be kept with each product container.
- If surplus product must be disposed of, the manufacturer-recommended or the local and recommended methods for proper disposal will be followed. Dispose of all hazardous and non-hazardous products (e.g., fuels and petroleum products, fertilizers, chemicals, sanitary wastes) in a proper manner offsite—not within the RID Area.
- Onsite vehicles will be monitored for fluid leaks and will receive regular maintenance to reduce the chance of leakage. Drip pans will be used for construction equipment.
- Bulk storage tanks having a capacity of more than 55 gallons will have secondary containment (a prefabricated temporary containment mat, a temporary earthen berm, or other measure can provide containment). After any rainfall, the contractor will inspect the contents of any secondary containment area. If there is no visible sheen on collected water, it can be pumped onto the ground in a manner that does not cause scouring. If sheen is present, it must be cleaned up prior to discharge of the water.

Mitigation Measure HYD-3. Implement measures to reduce turbidity resulting from earth moving in or adjacent to water bodies

Levee breaching and earth moving adjacent to the San Joaquin River, Old River, and Paradise Cut could increase short-term turbidity and release small quantities of construction-related contaminants in the local disturbance area. To reduce turbidity effects, River Islands at Lathrop will, to the extent possible, conform to the requirements listed below.

- Perform breaching operations, all other in-river work, and work immediately adjacent to the rivers during low tide and during low flows.
- Work in Paradise Cut only when floodwaters from the San Joaquin River are not present in the cut and there is no immediate threat of floodwaters overtopping Paradise Weir.
- Perform all interior dredging, grading, and construction of in-water facilities (e.g., dock installation) in the Lathrop Landing back bay and the Paradise Cut Canal before breaching levees to the adjacent water body. Soils that will be inundated after breaching will be stabilized to the extent possible to minimize erosion and sediment backwash as these constructed water bodies initially fill.
- Adhere to all local, state, and federal regulations regarding turbidity reduction measures applicable to this activity, including developing and implementing a SWPPP.

Decrease in water quality resulting from periodic dredging (significant)

Periodic dredging is planned for maintenance of the Lathrop Landing back bay and the Paradise Cut Canal. Dredging may directly produce temporary water quality effects by stirring up contaminated bottom sediments and releasing them into the water column. This could cause increased turbidity and increased levels of contaminants such as pesticides and metals. Dredging may also indirectly affect water quality if contaminated dredged material is placed in a location where contaminants may percolate with rainwater into the soil and reach groundwater. Any of these occurrences could constitute a significant direct or indirect effect.

Several steps would be taken to reduce direct and indirect effects on water quality associated with dredging. These include dredging during low flows and use of suction dredging to minimize release of sediment. In addition, dredging would require a permit under RHA Section 10; if decant water were to be returned to the waterway, a CWA Section 404 permit (and Section 401 certification issued by the State Water Board) would also be required. Mitigation Measure HYD-4, described below, would address these direct and indirect effects.

Mitigation Measure HYD-4. Implement measures to reduce effects from periodic dredging

To reduce turbidity effects, River Islands will, to the extent possible, conform to the requirements listed below.

- Perform dredging during low flows.
- Use suction dredging to minimize sediment releases.
- Adhere to all local, state, and federal regulations regarding turbidity reduction measures and dredged material disposal applicable to this activity, including developing and implementing a SWPPP.

Effects on groundwater quality (less than significant)

The existing shallow groundwater elevation in the proposed action area is controlled by the river elevations and the agricultural drainage ditches. The proposed action would entail raised land elevations for construction and continued drainage pumping from the internal lake system. Construction activities associated with the proposed action could temporarily affect shallow groundwater and infiltration from the internal lake system, and creation of the Paradise Cut Canal could slightly change groundwater quality. Each of these elements represents a potential source of groundwater quality degradation.

The RID Area is surrounded by levees that have been reconstructed or are proposed to be reconstructed and reinforced. The approximately 300-acre internal lake system would collect and store all onsite drainage. Consequently, the proposed action area would not produce any runoff to adjacent properties that could cause drainage effects on such properties.

Under the proposed action, the overall storm drainage system would be designed to minimize the volume of stormwater released into the surrounding rivers and maximize the quality of all storm drainage water that must be discharged. The storm drainage system described below would also provide sufficient onsite flood detention to retain the l% (100-year) storm event onsite without affecting the levees or developed properties.

To maximize percolation into the ground, the internal lake system would not be lined. The lake bottom would be set roughly 12–20 feet below the ground surface surrounding the lake-canal complex. The lake bottom would be below the existing groundwater elevation. Groundwater in the RID Area fluctuates on both a seasonal and an annual basis. Data collected onsite during 1999 and 2000 showed the groundwater elevation varying between +3.5 and +1.6 feet NGVD 29 (HSI

Hydrologic Systems 2002). The desired lake level would range from +2.0 to +6.0 feet NGVD 29. To maintain these levels, water would be pumped out of the lake into Paradise Cut following winter storms. During summer, water needed to maintain the lake level would be diverted from the San Joaquin River and Old River using existing riparian water rights. New intake structures with fish screens would be constructed, replacing the current unscreened agricultural intakes.

There are no private domestic wells in the Phase 1 development area. Private wells in the proposed action area would be abandoned prior to development. There are no municipal water supply wells on Stewart Tract. Therefore, potential contamination of potable groundwater used for private or municipal wells would not occur.

The proposed action would include measures to prevent contaminants from reaching the groundwater. These include implementation of BMPs to reduce potential contamination during construction and treatment of urban runoff contaminants in the wetlands prior to entering the internal lake system. Consequently, the direct and indirect effects on groundwater quality would be less than significant.

Decreased water quality as a result of increased boat traffic (significant)

The construction and operation of boat docks for the proposed action could result in hundreds of additional boats in the Delta. Recreational boating can have deleterious water quality effects in several ways. Depending on the size of the wake and the composition of the riverbank, boat wakes can cause erosion, indirect increasing turbidity and sedimentation. Direct water quality degradation can result from fuel spills, exhaust, and waste discharges. Mitigation Measure HYD-5 would address these significant direct and indirect effects.

Mitigation Measure HYD-5. Minimize effects of increased boat traffic

- Designate no-wake zones in the Lathrop Landing back bay, Paradise Cut Canal, dock areas, and all perimeter waterways (San Joaquin River, Old River, and Paradise Cut) and post signs indicating a 5 mph speed limit.
- Provide educational material at public docks and to River Islands at Lathrop residents to help boaters reduce water quality effects.
- Post information on pertinent local, state, and federal laws regarding procedures and equipment for fueling watercraft at all dock areas on the perimeter waterways (Old River, San Joaquin River, and Paradise Cut).
- Post applicable laws and waste discharge requirements to indicate proper procedures for refueling and waste disposal.
- Provide trash cans and bathrooms at external group docks.

Flood Risk Reduction and Hydraulics

High winter flows can stress levees and berms. Longer flood durations can contribute to levee seepage and potentially cause structural levee failure. Floodwater surface elevations can exceed levee heights and cause overtopping and partially controlled flooding of the areas behind the levee. Overtopped levees may maintain structural integrity; in such cases, they are not considered failed levees. However, the erosive forces that occur during overtopping may eventually cause structural failure and uncontrolled flooding in the served areas behind the levee. Flood risk reduction improvements can therefore lead to hydraulic effects at other locations.

MBK Engineers (2002, 2006a, 2006b, 2006c, 2014) has developed water surface profiles for use in this analysis. Their reports describe and present the results of a hydraulic analysis that was conducted to determine 2% (50-year), 1% (100-year), 0.5% (200-year), and 0.2% (500-year) water surface elevations in the surrounding waterways. Modeling results for the 0.2% (500-year) estimated storm (165,000 cfs at Vernalis) are highly speculative and were not used for evaluation of effects in this EIS. Because the San Joaquin River peak flow at Vernalis is diverted into Paradise Cut at the upstream tip of Stewart Tract and into Old River about 5 miles farther downstream, the peak elevation profiles in these three channels was described and evaluated.

Flows exceeding the 2% (50-year) design flood of the San Joaquin levees are likely to overtop some levees and allow some river flow to flood the adjacent floodplain. The more water that is diverted from the river channel to the floodplain storage areas, the lower the peak flow and elevations are likely to be downstream. Accordingly, to ensure a conservative assessment of the potential effects of levee modifications associated with River Islands at Lathrop—in other words, an assumption of the greatest downstream peak river flow and peak river elevations—the modeling of hydraulic effects assumed that the existing upstream levees would overtop when the river elevation reached the top of the levees, but that they would not fail. A more realistic hydraulic simulation would allow the levees to breach when the water elevation reached the top of levee, as they did during the January 1997 flood.

Effects on federal project levees—Section 408 evaluation (less than significant)

The proposed action would not indirectly change the performance of the existing federal project agricultural levees, because the levees are high enough to provide more than 3 feet of levee freeboard during the 50-year peak flow of 47,400cfs. MBK simulated the existing levee performance for the 2% (50-year) project design flow, estimated as 47,400 cfs at Vernalis (MBK Engineers 2014). There were no simulated levee failures, and the river profile elevations were several feet below the simulated and measured January 1997 river profile elevations. The simulated peak elevations were also lower than the 1955 design profile; consequently, the existing levees had at least 3 feet of freeboard. Some of the existing levees were higher than the design elevation and most had about 5 feet of freeboard. For example, the simulated elevation at Vernalis was 32.4 feet, about 3.5 feet below the 1997 peak elevation, and about 2 feet below the assumed design water elevation.

Figure 6-7 shows the simulated 2% (50-year) peak river elevations and levee crown elevations for the San Joaquin River under the simulated proposed action in comparison with existing levee conditions. The simulated elevation downstream of Paradise Weir was about 22 feet, almost 5 feet below the 1997 peak elevation. The simulated elevation at Old River was about 18.4 feet, and the simulated elevation at Brandt Bridge was 13.7 feet. There were no noticeable changes under the proposed action. The simulated diversion into Paradise Cut was increased slightly from 11,650 cfs to about 12,160 cfs. This small change in San Joaquin River flow downstream of Paradise Weir did not change the peak river elevations because the minimum freeboard was simulated on the right (east) bank levee just downstream of Paradise Weir. There were no simulated effects on the federal project levees caused by the strengthening of the Stewart Tract levees associated with the proposed action.

Figure 6-8 shows the simulated 2% (50-year) peak river profile elevations and levee crown elevations in Paradise Cut for the simulated proposed action in comparison with the existing levee conditions. The simulated Paradise Cut peak elevation just downstream of the Paradise Weir was

21.3 feet and the elevation at I-5 was 16.8 feet. The simulated elevation at Paradise Road was 13.5 feet and the elevation at Old River was 12.8 feet. The proposed action includes the Paradise Cut modifications, and the peak elevation just below the Paradise Weir was reduced slightly (0.2 foot). The setback levees along Stewart Tract were simulated to lower the peak elevations by a small amount (less than 1.0 foot) between I-5 and Paradise road. This does not change the flood risk reduction of the existing Stewart Tract levees because the existing levees provide more than 5 feet of freeboard for the 2% (50-year) flood. There were no simulated effects on the federal project levees caused by the proposed action strengthening of the Stewart Tract levees.

Figure 6-9 shows the simulated 2% (50-year) peak river profile elevation in Old River for the simulated proposed action in comparison with the existing levee conditions. The simulated peak elevation at the head of Old River was 17.5 feet, the simulated elevation at Middle River was 13.5 feet, and the simulated elevation at Tracy Boulevard Bridge was 9.5 feet. There were no noticeable changes under the proposed action. The simulated diversion into Old River was reduced slightly—from 19,940 cfs to about 19,570 cfs. This small change in Old River flow did not change the peak river elevations. The minimum freeboard of about 5 feet was simulated on the right (north) bank levee just upstream of Middle River (Upper Roberts Island). There were no simulated effects on the federal project levees caused by the strengthening of the Stewart Tract levees associated with the proposed action. In addition, the extended levee along Old River may be set farther back to reduce flow constriction, widen the channel reach between Paradise Cut and Middle River, and create additional floodplains. Design of this reach is in progress and has not yet been finalized, but preliminary analysis indicates approximately 16 acres of planting benches/floodplains could be created along this reach if this levee were set farther back from the existing levee.

Most of the levee elevations were higher than the required 3 feet of freeboard, although there were some low spots that could be raised to provide more uniform 2% (50-year) level of performance. Because there was no simulated overtopping of these existing levees, no reduction of the required 3 feet of freeboard, and almost no changes (i.e., water surface elevation decreased less than 2 feet in Paradise Cut between I-5 and Paradise Road) in the simulated river profile elevations along the San Joaquin River or along Old River under the proposed action, there are no simulated hydraulic effects on the existing levee performance and no increase in flood risk caused by the proposed action. The proposed modifications in Paradise Cut (setback levees and removal of bench material between the Paradise Weir and the eastern UPRR bridge) would slightly lower the profile elevation between I-5 and Paradise Road (i.e., water surface elevation decreased by about 1 foot in Paradise Cut between I-5 and Paradise Road). However, this does not reduce the flood risk of any project levees because the simulated profile is much lower than the assumed design profile, so the existing levees have more freeboard than required. Therefore, the proposed modifications in Paradise Cut to provide 0.5% (200-year) urban levee level of performance and wildlife habitat enhancement would not improve the hydraulic performance of the existing levees.

Several levee failures during the 1997 flood were documented in the calibration report (MBK Engineers 2006b) and should be considered in the Corps's Section 408 evaluation of the effects of the proposed action on federal project levee performance. Because the 1997 (1% [100-year]) flood was 50% greater than the project levees' design flow (2% [50-year]), the project levees were expected to fail and flood adjacent agricultural lands. But all FEMA-accredited 1% (100-year) urban levees would be expected not to overtop or fail during the 1997 flood event. The January 1997 failure of Stewart Tract levees occurred on the upstream levee adjacent to Paradise Weir, not along the RID Area (urban) levees along the San Joaquin River downstream of the UPRR berm at Mossdale, Old River, or Paradise Cut downstream of the UPRR berm. The failure of project levees during the

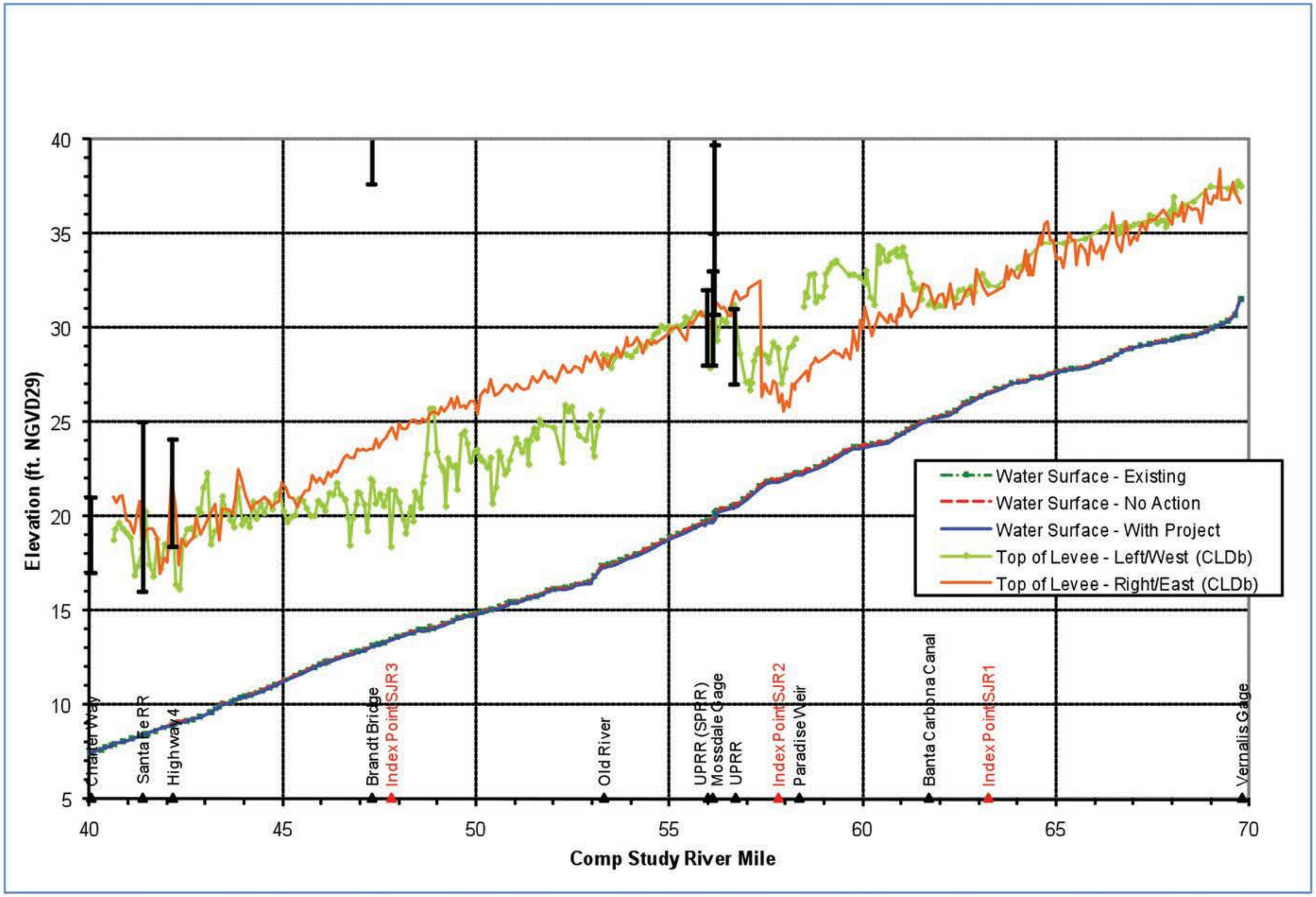


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Figure 6-7
Maximum Water Surface Elevation Profiles - San Joaquin River
Levees Overtop Without Failure, 2% (50-year) Flood Event

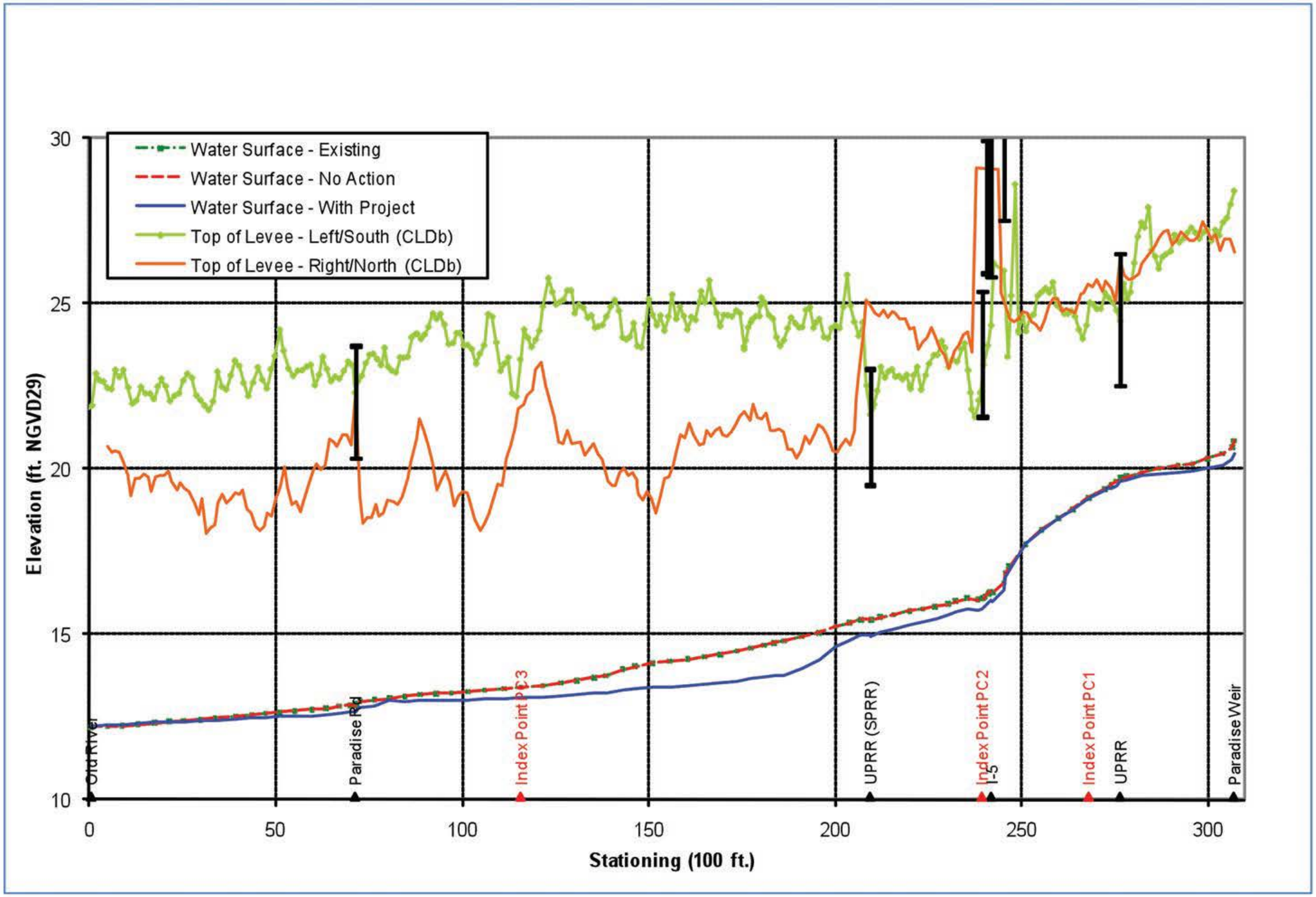

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Figure 6-8
Maximum Water Surface Elevation Profiles – Paradise Cut
Levees Overtop Without Failure, 2% (50-year) Flood Event

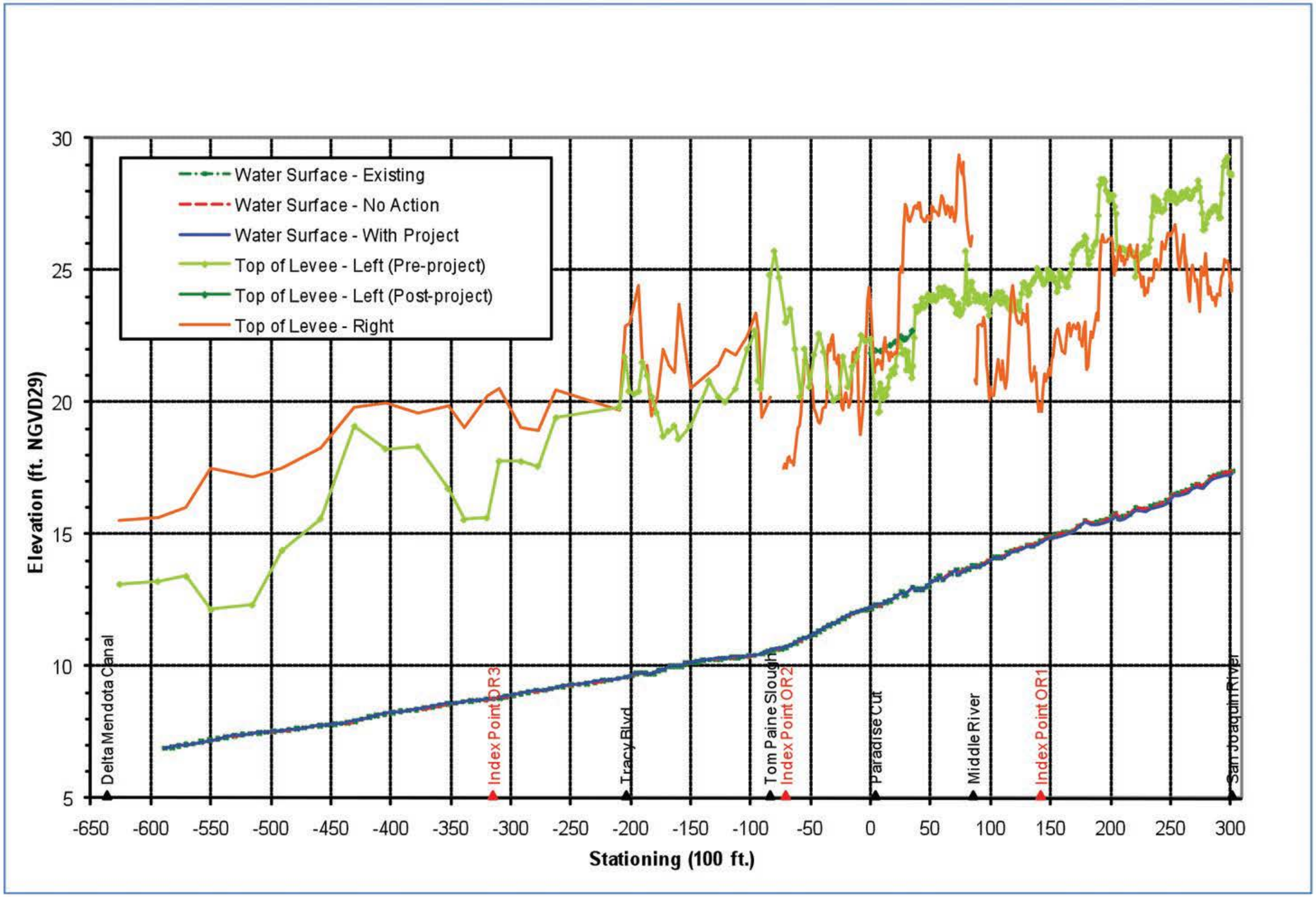

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Figure 6-9
Maximum Water Surface Elevation Profiles – Old River Levees Overtop Without Failure, 2% (50-year) Flood Event

January 1997 (1% [100-year]) flood does not indicate that the federal project levees are deficient. The indirect effects on federal project levees would be less than significant. No direct effects were identified.

Increased river elevations causing reduced level of performance of surrounding and downstream urban levees (less than significant)

Providing a 0.5% (200-year) level of performance to the RID Area could result in increased peak elevations in the surrounding or downstream channels during severe flood events, indirectly compromising flood risk reduction. However, these increases in San Joaquin River and Old River would not increase the flood risk for any urban levees. Increases of 1–2 feet in Paradise Cut, resulting from the modifications to increase the flood flow diversions into Paradise Cut, would not change the 2% (50-year) or the 1% (100-year) level of performance provided by the agricultural project levees.

Under previous conditions, levee failures along Stewart Tract during high flood events would result in flooding of about 80% of the tract, allowing the tract in effect to function as off-stream storage. Consequently, when Stewart Tract levees have failed, peak flood elevations downstream of Stewart Tract were slightly lower than they would have been if Stewart Tract had not flooded. Under the proposed action, the RID Area would be removed from floodplain for storms exceeding the 2% (50-year) event, because the altered urban levees would provide 0.5% (200-year) level of performance. The Stewart Tract levee modifications would therefore reduce the off-stream flood storage capacity of Stewart Tract and potentially raise peak elevations in the surrounding and downstream channels.

Because of the presence of the cross levee along the UPRR berm under the proposed action, floodwaters during a levee failure along the remaining Stewart Tract would be prevented from flowing from the remaining Stewart Tract into the RID Area, as has occurred in the past. The proposed action would increase the peak flood elevation by approximately 0.7 foot between I-5 and the western UPRR in RD 2107 during a 1% (100-year) flood with a levee failure. At the end of the simulation study period, 10 days after the initial inundation of remaining Stewart Tract, the flood stage in that area would be 1.2 feet higher under the proposed action than under existing conditions, indicating that the project has the potential to increase the depth and duration of flooding (MBK Engineers 2002). The frequency of flooding in remaining Stewart Tract, which is dependent on peak San Joaquin River elevations and subsequent levee failures, would not change.

To ensure that the proposed action would not result in an increase of the existing 1% (100-year) elevation and flood duration in remaining Stewart Tract, a designed breach location would be constructed as an offsite feature along the northern Paradise Cut levee between I-5 and the western UPRR tracks. A slurry wall would be constructed on an approximately 100-foot segment of the levee. The top of the slurry wall would be 9 feet below the top of the levee. If the remaining portion of Stewart Tract floods, the 9 feet of levee soil freeboard above the slurry wall could be removed, allowing water to drain from RD 2107 into Paradise Cut without compromising the overall levee integrity. The designed breach location would be built to Corps standards and would provide a level of performance equal to that of the existing adjacent levee segments. This proposed feature may provide a flood drainage benefit to remaining Stewart Tract following a major flood event (greater than 2% [50-year]) with a levee failure, but it does not provide a flood risk management benefit for remaining Stewart Tract or any other area served by the existing federal project agricultural levees (designed for 2% [50-year] level of performance).

MBK (2014) simulated the hydraulic effects of the proposed action for major peak storms representing the 2% (50-year), 1% (100-year), 0.5% (200-year), and 0.2% (500-year) events. As described above, flows higher than the 2% (50-year) design flow would cause some levee sections to overtop and could cause some levees to breach, as they did during the January 1997 flood. However, the simulated peak elevations assumed that levees would overtop without failure, so the simulated downstream peak elevations are higher than would likely be observed (because some upstream levees would likely fail). Results from the 0.5% (200-year) event simulation is the focus of this evaluation because they represent the urban levee design storm. Table 6-5 gives the simulated peak (200-year) elevations at several index locations for the proposed action and no action conditions compared to existing levee conditions.

Table 6-5. Simulated 0.5% (200-year) Peak Water Surface Elevation Effects of River Islands Levee Alterations (feet NAVD 88[a])

		Maximum Water Elevation			Change		
Index Point	Location	Existing	No Action	Proposed Action	Existing to No Action	Existing to Proposed Action	No Action to Proposed Action
SJR1	Above Banta-Carbona Canal	34.42	34.42	34.39	0	-0.03	-0.03
SJR2	Below Paradise Weir	30.25	30.25	30.23	0	-0.02	-0.02
SJR3	Brandt Bridge	19.38	19.38	19.39	0	+0.01	+0.01
PC1	Below UPRR (east)	27.73	27.70	28.03	-0.03	+0.30	+0.33
PC2	Below I-5 Bridges	23.92	24.23	25.47	+0.31	+1.55	+1.24
PC3	Above Paradise Road	20.95	22.80	22.23	+1.85	+1.28	-0.57
OR1	Above Middle River	21.62	21.62	21.64	0	+0.02	+0.02
OR2	Tom Paine Slough	18.93	19.17	19.37	+0.24	+0.44	+0.20
OR3	Below Tracy Boulevard	15.99	16.20	16.37	+0.21	+0.38	+0.17
SA E	RD 2095	25.46	25.6	24.8	+0.14	-0.66	-0.8
SA G	RD 2058	21.09	21.12	21.48	+0.03	+0.39	+0.36
SA K	RD 2107	27.05	24.83	28.52	-2.22	+1.47	+3.69

Source: MBK Engineers 2014 (July).
Note: This analysis assumes levee overtopping results in failure.
[a] North American Vertical Datum 1988.

Figure 6-10 shows the simulated San Joaquin River profile elevations for the 0.5% (200-year) storm. There were no simulated changes in the river profile elevations for the proposed action upstream of Paradise Weir, because the flow and the river-levee geometry did not change. The 0.5% (200-year) peak elevations are higher than the existing levees in this reach, but these levees are only designed for the 2% (50-year) flood event. Because the Stewart Tract levee did not overtop under the proposed action, the San Joaquin River flow was slightly increased (a profile elevation 0.06 foot higher) downstream of Old River. These differences are not considered significant because the right (east) levee across the river from Stewart Tract between the UPRR and Old River provides the required 3 feet of freeboard for urban levee protection. Because of the 2-foot elevation drop below the Old River diversion, the freeboard is even greater.

Figure 6-11 shows the simulated Paradise Cut profile elevations for the 0.5% (200-year) storm. There were some simulated increases in the Paradise Cut profile elevations between the eastern

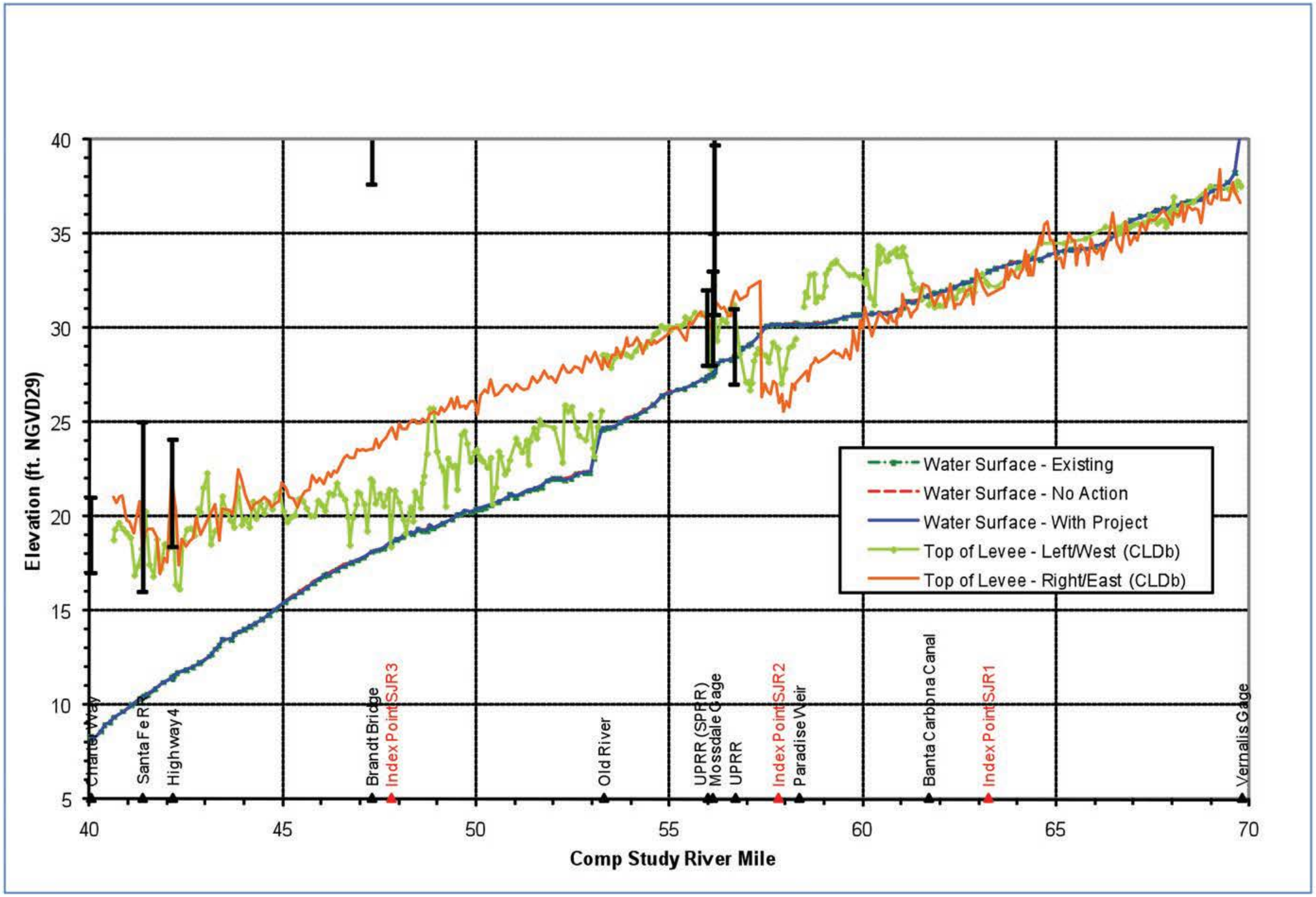

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Figure 6-10
Maximum Water Surface Elevation Profiles – San Joaquin River Levees Overtop Without Failure, 0.5% (200-year) Flood Event

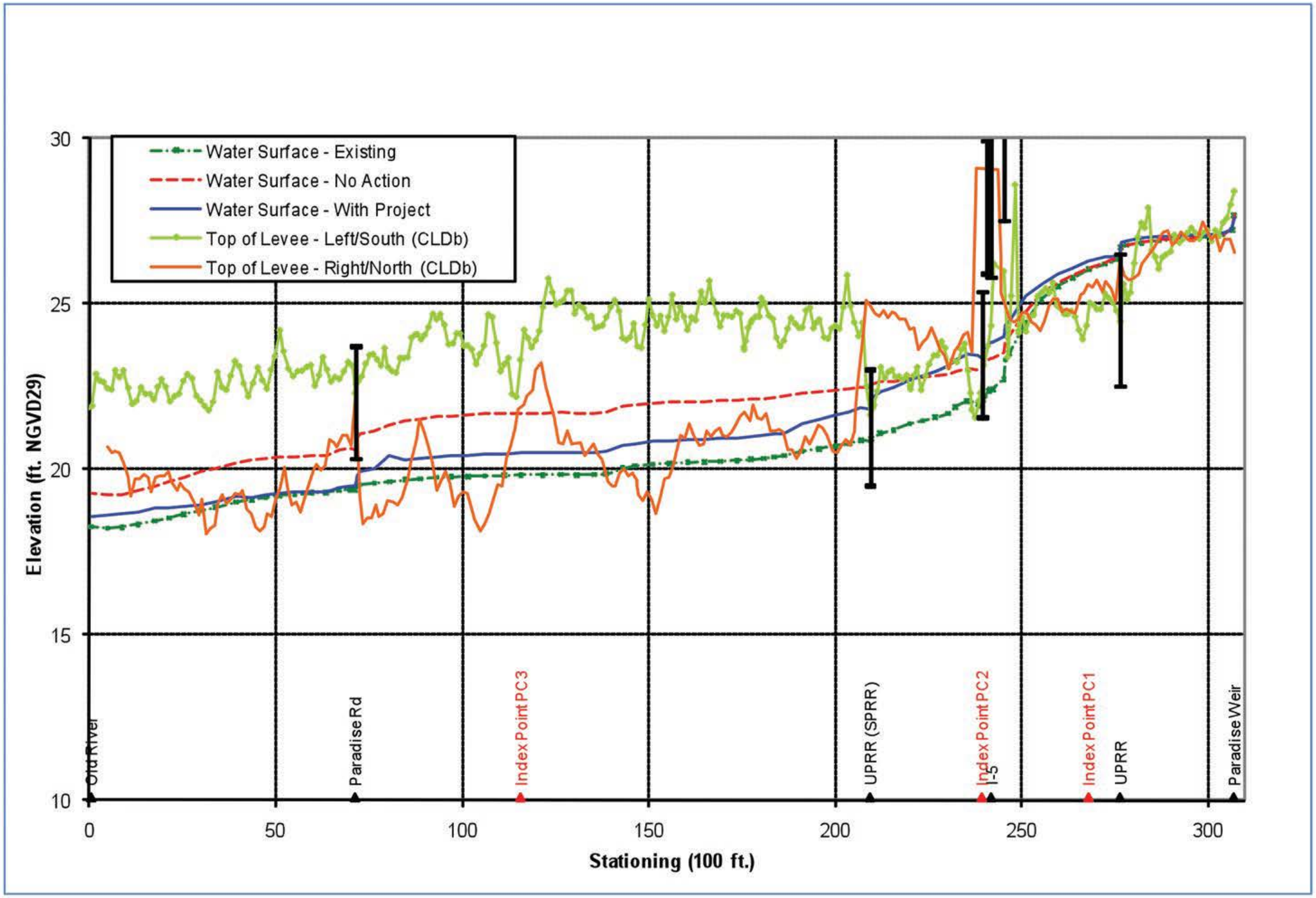

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Figure 6-11
Maximum Water Surface Elevation Profiles – Paradise Cut
Levees Overtop Without Failure, 0.5% (200-year) Flood Event

UPRR and the I-5 bridges under the proposed action because slightly more water was diverted into Paradise Cut. The simulated elevations under the proposed action were about 1.5 feet higher than under existing conditions because the Stewart Tract levees did not overtop under the proposed action. The simulated elevations under the No Action Alternative were 2 feet higher than under existing conditions between I-5 and Paradise Road and about 1 foot higher downstream of Paradise Road, because water that flooded remaining Stewart Tract would overtop the Stewart Tract levees along Paradise Cut and flow into Paradise Cut. The simulated Paradise Cut diversions were similar for the three cases, with 29,000 cfs under existing and no action conditions, and about 30,000 cfs under the proposed action. But the simulated peak flow at the downstream end of Paradise Cut was increased from about 44,000 cfs for existing conditions to 48,000 cfs under the proposed action, because water that flooded remaining Stewart Tract from the San Joaquin River would drain back into Paradise Cut. The peak flow at the downstream end of Paradise Cut was increased to about 55,000 cfs under the No Action Alternative, because water that flooded remaining Stewart Tract would drain more rapidly into Paradise Cut. However, the left (south) bank levee along Paradise Cut between I-5 and the western UPRR line has several low spots that would have overtopped during the 0.5% (200-year) flood under existing levee conditions. Although the increased Paradise Cut elevation would cause a greater flooded depth in this floodplain area (Tom Paine Slough), this would not be considered an increase in flooding risk. This south levee of Paradise Cut does not serve any urban area, and was not designed to withstand a 0.5% (200-year) storm.

Figure 6-12 shows the simulated Old River profile elevations for the 0.5% (200-year) storm. There were small (0.2 feet) simulated increases in the Old River profile elevations under the proposed action because of the increased elevations in Paradise Cut influencing the elevations along Old River. The higher peak flows from Paradise Cut raised the Old River elevations by about 1 foot under the No Action Alternative. However, the Old River levees (across from Stewart Tract on Upper Roberts and Union Islands) are not high enough to prevent overtopping during the 0.5% (200-year) storm. Although increased Old River elevations were simulated, they would not increase the flooding risk substantially along the Old River levees. Therefore, these simulated increases in river elevations, caused primarily by the RID Area no longer flooding, would constitute a less-than-significant indirect effect on flood risk reduction.

6.2.3.2 Alternative 2—No Modification of Paradise Cut

Changes in Delta flow as a result of modified diversions and drainage (less than significant)

The effects on Delta flow under Alternative 2 would be the same, or nearly the same, as those under the proposed action. The direct and indirect effects would be less than significant.

Changes in Delta water quality associated with runoff (less than significant)

The effects on Delta water quality under Alternative 2 would be similar to those under the proposed action. The direct and indirect effects would be less than significant.

Decrease in water quality resulting from construction activities (less than significant)

The effects on water quality associated with construction activities would be the same under Alternative 2 as under the proposed action. The direct and indirect effects would be less than significant.

Decrease in water quality resulting from construction adjacent to Delta waterways (significant)

The effects on water quality associated with construction adjacent to Delta waterways would be similar under Alternative 2 to those under the proposed action, but to a lesser degree because of the omission of activities in Paradise Cut. Such activities could result in significant direct effects on water quality. Mitigation Measures HYD-1, HYD-2, and HYD-3 would address this effect.

Decrease in water quality resulting from periodic dredging (significant)

Because this alternative would not require dredging of the Paradise Cut Canal, the significant effects associated with periodic dredging in the Paradise Cut Canal would not occur. However, periodic dredging would still be required for the Lathrop Landing back bay. As under the proposed action, this could result in significant direct and indirect effects. Mitigation Measure HYD-4 would address these effects.

Effects on groundwater quality (less than significant)

Effects on groundwater quality under Alternative 2 would the same as under the proposed action. The direct and indirect effects would be less than significant.

Decreased water quality as a result of increased boat traffic (significant)

The effects of increased boat traffic would be less under Alternative 2 than under the proposed action because Alternative 2 would eliminate 200 berths and boating activity in Paradise Cut Canal. Nevertheless, the increased boating activity associated with the Lathrop Landing back bay and boat docks along the San Joaquin and Old Rivers would still result in significant direct and indirect effects. Mitigation Measure HYD-5 would address these effects.

Effects on federal project levees—Section 408 evaluation (less than significant)

The effects on federal project levees would be the same under Alternative 2 as under the proposed action. The indirect effects would be less than significant. No direct effects were identified.

Increased river elevations causing reduced level of performance of surrounding and downstream urban levees (less than significant)

Under Alternative 2, the changes in Paradise Cut diversion flow would not occur, but the changes caused by Stewart Tract levees being raised to provide 0.5% (200-year) level of performance would cause slightly greater simulated increases in the 0.5% (200-year) profile elevations in Paradise Cut and Old River. However, because upstream levees (i.e., those not serving the RID Area) would likely fail during the 0.5% (200-year) flood, this indirect effect would be less than significant. No direct effects were identified.

6.2.3.3 Alternative 3—Avoidance of Central Drainage Ditch

Changes in Delta flow as a result of modified diversions and drainage (less than significant)

The effects on Delta flow under Alternative 3 would be the same as those under the proposed action. The direct and indirect effects would be less than significant.

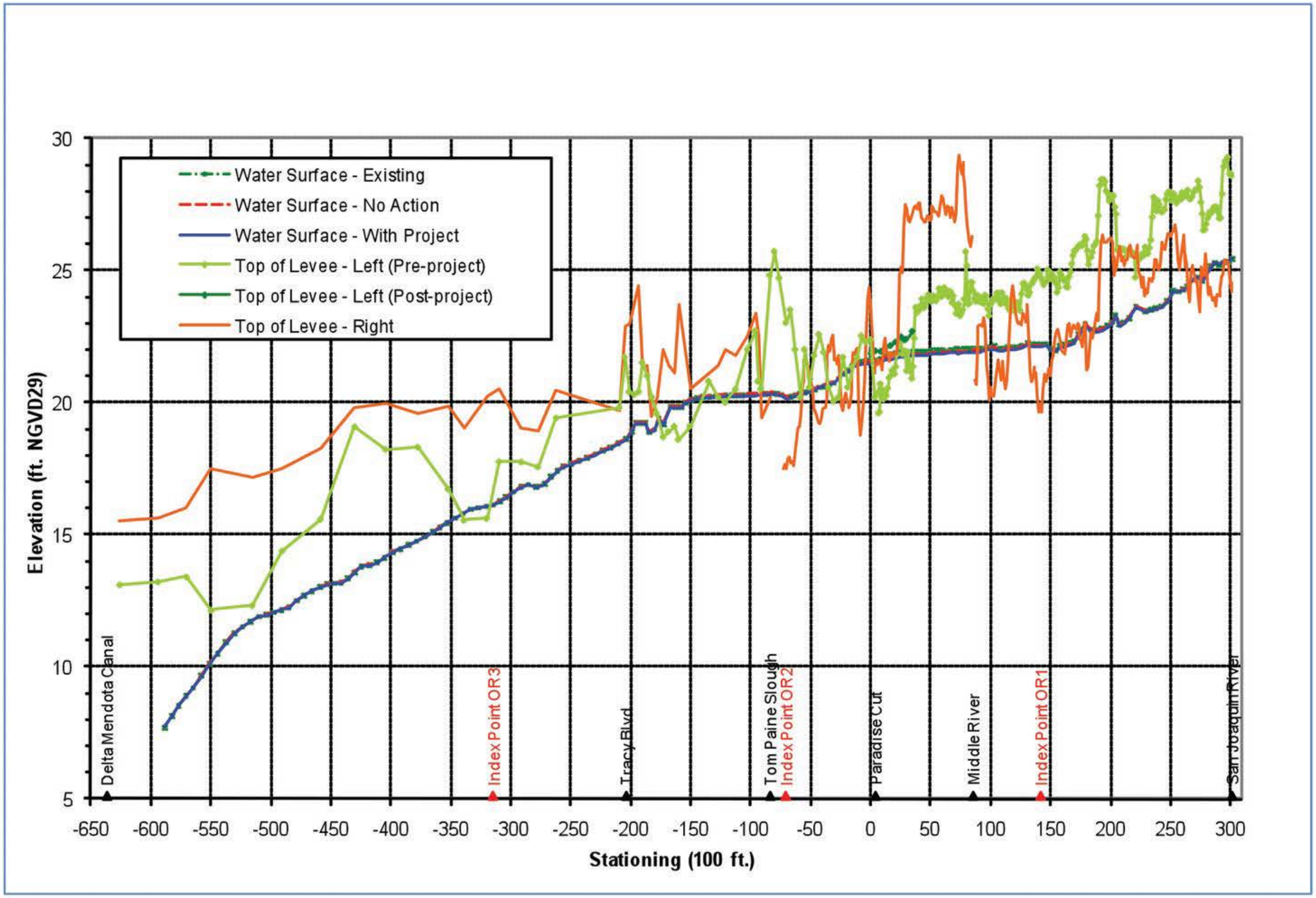

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Figure 6-12
Maximum Water Surface Elevation Profiles – Old River
Levees Overtop Without Failure, 0.5% (200-year) Flood Event

Changes in Delta water quality associated with runoff (less than significant)

The effects on Delta water quality under Alternative 3 would be similar to those under the proposed action. Consequently, the direct and indirect effects would be less than significant.

Decrease in water quality resulting from construction activities (less than significant)

The effects on water quality associated with construction activities would be the same under Alternative 3 as under the proposed action. The direct and indirect effects would be less than significant.

Decrease in water quality resulting from construction adjacent to Delta waterways (significant)

The effects on water quality associated with construction adjacent to Delta waterways would be the same under Alternative 3 as under the proposed action. Such activities could result in significant direct and indirect effects on water quality. Mitigation Measures HYD-1, HYD-2, and HYD-3 would address this effect.

Decrease in water quality resulting from periodic dredging (significant)

The effects of periodic dredging would be the same as those under the proposed action, potentially resulting in significant direct and indirect effects. Mitigation Measure HYD-4 would address these effects.

Effects on groundwater quality (less than significant)

Effects on groundwater quality under Alternative 3 would the same as under the proposed action. The direct and indirect effects would be less than significant.

Decreased water quality as a result of increased boat traffic (significant)

The effects of increased boat traffic would be the same as under the proposed action. Mitigation Measure HYD-5 would address these significant direct and indirect effects.

Effects on federal project levees—Section 408 evaluation (less than significant)

The less-than-significant indirect effects on federal project levees would be the same under Alternative 2 as under the proposed action. There would be no direct effects.

Increased river elevations causing reduced level of performance of surrounding and downstream urban levees (less than significant)

Under Alternative 2, the changes in Paradise Cut diversion flow would not occur, but the changes caused by Stewart Tract levees being raised to provide 0.5% (200-year) level of performance would cause slightly greater simulated increases in the 0.5% (200-year) profile elevations in Paradise Cut and Old River. However, because upstream levees (i.e., those not serving the RID Area) would likely fail during the 0.5% (200-year) flood, this would be a less-than-significant effect.

6.2.3.4 Alternative 4—Proposed Action with Expanded Flood Risk Reduction

Changes in Delta flow as a result of modified diversions and drainage (less than significant)

The effects on Delta flow under Alternative 4 would be the same as those under the proposed action. The direct and indirect effects would be less than significant.

Changes in Delta water quality associated with runoff (less than significant)

The effects on Delta water quality under Alternative 4 would be similar to those under the proposed action. The direct and indirect effects would be less than significant.

Decrease in water quality resulting from construction activities (less than significant)

The effects on water quality associated with construction activities would be the same under Alternative 4 as under the proposed action. The direct and indirect effects would be less than significant.

Decrease in water quality resulting from construction adjacent to Delta waterways (significant)

Alternative 4 includes additional levee setbacks and dredging within Paradise Cut and would consequently increase the potential for construction-related sediment and turbidity effects in Paradise Cut. However, most of this additional construction would occur during periods when there is no runoff from the construction locations into Paradise Cut channels. Nevertheless, such activities could result in significant direct effects on water quality. No indirect effects were identified. Mitigation Measures HYD-1, HYD-2, and HYD-3 would address these direct effects.

Decrease in water quality resulting from periodic dredging (significant)

The effects of periodic dredging would be the same as those under the proposed action, potentially resulting in significant direct and indirect effects. Mitigation Measure HYD-4 would address these effects.

Effects on groundwater quality (less than significant)

Effects on groundwater quality under Alternative 4 would the same as under the proposed action. The direct and indirect effects would be less than significant.

Decreased water quality as a result of increased boat traffic (significant)

The effects of increased boat traffic would be the same as under the proposed action. Mitigation Measure HYD-5 would address these significant direct and indirect effects.

Effects on federal project levees—Section 408 evaluation (less than significant)

The effects on federal project levees would be the same under Alternative 4 as under the proposed action. The direct and indirect effects would be less than significant.

Increased river elevations causing reduced level of performance of surrounding and downstream urban levees (less than significant)

The hydraulic and flood risk reduction effects under Alternative 4 would likely be less than those described for the proposed action (less than significant). The diversion flows through Paradise Cut would be greater. However, dredging and additional setback levees in Paradise Cut would increase conveyance capacity and likely reduce the peak elevations along Paradise Cut and in Old River downstream of its confluence with Paradise Cut. Moreover, an enhanced Paradise Weir would reduce water elevations in the San Joaquin River downstream of Paradise Cut during flood events, although it is not possible to model this scenario absent design of the flood risk reduction features.

6.2.3.5 Alternative 5—No Action

Changes in Delta flow as a result of modified diversions and drainage (less than significant)

The effects on Delta flow under Alternative 5 would be the same as those under the proposed action. The direct and indirect effects would be less than significant.

Changes in Delta water quality associated with runoff (less than significant)

The effects on Delta water quality under Alternative 5 would be similar to those under the proposed action. The direct and indirect effects would be less than significant.

Decrease in water quality resulting from construction activities (less than significant)

The effects on water quality associated with construction activities would be the same under Alternative 5 as under the proposed action. The direct and indirect effects would be less than significant.

Decrease in water quality resulting from construction adjacent to Delta waterways (less than significant)

Because there would be no construction disturbance of any of the perimeter levees, the direct effects of sediment and turbidity in the San Joaquin River, Old River, and Paradise Cut would be less than significant. Effects associated with bridge construction would not be a result of the proposed action, because these bridges would be constructed under authority of the City of Lathrop.

Decrease in water quality resulting from periodic dredging (no effect)

Because this alternative would require no periodic dredging of the Paradise Cut Canal or the Lathrop Landing back bay and the boat docks would not be constructed, there would be no effects associated with these activities.

Effects on groundwater quality (less than significant)

Effects on groundwater quality under Alternative 5 would be the same as under the proposed action. The direct and indirect effects would be less than significant.

Decreased water quality as a result of increased boat traffic (significant)

Because no marinas or boat docks would be constructed under this alternative, there would be no direct effects associated with increased boat traffic. However, significant indirect effects could result because of an increased population base, although it is not possible to quantify the extent to which this new population would make use of water-based recreational activities.

Effects on federal project levees—Section 408 evaluation (no effect)

There would be no effects on federal project levees.

Increased river elevations causing reduced level of performance of surrounding and downstream urban levees (less than significant)

The hydraulic and flood risk reduction effects under Alternative 5 would be similar to those under Alternative 2 because the Stewart Tract levees would be strengthened (precluding flooding of the RID Area), but none of the Paradise Cut improvements would occur. The changes in Paradise Cut diversion flow would not occur, but the changes caused by new setback levees in the RID Area increasing the level of performance to the 0.5% (200-year) level would cause simulated increases in the 0.5% (200-year) profile elevations in Paradise Cut and Old River (Figures 6-11 and 6-12). This would be a less-than-significant indirect effect. No direct effects were identified.

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Chapter 7
Cultural Resources

This chapter analyzes the proposed action's potential effects related to cultural resources. *Cultural resources* include prehistoric and historic archaeological sites; historic buildings and structures; historic districts with multiple buildings or structures; districts of archaeological sites; cultural landscapes; traditional cultural properties; and resources of interest to Native American groups. Related discussions are found in Chapter 8, *Paleontological Resources,* and Chapter 21, *Cumulative Effects*.

The key sources of information listed below were used in the preparation of this chapter.

- A detailed records search of the proposed action area.
- Previous cultural resources studies completed by Far Western Anthropological Research Group (Wohlgemuth and Mears 1994) and EDAW (Gross 2002, 2004).
- Field inventory of previously recorded archaeological sites, historic period structures, and areas of archaeological sensitivity conducted for the proposed action.
- Additional archival research conducted for the proposed action.

Specific reference information is provided in the text.

7.1 Affected Environment

7.1.1 Regulatory Framework

7.1.1.1 Federal Regulations

Antiquities Act

The Federal Antiquities Act of 1906 was enacted with the primary goal of protecting cultural resources in the United States. It explicitly prohibits appropriation, excavation, injury, and destruction of "any historic or prehistoric ruin or monument, or any object of antiquity" located on lands owned or controlled by the federal government, without permission of the secretary of the federal department with jurisdiction. It also establishes criminal penalties, including fines and/or imprisonment, for these acts. Accordingly, the Antiquities Act represents the foundation of modern regulatory protection for cultural resources.

National Environmental Policy Act

NEPA requires that federal agencies assess whether federal actions would result in significant effects on the human environment. CEQ's NEPA regulations further stipulate that identification of significant effects should incorporate "the degree to which the action may adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register for Historic Places (NRHP) or may cause loss or destruction of significant scientific, cultural, or historic resources" (40 CFR 1508.27[b][8]).

Section 106 of the National Historic Preservation Act

In addition to meeting NEPA requirements, the proposed action is required to comply with Section 106 of the National Historic Preservation Act of 1966, as amended, and with its implementing regulations, 36 CFR 800. Section 106 requires that federal agencies take into account the effects of their actions on properties that may be eligible for listing in, or are already listed in, the NRHP. An eligible property is called a *historic property,* a term that applies to any building, site, structure, object, or district that may have historical, prehistorical, architectural, archaeological, cultural, or scientific importance, and meets one or more significance criteria (discussed below). To determine if an undertaking could affect properties eligible for NRHP listing, cultural sites (including archaeological and architectural properties) must first be inventoried and evaluated for eligibility for listing in the NRHP.

Specific NRHP significance criteria are applied to evaluate cultural resources and are defined in 36 CFR 60.4.

> The quality of significance in American history, architecture, archaeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association, and
>
> (a) that are associated with events that have made a significant contribution to the broad patterns of our history; or
>
> (b) that are associated with the lives of persons significant in our past; or
>
> (c) that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
>
> (d) that have yielded, or may be likely to yield, information important in prehistory or history.

A resource must also possess *integrity* to be considered eligible for listing in the NRHP. *Integrity* refers to a property's ability to convey its historic significance (National Park Service 1991). Integrity is a quality that applies to historic resources in seven specific ways: location, design, setting, materials, workmanship, feeling, and association. Ideally, a resource must possess most if not all of these kinds of integrity, depending on the context and the reasons the property is significant.

Significant impacts can occur when prehistoric or historic archaeological sites, structures, or objects listed in or eligible for listing in the NRHP are subjected to one or more of the following effects: physical destruction of or damage to all or part of the property; alteration of a property; removal of the property from its historic location; change of the character of the property's use or of physical features within the property's setting that contribute to its historic significance; introduction of visual, atmospheric, or audible elements that diminish the integrity of the property's significant historic features; neglect of a property which causes its deterioration; or transfer, lease, or sale of the property.

California Health and Safety Code—Treatment of Human Remains

Under Section 8100 of the California Health and Safety Code, six or more human burials at one location constitute a cemetery. Disturbance of Native American cemeteries is a felony (Health and Safety Code Section 7052).

Section 7050.5 of the Health and Safety Code requires that construction or excavation be stopped in the vicinity of discovered human remains until the County Coroner can determine whether the remains are those of a Native American. If the remains are determined to be Native American, the Coroner must then contact the Native American Heritage Commission (NAHC), which has jurisdiction pursuant to Section 5097 of the California Public Resources Code.

When human remains are discovered or recognized in any location other than a dedicated cemetery, no further excavation or disturbance of the site or any nearby area reasonably suspected to overlie adjacent human remains may take place until the County Coroner has been informed and has determined that no investigation of the cause of death is required; and, if the remains are of Native American origin, either:

- the descendants of the deceased Native American(s) have made a recommendation to the landowner or the person responsible for the excavation work for means of treating or disposing of, with appropriate dignity, the human remains and any associated grave goods as provided in PRC 5097.98; or
- the NAHC was unable to identify a descendant or the descendant failed to make a recommendation within 24 hours after being notified by the commission.

7.1.1.2 Local Plans and Regulations

San Joaquin County General Plan 2010

The stated Heritage Resources Objective is to protect San Joaquin's valuable architectural, historical, archaeological, and cultural resources. Policies supporting this objective include: continuing preservation efforts, identifying and protecting significant historical resources from destruction, reuse of historic buildings, and the promotion of public awareness and historic preservation. Implementation of these policies falls to the County Museum to establish a Heritage Information Program, a Historic Preservation Commission, a Historic Resources Inventory, and a Registration Program for owners of historic properties under renovation. The Planning Department is mandated to include archaeological and historic preservation regulations as a component of the County Development Title (San Joaquin County 1992).

City of Lathrop General Plan (Amended 2004)

In the Resource Management Element, Archaeological and Cultural Resource Policy 1 states that for existing known cultural resources, the City shall follow procedures set forth in CEQA and that development design shall be reviewed by local Native Americans, in order to determine the most desirable method to ensure preservation. Archaeological and Cultural Resource Policy 2 states that the potential loss of as yet unknown archaeological and cultural resources shall be avoided by close monitoring of the development process (City of Lathrop 2004).

2003 West Lathrop Specific Plan

The archaeology section in the WLSP states that currently unknown archaeological and cultural resources of significance at subsurface locations will be avoided or impacts on such resources mitigated through close monitoring of construction activities as required by the appropriate agencies (City of Lathrop 2003).

7.1.2 Existing Conditions

7.1.2.1 Methods Used to Identify Existing Conditions

Efforts to locate cultural resources in the proposed action area consisted of reviewing a records search and cultural resources reports completed for the proposed action area; conducting archival research; contacting the NAHC, Native American representatives, and local historical societies; conducting archaeological and architectural fieldwork; and evaluating cultural resources for eligibility for inclusion in the NRHP.

Area of Potential Effects

Section 106 of the NHPA requires that an Area of Potential Effects (APE) be defined for the proposed action. The APE is defined in 36 CFR § 800.16(d) as the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist. The APE is influenced by the scale and nature of an undertaking and may be different for different kinds of effects caused by the undertaking. In accordance with 36 CFR § 800.4(a)(1), the Corps defined an APE for the proposed action.

The APE for archaeological resources is defined as all areas of ground that would be disturbed by construction or construction staging during the proposed action. This includes the footprint for areas of borrow and fill, temporary construction staging, access roads, subsurface excavation, and grading. The footprint and construction areas for these facilities will be added to the APE as project plans become available.

The APE for architectural resources comprises all parcels containing buildings, structures, and/or linear features that are 45 years old or older and that could be affected by construction activity or by visual changes to their setting. Accordingly, the APE for River Islands at Lathrop was considered to be Stewart Tract in its entirety.

Prefield Investigation

The prefield investigation consisted of a review of existing information (literature) and archival research. The review of existing information included records search materials obtained for earlier studies of the proposed action area. The records searches were conducted at the Central California Information Center (CCIC) of the California Historical Resources Information System (CHRIS) and consisted of an initial extensive records search in December 2001 and supplemental searches in April 2002 and November 2003.

The records searches provided information on all previous cultural resources studies and all recorded sites in and adjacent to the proposed action area. Additionally, the record searches provided information about sites listed in the NRHP, the California Register of Historical Resources (CRHR), the *California Inventory of Historic Resources*, *California Historical Landmarks*, the *California Points of Historical Interest* listing, the Historic Property Data File, the *Caltrans State and Local Bridge Survey*, the *Survey of Surveys*, Government Land Office (GLO) Plats, and other pertinent historic data available at the CCIC. Other sources consulted during the record searches included historic maps and secondary sources related to the history of California.

The record searches indicate that the entire proposed action area has been surveyed for cultural resources. A total of 26 studies have been conducted within and surrounding the proposed action area. Two prehistoric cultural resource sites, CA-SJO-255 and CA-SJO-280, were previously recorded on Stewart Tract, but no previously recorded archaeological sites exist in the APE (Gross 2002, 2004; Wohlgemuth and Mears 1994). A total of 35 historic built environment resources have been previously recorded in the APE.

In an effort to identify important historic people, events, and architectural trends that may have been associated with the proposed action area, an ICF architectural historian conducted archival research at the California Room, California State Library; the Government Publications Section, California State Library; the San Joaquin County Public Library (Tracy Branch); The Haggin Museum; and the San Joaquin County Historical Society. In addition, ICF contacted the San Joaquin County Assessor's Office for pertinent information.

Consultation with Interested Parties

On March 19, 2009, ICF sent a letter to the NAHC asking them to consult their sacred lands file and provide a list of potentially interested Native American representatives. On April 2, 2009, the NAHC responded to the request, stating that no known Native American cultural resources in the proposed action vicinity are listed in their files. The NAHC also provided the name of one Native American, Kathy Perez, who may have information regarding Native American concerns as they relate to the proposed action area. On April 3, 2009, ICF sent Ms. Perez a letter and map describing the proposed action. On November 10, 2009, ICF attempted to reach Ms. Perez by telephone; Ms. Perez was not available at the time and a message regarding the proposed action and contact information was left with a household member who answered the call. Consultation is ongoing but to date no response has been received.

On March 9, 2009, ICF initiated correspondence with local historical societies and museums, including the San Joaquin County Historical Society, The Haggin Museum, and the San Joaquin County Public Library. Outgoing correspondence comprised a letter describing the proposed action and a map depicting the proposed action area. On April 2, 2009, the San Joaquin County Historical Society contacted ICF by telephone to discuss the scope of its collection and particular items that may elicit information regarding the proposed action area's built environment.

Field Methods

Archaeological Resources

Because the entire Stewart Tract was previously surveyed for archaeological resources during earlier phases of the River Islands at Lathrop project, the Corps determined that a complete resurvey of the proposed action area was not necessary. At the request of the Corps, a focused archaeological survey was completed at sites CA-SJO-255 and CA-SJO-280, which are adjacent to the APE, to determine if the site boundaries extended into the APE. Areas in the proposed action area surveyed for archaeological resources included one location reported by local residents to have been a prehistoric occupation site, and areas of elevation higher than 10 feet above mean sea level, as depicted on the 1915 USGS Lathrop, CA, quadrangle (U.S. Geological Survey 1915). These areas were intensively surveyed using transect intervals of 5–15 meters.

No archaeological resources were identified in the APE as a result of the focused archaeological investigation (ICF Jones & Stokes 2009).

Architectural Resources

Over the course of 4 days (March 12 and 16 and April 14 and 21, 2009), ICF architectural historians conducted field surveys of cultural resources within the APE. As part of the field process, buildings, structures and linear features 45 years old or older were inspected, photographed, and documented on DPR 523 forms. The results of the prefield investigation and field survey are described below.

7.1.2.2 Cultural Setting

Prehistoric Context

Little is known of human occupation in the lower Sacramento Valley prior to 4500 B.P. (years before present, standardized at 1950). Because of rapid alluvial and colluvial deposition in the valley over the past 10,000 years, ancient cultural deposits are deeply buried in many areas. The earliest evidence of widespread occupation of the lower Sacramento Valley/Delta region comes from several sites assigned to the Windmiller Pattern (formerly the Early Horizon), dated ca 4500–2500 B.P. (Ragir 1972).

Known Windmiller Pattern sites are concentrated on low rises or knolls within the floodplains of major creeks or rivers. Such locations provided protection from seasonal flooding and proximity to riverine, marsh, and valley grassland biotic communities. Most Windmiller Pattern sites contain cemeteries, in which skeletons are typically extended ventrally, oriented toward the west, and accompanied by abundant grave goods. Subsistence apparently focused on hunting and fishing, as evidenced by large projectile (spear or dart) points, clay net sinkers, bone fishhooks and spears, and abundant faunal remains. Collection and processing of floral resources, such as seeds and nuts, is inferred from mortar and milling slab fragments recovered from a few of the sites. Other characteristic artifacts include charm stones, quartz crystals, bone awls and needles, and abalone and olivella snail shell beads and ornaments (Beardsley 1948; Gerow 1974; Heizer 1949; Heizer and Fenenga 1939; Lillard et al. 1939; Ragir 1972; Schulz 1970).

The succeeding Berkeley Pattern (formerly the Middle Horizon) dates from ca 2500 to 1500 B.P. in the Central Valley. Berkeley Pattern sites are greater in number and more widely distributed than Windmiller sites and are characterized by deep midden deposits, suggesting intensified occupation and a broadened subsistence base. The abundance of milling slabs, mortars, and pestles indicates a dietary emphasis on vegetal resources; however, distinct projectile points and faunal remains attest to the continued importance of hunting. Fishing technology improved and diversified, suggesting greater reliance on aquatic resources. Common artifacts include mortars and milling slabs, quartz crystals, charm stones, projectile points, shell beads and ornaments, and bone tools. New elements include steatite beads, tubes and ear ornaments, slate pendants, and burial of the dead in flexed positions or cremations accompanied by fewer grave goods (Beardsley 1948; Fredrickson 1973; Heizer and Fenenga 1939; Lillard et al. 1939; Moratto 1984).

The late prehistoric period (ca 1500 to 100 B.P., formerly the Late Horizon) is characterized by the Augustine Pattern (Fredrickson 1973). The Augustine Pattern represents the peak cultural development of the prehistoric period in the lower Sacramento Valley and Delta regions and is characterized by intensified hunting, fishing, and gathering subsistence strategies; large, dense populations; highly developed trade networks; elaborate ceremonial and mortuary practices; and social stratification. In addition to cultural elements from the preceding patterns, new elements include shaped mortars and pestles, bone awls for basketry, bone whistles and stone pipes, clay effigies, and the introduction of the bow and arrow as evidenced by small notched and serrated projectile points. Pottery is also found at a few of the sites assigned to this period. Burials were flexed and generally lacked grave goods (Beardsley 1948; Fredrickson 1973; Moratto 1984; Ragir 1972).

Ethnographic Context

The aboriginal inhabitants of the APE vicinity is located are known as the Northern Valley Yokuts. *Yokuts* is a term applied to a large and diverse number of peoples inhabiting the San Joaquin Valley and Sierra Nevada foothills of central California. The Yokuts cultures include three primary divisions, corresponding to general environmental zones: the Southern Valley Yokuts, the Foothill Yokuts, and the Northern Valley Yokuts (Kroeber 1976; Silverstein 1978).

The Northern Valley Yokuts lived in the northern San Joaquin Valley from around Bear Creek north of Stockton to the bend in the San Joaquin River near Mendota (Wallace 1978). The study area was inhabited by a division of the Northern Valley Yokuts known as the *Chulamni*, which in early records include the *Cholbones*, the *Nototemne*, and the *Coybos*. Variants of the names and designation include Jusmites, and Fugites or Tugites (Schenck 1926:Figure 1, 137–138; Wallace 1978:Figure 1, 462 and 466).

It is believed that the Northern Valley Yokuts followed a similar pattern to most indigenous groups in California; however, very little is known of their way of life prior to the mission era. The largest political entity among the Yokuts was the tribelet, which consisted of a large village and a few smaller surrounding villages (Wallace 1978). Wallace (1978) suggests that the "mini-village" was more consistent with the Northern Valley Yokuts, consisting of approximately 300 individuals with smaller communities and hamlets.

The Northern Valley Yokuts were semi-sedentary, occupying the same sites for generations. Seasonal movements to temporary camps would occur to take advantage of food resources in other environmental zones. The Northern Valley Yokuts relied heavily on riverine resources and their abundance of fish and waterfowl. The main staples were probably salmon, aquatic fowl, and wild plant foods such as acorns, seeds, and tule roots (Wallace 1978).

Principal settlements were located on the tops of low mounds, on or near the banks of the larger watercourses. Settlements were composed of single-family dwellings, sweathouses, and ceremonial assembly chambers. Dwellings were small and lightly constructed, semi-subterranean and oval in shape. The public structures were large and earth covered (Wallace 1978).

The Yokuts first came into contact with Europeans when Spanish explorers visited the area in the late 1700s, followed by expeditions to recover Native Americans who had escaped from the missions. The Northern Valley Yokuts were far more affected by missions than were other groups farther east. The loss of individuals to the missions, the influence of runaway neophytes, various epidemics in the 1800s, and the arrival of settlers and miners inflicted major depredations on the Yokuts peoples and their culture (Wallace 1978).

Historic Context

Early History: Exploration and Settlement

The proposed action area is in San Joaquin County, within the Lathrop city limits. San Joaquin County was one of California's original 27 counties, established with statehood in 1850. The County takes its name from the San Joaquin River, which Spanish explorer Gabriel Moraga named for Saint

Joachim in 1813. The City of Stockton, 10 miles north of Lathrop, has been the county seat since its inception (Hoover et al. 1990).

Although Spanish and Mexican explorers generally confined their explorations and settlements to the coastal regions of California, early explorers did venture into the Sacramento and San Joaquin Valleys. Eighteenth-century explorers of the area included Pedro Fages (1772), Juan Bautista de Anza (1776), and Francisco Eliza (1793). Between 1806 and 1817, Father Ramon Abella (1811), Jose Antonio Sanchez (1811), and Father Narciso Duran (1817) led expeditions into the interior valley region (Hoover et al. 1990:285–286, 348–349). Gabriel Moraga was the first early explorer to reach present-day San Joaquin County while on a scouting expedition for mission sites. Moraga explored sections of the Stanislaus River—the southern border of San Joaquin County—on several occasions in 1806, 1808, and 1810 (Hoover et al. 2002).

The first Euroamerican to traverse the area was likely Jedediah Strong Smith, who opened the Sacramento Trail in the late 1820s. Smith reported the quantity and quality of furs available in California to the Hudson's Bay Company, which established the settlement of French Camp, south of present-day Stockton and just north of Lathrop. Trappers occupied French Camp from 1832 to 1845 (Hoover et al. 2002).

Following Mexico's independence from Spain in 1821, the colonization of California progressed with the issuance of rancho lands by Mexican governors, the most notable of which were Governors Alvarado, Micheltorena, and Pico. San Joaquin County was no exception to the large swathes of land granted throughout California. Grantees used their ranchos primarily for cattle grazing. Charles M. Weber held the title to *Rancho El Campo de los Franceses*, which included both Stockton and French Camp. Weber and his business partner, William Gulnac, went on to establish a colony at French camp in 1843. Antonio María Pico held the second land grant, naming the 35,000 acres *Rancho El Pescadero* in 1861. This rancho's acreage included Lathrop and the City of Tracy. Three other peripheral ranchos crossed the county's lines on the north, east, and south (Beck and Haase 1974; Marschner 2000).

Regional Development

Lathrop

Trappers and hunters began populating the area that would become the City of Lathrop in the late 1820s, and by mid-century, William Gulnac and Charles Weber's (of the French Camp colony) land grant included the area known as present-day Lathrop. A decade later, the land holding was partitioned, and local trapper John Morrison acquired a 160-acre portion. The area was known as Wilson Station until 1869. Late nineteenth-century railroad expansion made its mark on the area when Leland Stanford took ownership of Wilson Station and renamed it after his brother-in-law, Charles Lathrop. Along with the Central Pacific Railroad (CPRR) Board of Directors, Stanford set out to establish Lathrop as the gateway to the greater San Joaquin Valley (Lathrop District Chamber of Commerce 1966).

From its earliest development, the City of Lathrop has been identified with agriculture, largely due to the region's flat terrain, fertile soil, and mild climate. Early agriculture in Lathrop included dairy farming; cattle ranching; and grain, alfalfa, fruit, and vegetable row crops. By the 1950s, increased and consistent irrigation water supplied by the SSJID had encouraged more diversified crops that included nuts, onions, carrots, tomatoes, sugar beets, melons, and peach and apricot orchards (Lathrop District Chamber of Commerce 1966).

By 1840, traffic had increased significantly in the growing settlements, necessitating an alternate route of travel. One such route took advantage of the natural waterway—the San Joaquin River. In 1846, the San Francisco–based sloop *Comet* sailed up the San Joaquin River carrying a party of Mormon pioneers who were en route to survey the banks of the Stanislaus River for an agricultural venture. Two men aboard the Comet, John Doak and Jacob Bonsall, spotted an opportunity as the river vessel passed through present-day Mossdale, and returned two years later to establish the first ferry crossing service on the San Joaquin. This ferry service provided for easier travelling along the route from Sacramento to San Jose (Gudde 1998; Lathrop District Chamber of Commerce 1966).

Mossdale

The site of Mossdale is immediately adjacent to the APE and is one of the earliest settlements in San Joaquin County. Mossdale sits at a location on the bank of the San Joaquin River that made for an ideal crossing location (Hillman and Covello 1985).

Early Spanish explorers called the crossing El Pescadero ("fishing spot"), and the name was later applied to the El Rancho del Pescadero in 1843. By 1848, Mormon pioneers took advantage of the crossing en route to the future New Hope settlement at the confluence of the San Joaquin and Stanislaus Rivers. As mentioned above, John Doak and Jacob Bonsell operated a ferry service at the crossing until 1851. The crossing had become so popular by mid-century that the two men would profit an amount equivalent to several thousand dollars per day by current standards (Hillman and Covello 1985; Thompson 1980).

In 1856, Doak and Bonsell passed ownership of the ferry service to William S. Moss, a Virginia native. Moss operated the ferry until the CPRR constructed the original iron truss bridge in 1869, which became the final link of the transcontinental railroad. After retiring the ferry service, Moss secured ownership of more than 10,000 acres of surrounding land, purchased a home in San Leandro, and went on to acquire ownership of the San Francisco Examiner. Moss later sold the Examiner to George Hearst, who bequeathed it to his son, William Randolph Hearst (Hillman and Covello 1985; Thompson 1980).

By 1860, the makings of a small town formed in Mossdale, which included a hotel and post office and, by 1930, a school as well as several taverns and general stores. None of these buildings exist today. In 1918, on the southwest bank of the River (Stewart Tract side), Stewart Moore launched a large-scale dairy operation, employing more than 100 people. The six extant brick silos presently owned by the Dell'Osso family remain the only structural evidence of Moore's original dairy business (Hillman and Covello 1985; Thompson 1980).

By the second half of the twentieth century, Mossdale reinvented itself as more of a recreational destination than a town per se. San Joaquin County established the site as a county park and boat launching facility in 1977, and renamed the location Mossdale Marina. The site continues to operate as a marina to this day, and the City of Lathrop is in the beginning phases of developing a mixed-use community at Mossdale Landing (City of Lathrop 2000; Hillman and Covello 1985; Thompson 1980).

Railroad

The 1860s was a pivotal decade for the development of the San Joaquin Valley, and Lathrop in particular, as it was for many developing towns in California. The force behind that change was the burgeoning railroad industry. Two UPRR ROWs bisect the proposed action area.

In 1868, Leland Stanford, Collis P. Huntington, Charles Crocker, and Mark Hopkins–owners of the CPRR and known as "the Big Four"—acquired a controlling interest in the Southern Pacific Company. Prior to this acquisition, Congress authorized the Southern Pacific Company to build the western section of the southern transcontinental railroad. In acquiring the Southern Pacific, the Big Four gained control of the route to southern California and eliminated competition from another transcontinental route. The CPRR soon began construction on a line from San Francisco to San Diego, completing the project in 1877 (Bean and Rawls 1983).

While the historically celebrated transcontinental railroad connection took place at Promontory Summit, Utah, in 1869, cross-country travel still required the rail passenger to de-board the rail car when the line reached either side of the San Joaquin River. At that point, passengers had to continue across the river by ferry at the town of Mossdale, 3 miles from Lathrop. In 1869, CPRR constructed a railroad bridge across the San Joaquin River at the town of Mossdale, closing the final gap of the transcontinental line, providing continuous rail service coast to coast. In 1895, CPRR replaced the original bridge with an iron truss structure. The truss bridge carried railway traffic over the river for roughly 50 years, until CPRR replaced it with the current structure in 1942. Today, the railroad bridge is owned, operated, and maintained by UPRR (Hillman and Covello 1985; Thompson 1980).

Prior to the Southern Pacific Railroad (SPRR) and CPRR combining their operations in 1868, CPRR filed a railroad plat map with the Secretary of the Interior in early 1867 that proposed a new railroad alignment through the San Joaquin Valley. Originally, CPRR had its sights set on Stockton as the line's major junction in the valley, but the railroad company changed course when Stockton fell short on monetary and land donation demands. As a result, CPRR established its junction and terminal 10 miles south of Stockton, at Lathrop. By 1870, Lathrop was a thriving railroad town, with three hotels, several general stores, saloons, blacksmith shops, and a series of freight companies. In 1886, a fire at the railyard prompted CPRR to move its hub to Tracy, leading to a decrease in Lathrop's population from 600 in 1879 to 500 in 1890 (Hillman and Covello 1985; Hawkins 1962; Thompson 1980; Smith 1956).

Reclamation and Agriculture

Land speculators and individual farmers in the nineteenth century were attracted to the Delta region because of its fertile agricultural soil and the area's miles of navigable channels. Efforts to reclaim the land began as early as 1849 in the San Joaquin Delta (largely through the efforts of Chinese laborers), although the process was time consuming and costly. Because of the expenses involved, large corporations were commonly formed to supply the capital needed to reclaim vast areas of swampland. Financier Lee Philips played a key role in reclaiming the region located primarily north of Stewart Tract. Phillips purchased thousands of acres of Delta land and teamed with Japanese immigrant farmer George Shima to reclaim and plant the area with profitable crops (CALFED Bay-Delta Program 1996).

Other companies involved in reclamation included the Tide Land Reclamation Company and the Old River Land Reclamation Company. Overall, dredging efforts during this period were not very successful until the advent of improved dredging machinery in the late nineteenth century. Throughout the twentieth century the south Delta region continued to be used primarily for agricultural purposes, with the majority of cultivation directed toward row crops of fruits and vegetables, alfalfa, wheat, sugar beets, and walnuts. Dairy farming was also prevalent in the region (CALFED Bay-Delta Program 1996; Gibbs 1869; Paterson et al. 1978; Preston 1981; Thompson and West 1957).

The Delta region attracts a variety of resident and migratory waterfowl and fish, making it a destination point for hunting and fishing from prehistoric into modern times. Other recreational uses of the area include a variety of water sports (CALFED Bay-Delta Program 1996).

Development in the Proposed Action Area

Reclamation efforts on Stewart Tract, which encompasses the APE, began in spring 1922 when A. O. Stewart petitioned the San Joaquin County Board of Supervisors to form Islands Reclamation District 2062, which included 3,680 acres bounded by the San Joaquin and Old Rivers, Salmon Slough, Paradise Cut, and the UPRR embankment. Later that year, the State Reclamation Board approached Stewart with a proposal to construct a levee system on the portion of his district that had not yet been reclaimed. The agency outlined a comprehensive flood control plan, including levees along the San Joaquin and Old Rivers, a levee along the section of Salmon Slough beneath the Middle River, and a junior levee along Paradise Cut (Herrmann 1923; Mayhew 1922; Stanley 1922).

Shortly after groundbreaking for the levee system began—in July 1922—Stewart initiated plans for a drainage and irrigation system. In February 1923, State Civil Engineer F. C. Herrmann outlined in a letter to Stewart a drainage and irrigation plan that consisted of a seepage ditch along the toe of the levee system, a central drainage canal and branch canals, four irrigation pumps, and a single drainage pump. Tenants were required by terms in their leasing agreement to construct their own canals and operate the irrigation pumps provided by the Reclamation District (Herrmann 1923; Mayhew 1922; Stanley 1922).

Prior to the turn of the twentieth century, roadways were virtually nonexistent in the region, with most local travel being accomplished by schooners or barges. SPRR and UPRR had, however, constructed alignments that bisect Stewart Tract, not only connecting it to population centers such as Sacramento and San Francisco, but also encouraging the movement of agricultural products from the region to outlying markets. Transportation systems improved on Stewart Tract when officials granted rights-of-way for road construction on the tops of levees. Based on historic maps, additional roadways in the interior included Paradise Avenue (present-day Stewart Road), which ran northwest/southeast along the central drainage canal; and River Avenue (present-day Cohen Road), which ran northwest/southeast on the northwestern portion of the Tract (Wallace 1870; Reid 1883; Compton 1895; Handy 1862; Quail 1905, 1912; Budd and Widdows 1917, 1918, 1926; Thomas Brothers 1920; Metsger 1940; U.S. Geological Survey 1952, 1968, 1976, 1994).

California Irrigated Farms (CIF) acquired the tract from Stewart shortly after it was reclaimed. CIF oversaw the initial residential and agricultural development of Stewart Tract through the mid-twentieth century as it initiated construction of agricultural drains (ditches) on the subject property. The ditches served the purpose of collecting irrigation runoff and conveying it to a pumping station at the southwestern boundary of the site, adjacent to Paradise Cut (Thomas Brothers 1920).

In the late 1920s, the Dell'Osso brothers emigrated from Italy to the Lathrop area and purchased four parcels of land at the southeast end of Stewart Tract to farm asparagus. Each of the four parcels was approximately 200 acres. Rudy Dell'Osso, son of one of the original brothers, acquired ownership of the farm and expanded crop cultivation to include melons and corn (Dell'Osso Family Farm 2009).

Little is known about additional people or persons who may have lived on Stewart Tract during the first half the twentieth century, as historical evidence of a residential built environment is lacking until mid-century. By the 1950s, three families, one individual, and one corporation occupied parcels on Stewart Tract. The lessee with the largest amount of acreage was Reclaimed Island Lands Company, occupying nearly 2,000 of the Tract's approximately 5,000 acres. The present-day location of 16426 South Cohen Road appears on historic maps dating to the 1950s. However, neither maps nor research reveal the names of families or individuals who may have occupied the residence (San Joaquin County 2006; Stockton City and San Joaquin County 1891, 1893, 1936; Thomas Brothers 1920).

John W. Sinai occupied 196 acres fronting on present-day South Cohen Road. The present-day location of the residence at 16777 South Cohen Road is consistent with that of a property appearing on historic maps dating to the 1950s, implying it was a potential dwelling for Sinai. In 1970, Thelma and Anthony Souza occupied two contiguous parcels at the western end of the tract, adjacent to the confluence of the Old River and Paradise Cut. The Souzas had a total of four dwellings and structures on their parcels, two of which still exist: 5100 A and B West Stewart Road (San Joaquin County 2006; Thomas Brothers 1920).

Today, members of the third generation of the Dell'Osso family own the property within the APE, which includes the four extant residences discussed above. The Dell'Osso family rents the four properties to tenants employed by the River Islands Corporation. As of 2009, crop cultivation is no longer the primary land use activity, as much of the tract is currently in early stages of residential development. A small portion of the tract, between the UPRR ROW and I-5, serves as a seasonal amusement park with a pumpkin maze and other attractions (Dell'Osso Family Farm 2009).

7.1.2.3 Existing Conditions for Cultural Resources

There are no known archaeological resources and 26 historic architectural resources within the study area.

Archaeological Sensitivity

Based on the distribution of known resources in the vicinity of the proposed action area and the depositional environment of the proposed action area, portions of the APE are assumed to be sensitive for buried archaeological resources. Sensitive areas would include any areas of high elevation relative to the surrounding topography. Although many of these areas have been graded for the purposes of agricultural field leveling, local residents have reported prehistoric sites existing at these higher (or formerly higher) elevations. Sites recorded adjacent to the proposed action area demonstrate that intact subsurface deposits can still exist below plowed soils. Prehistoric archaeological sites may exist in other portions of the proposed action area, but the likelihood is not as great as those areas where mounds once existed or still exist.

Architectural Resources

A total of 26 historic built environment resources (4 residences, 6 grain silos, 1 SPRR bridge, 1 UPRR trestle, 10 canals, 3 levees, and 1 weir) 45 years old or older are located in the APE. The resources were evaluated for eligibility for inclusion in the NRHP.

16777 South Cohen Road

The property at 16777 South Cohen Road contains a modest, single-family residence of common design, a barn, and a series of irrigation tanks. The property is not associated with significant events or persons in history, does not embody a significant architectural style or work of a master builder/designer, and does not have the potential to yield important information to history. Therefore, the resource does not appear to meet the criteria for listing in the NRHP.

16426 South Cohen Road

The property at 16426 South Cohen Road contains a modest, single-family residence of common design, a detached garage, a storage shed, a utility shed, and a chicken coop. The property is not associated with significant events or persons in history, does not embody a significant architectural style or work of a master builder/designer, and does not have the potential to yield important information to history. Therefore, the resource does not appear to meet the criteria for listing in the NRHP.

5100 West Stewart Road

The property at 5100 West Stewart Road contains two modest, single-family residences and four shed outbuildings. For purposes of clarity, ICF subjectively distinguished the two spatially separated residences—and their associated shed outbuildings—as 5100-A and 5100-B. 5100-A is located at the east end of the property and 5100-B is located at the west end. The two residences are evaluated as a single property. The property is not associated with significant events or persons in history, does not embody a significant architectural style or work of a master builder/designer, and does not have the potential to yield important information to history. Therefore, the resource does not appear to meet the criteria for listing in the NRHP.

Grain Silos

Six grain silos are located in the study area. Four of the silos are side by side in a northwest/southeast alignment; the other two are approximately 0.25 mile to the west, paired in an east/west alignment. The silos all share a similar construction style. Each cylindrical structure is approximately 30 feet tall, clad with red brick siding, and displays a mildly pitched conical roof. Additional features include an elevator dispensing mechanism with loading/dispensing archways—commonly referred to as augers—that extend vertically from the structures. A series of three deteriorated ancillary buildings clad with brick masonry are located immediately northeast and southwest of silos 2 and 3.

The six grain silos appear to meet the criteria for listing in the NRHP under Criterion C for their distinguished type, period, and method of construction. Under NRHP Criterion C, the grain silos are a significant example of late nineteenth-century silo construction and engineering that predates the modern slipform, reinforced-concrete structures ubiquitous throughout the United States. The period of significance for the resource is 1918—the period when Stewart Moore established his dairy operation near the southwest bank of the Mossdale Landing site.

SPRR Bridge

The SPRR bridge is a vertical-lift drawbridge that carries the UPRR tracks over the San Joaquin River at the eastern edge of Stewart Tract. The bridge does not appear to be eligible for listing in the NRHP. CPRR constructed the first bridge over the San Joaquin River in November 1869, completing the final link of the nation's transcontinental railroad. The original structure was later modified in the form of an iron-truss structure in 1895. SPRR replaced the structure in 1942. Although the original structure no longer exists, the location is registered as "California Historical Landmark No. 780-7, First Transcontinental Railroad—Site of Completion of Pacific Railroad." The SPRR bridge at the site of CHL 780-7 is not itself associated with this historic event. Therefore, the structure does not appear to meet the criteria for listing in the NRHP because it lacks integrity to its period of historical significance of 1869, the period of initial construction.

UPRR Trestle

A 500-foot trestle within the APE carries the UPRR over Paradise Cut in a southwest/northeast direction 0.5 mile southeast of I-5. The trestle displays common, wood-beam crossings and beams that support the span of the railroad. The trestle is not associated with significant events or persons in history, does not embody a significant architectural style or work of a master builder/designer, and does not have the potential to yield important information to history. Therefore, the resource does not appear to meet the criteria for listing in the NRHP.

Canal System

A system of 10 earthen-lined canals traverses the study area. The lengths of the segments vary, ranging from 1,500 feet to 1 mile. Aside from the variations in length, the physical features of the segments are, for the most part, uniform in character in that they are all approximately 12 feet wide, earthen, and U-shape in form, and all traverse Stewart Tract in a southwest/northeast direction. The period of significance for the canal system is ca. 1922, when it was originally constructed during early efforts to install an irrigation and drainage system on Stewart Tract. Although several of the conveyance segments to an extent follow their historic alignment, from an engineering perspective the extant system as a whole conveys little likeness to the system from the period of significance. Moreover, the system is not associated with significant events or persons in history, does not embody a significant architectural style or work of a master builder/designer, does not have the potential to yield important information to history, and therefore does not appear to meet the criteria for listing in the NRHP.

Levee System

A system of three earthen levees bordering the San Joaquin, Old River, and Paradise Cut is located along the margin of the site, immediately within the APE. The levees vary in width and height but are typically approximately 30–40 feet wide on top and 40 feet high. The system of levees is not associated with significant events or persons in history, does not embody a significant architectural style or work of a master builder/designer, does not have the potential to yield important information to history, and therefore does not appear to meet the criteria for listing in the NRHP.

Paradise Weir

Paradise Weir is located at the southeast extremity of Paradise Cut and features a somewhat broad-crested top composed of jagged granite rock, spanning approximately 260 feet across Paradise Cut, forming a “T” barrier between the Cut and the San Joaquin River. Paradise Weir is not associated with significant events or persons in history, does not embody a significant architectural style or work of a master builder/designer, does not have the potential to yield important information to history, and therefore does not appear to meet the criteria for listing in the NRHP.

Summary of Cultural Resource Significance

The proposed action would potentially affect six cultural resources. Each was evaluated for significance according to criteria established by the NRHP. Results of the Cultural Resources

Inventory and Evaluation Report (ICF file information) identify the six grain silos as a historic property according to the NRHP criteria.

The properties at 16777 and 16426 South Cohen Road, 5100 West Stewart Road, the SPRR Bridge, UPRR Trestle, canal system, levee system, and Paradise Weir are not historic properties or historical resources. Any effects on the additional 20 cultural resources would be considered less than significant and would not require mitigation. Therefore, these resources do not require further consideration under Section 106 of the NHPA.

7.2 Environmental Consequences

7.2.1 Methods for Analysis of Effects

Adverse effects on cultural resources focus on damage or loss affecting resources that qualify for any or all of the following.

- Historic properties listed in or eligible for listing in the NRHP.
- Historical resources listed in or eligible for listing in the California Register of Historical Resources.
- Inclusion in a local register of historical resources, or identification as an important resource by a local jurisdiction or agency (for instance, identification in a county or city general plan).

Modification to resources that are eligible for listing typically also constitutes an adverse effect if it alters the resource (e.g., archaeological site, historic site, historic building) in such a way that it would no longer be considered eligible for listing. This is because the criteria for inclusion in the National and California Registers are designed to capture the features of a resource that render it "special" and valuable from a historic, anthropological, and/or cultural perspective. Note that resources may derive part of their importance from their context (their physical setting or their association with other resources), so damage and modification affecting the context of a resource may constitute an adverse effect even if the resource itself is not directly affected.

7.2.2 Definition of Significant Effects

To comply with Section 106 of the NHPA, any effects of the proposed undertaking on properties listed in or determined eligible for inclusion in the NRHP must be analyzed by applying the Criteria of Adverse Effect (36 CFR § 800.5).

> An adverse effect is found when an undertaking may alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the National Register in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. Consideration shall be given to all qualifying characteristics of a historic property, including those that may have been identified subsequent to the original evaluation of the property's eligibility for the National Register. Adverse effects may include reasonably foreseeable effects caused by the undertaking that may occur later in time, be farther removed in distance or be cumulative.

Significant effects on historic properties include the actions and consequences listed below.

- Physical destruction of or damage to all or part of the property.
- Alteration of a property, including restoration, rehabilitation, repair, maintenance, stabilization, hazardous material remediation, and provision of handicapped access, that is not consistent with the Secretary's Standards for the Treatment of Historic Properties and applicable guidelines.
- Removal of the property from its historic location.
- Change of the character of the property's use or of physical features within the property's setting that contribute to its historic significance.
- Introduction of visual, atmospheric or audible elements that diminish the integrity of the property's significant historic features.
- Neglect of a property which causes its deterioration, except where such neglect and deterioration are recognized qualities of a property of religious and cultural significance to an Indian tribe or Native Hawaiian organization.
- Transfer, lease, or sale of property out of federal ownership or control without adequate and legally enforceable restrictions or conditions to ensure long-term preservation of the property's historic significance.

7.2.3 Effects and Mitigation Approaches

7.2.3.1 Alternative 1—Proposed Action

Effects on archaeological resources resulting from construction (significant)

Because there are no known archaeological resources in the APE, there would be no anticipated significant direct effects on known archaeological resources under the proposed action. No indirect effects were identified, and no effects are expected to result from operational activities.

Nevertheless, significant direct effects resulting from ground disturbance at undiscovered archaeological sites or at sites of human remains have the potential to damage or destroy sites or human interments that could not be identified using standard archaeological survey methods. The entire APE has the potential to contain buried archaeological resources, but is greatest at archaeologically sensitive areas. Construction could result in inadvertent damage to or destruction of buried archaeological sites or human remains.

Mitigation Measure CR-1. Protect archaeological resources if discovered during construction

If buried cultural resources, such as chipped or ground stone, quantities of bone or shell material, or historic debris or building foundations are inadvertently discovered during ground-disturbing activities, work will be stopped within a 100-foot radius of the find until a qualified archaeologist can assess the significance of the find. If, after evaluation by a qualified archaeologist, an archaeological site or other find is identified as meeting the criteria for inclusion in the NRHP, River Islands will retain a qualified archaeologist to develop and implement an adequate program for this investigation, avoidance if feasible, and data recovery for the site, with Native American consultation if appropriate. If human skeletal remains are inadvertently encountered during construction of the proposed action, the San Joaquin County coroner will be contacted immediately. If the county coroner determines the remains are Native American, the coroner will contact the NAHC, as required by Section 7050.5[c] of the California Health and Safety Code. A qualified archaeologist will also be contacted immediately.

Effects on historical resources (less than significant)

The proposed action would introduce new elements that have the potential to adversely affect the historic setting of the six grain silos, which are recommended as eligible for listing in the NRHP because they represent a distinguished type, period, and method of construction. The silos also appear to retain their integrity to the established period of historical significance (1918) in the form of materials, location, design, and feeling. The silos retain these elements of integrity because a lack of material alteration and their continuity of location allow them to appear as they did when originally constructed. The silos remain in a largely rural landscape environment, the majority of which has remained unobstructed. By retaining these elements, the resources appear to effectively convey their historical integrity. In sum, the proposed action has the potential to visually obstruct and aesthetically impede upon the silos' contextual setting by way of compromising the resources' historical integrity of materials, location, design, and feeling. This could constitute a significant indirect effect.

Line-of-sight diagrams (Figure 7-1) show the locations of the silos, relevant areas of earlier phases of River Islands at Lathrop as well as the proposed action area, and the approximate locations, mass, and height of major buildings based on the *River Islands at Lathrop Urban Design Concept* (The SWA Group 2002:II-49), which specifies a maximum building height of 75 feet (six stories). Visual screening is depicted in the form of 15- to 35- foot-tall trees, portrayed with 5–10 years of growth.

Three key viewpoints were generated for each of the three lines of sight depicted in Figure 7-1. The first two line of site diagrams (A and B) consider earlier phases of River Islands at Lathrop, and are provided merely to convey a cumulative perspective of future development. The proposed action is assessed in line of site C.

The result of this analysis reveals that each line of sight will intercept some portion of the proposed action. In turn, the various portions of the silos themselves will be visible from lines of sight originating from the proposed action. This conclusion, however, does not mean that the historical setting of the silos would be compromised, because the natural barrier between the proposed action and the silos—that is, the 15-foot railroad embankment and natural treeline northwest of the silos—block lines of sight. A 400-foot transition area (no development) will also separate the proposed action from the silos, effectively setting the undertaking 400 feet back from the embankment. This barrier would effectively form a 1.5-mile, 40-foot-high partition between the historic property and the location upon which the proposed action would occur, essentially lessening the viewers' exposure to change in the historic setting (Figure 7-1).

In conclusion, both field survey and line-of-sight analysis suggests that implementation of the proposed action would have a less-than-significant indirect effect on the NRHP-eligible grain silos. No direct effects were identified.

7.2.3.2 Alternative 2—No Alteration of Paradise Cut

Alternative 2 would eliminate all alterations to Paradise Cut. Instead, to provide the needed flood risk reduction measures, the existing Paradise Cut levee would be expanded on the landside.

Effects on archaeological resources (significant)

The direct effects on archaeological resources would be the same as those under the proposed action because eliminating changes to Paradise Cut would not alter the overall development footprint or the associated potential for significant effects. Mitigation Measure CR-1 would address this direct effect. No indirect effects were identified.

Effects on historical resources (less than significant)

The indirect effects on historical resources would be the same under Alternative 2 as under the proposed action, because the elimination of alterations to Paradise Cut would have no bearing on the portions of the proposed action that could potentially affect the context of the grain silos. This would be a less-than-significant indirect effect. No direct effects were identified.

7.2.3.3 Alternative 3—Avoidance of Central Drainage Ditch

Alternative 2 would avoid all construction affecting the central drainage ditch and would establish a no-development buffer zone least 100 feet wide on either side of it.

Effects on archaeological resources (significant)

The direct effects on archaeological resources would be similar to those under the proposed action because avoidance of the central drainage ditch would not alter the overall development footprint. Although the development area would be reduced by approximately 150 acres (the area encompassing the drainage ditch and its buffer zone), the potential for disturbing unknown archaeological resources associated with development of more than 4,000 acres would be essentially the same as that under the proposed action. Mitigation Measure CR-1 would address this significant direct effect. No indirect effects were identified.

Effects on historical resources (less than significant)

The indirect effects on historical resources would be the same under Alternative 3 as under the proposed action, because avoidance of the central drainage ditch would have no bearing on the portions of the proposed action that could potentially affect the context of the grain silos. This would be a less-than-significant indirect effect. No direct effects were identified.

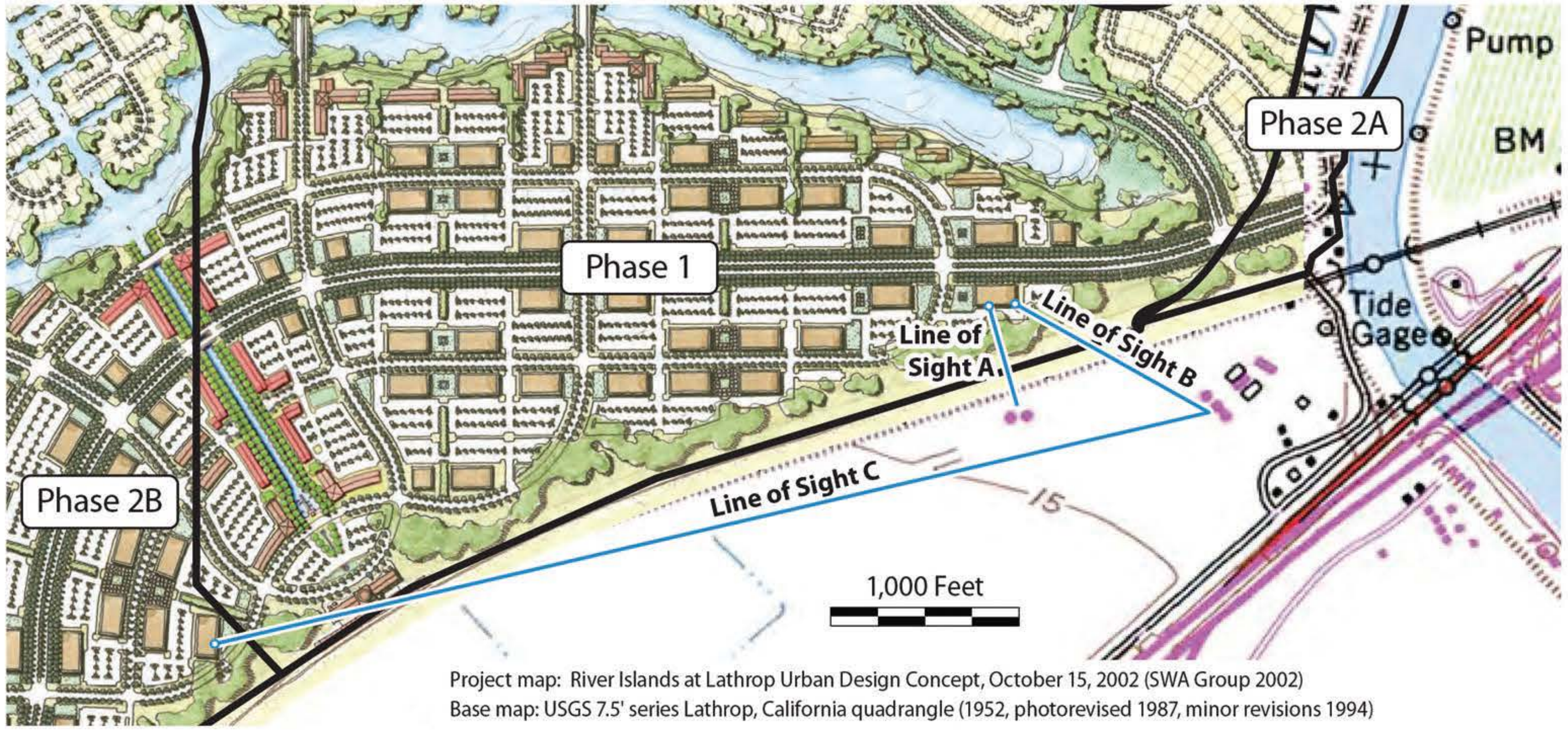
7.2.3.4 Alternative 4—Proposed Action with Expanded Flood Risk Reduction

Alternative 4 would involve additional risk reduction components, but the development components would be identical to those of the proposed action.

Effects on archaeological resources (significant)

The significant direct effects on archaeological resources would be the same as those described for the proposed action. Mitigation Measure CR-1 would address these direct effects. No indirect effects were identified. Moreover, if a new bypass channel were constructed, additional cultural resource surveys would be required to determine potential effects on listed or recorded archaeological sites. Mitigation Measure CR-2 would need to be implemented.

Line of Sight Locations

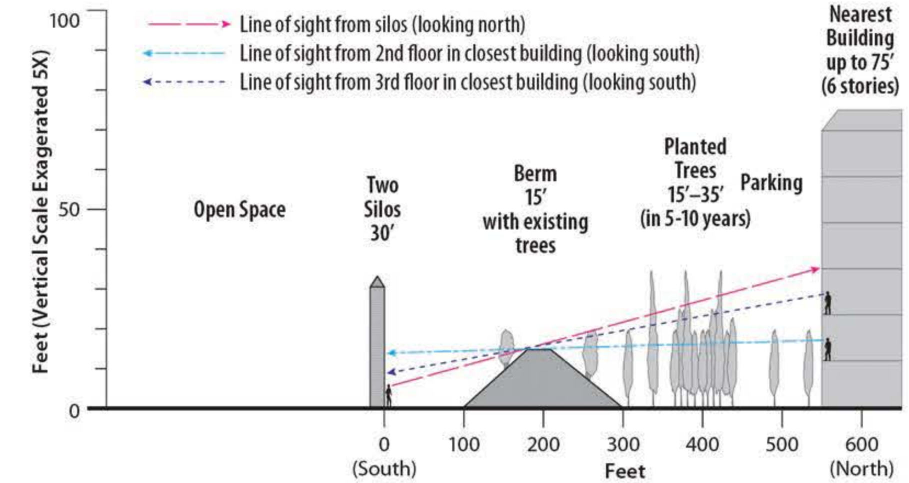


Project map: River Islands at Lathrop Urban Design Concept, October 15, 2002 (SWA Group 2002)
Base map: USGS 7.5' series Lathrop, California quadrangle (1952, photorevised 1987, minor revisions 1994)

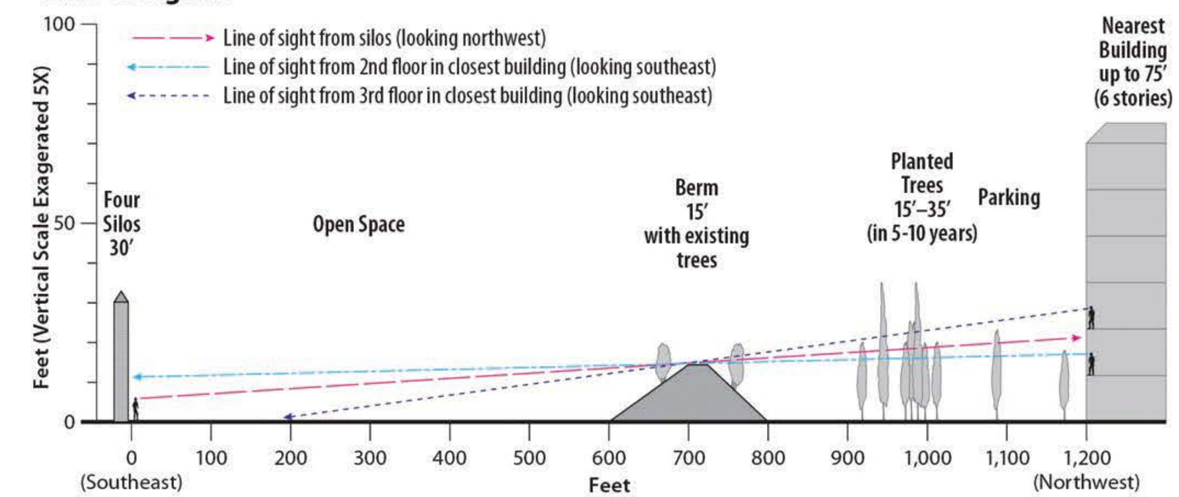
Note: These diagrams are intended to show approximate lines of sight between historic silos and the nearest buildings in the Employment Center in Phases 1 and 2B.

Building locations and heights are based on the "River Islands at Lathrop Urban Design Concept" (SWA Group 2002). This plan (page II-49) specifies a maximum building height in the Employment Center of "75 feet (six stories)". Vegetated areas that could provide visual screening are represented as trees 15–35 feet tall at locations indicated in the Design Concept maps.

Line of Sight A



Line of Sight B



Line of Sight C

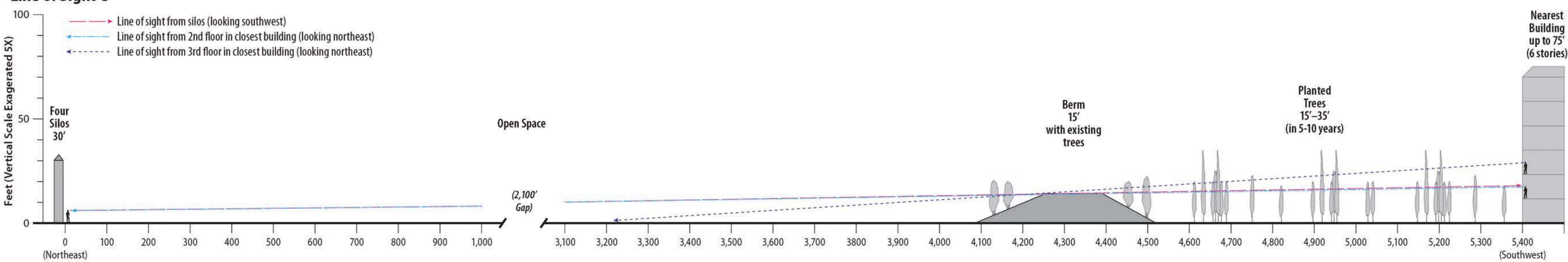


Figure 7-1
Lines of Sight between Silos and Employment Center

Mitigation Measure CR-2. Evaluate effects on archaeological resources before implementation

Once disturbance areas for offsite components of this alternative are sufficiently defined and property access is available, River Islands will retain a professional archaeological consultant to review the results of existing records searches and conduct field surveys, as needed, for these facilities. If cultural resources are found in the potential disturbance area, the archaeologist will recommend additional actions deemed necessary for the protection of these resources. If discoveries are made during construction, Mitigation Measure CR-1 will be implemented.

Effects on historical resources (significant)

Although development of the RID Area would be identical to that under the proposed action and effects associated with implementation of those portions of the alternative would be less than significant, the location of additional flood risk reduction work is not known at this time. Accordingly, there could be a potential for significant direct and indirect effects on historical resources depending on the location of the earthwork that could occur under Alternative 4. Mitigation Measure CR-3 would address these effects.

Mitigation Measure CR-3. Evaluate effects on historical resources before implementation

Before implementation, River Islands will retain an architectural historian to identify and confirm the boundaries of the APE and conduct a historical records search of the APE. If historic resources are identified, the architectural historian will record these sites consistent with the standards of a Historic American Engineering Record. Recordation of the sites would result in permanent documentation of the architectural, visual, and historic context of the resources and would give historians and others access to documentation on preproject conditions. Additionally, the architectural historian will recommend additional actions deemed necessary for the protection of these resources.

7.2.3.5 Alternative 5—No Action

Under the No-Action Alternative, an interior ring levee would be constructed along Old River and Paradise Cut that would allow for the development of the River Islands RID area, including the proposed residential and commercial components. Earlier phases of River Islands at Lathrop are already under construction, so the No-Action Alternative would not affect the completion of these phases.

Effects on Archaeological Resources (significant)

Because the No Action Alternative would entail development of commercial and residential amenities within roughly the same footprint as the proposed action, the potential for a significant direct effect on archaeological resources during construction would be the same as under the proposed action. Mitigation Measure CR-1 would address this direct effect. No indirect effects were identified.

Effects on historical resources (less than significant)

Because the No Action Alternative would entail development of commercial and residential amenities analogous to those under the proposed action, the indirect effect on historical resources would be less than significant. No direct effects were identified.

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Chapter 8
Paleontological Resources

This chapter analyzes the proposed action's potential effects on paleontological resources. For the purposes of this analysis, *paleontological resources* is defined as comprising fossilized remains of vertebrate and invertebrate organisms, fossil tracks and trackways, and plant fossils. Related discussions are found in Chapter 4, *Geology, Soils, and Mineral Resources* (including an overview of bedrock and Quaternary geology in the action area), and Chapter 21, *Cumulative Effects*. Cultural resources are addressed separately in Chapter 7, *Cultural Resources*.

No new paleontological fieldwork or locality searches were conducted for this EIS. However, a literature search and relevant geologic maps were reviewed. Specific reference information is provided in the text.

8.1 Affected Environment

8.1.1 Regulatory Framework

A variety of federal, state, and local regulations and policies protect paleontological resources. These include NEPA, CEQA, the Federal Antiquities Act of 1906, the National Natural Landmarks (NNL) Program, the California Public Resources Code, and the federal Paleontological Resources Preservation Act (2009). Professional standards of practice such as those adopted by the Society of Vertebrate Paleontology (SVP) (Society of Vertebrate Paleontology Conformable Impact Mitigation Guidelines Committee 1995) offer additional guidance for control and mitigation of adverse impacts on paleontological resources. Key regulatory provisions relating to paleontological resources are described here.

8.1.1.1 Federal Regulations

Antiquities Act

As discussed in Chapter 7, *Cultural Resources*, the Federal Antiquities Act of 1906 was enacted with the primary goal of protecting cultural resources in the United States. As such, it explicitly prohibits appropriation, excavation, injury, and destruction of "any historic or prehistoric ruin or monument, or any object of antiquity" located on lands owned or controlled by the federal government, without permission of the secretary of the federal department with jurisdiction. It also establishes criminal penalties, including fines or imprisonment, for these acts.

Neither the Antiquities Act itself nor its implementing regulations (43 CFR 3) specifically mentions paleontological resources. However, several federal agencies—including the National Park Service (NPS), the Bureau of Land Management, and the U.S. Forest Service—interpret *objects of antiquity* as including fossils. Consequently, the Antiquities Act represents an early cornerstone for efforts to protect the nation's paleontological resources.

National Environmental Policy Act

NEPA does not provide specific guidance regarding paleontological resources, but the NEPA requirement that federal agencies take all practicable measures to "preserve important historic, cultural, and natural aspects of our national heritage" (NEPA Sec. 101[b][4]) is interpreted as applying to paleontological materials. Under NEPA, paleontological resources are typically treated in a manner similar to that used for cultural resources.

National Natural Landmarks Program

The NNL Program was established in 1962 under authority of the Historic Sites Act of 1935. The goals of the NNL Program are listed below.

- To encourage the preservation of sites that illustrates the nation's geological and ecological character.
- To enhance the scientific and educational value of the sites preserved.
- To strengthen public appreciation of natural history and foster increased concern for the conservation of the nation's natural heritage.

Under the NNL Program, sites that represent the nation's "best" examples of various types of biological communities or geologic features (meaning that they are in good condition and effectively illustrate the specific character of a certain type of resource) are listed on the National Registry of Natural Landmarks (NRNL). At present, the NRNL includes 587 sites, ranging in size from 7 acres to almost 1 million acres.

The NNL Program is administered by NPS. However, most sites listed on the NRNL are not transferred to federal ownership and most do not become units in the National Parks system. Most listed sites continue to be managed by their current owners following listing. Currently, about 50% of the nation's NNLs are managed by public agencies, about 30% are privately owned and managed, and about 20% are managed through collaboration between agencies and private entities.

NPS is responsible for maintaining relationships with NNL landowners and monitoring the condition of all NNLs. NPS prepares an annual report, based on its monitoring, for transmission by the Secretary of the Interior to Congress, identifying NNLs at risk of damage or degradation.

8.1.1.2 State Regulations and Policies

California Environmental Quality Act

CEQA includes in its definition of *historical resources* "any object [or] site … that has yielded or may be likely to yield information important in prehistory" (State CEQA Guidelines Sec. 15064.5[3]), which is typically interpreted as including fossil materials and other paleontological resources. In addition, destruction of a "unique paleontological resource or site or unique geologic feature" constitutes a significant impact under CEQA (State CEQA Guidelines Appendix G). Treatment of paleontological resources under CEQA is generally similar to treatment of cultural resources, requiring evaluation of resources in a project's area of potential affect, assessment of potential impacts on significant or unique resources, and development of mitigation measures for potentially significant impacts, which may include monitoring combined with data recovery and avoidance.

California Public Resources Code

Several sections of the California Public Resources Code protect paleontological resources. Section 5097.5 prohibits "knowing and willful" excavation, removal, destruction, injury, and defacement of any paleontological feature on public lands (lands under state, county, city, district, or public authority jurisdiction, or the jurisdiction of a public corporation), except where the agency with jurisdiction has granted express permission. Section 30244 requires reasonable mitigation for impacts on paleontological resources that occur as a result of development on public lands. The sections of the California Administrative Code relating to the State Division of Beaches and Parks afford protection to geologic features and "paleontological materials" but grant the director of the state park system authority to issue permits for specific activities that may result in damage to such resources, if the activities are in the interest of the state park system and for state park purposes (California Administrative Code Section 4307–4309).

8.1.1.3 Local Regulations and Policies

San Joaquin County General Plan

The San Joaquin County General Plan contains an objective to protect the County's paleontological resources through appropriate actions to preserve or remove sensitive resources. The general plan acknowledges that a records search can identify locations of sensitive sites and specifies actions to be taken if sensitive resources are found during construction.

8.1.1.4 Professional Standards and Guidelines

In response to a recognized need for standard guidance, the SVP published a set of *Standard Guidelines* (Society of Vertebrate Paleontology Conformable Impact Mitigation Guidelines Committee 1995) that are now widely followed. The SVP guidelines identify two key phases in the process for protecting paleontological resources from project impacts.

1. Assess the likelihood that the project's area of potential effect contains significant nonrenewable paleontological resources that could be directly or indirectly impacted, damaged, or destroyed as a result of the project.
2. Formulate and implement measures to mitigate potential adverse impacts.

An important strength of SVP's approach to assessing potential effects on paleontological resources is that the SVP guidelines provide standardization in evaluating a project area's paleontological sensitivity. Table 8-1 defines SVP sensitivity categories for paleontological resources and summarizes SVP-recommended treatments to avoid adverse impacts in each sensitivity category.

Table 8-1. Society of Vertebrate Paleontology's Recommended Treatment for Paleontological Resources, by Sensitivity Category

Sensitivity Category	Definition	Recommended Treatment
High potential (high sensitivity)	Areas underlain by geologic units from which vertebrate or significant invertebrate fossils or suites of plant fossils have been recovered.	• Preliminary survey and surface salvage before construction begins. • Monitoring and salvage during construction. • Specimen preparation; identification, cataloging, curation, and storage of materials recovered. • Preparation of final report describing finds and discussing significance. • All work should be supervised by a professional paleontologist who maintains the necessary collecting permits and repository agreements.
Undetermined potential (undetermined sensitivity)	Areas underlain by geologic units for which little information is available.	• Preliminary field surveys by a qualified vertebrate paleontologist to assess the project area's sensitivity. • Design and implementation of mitigation if needed, based on results of field survey.
Low potential (low sensitivity)	Areas underlain by geologic units that are not known to have produced a substantial body of significant paleontologic material.	• Protection and salvage are generally not required. However, a qualified paleontologist should be contacted if fossils are discovered during construction, in order to salvage finds and assess the need for further mitigation.

Source: Society of Vertebrate Paleontology Conformable Impact Mitigation Guidelines Committee 1995.

The SVP guidelines also provide a working definition of *significance* as applied to paleontological resources. According to SVP, significant paleontological resources are those that meet one or more of the following criteria (Society of Vertebrate Paleontology Conformable Impact Mitigation Guidelines Committee 1995).

- Provides important information shedding light on evolutionary trends and/or helping to relate living organisms to extinct organisms.
- Provides important information regarding the development of biological communities.
- Demonstrates unusual circumstances in the history of life.
- Represents a rare taxon or a rare or unique occurrence; is in short supply and in danger of being destroyed or depleted.
- Has a special and particular quality, such as being the oldest of its type or the best available example of its type.
- Provides important information used to correlate strata for which other types of age dates might be difficult to obtain.

Significant paleontological resources may include vertebrate fossils and their associated taphonomic and environmental indicators; invertebrate fossils; and plant fossils.

8.1.2 Existing Conditions

8.1.2.1 Methods Used to Identify Existing Conditions

Information on paleontological resources in the proposed action area was gathered from USGS and the Earth Sciences and Map Library at the University of California, Berkeley, on June 2 and 28, 2010, respectively. The area considered for existing conditions for this resource topic encompasses the City of Lathrop and the proposed action area.

8.1.2.2 Paleontological Setting

The surficial deposits mapped across the proposed action area are the Dos Palos Alluvium (Wagner et al. 1990), which is Holocene in age (12,000 years old to present). A more detailed geologic map of the proposed action area shows the surficial deposits as Holocene alluvial-floodplain deposits (Qpf) (Atwater 1982) (Figure 8-1). The Pleistocene Modesto Formation (Qm) is mapped immediately east of the proposed action area (Atwater 1982) and has been identified in the proposed action area at approximately 15 feet below ground surface (ENGEO 2002).

At further depth, the Modesto Formation overlies the Riverbank Formation regionally in the Sacramento Valley (Blake et al. 1999). The Modesto Formation contains significant extinct (non-renewable) vertebrate fossils such as giant ground sloth (*Megalonyx jeffersoni*), Columbian mammoth (*Mammuthus columbi*), camels, bison, and reptiles (Allen and Jones & Stokes 2008).

8.1.2.3 Paleontological Sensitivity Evaluation

No fossils have been reported in the proposed action area. Holocene materials are not typically considered paleontologically sensitive because biological remains are not considered fossils until they are 10,000 years old. However, the Modesto Formation is considered highly sensitive for paleontological resources because of its vertebrate content. Vertebrate content alone would indicate that this unit should be considered highly sensitive for paleontological resources (Society of Vertebrate Paleontology Conformable Impact Mitigation Guidelines Committee 1995).

8.2 Environmental Consequences

8.2.1 Methods for Analysis of Effects

An assessment of paleontological resources in the action area was developed based on review of published and unpublished paleontological and geologic literature, maps of the proposed action area and vicinity, and a paleontological archival search at the USGS and Earth Sciences and Map Library at the University of California, Berkeley. Potential effects were assessed by identifying the nature and likelihood of occurrences of paleontological resources within the proposed action area, and identifying activities (e.g., excavation and other earthwork activities) that could adversely affect potential paleontological resources. No effects are expected to occur as a result of operational activities such as periodic maintenance dredging and operation of the marina.

8.2.2 Definition of Significant Effects

Substantial damage or loss to scientifically important paleontological resources constitutes a significant effect. Such resources—referred to by the Society of Vertebrate Paleontology's Conformable Impact Mitigation Guidelines Committee (1995) as *significant paleontological resources*—are those that meet any of the criteria below.

- Provide important information about evolutionary trends, including the development of biological communities.
- Are rare, special, or unique in some way, such as demonstrating unusual circumstances in the history of life, representing a rare taxon or occurrence, or being the oldest or the best available example of an organism or type of fossil.
- Provide information that is geologically useful and can be used to correlate strata for which it may be difficult to obtain other types of age dates.

The SVP typically considers vertebrate fossils as inherently significant. Other types of fossils, including invertebrates, plants, and trace fossils may also be significant if they meet one or more SVP criteria for paleontological significance.

8.2.3 Effects and Mitigation Approaches

8.2.3.1 Alternative 1—Proposed Action

Potential to damage unknown, potentially unique paleontological resources (significant)

Much of the action area is underlain by younger Holocene-age sediments mapped as Holocene alluvial floodplain deposits (Qpf) (Atwater 1982), which is considered to have a low potential (low sensitivity) rating for containing significant paleontological resources. The potential to damage vertebrate fossils in this formation during construction-related activities is low, since this unit is too young to contain fossils.

However, the Pleistocene Modesto Formation (Qm) contains significant paleontological resources that could underlie the alluvial floodplain deposits at certain depths. This unit has a high potential (high sensitivity) rating based on its Pleistocene age and reported fossil content. The action area appears to be underlain by the Pleistocene Modesto Formation at approximately 15 feet below ground surface. Under the proposed action, the maximum lake depth would be roughly 30 feet below ground surface, which would be the deepest points of excavation; typical excavations would be closer to 15 feet below ground surface.

This Pleistocene Modesto Formation is known to contain vertebrate fossils, including remains of mammoth, bison, rodents, and reptiles (Allen and Jones and Stokes 2008; Savage 1951). This analysis did not conduct subsurface exploration, such as drilling or test-pitting, which is necessary to identify the depth to the top of the Modesto Formation. However, because the Modesto Formation is considered highly sensitive for paleontological resources, earthwork required to construct the proposed action would have the potential to damage or disturb vertebrate and other fossil resources. Depending on the degree of loss, disturbance or damage to vertebrate fossils could represent a significant direct effect. No indirect effects were identified. Implementation of Mitigation Measures PALEO-1 and PALEO-2 would be consistent with the current standard of care for paleontological resources.

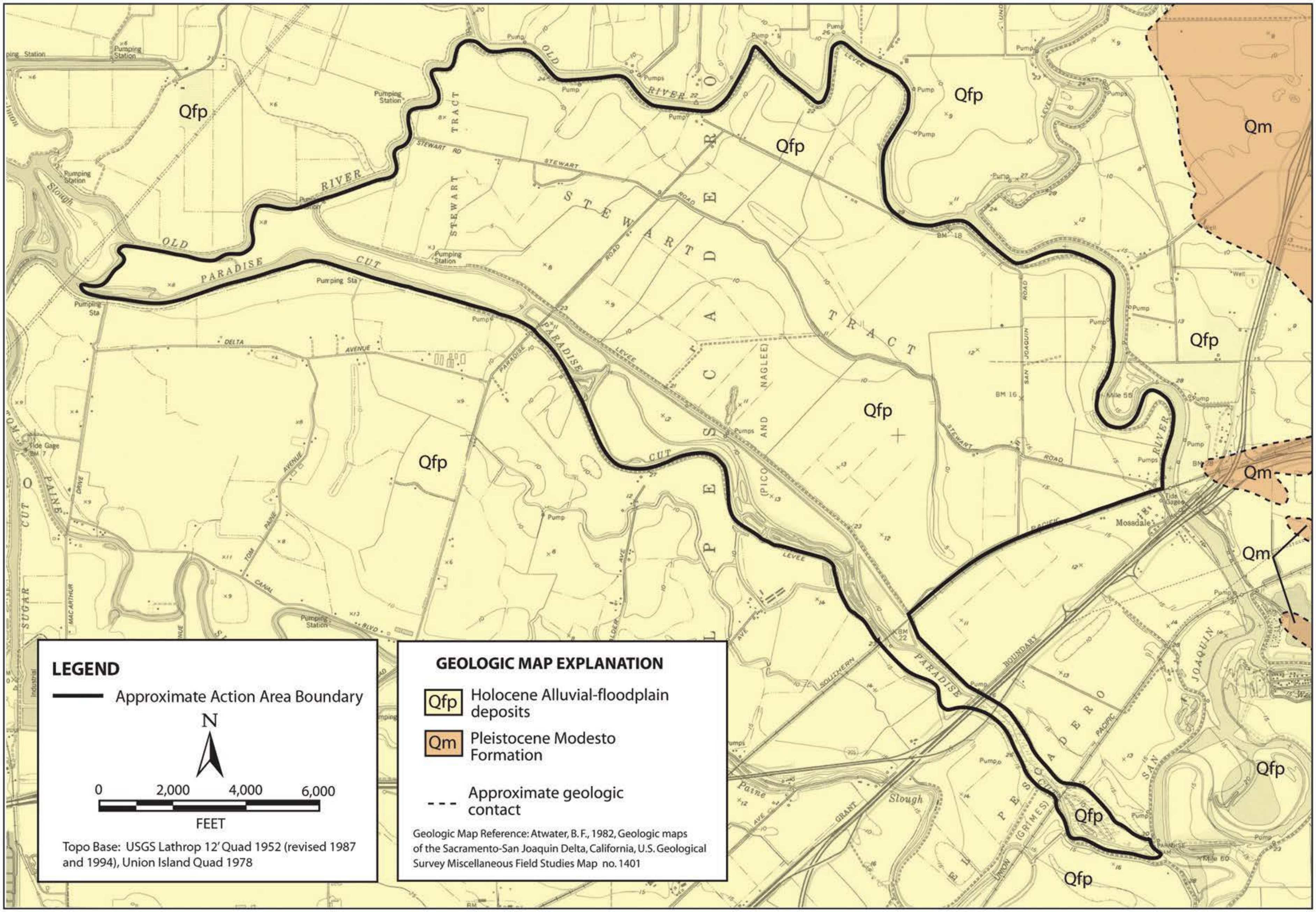

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Figure 8-1
Action Area Geologic Map

Mitigation Measure PALEO-1. Retain a qualified paleontologist for earthmoving activities at a depth of 15 feet or greater

A qualified paleontologist will be retained to inspect excavations at approximately 15 feet below ground surface and deeper to document the geology, lithology, and potential paleontological content. If paleontological materials are discovered during site preparation, excavation, or project-related activities, work will stop in the area of the find, the contractor will notify the City's project manager, and Mitigation Measure PALEO-2 will be implemented.

A paleontologist will be hired by River Islands to assess the nature and importance of the find and recommend appropriate treatment, consistent with SVP's 1995 guidelines and all other applicable standards of care. If the paleontologist identifies a need, a state-licensed professional geologist (California Registered Professional Geologist) will also be retained to assist with evaluating the potential for project work to further disturb the geologic units in which the find was made. Work will not resume in the area of the find until the find has been assessed by the paleontologist and any treatment identified as necessary has been implemented. However, with the paleontologist's approval, work may resume on other portions of the site during evaluation and treatment of the find.

Depending on the nature of the find, site-specific geologic conditions, and the project activities planned for the site, treatment might include paleontological monitoring and preparation and recovery of fossil materials so that they can be housed in an appropriate museum or university collection. Treatment also might include preparation of a report for publication describing the finds or other approaches developed for the site. River Islands will be responsible for ensuring that the paleontologist's recommendations regarding treatment and reporting are implemented.

Mitigation Measure PALEO-2. Prepare a paleontological mitigation plan if paleontological resources are discovered during construction

If paleontological materials are discovered, a paleontological mitigation plan will be developed and implemented for the proposed action. Consistent with the requirements of the Society of Vertebrate Paleontology Conformable Impact Mitigation Guidelines Committee (1995), the paleontological mitigation plan should contain guidance in the following areas.

- The contract and task order requirements for monitoring and mitigation.
- The general field, sampling, monitoring, and laboratory methods proposed.
- Any relevant curation requirements.
- An overview of report content and format.
- Proposed report distribution.
- Staff qualifications needed to implement the paleontological mitigation plan.

8.2.3.2 Alternative 2—No Alteration of Paradise Cut

Potential to damage unknown potentially unique paleontological resources (significant)

Under Alternative 2, the development area would be expanded by approximately 225 acres. However, this area would be underlain by the same deposits (i.e., Holocene alluvial floodplain deposits and Pleistocene Modesto Formation) as the proposed action area. Accordingly, the significant direct effects on paleontological resources would be the same as those of the proposed action, and the mitigation measures (PALEO-1 and PALEO-2) associated with the proposed action would apply. No indirect effects were identified.

8.2.3.3 Alternative 3—Avoidance of Central Drainage Ditch

Potential to damage unknown, potentially unique paleontological resources (significant)

Under Alternative 3, the proposed action would be built as proposed, except that the central drainage ditch and a 100-foot buffer on either side of it would be avoided, reducing the available development area by approximately 150 acres. However, this area would be underlain by the same deposits (i.e., Holocene alluvial floodplain deposits and Pleistocene Modesto Formation) as the proposed action area. Accordingly, the significant direct effects on paleontological resources would be the same as those of the proposed action, and the mitigation measures (PALEO-1 and PALEO-2) associated with the proposed action would apply. No indirect effects were identified.

8.2.3.4 Alternative 4—Proposed Action with Expanded Flood Risk Reduction

Potential to damage unknown, potentially unique paleontological resources (significant)

Alternative 4 would comprise the proposed action as well as expanded flood risk reduction. Because there would be no change in development of the proposed action area, the effects on paleontological resources would be the same those under the proposed action, and the mitigation measures (PALEO-1 and PALEO-2) associated with the proposed action would apply. Construction and operation of the additional flood risk reduction measures included in Alternative 4 could result in additional similar effects on paleontological resources, but the extent of effects cannot be anticipated in detail until the specifics of the additional improvements have been developed. Nevertheless, because of the similarity of the expanded action area, the character of the potential significant direct effects would be the same and the mitigation measures (PALEO-1 and PALEO-2) associated with the proposed action would apply. No indirect effects were identified.

8.2.3.5 Alternative 5—No Action

Potential to damage unknown, potentially unique paleontological resources (significant)

The No Action Alternative would entail construction an interior levee system rather than extended levees for flood risk reduction. Because the No Action Alternative would effectively involve the same development area as the proposed action, the significant direct effects on paleontological resources would be the same as those of the proposed action, and the mitigation measures (PALEO-1 and PALEO-2) associated with the proposed action would apply. No indirect effects were identified.

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Chapter 9
Land Use

This chapter analyzes the proposed action's and alternatives' potential effects relative to land use planning. Related discussions are found in Chapter 10, *Agricultural Resources*; Chapter 11, *Recreation*; and Chapter 21, *Cumulative Effects*.

The key sources of data listed below were used in the preparation of this chapter.

- *West Lathrop Specific Plan* (City of Lathrop 2003).
- *Comprehensive General Plan for the City of Lathrop, California* (City of Lathrop 2004).
- *Draft Subsequent Environmental Impact Report for the River Islands at Lathrop Project* (City of Lathrop 2002) and addenda (City of Lathrop 2005, 2007, 2012).

Specific reference information is provided in the text.

9.1 Affected Environment

9.1.1 Regulatory Framework

Land use planning is the province of local governments in California. All cities and counties in California are required by the state to adopt a general plan establishing goals and policies for long-term development, protection from environmental hazards, and conservation of identified natural resources (California Government Code 65300). Local general plans lay out the pattern of future residential, commercial, industrial, agricultural, open space, and recreational land uses within their communities. To facilitate implementation of planned growth patterns, general plans typically include goals and policies addressing the compatibility of land use patterns.

San Joaquin County and the City of Lathrop are the two entities exerting land use authority over the proposed action and alternatives. The land use planning documents pertaining to Stewart Tract and the proposed action are discussed briefly below.

9.1.1.1 San Joaquin County General Plan

The *San Joaquin County General Plan* (County General Plan) (San Joaquin County 1992) guides land use decisions to provide for orderly growth and to define communities' values and expectations for the future of San Joaquin County. At the time of this Draft EIS, the County is in the process of updating the 1992 County General Plan. The update was scheduled for adoption in 2011; in March 2011, the Alternatives Report was released for public review (San Joaquin County 2011). The County published the Staff Recommended Alternative on June 14, 2012. A program EIR will be prepared by the County prior to adoption of the General Plan Update.

According to the current County General Plan, the Lathrop planning area anticipates growth and expansion to the north, south, and west. Development policies specific to Lathrop include the following.

- Development on the west side of I-5 should be "phased" and "orderly," supported by adequate infrastructure within the City.
- The traffic circulation system internal to Lathrop should minimize reliance on freeways.
- Riparian vegetation along the San Joaquin River should be preserved; public access to the river should be established as riverfront development occurs.

9.1.1.2 City of Lathrop General Plan

The City's General Plan (City of Lathrop 2004) was adopted in December 1991 and most recently amended in November 2004. The General Plan reflects the long-range vision for physical development in the City. Since 1991, Stewart Tract has been identified as a primary sub-plan area to achieve long-term community and economic benefits for the City. The primary General Plan policy pertaining to Stewart Tract calls for preparation of a specific plan to guide and specify the distribution, location, and extent of land uses in this area. The specific plan prepared for Stewart Tract is discussed in *West Lathrop Specific Plan* below.

Chapter 1 of this EIS summarizes the evolution of the City's vision for Stewart Tract. The current General Plan (City of Lathrop 2004) states:

> Sub-Plan Area #3 [Stewart Tract] represents the largest remaining area in Lathrop that is available for future masterplanned development. The 5,794-acre Stewart Tract represents a unique opportunity to control phasing of a large-scale mixed use development designed to establish an integrated community environment west of Interstate 5.
>
> Sub-Plan Area #3 is envisioned as a master planned development integrating recreation-oriented residential villages, activities centers, recreation-oriented commercial enterprises, and a regional employment center, developed around a newly planned town center and regional commercial area. Recreational facilities will include a golf course, parks, ball fields, tennis courts, and other similar facilities. Development will take advantage of the proximity of the site to the San Joaquin Delta, by offering a marina, boating, water skiing, canoeing, fishing, wildlife excursions and other water-related activities.

9.1.1.3 West Lathrop Specific Plan

The WLSP (City of Lathrop 2003) lays out a blueprint for development in the southwestern portion of the City's planning area. According to the City's General Plan, specific plans are intended to be the primary instruments of general plan implementation. As such, the WLSP describes the proposed pattern of land uses; their nature and intensity; and the circulation, transit, public services, and utilities needed to serve the plan area, along with the implementation measures that will ensure the plan's viability.

Except for a small portion of Stewart Tract east of I-5, the WLSP plan area is within Lathrop city limits. The plan area comprises Stewart Tract (5,794 acres) and Mossdale Village (1,611 acres). The WLSP's land use plan envisions a sustainable, comprehensively designed community, balancing nonresidential with residential uses. Principal land uses include a mixed-use town center, an employment center, and varied housing types. Land uses also include parks, recreation areas, schools, and open space incorporated within major land uses, with the exception of Paradise Cut, which is designated as a conservation/open space area.

Stewart Tract, including the proposed action area, is zoned according to the 1999 Lathrop City Zoning Ordinance. However, as discussed in Chapter 1, the City's SEIR (City of Lathrop 2002) identified a potential conflict with the City's General Plan, and the General Plan and specific plan have subsequently been updated to reflect Measure D and mixed-use development on Stewart Tract (Figure 9-1).

9.1.2 Existing Conditions

9.1.2.1 Methods Used to Identify Existing Conditions

Information used to prepare this overview of existing land use conditions was collected from the City's General Plan, the WLSP, the City's SEIR for River Islands at Lathrop, personal correspondence with City staff, and site visits conducted on February 29, 2009, and June 3, 2010. The following discussion encompasses Stewart Tract and surrounding lands in the City, including Mossdale Landing housing developments and areas proposed for development under the River Islands at Lathrop proposal.

9.1.2.2 Land Use Setting

Stewart Tract (with the exception of the portion east of I-5) is within the City of Lathrop, San Joaquin County. An island in the Secondary Delta, Stewart Tract is bounded by the San Joaquin River on the east, Old River on the north, and Paradise Cut on the southwest (Figure 1-2). Paradise Cut is a flood risk reduction bypass connecting the San Joaquin River and Old River. Stewart Tract is within the WLSP plan area.

The proposed action area occupies more than half of Stewart Tract. Earlier phases of the project occupy the eastern portion of the RID Area (Figure 1-4), which is bounded on the southeast by the UPRR tracks.

Existing land uses on Stewart Tract, including the proposed action area, consist of large areas of agricultural lands and open space typical of the south Delta region. Currently, several residences in the proposed action area house caretakers of the property, seasonal agricultural workers, and a 28-acre horse ranch.

Land uses north and west of Stewart Tract are primarily agricultural lands. Land uses south and southeast of the RID Area include the I-5 corridor, the I-205 corridor, the UPRR tracks, a sand mining facility, additional rural residences, and farming structures. The City's town center is approximately 2 miles northeast of Stewart Tract: this is where the majority of existing commercial and industrial uses are concentrated. Mossdale Landing, which was part of the proposed development outlined in the WLSP, is across the San Joaquin River from earlier phases of the project and consists of suburban residential development, commercial uses, and a new City government center.

Earlier phases of the project were approved under CEQA and state and local authorizations (City of Lathrop 2003, 2005, 2007, 2012) and are currently in progress. Fill placement and levee alterations have been completed. Construction of the proposed residential and commercial development has recently begun.

9.2 Environmental Consequences

9.2.1 Methods for Analysis of Effects

Analysis of land use effects typically involves comparison of anticipated postproject conditions with a baseline condition to evaluate whether project-related changes in land use would be consistent with adopted land use planning documents (e.g., general plans, specific plans) and any relevant regulations such as zoning ordinances. A further assessment identifies the outcomes of any inconsistencies—for example, failure to provide needed housing or utilities service. Under NEPA, the baseline used to determine the effects of a proposed action is defined as the conditions existing at the time of issuance of the Notice of Intent (NOI) to prepare an EIS. The NOI for the proposed action was published in 2005 (70 FR 111 33885–33886, June 10, 2005). For the purposes of this land use analysis, the baseline condition includes the existing Mossdale Village housing development and CEQA clearance of River Islands at Lathrop Phases 1 and 2A, with the assumption that these phases of River Islands will be constructed independent of the proposed action.

Land use effects associated with the proposed action were assessed qualitatively, using information from correspondence with City staff and a review of relevant documents: the WLSP, the City's General Plan, the County General Plan, and the River Islands at Lathrop SEIR.

9.2.2 Definition of Significant Effects

Adverse effects related to land use typically relate to inconsistency with existing land use planning documents or policies, and the outcomes of such inconsistencies. An action that proposes land uses inconsistent with existing zoning or with the land use vision described in the applicable general plan is likely to have significant effects on land use. In addition, even if a proposed action is nominally consistent with existing plans, policies, and zoning, it would have the potential to have significant land use effects if it would construct features that are incompatible with existing or planned uses—for instance, construction of a highway that separates one part of an established community from another, or establishment of a manufacturing facility adjacent to existing schools or recreational uses. Operations and maintenance of an action are considered to have no effect on land use and are not discussed further in this section.

9.2.3 Effects and Mitigation Approaches

9.2.3.1 Alternative 1—Proposed Action

Consistency with land use plans (no effect)

The proposed action would directly result in substantial changes in land use on Stewart Tract by enabling development of the River Islands at Lathrop project. The proposed action would consist of 6,716 residential units (3,891 single-family and 2,825 multifamily homes); commercial space; public amenities such as boat docks, parks, open space, and other recreational facilities; schools; and revegetation along portions of the San Joaquin and Old River riverbanks, in compliance with the Corps' levee vegetation guidelines. Further, the WLSP designated land uses and provided zoning classifications to accommodate the development proposed under the River Islands at Lathrop project, including the proposed action area. No general plan or specific plan amendments would be required to support the proposed action (Ponton pers. comm.). Therefore, the proposed action

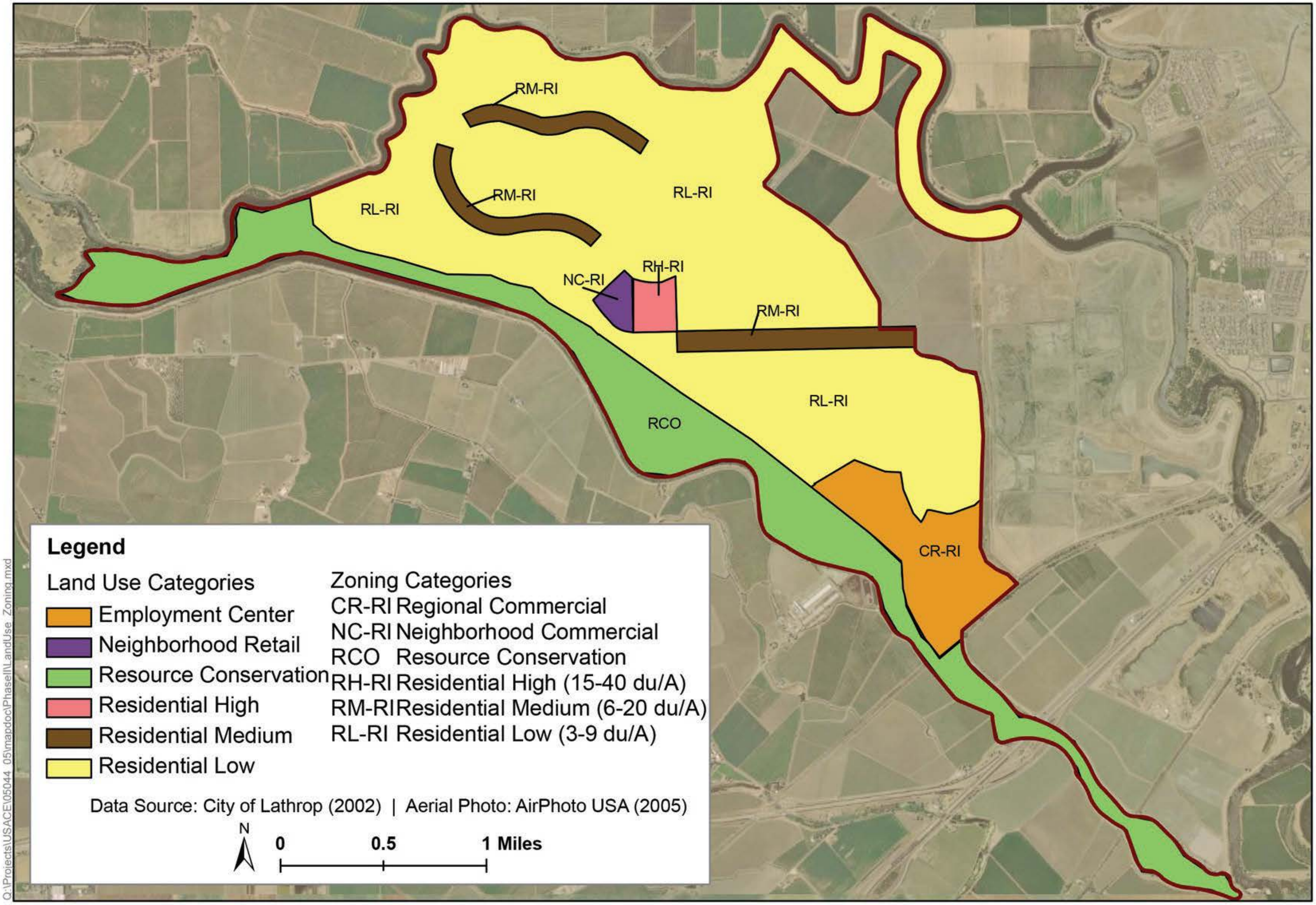

Figure 9-1
Existing Land Use and Zoning, Phase 2B Area

would be consistent with land use plans governing Stewart Tract and is considered to have no effect on land use.

Further indirect changes in the surrounding area could result from a leapfrog effect as the community is built out. However, because the direct changes would be consistent with the relevant local jurisdiction planning documents, and any additional growth would proceed as planned growth under City and County General Plans, related indirect changes in land use would have no effect from a land use planning perspective. Specific aspects or results of the change in land use—such as the conversion of agricultural lands to nonagricultural uses, loss of habitat for special-status species, increased noise levels, and pollutant generation—could be significant, but these represent issues specific to other resource topics and are addressed in the respective chapters in this EIS.

9.2.3.2 Alternative 2—No Alteration of Paradise Cut

Consistency with land use plans (no effect)

Under Alternative 2, residential and commercial development would occur as described for the proposed action. The existing Paradise Cut levee would be reconstructed and expanded on the landside, and approximately 225 additional acres would be available for residential development. Development density would be decreased under this alternative, but the overall project footprint and development concept would be very similar to those of the proposed action. Consequently, like the proposed action, Alternative 2 would be consistent with land use plans and policies. There would be no effects related to inconsistency with relevant planning documents.

9.2.3.3 Alternative 3—Avoidance of Central Drainage Ditch

Consistency with land use plans (no effect)

Alternative 3 would avoid all construction affecting the central drainage ditch, decreasing the available development footprint by approximately 150 acres. The reduction in development acreage would increase development density, but the overall project footprint and development concept would be very similar to those of the proposed action. The reduction in development acreage would not affect consistency with local general and specific planning documents. There would be no effects related to inconsistency with relevant planning documents.

9.2.3.4 Alternative 4—Proposed Action with Expanded Flood Risk Reduction

Consistency with land use plans (significant)

Alternative 4 would entail the proposed action along with expanded flood risk reduction, including a new bypass channel or channels west of the existing Paradise Cut flood bypass; more extensive widening of Paradise Cut; a widened Paradise Weir and an additional weir upstream of the existing Paradise Weir; and new flood storage areas. This alternative would require substantial additional acreage outside Stewart Tract, and could not be implemented without developing numerous landowner agreements. Additional acreage required to implement the expanded flood risk reduction component of this alternative would be outside the WLSP planning area and would likely require amendments to the City's or County's General Plan and the WLSP. Consequently, this alternative could have significant direct and indirect effects related to inconsistency with relevant planning documents. Additional analysis at the project level would be needed before this alternative could be implemented.; absent detailed design, it is not possible to quantify the severity of this effect.

9.2.3.5 Alternative 5—No Action

Consistency with land use plans (no effect)

The No Action Alternative would entail construction of an interior levee system rather than the use of extended levees for flood risk reduction. The No Action Alternative would not involve any waterside vegetation on project levees along the San Joaquin River, Old River, and Paradise Cut, nor would it include habitat restoration and enhancement activities associated with the PCC or PCIP Areas.

Because CEQA compliance has been completed for earlier phases of the project (City of Lathrop 2003, 2005, 2007) and these portions of the project would partially implement the City's General Plan and WLSP vision for Stewart Tract, construction and occupancy of these portions of the overall River Islands project would not directly result in inconsistency with land use plans or regulations. The No Action Alternative would effectively increase development density (due to the interior levee system and avoidance of the central drainage ditch), but the overall development concept would be very similar to that of the proposed action (that is, development of single- and multifamily residential units, commercial space, and public amenities and bridge construction), and effects would be essentially the same as those described for the proposed action. This alternative would continue to implement the City's approved planning vision for the WLSP area (albeit on a smaller scale), and is therefore considered consistent with the WLSP and the General Plan. No effects associated with consistency of land use plans are anticipated.

9.3 References

9.3.1 Printed References

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9.3.2 Personal Communications

Ponton, Marilyn. City of Lathrop Community Planning Director. City of Lathrop Planning Department, Lathrop, CA. March 11, 2009—email correspondence with ICF.

Chapter 10
Agricultural Resources

This chapter analyzes the proposed action's and alternatives potential effects related to agricultural resources. Related discussions are found in Chapter 9, *Land Use and Planning*, Chapter 19, *Socioeconomics*, and Chapter 21, *Cumulative Effects*.

The key sources of data listed below were used in the preparation of this chapter.

- Plans for the proposed project.
- *Draft Subsequent Environmental Impact Report for the River Islands at Lathrop Project* (City of Lathrop 2002) and Addenda (City of Lathrop 2005, 2007, 2012).GIS data from the California Spatial Library.
- Documents published by city, county, state, and federal agencies, including NRCS and the California Department of Conservation (DOC).
- Applicable elements from the City's General Plan and the WLSP.

Specific reference information is provided in the text.

10.1 Affected Environment

10.1.1 Regulatory Framework

The following sections describe the major federal and state programs that regulate agricultural resources in the action area, and how agricultural resources are integrated into land use planning by local agencies.

10.1.1.1 Federal Farmland Protection Policy Act

The Farmland Protection Policy Act (FPPA) of 1984 requires federal agencies to consider how their activities or responsibilities may affect farmland. To comply with the FPPA, the federal lead agency must consult with NRCS and complete a Land Evaluation and Site Assessment (LESA) for each affected site or area. LESA is a point-based approach that rates the relative importance of agricultural land resources on the basis of specific measurable factors. Under the LESA system, proposed project sites are rated for several criteria, including soil quality and existing land use. The resulting score is a quantitative indicator of the impact that the proposed action or program may have on farmland.

Projects are required to comply with the FPPA if they may result in irreversible conversion of farmland to nonagricultural use and would be completed by or with assistance from a federal agency. This includes all projects that involve federal land acquisition, land disposal, or property management; projects that receive federal financing, including loans; and projects that receive technical assistance from a federal agency. FPPA compliance is not required if federal involvement in the project is limited to permitting or licensing.

10.1.1.2 State Programs and Regulations

Farmland Mapping and Monitoring Program

DOC's Farmland Mapping and Monitoring Program (FMMP), administered by the Division of Land Resource Conservation, is responsible for mapping and monitoring farmland for most of the state's agricultural areas. The FMMP updates its farmland maps every 2 years based on information from local agencies. FMMP maps show five categories of agricultural lands and three categories of nonagricultural lands.

Agricultural Lands

- *Prime Farmland* is defined as "irrigated land with the best combination of physical and chemical features able to sustain long-term production of agricultural crops." Prime Farmland has the soil quality, growing season, and moisture supply needed to produce sustained high yields. To be designated as Prime Farmland, the land must have been used for production of irrigated crops at some time during the 4 years prior to the mapping date.
- *Farmland of Statewide Importance* is defined as "irrigated land similar to Prime Farmland that has a good combination of physical and chemical characteristics for the production of agricultural crops." However, this land has minor shortcomings, such as steeper slopes or less ability to store soil moisture than Prime Farmland. To be designated as Farmland of Statewide Importance, the land must have been used for production of irrigated crops at some time during the 4 years prior to the mapping date.
- *Unique Farmland* is considered to consist of lower quality soils but nonetheless is used for production of the state's leading agricultural crops. Unique Farmland is usually irrigated, but may include non-irrigated orchards or vineyards in some climatic zones. To qualify for this designation, the land must have been used for crops at some time during the 4 years prior to the mapping date.
- *Farmland of Local Importance* is land identified as important to the local agricultural economy by each county's board of supervisors and a local advisory committee.
- *Grazing Land* is land on which the existing vegetation is suited to the grazing of livestock. This category was developed in cooperation with the California Cattlemen's Association, the University of California Cooperative Extension, and other groups interested in the extent of grazing activities.

The minimum mapping unit for all agricultural land categories except Grazing Land is 10 acres. The minimum mapping unit for Grazing Land is 40 acres.

Prime Farmland, Farmland of Statewide Importance, and Unique Farmland are the most suitable for agriculture and are considered especially important agricultural resources. Along with Farmland of Local Importance, they are often referred to collectively as *important farmland*. Grazing Land may also qualify as important farmland where grazing is a key component of the local economy. Consistent with this trend, this EIS includes Grazing Land as important farmland because of the importance of grazing to the action area's economy.

Nonagricultural Lands

- *Urban and Built-Up Lands* is land occupied by structures with a building density of at least one structure to 1.5 acres, or approximately six structures to a 10-acre parcel. This type of land is used for residential, industrial, commercial, construction, institutional, and public administration purposes; railroad and other transportation yards; cemeteries; airports; golf courses; sanitary landfills; sewage treatment facilities; water control structures; and other developed purposes.
- *Other Land* is land not included in any other mapping category. Examples include low-density rural developments and brush, timber, wetland, and riparian areas not suitable for livestock grazing. This category also includes vacant and nonagricultural land surrounded on all sides by urban development; confined livestock, poultry, or aquaculture facilities; strip mines; borrow pits; and water bodies smaller than 40 acres.
- *Water* denotes perennial water bodies with an extent of at least 40 acres.

California Land Conservation Act (Williamson Act)

Under the provisions of the Williamson Act (California Land Conservation Act of 1965, Section 51200), landowners contract with the county to voluntarily restrict their land to agricultural, open-space, and compatible uses in return for reduced property tax assessment. In return for the preferential tax rate, the landowner must agree not to develop the land for a minimum 10-year period. Contracts are automatically renewed annually unless a party to the contract files for nonrenewal or petitions for cancellation. If the landowner chooses not to renew the contract, the contract expires at the end of its duration. Under certain circumstances described in the Williamson Act, a county or city may approve cancellation of a Williamson Act contract. Cancellation requires private landowners to pay back taxes and cancellation fees. Cancellations are subject to oversight by DOC, which advises the county regarding whether DOC considers the cancellation to be consistent with the Williamson Act (Government Code Section 51284.1).

10.1.1.3 Local Regulations

City of Lathrop Right-To-Farm Ordinance

In 1991, the City adopted the Agricultural Land Preservation Ordinance, known as the Right-to-Farm Ordinance. The ordinance is intended to conserve and protect agricultural land and limit cases in which agricultural operations may be considered a nuisance (Lathrop Municipal Code, Chapter 15.48). The ordinance requires a disclosure notice to be provided to notify prospective property buyers that, if the property in consideration is in the vicinity of agricultural land, exposure to certain inconveniences associated with normal agricultural operations (e.g., fertilizing, spraying, irrigation, cultivation) may occur.

City of Lathrop General Plan

The *Resource Management Element* of the City's General Plan (City of Lathrop 2004) contains four agricultural land policies, two of which may be relevant to the proposed project.

> **Policy 2:** Exclusive agricultural zoning shall be continued on agricultural lands outside the boundaries of the three sub-plan areas.

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

The General Plan also has four phasing considerations specific to planned development on Stewart Tract. Policy 3 is applicable to agricultural resources on the project site.

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

West Lathrop Specific Plan

Augmenting the City of Lathrop's General Plan, the WLSP was originally developed in 1996 and most recently amended in 2007 to clarify the vision and define the land use concepts for Stewart Tract, as well as to develop a realistic implementation plan for development. Objective 5A of the Specific Plan relates to agricultural resources in the proposed action area.

Objective 5A: Arrange phases of development to allow on-going agricultural operations in the plan area to continue as long as feasible.

While the approved WLSP provides development zoning designations for the proposed project site, it calls for concentrated rather than dispersed development to ensure that agricultural activities continue as long as is practicable.

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

The SJMSCP provides a strategy for balancing the need to conserve open space with the need to develop open space, while providing for the long-term management of nearly 100 plant, fish, and wildlife species—especially those that are listed or may become listed under ESA or CESA. The SJMSCP was developed to avoid, minimize, and mitigate effects on plant and wildlife habitat that would result from the conversion up to 109,302 acres of open space land to non–open space uses, projected to occur in San Joaquin County between 2001 and 2051 (San Joaquin County 2000). Participation in the SJMSCP provides mitigation for impacts on covered special-status plant and wildlife species, but it also provides some compensation to offset impacts of open space land conversion on non–wildlife-related resources, such as agriculture. The SJMSCP relies on minimization of potential take through implementation of take avoidance and minimization measures and compensation for incidental take and loss of habitat through payment of fees (or in-lieu land dedication) for conversion of open space lands. These fees are used for preservation and creation of habitats to be managed in perpetuity through the establishment of preserves.

Participation in the SJMSCP is voluntary for local jurisdictions and project proponents. The City of Lathrop adopted the SJMSCP on January 16, 2001, and has signed the implementation agreement. As a result of the City's participation in the SJMSCP, project proponents within the City's jurisdiction have the opportunity to seek coverage under the SJMSCP.

10.1.2 Existing Conditions

10.1.2.1 Methods Used to Identify Existing Conditions

The RID Area is located on Stewart Tract near the southern edge of the Sacramento–San Joaquin River Delta. Agricultural lands in the proposed action area encompass approximately 3,491 acres, comprising portions of the RID and PCC Areas. The PCIP Area contains no agricultural lands. A variety of crops, including alfalfa, corn, tomatoes, and melons, have been produced on the lands in the proposed action area. Of the 3,491 acres of farmland in the proposed action area, approximately 2,600 acres—approximately 60% of the gross acreage of the proposed action area—were planted in various crop types in 2010. The remaining 891 acres constitute lands not suitable for farming. They consist of a horse farm, buildings, roads, and other facilities.

Table 10-1 shows the acreages of crop types grown on the project site in 2010.[1]

Table 10-1. Acreage of Crops Grown in 2010 in the Proposed Action Area

Crop	Acreage in the Proposed Action Area
Alfalfa	91
Wheat	300
Safflower	214
Corn	600
Tomatoes (shipped)	200
Tomatoes (processed)	387
Pumpkins	800
Total	2,592

Source: Dell'Osso pers. comm.

Of the 3,491 acres in the proposed action area, the DOC has mapped approximately 2,938 acres as Prime Farmland and 204 as Farmland of Statewide Importance (Figure 10-1) (California Department of Conservation 2006a). In 2010, San Joaquin County was estimated to support 614,994 acres of important farmland: 385,337 acres of Prime Farmland, 83,307 acres of Farmland of Statewide Importance, 69,481 acres of Unique Farmland, and 76,869 of Farmland of Local Importance (Table 10-2). To place these data in context, the proposed action area contains roughly 0.6% of the important farmland in San Joaquin County.

Under the FMMP, an analysis of agricultural land use and changes in land use throughout California is conducted every other year. Between 1998 and 2010, the amount of Prime Farmland in San Joaquin County has steadily decreased, due primarily to land use conversions. Table 10-2 lists the acreages of important farmland in San Joaquin County calculated by the DOC during that period. Prime Farmland and Farmland of Statewide Importance show declines in acreage amounts. Designation of new areas as Unique Farmland and Farmland of Local Importance has resulted in net increases for these categories.

[1] Data from 2010 were used to assess crop values and loss of production value.

Table 10-2. Acreages of Important Farmland in San Joaquin County

Land Use Category	1998	2000	2002	2004	2006	2008	2010
Prime Farmland	429,168	423,158	415,527	412,550	407,609	396,985	385,337
Farmland of Statewide Importance	96,795	93,846	92,521	91,222	89,274	86,299	83,307
Unique Farmland	52,715	57,977	61,849	62,535	63,232	66,624	69,481
Farmland of Local Importance	53,682	56,009	56,507	57,808	59,965	65,788	76,869
Total	632,360	630,990	626,404	624,115	620,080	615,696	614,994

Sources: California Department of Conservation 2000, 2002, 2004, 2006b, 2010, 2012.

10.2 Environmental Consequences

10.2.1 Methods for Analysis of Effects

The evaluation of agricultural resources is based on a comparison between existing and planned future loss of agricultural land, as well as review of relevant land use plans and policies in the proposed action area, to determine if the proposed land conversion would directly or indirectly affect agricultural operations in the proposed action area. Data from 2010 were used to assess crop values and loss of production value.

10.2.2 Definition of Significant Effects

NEPA analysis of effects on agriculture assumes that agriculture is inherently valuable as an important aspect of the economy. Accordingly, significant effects on agricultural resources typically relate to a proposed action's potential to decrease the extent of available agricultural lands or to limit agricultural productivity. Decrease of available agricultural land or limitation of productivity can occur directly through conversion of agricultural lands to other uses (e.g., development) or indirectly as a result of introducing an increasing number of incompatible land uses into an agricultural area or through decrease in the water supply or transportation availability needed to support agricultural success. Operations and maintenance of an action are considered to have no effect on agricultural resources and are not discussed further in this section.

10.2.3 Effects and Mitigation Approaches

10.2.3.1 Alternative 1—Proposed Action

Conversion of important farmland to non-agricultural uses (significant)

Construction of the proposed action would directly affect important farmland through the permanent conversion of approximately 2,938 acres and 204 acres of Prime Farmland and Farmland of Statewide Importance, respectively, as designated by the FMMP. This permanent conversion represents 0.8% of Prime Farmland and 0.2% of Farmland of Statewide Importance within San Joaquin County (Table 10-2). Associated losses in annual production value (derived from the values of the crops grown on Stewart Tract in 2010 as shown in Table 10-1) are approximately

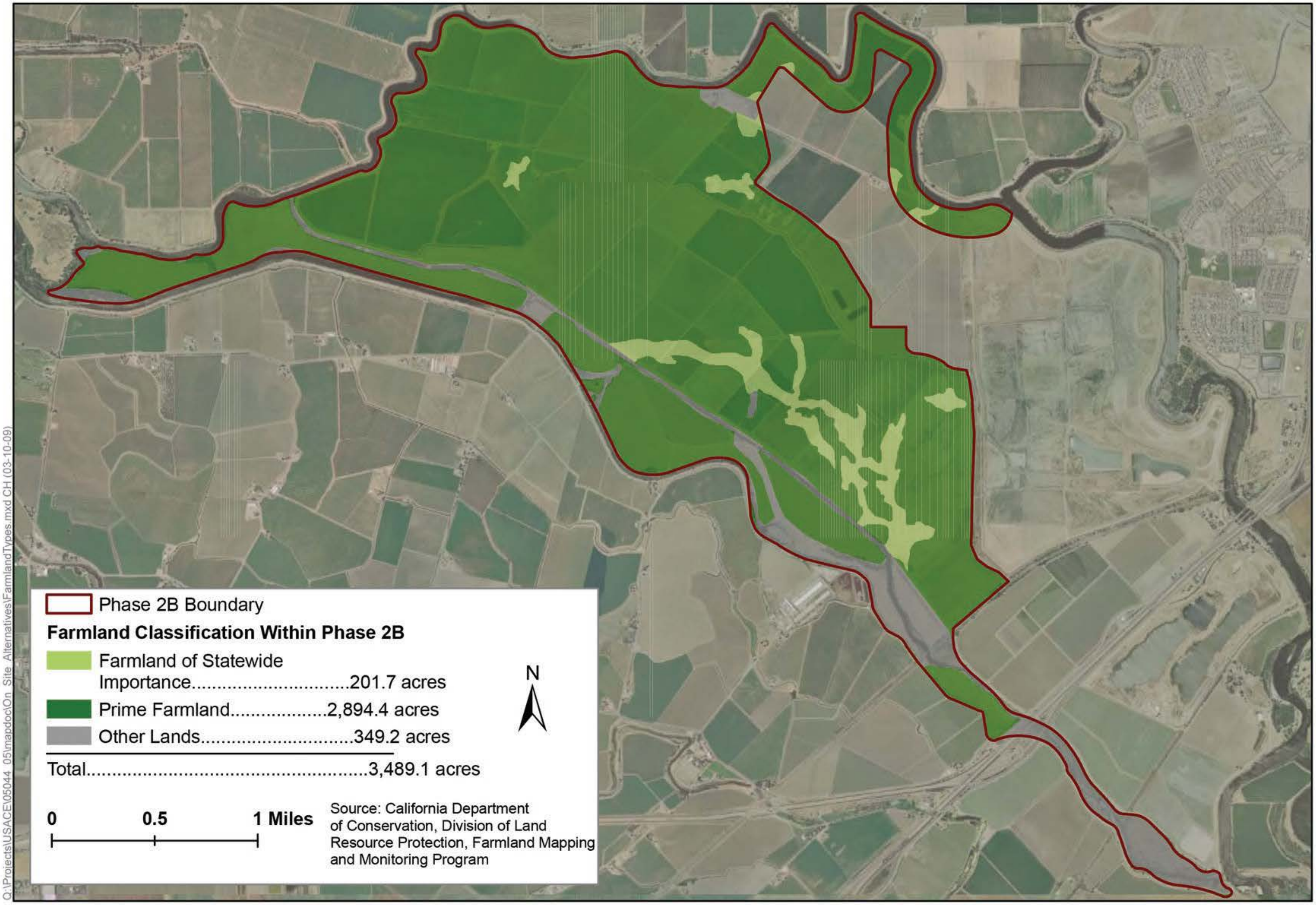

Figure 10-1
Farmland Classification in the River Islands Study Area

$7,604,000 (San Joaquin County 2010). It is assumed that agricultural lands in the proposed action area would remain in production until construction activities begin, currently scheduled for 2016.

In 2010, San Joaquin County estimated the gross value of agricultural production at $1,960,086,000. This represents a decrease of about 2% from a 2009 estimated gross value of $2,000,473,000. The loss of production associated with the proposed action, or around $7,604,000, would constitute approximately 0.39% of the County's total for 2010. Mitigation Measure AG-1 would address this significant direct effect. No indirect effects were identified.

Mitigation Measure AG-1. Compensate for conversion of important farmland

The City of Lathrop would participate in the SJMSCP. Fees would be paid to the SJCOG on a per-acre basis for lost agricultural land during development of the proposed action. The SJCOG uses these funds to purchase conservation easements on agricultural and habitat lands in the project vicinity (in the Central Index Zone identified in the SJMSCP). The preservation in perpetuity of agricultural lands through the SJMSCP, a portion of which would consist of Prime Farmland and Farmland of Statewide Importance, would ensure the continued protection of farmland in the project vicinity, partially offsetting project impacts. However, because easements are purchased for land exhibiting benefits to wildlife, including a combination of habitat, open space, and agricultural lands, the overall compensation provided by the fee contribution for the proposed project would result in a ratio of less than 1:1 of compensation specifically for agricultural land. In addition, no new farmland would be made available, and the productivity of existing farmland would not be improved as a result of SJMSCP implementation. Nevertheless, because no new farmland is being created, the effect cannot be fully offset.

Adjacent landowner/user conflicts (significant)

In locations where agricultural activities occur in close proximity to urban development, conflicts can arise. Noise, dust, and odors associated with standard agricultural practices are all potential indirect sources of disturbance to residential and commercial uses. Similarly, agricultural operations adjacent to residential and commercial areas can be subject to social pressures arising from residents' reaction to those disturbances, as well as the expansion of development into agricultural areas.

The RID Area and adjacent offsite agricultural operations are naturally buffered by the Old River, San Joaquin River, and Paradise Cut. The distance between homes and offsite agricultural activities would range from about 150 to several hundred feet, given the width of the rivers, the Paradise Cut Canal, and the levees on the opposite side of the rivers (City of Lathrop 2003). This physical separation is expected to reduce long-term conflicts between RID Area and offsite agricultural land uses, and the indirect effects related to conflict with offsite agricultural uses are anticipated to be less than significant. No direct effects were identified.

Within Stewart Tract, where development will abut ongoing agricultural operations, indirect conflicts could arise if appropriate barriers (fencing, walls, or other effective barriers) are not utilized. Mitigation Measure AG-2 would address this potentially significant indirect effect.

Mitigation Measure AG-2. Require buffer distance to adjacent landowners

The following actions are consistent with those included in the WLSP EIR to address this impact. River Islands would phase the development of agricultural lands in the RID Area to avoid the fracturing or fragmentation of continuing agricultural operations. As development occurs in the RID Area, fencing, walls, or other suitable barriers (e.g., watercourses) will be established at the interface between development and adjacent agricultural lands. In addition, a buffer zone of at least 150 feet will be provided between the edge of residential or commercial development and the adjacent agricultural land. The City will include the buffer as a condition of development approval, with the buffer being maintained until the next phase of development over the adjacent agricultural land is approved. Growers cultivating lands in the RID and PCC Areas that are near or adjacent to urban development will comply with all necessary federal, state, and local restrictions regarding buffers between pesticide/herbicide applications and sensitive areas such as schools, residences, and parks. Required buffer distances may vary depending on the type of chemicals used and the method of application. Residents and other individuals purchasing property near agricultural lands will be provided information on the types of conflicts that might occur and appropriate means to address these conflicts, consistent with the City's Right-to-Farm Ordinance.

10.2.3.2 Alternative 2—No Alteration of Paradise Cut

Under Alternative 2, the Paradise Cut levee would be reconstructed and expanded on the landside, and approximately 225 additional acres would be available for residential development, allowing a reduction in the density of single-family development. However, although the acreage available for development would increase slightly, the total acreage of converted agricultural lands would be the same.

Conversion of important farmland to non-agricultural uses (significant)

The significant direct effects related to agricultural conversion under Alternative 2 would be generally similar those under the proposed action. However, because the proposed action would entail the eventual loss of about 100 acres of agricultural land in the PCC Area, Alternative 2, by forgoing these alterations, would result in a slightly reduced level of loss of agricultural lands compared to the proposed action. No indirect effects were identified. Mitigation Measure AG-1 would partially offset the direct effect of agricultural conversion, but would not provide full compensation. No other feasible mitigation approach has been identified. Some net loss of agricultural lands would be unavoidable.

Adjacent landowner/user conflicts (significant)

Under Alternative 2, additional acreage would be available for residential development, reducing the density of single-family development. Nevertheless, the distance to offsite agricultural activities would be minimally altered, and the significant indirect effects would be generally the same as those under the proposed action. No direct effects were identified. Mitigation Measure AG-2 would address this effect.

10.2.3.3 Alternative 3—Avoidance of Central Drainage Ditch

Under Alternative 3, the proposed action would be altered to avoid all construction affecting the central drainage ditch, decreasing the available development footprint by about 150 acres.

Conversion of important farmland to non-agricultural uses (significant)

Although the amount of acreage available for development would decrease under Alternative 3, the overall development footprint would remain the same, and the acreage of converted agricultural lands would be the same. No indirect effects were identified. Mitigation Measure AG-1 would address this significant direct effect.

Adjacent landowner/user conflicts (significant)

The distance from the development areas to offsite agricultural operations under Alternative 3 would be the same as under the proposed action, and the potential for indirect landowner/user conflicts would be the same. No direct effects were identified. Mitigation Measure AG-2 would address this significant indirect effect.

10.2.3.4 Alternative 4—Proposed Action with Expanded Flood Risk Reduction

Alternative 4 would entail the same development components as the proposed action, as well as additional flood risk reduction elements. Alternative 4 would involve substantial additional acreage outside Stewart Tract and could not be implemented without developing numerous landowner agreements. Approximately 500 additional acres would be required (acquired by landowner agreement) to develop the new bypass channel and construction of adjacent levee segments. Some farmlands affected by this alternative's widening of Paradise Cut could remain in production but would be allowed to inundate during periodic flood events, returning to farmland use after the flood flows subside. In addition, existing farmlands would be utilized, pending landowner agreements, for flood storage to decrease peak flood flows and to allow for "queuing" of floodwaters into Paradise Cut and the proposed new bypass. Farmlands supporting such easements would remain in full production except when supporting flood storage.

Conversion of important farmland to non-agricultural uses (significant)

Alternative 4 would result in more extensive conversion of agricultural lands than would the proposed action, although the extent of the increase cannot be quantified at this time due to the programmatic nature of Alternative 4. The loss of production value associated with implementation of Alternative 4 could also be substantial. Depending on how many of the additional 500 acres would be permanently removed from active cultivation and on crop type allocation, the additional resulting production loss could range from $41,000 to $441,000. Direct effects related to agricultural conversion would be significant. Mitigation Measure AG-1 would provide partial compensation for Alternative 4 agricultural conversion, but would not fully offset the significant direct effect, and no additional feasible mitigation has been identified. No indirect effects were identified.

Adjacent landowner/user conflicts (significant)

The commercial and residential footprint of the proposed action would not change under this alternative. However, the project boundaries would expand to include substantial additional acreage outside Stewart Tract, as well as outside the project area for which the City has committed to mitigation through the CEQA process. Because this alternative would potentially directly affect active farmlands through land management changes, indirect conflicts between landowners and users could occur if adequate land use agreements are not developed. In addition to implementation of Mitigation Measure AG-2, similar mitigation to specifically address the areas involved in expanded flood risk reduction would need to be developed.

10.2.3.5 Alternative 5—No Action

The No Action Alternative would entail construction of an interior levee system rather than extended levees for flood risk reduction.

Conversion of important farmland to non-agricultural uses (significant)

The No Action Alternative would have the same significant direct effect related to agricultural conversion as would the proposed action. This conversion would be partially mitigated by the City's participation in the SJMSCP, but because it cannot be fully offset, some net loss would be unavoidable. No indirect effects were identified. Mitigation Measure AG-1 would address this significant direct effect.

Adjacent landowner/user conflicts (significant)

Under the No Action Alternative, residential and commercial development would proceed as described under the proposed action, and the significant indirect effects related to proximity of agricultural operations and residential/commercial development would be the same. No direct effects were identified. Mitigation Measure AG-2 would address this indirect effect.

10.3 References

10.3.1 Printed References

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10.3.2 Personal Communication

Dell'Osso, Susan. Project Director, River Islands at Lathrop. August 30, 2011—email to Megan Smith of ICF regarding the 2010 crop acreage amounts for the proposed action area.

Chapter 11
Recreation

This chapter analyzes the proposed action's and alternatives' potential effects on recreation. Related discussions are found in Chapter 9, *Land Use*, and Chapter 17, *Public Services and Utilities*.

The key sources of data listed below were used in the preparation of this chapter.

- *Draft Subsequent Environmental Impact Report for the River Islands at Lathrop Project* (City of Lathrop 2002) and addenda (City of Lathrop 2003, 2005, 2007, 2012).
- *Comprehensive General Plan for the City of Lathrop, California* (City of Lathrop 2004a).
- *West Lathrop Specific Plan* (City of Lathrop 2003).
- *Lathrop Bicycle Transportation Plan* (City of Lathrop 2004b).
- *River Islands at Lathrop Urban Design Concept* (The SWA Group 2002).

Specific reference information is provided in the text.

11.1 Affected Environment

11.1.1 Regulatory Framework

11.1.1.1 State Regulations

The Quimby Act

The Quimby Act authorizes cities and counties to require the dedication of parks and recreational land or the payment of fees as a condition of tentative subdivision map approval when the city or county has adopted a general plan containing policies and standards for parks and recreation facilities. These dedications and/or fees must be proportional to the effects caused by new residential development (California Government Code [CGC] 66477).

The City has collected Quimby Act fees since its incorporation in 1989. Before 1989, San Joaquin County collected Quimby Act fees in the area. The County turned over these funds to the City when it was incorporated. These fees contribute to a fund established to acquire properties for parkland. The City will continue to collect fees to meet the General Plan parkland requirement (City of Lathrop 2002:4.12.3). Past developments (both City and County) have paid their fair share. New development must meet Quimby Act requirements (Houx pers. comm.).

Subdivision Map Act

The Subdivision Map Act gives cities and counties the authority to regulate the design and improvement of subdivisions, to require dedications of public improvements or related impact fees, and to require compliance with the objectives and policies of general plans. Among other provisions, the act confers upon the City the authority to require that land (or in-lieu fees) be dedicated to recreational uses, consistent with requirements established in the General Plan, as a condition to the approval of a tentative subdivision map.

11.1.1.2 Local Regulations

City of Lathrop General Plan

The *Resource Management Element* of the City's General Plan includes several policies and standards related to recreation. The recreation policies excerpted below are applicable to the proposed action and alternatives.

1. It is the policy of the City and the School Districts, functioning under a joint powers or other appropriate written agreement, to provide the quantity and quality of recreation opportunity necessary for individual enjoyment and to assure the physical, cultural and spiritual benefit of recreation for all people of the community.

4. The range of recreation opportunities … will be provided through the development of general and specialized areas and facilities at the neighborhood and community level throughout the urban area.

7. The City will encourage and, where appropriate, require the provision of recreation areas and facilities within residential areas and the community as a whole to meet the general and specialized needs of existing and future residents. The Recreation component of the Resource Management Element of the General Plan is intended to meet the criteria and standards required by the State Subdivision Map Act and by the Quimby Act for determining financial responsibilities of developers in meeting recreation needs of the community. (City of Lathrop 2004a, pp. 5-15–5-17.)

The General Plan discusses three types of outdoor recreational areas that encompass a range of active and passive recreational uses—Neighborhood Park, Community Park, and Landscaped Open Space Corridor (City of Lathrop 2004a:5-17–5-18.). Overall, the General Plan states that in determining the amount of land dedication, land development, and/or in-lieu fee required of a developer, the requirement shall not exceed a combined standard of 5 acres per 1,000 City residents for neighborhood and community parkland (City of Lathrop 2004a:5-21). Acreage requirements for specific park types are provided in the subsequent sections.

Neighborhood Park

Typically, a neighborhood is considered to be the area served by a single elementary school. Neighborhood parks, then, generally serve 1,000 or more residences and a population of 2,500–3,500. The General Plan standard for neighborhood parks is 2.0 acres for every 1,000 persons.

Neighborhood parks should be within walking distance of the residences they are intended to serve, and every residence should be within 0.33–0.5 mile of a neighborhood park. Neighborhood parks are frequently situated adjacent to elementary school sites. Such combined facilities are designed to provide space and services (indoor and outdoor) for both students and the general public. Neighborhood parks that are not in combination with school sites should encompass 3.0–5.0 acres and may be designed to include drainage basin functions.

Mini-parks are a subset of neighborhood parks described in the General Plan. Mini-parks are smaller than the General Plan neighborhood park standard of 2.0 acres per every 1,000 persons. Mini-parks may be considered in combination with larger neighborhood parks to meet the General Plan standard.

Community Park

A community is considered in the General Plan to be the area served by a single high school. Community parks serve a larger user group than do neighborhood parks. The standard for community parks as established in the General Plan is 3.0 acres per 1,000 persons.

Community parks usually offer a wider range of recreation opportunities, which may include sports fields and courts, public swimming pools, community center buildings, picnic areas, and natural areas (City of Lathrop 2004a:5-18–5-19). Like neighborhood parks, community parks may be designed to include storm drainage features and functions (Houx pers. comm.).

Landscaped Open Space Corridor

Landscaped open space corridors vary depending on location and intent. They are broadly considered to provide a viable alternative to automobile transportation by supporting pedestrian and bicycle traffic within the community. They also serve to link the various elements of a community together in a harmonious manner. The General Plan identifies four types of landscaped open space corridors: pedestrian parkway or paseos, vehicle/pedestrian parkways, community-wide open space corridors, and landscaped buffer corridors.

West Lathrop Specific Plan

The WLSP establishes objectives to meet the goals of the City's General Plan. The objectives excerpted here pertain specifically to recreation.

Objective 3B: Provide central areas that act as focal points for community events, social gatherings and convenient shopping.

Objective 3C: Link all key activities such as schools, parks and retail with landscaped parkways or pedestrian-oriented corridors which encourage non-vehicular travel.

Objective 3D: Create ample outdoor and indoor areas for public gatherings and events that offer the chance for entertainment, education, relaxation and recreation for West Lathrop residents.

Objective 3F: Establish distinctive gateways welcoming travelers to West Lathrop.

Objective 3G: Create signature landscaped parkways and waterways that define an attractive image for West Lathrop.

Objective 3J: Create a West Lathrop park and open space system that is linked to citywide systems and is capable of linkage to regional open space and trails systems.

Objective 4D: Develop adequate and diverse recreational facilities for visitors and residents, for active and passive activities, especially along the San Joaquin River (City of Lathrop 2003:2-5–2-13).

The WLSP envisions a trail system throughout West Lathrop to encourage short walks or extended hikes; to connect the various components of community life (e.g., home life, schools, shopping); and to connect the physical components that make up the broader West Lathrop community. This system in River Islands at Lathrop would comprise paseos, sidewalks, a grand canal promenade, landscaped parkways, and lake and riverside paths (City of Lathrop 2003:IV-23–IV-24; The SWA Group 2002:I-66).

Lathrop Bicycle Transportation Plan

In 1995, the City approved and adopted a Bicycle Transportation Plan intended to provide a 20-year guide to develop a comprehensive bikeway system, consistent with the regional vision first articulated in the 1994 San Joaquin County Regional Bicycle Master Plan, which is currently undergoing an update process. To reflect the City's growth, the Bicycle Transportation Plan was amended in 2003 to include the River Islands portion of West Lathrop. In 2004, the plan was again amended to reflect the Central Lathrop Specific Plan.

The plan includes goals, policies, and programs for development of bikeways within Lathrop; specific to recreation, the Bicycle Transportation Plan contains the policies excerpted here.

A.1.c Bikeway access shall be provided to all schools, parks, recreation facilities, employment uses, shopping areas and public facilities.

B.1c. Adequate bike parking facilities shall be provided at all commercial, park, school, employment, recreation, and public places.

B.2.d Bicycle storage lockers should be provided to accommodate long term parking requirements at transit stops, park & rides, passenger rail stops, ferry and boat docks, and other applicable sites.

C.1.e Future marinas shall be designed for bike connections to modes of river transportation (City of Lathrop 1995:3-5–3-23).

The Bicycle Transportation Plan describes the general location of the proposed Class 1 paths and Class 2 lanes to be constructed as part of River Islands at Lathrop, including those within the proposed action area. The amended plan emphasizes flexibility in location and design of facilities in consideration of the innovative character of the River Islands at Lathrop project (City of Lathrop 2004b:3).

11.1.2 Existing Conditions

11.1.2.1 Methods Used to Identify Existing Conditions

Information used to prepare this overview of existing recreation conditions was collected from the City's General Plan, the WLSP, the City's SEIR for River Islands at Lathrop, and the City of Lathrop Bicycle Transportation Plan. The following sections discuss local recreational facilities in the project vicinity (Stewart Tract and City of Lathrop), as well as federal, state, and local recreational facilities in the general vicinity.

11.1.2.2 Recreation Setting

Stewart Tract is near the southern edge of the Sacramento–San Joaquin River Delta, which is composed of nearly 1,000 miles of navigable channels and supports water-based recreation opportunities such as fishing, water skiing, boat cruising, swimming, board sailing, and wind surfing. Other recreational activities in the Delta include camping, picnicking, walking, bicycling, wildlife viewing, sightseeing, hunting, and visiting cultural and historical sites (Delta Protection Commission 2007a).

The San Joaquin River and Old River provide many of the recreational opportunities in the project vicinity. Recreation in the project vicinity is primarily boating and fishing. Common activities include water skiing, wake boarding, sailing, operating personal watercraft (e.g., jet skis), house boating, fishing, swimming, boat camping, and wind surfing. Fishing along the banks of the San Joaquin River, Old River, and Paradise Cut is also popular. Boating is not limited by speed restrictions, except for within areas near marinas and/or other areas where people can enter the river by boat (City of Lathrop 2002:4.12-4–4.12-5).

11.1.2.3 Federal, State, and County Recreational Facilities

Federal, state, and county agencies manage a number of recreational facilities in the project region (Table 11-1).

Table 11-1. Federal, State, and County Recreational Facilities near Stewart Tract

Facility	County	Owner/Manager
San Joaquin River National Wildlife Refuge	Stanislaus County	U.S. Fish & Wildlife Service
White Slough Wildlife Area	San Joaquin County	California Department of Fish and Game
Woodbridge Ecological Reserve	San Joaquin County	California Department of Fish and Game
Mossdale Crossing County Park	San Joaquin County	San Joaquin County
Dos Reis County Park	San Joaquin County	San Joaquin County

San Joaquin River National Wildlife Refuge

Located about 8 miles west of Modesto in Stanislaus County, or about a 23-mile drive from Stewart Tract, San Joaquin River National Wildlife Refuge in Stanislaus County is the closest federal recreational facility to the proposed action area. Situated at the convergence of three major rivers (San Joaquin, Tuolumne, and Stanislaus), the refuge encompasses more than 7,000 acres of riparian woodlands, wetlands, and grasslands supporting a diversity of wildlife and providing a key movement corridor. Recreational uses center on environmental education and wildlife observation and photography (U.S. Fish and Wildlife Service 2009). The refuge also permits hunting and fishing as administered by CDFW.

White Slough Wildlife Area

Located about 13 miles north of Stockton and approximately 25 miles north of Stewart Tract, White Slough Wildlife Area encompasses 880 acres of canals, freshwater marshes, grasslands/uplands, riparian habitat, and human-constructed channels. Recreational opportunities include hunting (quail, pheasant, dove, and waterfowl), fishing, hiking, and wildlife viewing (California Department of Fish and Game 2009).

Woodbridge Ecological Reserve

Woodbridge Ecological Reserve is directly adjacent to the White Slough Wildlife Area near the City of Lodi. Also known as Isenberg Crane Reserve, Woodbridge Reserve provides seasonal sandhill crane habitat. Recreational opportunities focus on birdwatching and wildlife viewing (Delta Protection Commission 2007b).

Mossdale Crossing and Dos Reis Regional Parks

San Joaquin County operates two recreational facilities in the vicinity of Stewart Tract: Mossdale Crossing Regional Park, across the San Joaquin River from Stewart Tract, and Dos Reis Regional Park, farther north on the San Joaquin River in Lathrop. Mossdale Crossing Regional Park has a large, two-lane boat ramp with a floating dock and offers access to San Joaquin, Middle, and Old Rivers. It also provides shaded picnic areas. Dos Reis Regional Park provides 26 recreational vehicle campsites, tent camping (weekend), boat launching, picnic tables, barbecues, horseshoe pits, and a children's play area (San Joaquin County 2009).

Because the described facilities are open to the general public free of charge, except for camping fees at Dos Reis Regional Park, it is difficult to determine annual visitation patterns and use.

Additional parks, wilderness areas, and recreation areas are located more than 30 miles from the City of Lathrop. These include Mount Diablo State Park, Morgan Territory Regional Preserve, Black Diamond Mines Regional Preserve, Franks Tract State Recreation Area, Stanislaus County Park, Turlock Lake State Recreation Area, Carnegie State Vehicular Recreation Area, Lake Del Valle State Recreation Area, Del Valle State Recreation Area, Ohlone Regional Wilderness Area, Sunol Regional Wilderness Area, Kilkare Woods, and Devaney Regional Park.

11.1.2.4 City of Lathrop Facilities

The City of Lathrop currently operates two community parks, three neighborhood parks, and seven mini-parks throughout the City in addition to open space corridors and a specialty park (Table 11-2). The City also operates other types of recreational facilities, such as a senior center and a community center.

Table 11-2. Existing City of Lathrop Parks

Park Name	Acres
Community Parks	
Manuel Valverde Park	10.8
Mossdale Landing Community Park	20.2
Total	**31.0**
Neighborhood Parks	
Apolinar Sangalang Park	9.7
Park West	6.8
Woodfield Park	5.5
Total	**22.0**
Mini-parks	
Armstrong Park	0.4
Crescent Park	1.4
Libby Park	1.2
Milestone Park	1.0
Mossdale Commons	1.5
The Green	1.0
Thomsen Basin	0.8
Total	**7.3**
Open Space Corridors	
River Park North	3.5
River Park South	4.0
Total	**7.5**
Specialty Parks	
Skate Park	0.2
Total	**0.2**
Source: Houx pers. comm.	

The City's current population is estimated at 18,023 (U.S. Census Bureau 2011). According to the General Plan's standards, the City currently has a deficit of 18 acres of community parks and 4 acres of neighborhood parks (Table 11-3).

Table 11-3. Existing City Park Acreage Deficiencies per General Plan Standards

Park Type	Existing Acreage[a]	General Plan Standard	Acreage Needed	Acreage Deficit
Mini-/Neighborhood	29	2 acres/1,000 people	33	4
Community	31	3 acres/1,000 people	49	18

[a] Source: Houx pers. comm.

The City plans to purchase additional parkland using existing Quimby Act funds, and is planning at least two additional facilities (Houx pers. comm.).

- Basin Park is planned as a neighborhood park located just east of the San Joaquin River in the Mossdale Village development. It is expected to include child play structures, picnic tables, barbeque grills, tire swings, and a basketball court. The date of construction is uncertain. This facility would be provided by the developer.
- The East Lathrop Community Complex, proposed for the location of the existing skate park east of I-5 on the corner of 7th and L Streets, would expand the skate park by constructing a youth and teen center, a parking lot, child play structures, art walk, raised stage area and seating, and shade shelters and canopies. Construction of the East Lathrop Community Complex is expected to begin in 2013.

11.1.2.5 Private Facilities

Two private marina facilities offer recreational access to waterways in the vicinity of Stewart Tract. Located on the west side of the San Joaquin River near the Manthey Road Bridge, Mossdale Marina is a private houseboat marina with 23 boat berths and three picnic tables. It also provides showers, restrooms, and RV and camping sites. Haven Acres Marina, on the San Joaquin River north of the Dos Reis County Park, provides 10 boat berths, a boat ramp, and restrooms (Delta Protection Commission 2007c).

11.2 Environmental Consequences

11.2.1 Methods for Analysis of Effects

This analysis evaluates the effect of construction and operation of the proposed action and alternatives on the availability of existing and planned recreational facilities, and potential changes to existing recreational facilities and experiences. Because land-based and water-based recreational activities typically use different facilities, they were considered separately.

Effects on land-based activities were evaluated on the basis of demand for facilities resulting from the population increase that would be generated by the proposed action and alternatives. This analysis entailed comparison between the capacity of land-based facilities and the demand for such facilities upon buildout of the proposed action or alternatives. The quantification of demand was based on an estimate of project population at buildout, using population generation factors provided by the City of Lathrop and the parkland acreage requirements established in the City's General Plan.

Effects on water-based activities were evaluated on the basis of the changes in the character of water-based recreation anticipated as a result of the proposed action and alternatives. The City's General Plan does not establish numeric requirements for aquatic facilities such as boat docks, and while it is assumed that residents of River Islands at Lathrop would likely use facilities associated with River Islands rather than existing facilities located farther away, data concerning the numbers of River Islands at Lathrop residents who are likely to use the new facilities are not available, and any estimate would be highly speculative. Accordingly, analysis of effects on water-based recreation was qualitative rather than quantitative.

11.2.2 Definition of Significant Effects

The evaluation of effects on recreation typically addresses a proposed action's potential to degrade existing facilities, limit access to existing recreational facilities and uses, or increase demand beyond the capacity of the currently available facilities. These criteria were applied to land-based recreational activities for this analysis. However, because the proposed action and alternatives would include recreational facilities, these facilities were also considered in the analysis to the extent that they would meet the demands generated by the increased population.

In the absence of quantitative standards for the provision of aquatic recreational facilities, the proposed action would be considered to have a significant effect on water-based activities if it would result in an undesirable change in the character of users' experiences. Although this approach is subjective and qualitative, every effort was made to give consideration to the differing perspectives of various user groups.

11.2.3 Effects and Mitigation Approaches

11.2.3.1 Alternative 1—Proposed Action

Availability of local land-based recreational facilities and opportunities (no effect)

The proposed action would include 3,891 single-family homes and 2,825 multi-family homes at buildout. The City anticipates an occupancy rate of 3.2 persons per household for single-family homes and 2.5 persons per household for multi-family homes (Ponton pers. comm.). On the basis of these occupancy rates, the proposed action would generate 19,514 residents at buildout. To meet the City's General Plan standards, the new residents would require approximately 39 additional acres of neighborhood parks and 59 acres of community parks. These requirements and the acreages that would be provided by the proposed action are summarized in Table 11-4 and shown graphically in Figure 11-1.

Table 11-4. Comparison of Park Acreage Demand versus Availability

	Neighborhood	Community	Total
Park acreage needed[a]	39	59	98
Park acreage provided	144[b]	73	217

[a] Per General Plan standards, assuming a population at buildout of 19,514, as discussed in text.
[b] Combined acreage for lakefront parks, river vista parks, and village parks and paseos.

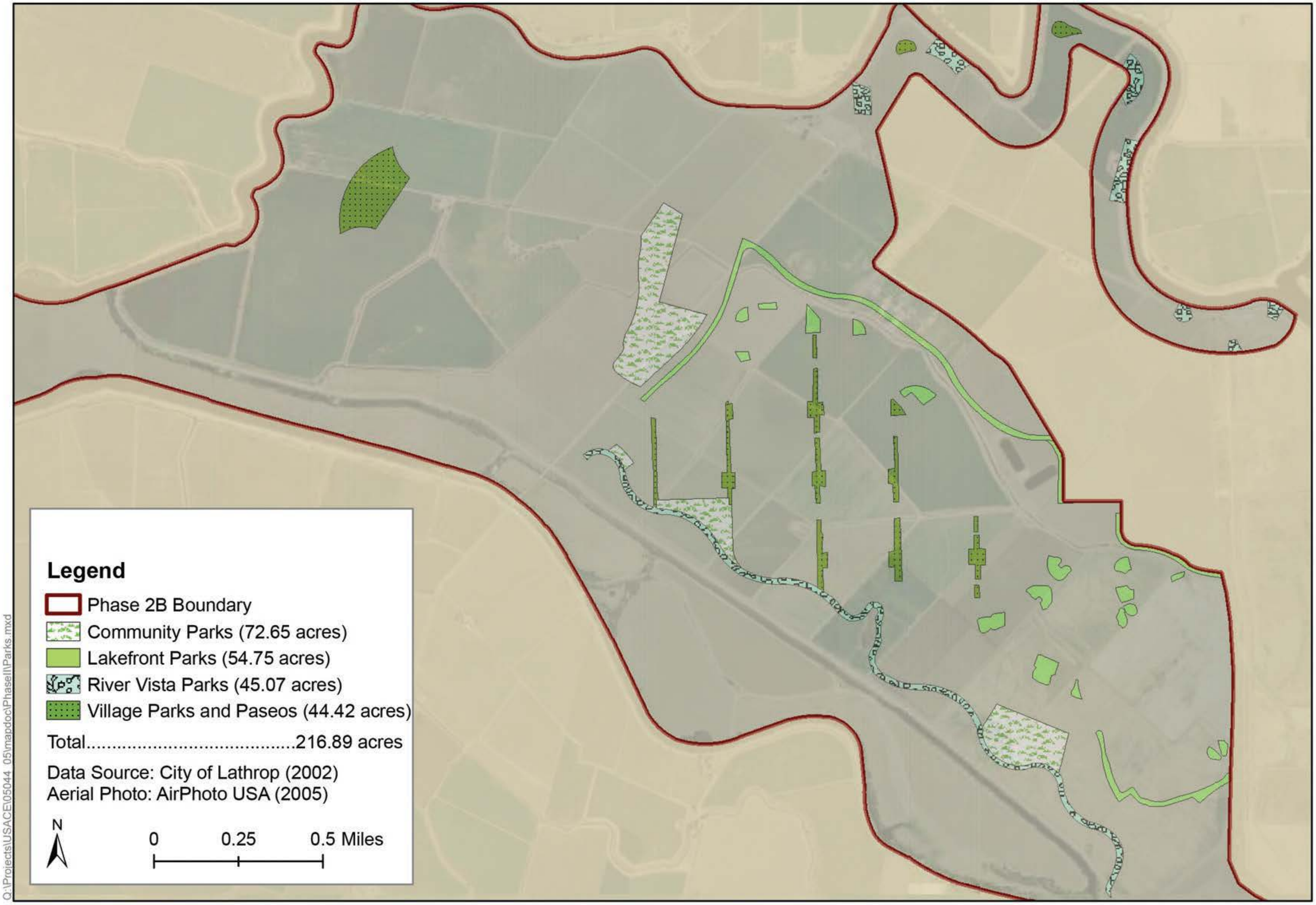

Figure 11-1
Proposed Action's Parks

Four primary categories of parks are included in the proposed action: community parks (73 acres), lakefront parks (55 acres), river vista parks (45 acres), and village parks and paseos (44 acres), for a total of approximately 217 acres. This system of parks would increase the overall availability of public parks in the Lathrop area, exceeding the required extent of parklands for the proposed action buildout population by 119 acres—an excess of more than 100%. The categories of parks described in the River Islands at Lathrop Urban Design Concept (The SWA Group 2002) do not correspond precisely with those described in the General Plan. However, the General Plan's broad requirements are exceeded by the facilities proposed for River Islands at Lathrop.

The aforementioned amended Bicycle Transportation Plan emphasizes flexibility in the design and location of planned bicycle facilities, given the innovative design approach for River Islands at Lathrop (City of Lathrop 2004b:3). Such flexibility is presumed to extend to the distribution and configuration of park space.

The proposal for River Islands at Lathrop has been incorporated into the City's General Plan and WLSP. Because design-phase distribution and configuration of recreation facilities will be subject to City approval, it is reasonable to assume that any disparities between General Plan standards and final design will be considered and reconciled to the satisfaction of the City, which is the local land use planning authority. More detailed discussion of the individual parkland categories is provided below.

The comprehensive trail system is an integral part of the conceptual design of River Islands at Lathrop and would be consistent with the vision set forth in the WLSP (see *Existing Conditions)*. Although the specific characteristics of the various components of the trail and paseo system may not coincide precisely with the Landscaped Open Space Corridor category outlined in the General Plan, collectively they would be consistent with the intent of the General Plan and the WLSP.

As Table 11-4 shows, the proposed community parks in the proposed action area would exceed the General Plan standard by 14 acres. Considered in combination, the lakefront, river vista, and village parks and paseos would exceed the neighborhood park standard by 105 acres. Although the distribution of acreage in these categories is subject to revision pending final design, and although the particular specifications of individual facilities may not coincide precisely with the characteristics of recreation area types described in the General Plan, collectively the park system of the proposed action would substantially exceed the standards established by the General Plan.

The construction of 217 acres of parks planned within the proposed action area would also provide additional opportunities for nature-based recreation. These opportunities could include birding, sightseeing, wildlife viewing, or nature photography, for example. Such opportunities would be increased throughout the proposed action area, particularly along the San Joaquin River, Old River, and Paradise Cut.

Moreover, the integrative approach to the parks and trails network throughout the River Islands project would render the proposed action's recreational facilities accessible not only to users from earlier phases of River Islands at Lathrop but to members of the broader Lathrop community by the bridges connecting the River Islands at Lathrop community with areas outside Stewart Tract as envisioned in the Bicycle Transportation Plan. The earlier phases of River Islands at Lathrop (Phases 1 and 2A) would offer similar recreation facilities at similar densities to those described for the proposed action. The proposed action's facilities would not be required to satisfy demands generated by earlier phases.

The extent of recreational facilities associated with the proposed action that exceeds the General Plan standard would help offset the existing deficit of recreation acreage in the City of Lathrop, particularly that deficit associated with community parks. Although the deficit of neighborhood parks in the existing portion of Lathrop may not be directly addressed by the acreage provided by the proposed action (i.e., 144 acres of lakefront parks, river vista parks, and village parks and paseos), these facilities—and the trail and paseo system that connects them to other local communities—could help ameliorate the deficit, particularly for residents who enjoy walking and bicycling from surrounding communities. The proposed action would have no direct or indirect adverse effect on the availability of local land-based recreational facilities and opportunities.

Availability of regional land-based recreational facilities and opportunities (less than significant)

Several regional land-based recreational facilities are located within 25 miles of the proposed action area—San Joaquin River National Wildlife Refuge, White Slough Wildlife Area, Woodbridge Ecological Reserve, Mossdale Crossing County Park, and Dos Reis County Park. Because most of these facilities are no-cost destinations, the number of visitors that travel to these locations annually and their point of origin are undetermined. Moreover, the amount by which visitation would indirectly increase as a result of the development of River Islands at Lathrop cannot be quantified in view of the paucity of available data.

The *Public Review Draft Background Report* (San Joaquin County 2009) for the San Joaquin County General Plan Update found that the County's park and recreation area has decreased by more than 200 acres over the last 25 years. The County has been unable to meet requests for additional recreational facilities and programs, such as sports fields, fish planting, and group use areas; the County also lacks adequate trails for hikers, cyclists, and horseback riders (San Joaquin County 2009:13-6). Implementation of the proposed action would add approximately 19,514 residents to the City and County, indirectly resulting in greater demand on the existing capacity of regional facilities. However, the proposed action would entail construction of a substantial amount of local recreational facilities, exceeding the General Plan recreational standard and offsetting the use of regional facilities. An indirect increase in the use of regional land-based recreational facilities could occur; at the same time, the increased facilities associated with River Islands at Lathrop would likely relieve some pressure on other regional facilities. This indirect effect is anticipated to be less than significant. No indirect effects were identified.

Access to water-based recreational activities (no effect)

Currently, most of the water-based recreational activities in the vicinity of Stewart Tract are associated with the San Joaquin and Old Rivers. As discussed in the *Environmental Setting* section, four marinas—two public and two private—currently serve the vicinity.

Development of the proposed action would add a total of 675 boat berths to the waterways around River Islands: 375 along the San Joaquin and Old Rivers, 100 in the Lathrop Landing back bay, and 200 in the Paradise Cut Canal. Because these berths would presumably be reserved for River Islands at Lathrop residents, it is unlikely that the addition of the proposed action's residential population would substantially affect existing use of the four nearby marinas. Fishing piers would be constructed near most of the boat docks.

The proposed action would increase access of the resident population to water-based recreational facilities. Similarly, development of the expanded Paradise Cut Canal floodway with its associated dock facilities would add roughly 3–4 miles of navigable waterway that are not currently available, although recreational use would likely be limited because of Paradise Cut's designation as a conservation area. The internal water bodies—the central lake and other lakes that are part of the internal stormwater system, which would provide 604 boat berths—would provide boating opportunities that are not currently available. The addition of fishing piers along the San Joaquin and Old Rivers would make shore fishing readily available to a large number of users The proposed action would have no direct or indirect adverse effect on the availability of water-based recreation.

Changes in character of existing water-based recreational activities (less than significant)

Most of the current users of the local waterways are presumably accustomed to boating and fishing in a largely undeveloped environment. The addition of a potentially large number of watercraft and construction of docks and waterfront development could be perceived as a direct constraint on current activities. Likewise, implementation of speed limits associated with increased watercraft activity could indirectly affect the character of existing water-based recreational activities. For example, the reaches of the San Joaquin and Old Rivers bordering the RID Area would be subject to a 5-mile-per-hour speed limit, effectively excluding water-skiing and some types of boating from those areas. For some existing user groups, such changes could constitute an adverse effect. However, the proposed action would construct additional public access to boating facilities and increase recreational opportunities. Similar watercraft activities (i.e., water-skiing and boating) would continue to be available along the San Joaquin River and Old River within navigable distance of the proposed action area. Because boat speed restrictions would be employed in a relatively small area of the Delta, and given the proposed action's increased water-based recreational opportunities, changes in character associated with reductions in specific watercraft activities are anticipated to constitute less-than-significant direct and indirect effects.

11.2.3.2 Alternative 2—No Alteration of Paradise Cut

Availability of local land-based recreational facilities and opportunities (no effect)

The availability of land-based recreational facilities and opportunities under Alternative 2 would be similar to that under the proposed action. Because Alternative 2 would maintain the design concepts and objectives set forth in the description of the proposed action—that is, population levels would be the same and park acreages would be similar to those provided under the proposed action—the effect of implementing this alternative on parkland availability would be beneficial. Like the proposed action, Alternative 2 would exceed the minimum standards established in the City's General Plan for provision of local and community parks and would help the City meet its overall standards. The omission of alterations in Paradise Cut under Alternative 2 is not expected to change the availability of park facilities because these flood risk reduction measures would not affect the amount or type of parkland constructed as part of the proposed action. Alternative 2 would have no direct or indirect adverse effect on theavailability of local land-based recreational facilities and opportunities.

Availability of regional land-based recreational facilities and opportunities (less than significant)

Under Alternative 2, the use of regional land-based recreation facilities would be to the same as those described for the proposed action. The population estimates under Alternative 2 are the same as those described for the proposed action—19,514 additional residents—and the estimated increase has the potential to have an indirect effect on regional land-based recreational facilities. However, use patterns are difficult to determine and effects are similarly difficult to predict. An increased use of regional land-based recreational facilities could occur; at the same time, the increased facilities associated with River Islands at Lathrop would likely relieve some pressure on other regional facilities. This indirect effect is anticipated to be less than significant. No direct effects were identified.

Access to water-based recreational activities (no effect)

Under Alternative 2, the Paradise Cut floodway would not be expanded and no dock facilities would be provided in Paradise Cut. This would reduce available boat docks by 200 berths compared to the number provided under the proposed action. In other respects, provisions for water-based recreation under Alternative 2 would be similar to those described for the proposed action, and Alternative 2 would result in no direct or indirect adverse effects in regard to increased access to water-based recreation.

Changes in character of existing water-based recreational activities (less than significant)

Because Alternative 2 would entail fewer docks, it would reduce the number of watercraft added to the local system of waterways compared to the proposed action. Nevertheless, the same general types of changes described for the proposed action would result (475 berths would be added, a substantial number of watercraft would be added along the San Joaquin and Old Rivers, and both reaches would be subject to a new 5-mile-per-hour speed limit). These changes could amount to an adverse effect for some user groups. However, because boat speed restrictions would be imposed in a relatively small area of the Delta, and given the increased water-based activities under the proposed action, changes in character associated with speed restrictions are anticipated to constitute less-than-significant direct and indirect effects.

11.2.3.3 Alternative 3—Avoidance of Central Drainage Ditch

Availability of local land-based recreational facilities and opportunities (no effect)

Avoidance of the central drainage ditch under Alternative 3 would entail a reduction in development area resulting in an increased density for residential and commercial space. Because the overall population and residential buildout would be the same under Alternative 3 as under the proposed action, the demand for and provision of parkland would also be the same. Neighborhood and community park acreages would still substantially exceed the General Plan standard. In addition, the buffer around the preserved central drainage ditch would offer some opportunities for limited passive recreation, potentially including walking and nature/wildlife observation. Accordingly, there would be no direct or indirect adverse effects related to availability of land-based recreational opportunities under Alternative 3.

Availability of regional land-based recreational facilities and opportunities (less than significant)

Under Alternative 3, the residential population would be the same as that under the proposed action. Although the avoidance of the central drainage ditch would slightly increase the density of development under Alternative 3, the use of regional land-based recreation facilities would be similar to those described under the proposed action. This indirect effect is anticipated to be less than significant. No direct effects were identified.

Access to water-based recreational activities (no effect)

Alternative 3 would entail the same access to water-based activities in waterways surrounding Stewart Tract as would the proposed action, offering similar benefits for access to water recreation. Avoidance of the central drainage ditch would necessitate reconfiguration of the internal lake system, but the central lake would likely still provide added boating opportunities. Overall, Alternative 3 would have no direct or indirect adverse effect relating to the availability of water-based recreational opportunities.

Changes in character of existing water-based recreational activities (less than significant)

Like the proposed action, Alternative 3 would add a large number of new users and create the need for new speed limits on the San Joaquin and Old Rivers. Overall effects would be similar to those described for the proposed action. and changes in character are anticipated to constitute less-than-significant direct and indirect effects.

11.2.3.4 Alternative 4—Proposed Action with Expanded Flood Risk Reduction

Availability of local land-based recreational facilities and opportunities (no effect)

The development and recreational components of Alternative 4 would be the same as those under the proposed action. The effects of the River Islands at Lathrop portion of Alternative 4 on both land- and water-based recreation would be the same as those described for the proposed action. There would be no direct or indirect adverse effects.

Availability of regional land-based recreational facilities and opportunities (less than significant)

The effects of Alternative 4 would be similar to those under the proposed action; however, the expanded flood risk reduction measures could potentially create an opportunity for expanded land-based recreational activities (e.g., nature trails). However, because none of these measures have been designed, it is not possible to quantify any specific effects. The direct and indirect effects would be less than significant.

Access to water-based recreational activities (no effect)

The expanded flood risk reduction measures outside Stewart Tract, including more extensive widening and other modifications to Paradise Cut and creation of a new bypass canal east of Paradise Cut, might offer additional opportunities to develop selected land- and water-based recreational uses, potentially offering benefits in addition to those provided by the proposed action. However, until these measures have been designed and the necessary landowner agreements obtained, it is not possible to quantify this effect with any precision. There would be no direct or indirect adverse effects.

Changes in character of existing water-based recreational activities (less than significant)

The direct and indirect effects of Alternative 4 would be similar to those under the proposed action. Although expanded flood risk reduction measures could possibly provide enhanced access to some waterways, until these measures have been designed and the necessary landowner agreements obtained, it is not possible to quantify this effect with any precision.

11.2.3.5 Alternative 5—No Action

Under the No Action Alternative, no modifications would be undertaken in Paradise Cut, an interior levee system would be constructed inside the existing federal project levees, and the central drainage ditch would be avoided. Regional flood risk reduction benefits and ecosystem restoration and enhancement activities associated with the PCIP and SRA habitat plantings would not be realized. The No Action alternative would not include waterside vegetation on project levees along the San Joaquin and Old Rivers, nor would it include habitat restoration and enhancement activities associated with the PCIP. Under the No Action Alternative, the Lathrop Landing back bay would not be created along the San Joaquin River, and none of the group boat docks or fishing piers would be installed in the San Joaquin River and Old River.

Availability of local land-based recreational facilities and opportunities (no effect)

Under the No Action Alternative, population levels would be the same and park acreages would be similar to those provided under the proposed action. The No Action Alternative would exceed the minimum standards established in the City's General Plan for provision of local and community parks and would help the City meet its overall standards. There would be no direct or indirect adverse effect of implementing this alternative on parkland availability.

Like the proposed action, the No Action Alternative would increase the overall availability of public parks in the Lathrop area.

Availability of regional land-based recreational facilities and opportunities (less than significant)

Under the No Action Alternative, the use of regional land-based recreation facilities would be similar to that described for the proposed action. Construction of local recreational facilities would offset the increased demand on regional facilities. This indirect effect is anticipated to be less than significant. No direct effects were identified.

Access to water-based recreational activities (significant)

The No Action Alternative would not install group boat docks or fishing piers in the San Joaquin and Old River, offering substantially less access to water-based recreational activities than the proposed action. Because of the large numbers of potential users moving into the area (19,514 residents at buildout), the capacity of existing nearby facilities could be overwhelmed by increased demand. This would be a significant indirect effect. No direct effects were identified.

Changes in character of water-based recreational activities (significant)

Because no group boat docks and/or fishing piers would be installed, the No Action Alternative would not change current water-based recreational activities—for example, speed limits would not be imposed in the vicinity of boat docks as would be the case under the action alternatives.

However, the buildout population (19,514 residents) would be the same as under the proposed action, representing a substantial number of new users for water-based recreation. The change in character associated with increased use and congestion of local facilities would be a potentially significant indirect effect for water-based recreational users. No direct effects were identified.

11.3 References

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Chapter 12
Transportation and Circulation

This chapter summarizes the proposed action's and alternatives' potential effects related to transportation and circulation and the potential mitigation measures to reduce these effects. The detailed traffic analysis prepared for the project by TJKM Transportation Consultants is included as Appendix E. Related discussions are found in Chapter 13, *Noise and Vibration*, and Chapter 14, *Air Quality*. The effects of the proposed action and alternatives on boat traffic in the waterways surrounding Stewart Tract are addressed in Chapter 11, *Recreation*.

The key sources of data listed below were used in the preparation of this chapter.

- *Draft Subsequent Environmental Impact Report for the River Islands at Lathrop Project* (City of Lathrop 2002).
- *West Lathrop Specific Plan* (City of Lathrop 2003).
- *Comprehensive General Plan for the City of Lathrop, California* (City of Lathrop 2004a).
- *Addendum to the Subsequent Environmental Impact Report for the River Islands at Lathrop Project* (City of Lathrop 2005).
- *Second Addendum to the Subsequent Environmental Impact Report for the River Islands at Lathrop Project* (City of Lathrop 2007).
- *TJKM Traffic Impact Study for River Islands Phase 2B Development in the City of Lathrop* (Appendix E)

Specific reference information is provided in the text.

12.1 Affected Environment

12.1.1 Regulatory Framework

Traffic analysis in California is guided by policies and standards set by Caltrans at the state level and by local jurisdictions. The proposed action is located in the City of Lathrop, but it also affects freeways and local roads under the jurisdictions of the City of Tracy, San Joaquin County, and Caltrans depending on the facility types and their locations. Accordingly, the proposed action or alternatives should adhere to the adopted transportation policies of Lathrop, Tracy, San Joaquin County, and Caltrans.

12.1.1.1 Level of Service Standards

Agencies adopt level of service (LOS) standards that define the acceptable level of traffic operations within their jurisdiction. LOS is a qualitative measure used to describe the condition of traffic flow, ranging from excellent conditions at LOS A to overloaded conditions at LOS F. The transportation facilities that would be affected by the proposed action include intersections, roadway segments, and freeway facilities. The applicable LOS standards for these facilities under the jurisdictions of Lathrop, Tracy, San Joaquin County, and Caltrans are provided below (City of Lathrop 2002).

City of Lathrop surface streets are subject to the following minimum acceptable levels of traffic operations.

- Signalized and all-way-stop intersections: LOS D or better.
- Intersections with side street stop-sign control: LOS E or better.

City of Tracy surface streets along the I-205 corridor are subject to the following minimum acceptable level of traffic operations.

- Signalized and all-way-stop intersections: LOS D or better.

San Joaquin County surface streets are subject to the following minimum acceptable level of traffic operations.

- Signalized, all-way-stop, and side street stop sign–controlled intersections or rural roadways: LOS C or better.

Caltrans freeways are subject to the following minimum acceptable level of traffic operations.

- I-5, I-205, and SR 120: LOS D or better.

12.1.1.2 City of Lathrop General Plan

The City's General Plan (City of Lathrop 2004a) establishes policies and implementation proposals to support Goal No. 6, *Transportation/Circulation/Traffic*, which is intended to guide and provide for the development of an integrated system of transportation and internal circulation, and to provide access to other parts of San Joaquin County and the region.

The General Plan provides specific policies for freeways, arterial streets, collector streets, and minor streets. Many of these policies relate specifically to roadway design elements, such as numbers of lanes, landscaping, types of pedestrian corridors, spacing between intersections, and presence/absence of on-street parking. General Plan policies that relate to circulation and traffic patterns, roadway improvements to accommodate anticipated increases in traffic, and methods to minimize traffic impacts are listed below. Specific implementation proposals that relate to the proposed action are also described.

Freeway Policies and Proposals

Policy 1: The City should protect the through traffic functions of Interstate and State Route Freeways serving the Lathrop area by planning arterial street alignments which will avoid the need or desire to utilize freeway sections for short, local area interval trips as if they were elements of the local arterial street system.

Policy 2: Land use designations along freeway sections should take into consideration the visual and noise impacts associated with existing and future traffic levels on these major traffic carrying facilities.

Policy 3: Freeway interchanges should be improved to carry the demands of traffic generated by development in Lathrop in keeping with the principle that responsibility for improvements must reflect the fair apportionment of traffic to existing and future regional demands vs. local demands.

One new interchange will be required along I-205 to accommodate traffic generated by new development on Stewart Tract. The most likely option is to convert the grade separation at Paradise Road to a full interchange.

Arterial Street Policies and Proposals

Policy 1: Arterials constructed to boulevard standards are to be the principal carriers of north–south traffic through Sub-Plan Areas #2 and #3 (West Lathrop area).

A north–south arterial (Golden Valley Parkway) is proposed west of I-5 extending north and south from Lathrop Road on an alignment generally parallel to I-5 to avoid pressure to use I-5 for local traffic movement. This arterial would eventually cross the San Joaquin River, extending into Stewart Tract, with eventual connection to one or more interchanges with I-205 farther west.

Another arterial is proposed to enter Stewart Tract by crossing the San Joaquin River as an extension of Louise Avenue (now referred to as River Islands Parkway). Neither of these arterials would be needed until substantial commercial development occurs on Stewart Tract. In the interim (for 5–10 years), Manthey Road (with some improvements) would continue to provide access to Stewart Tract from the north.

Collector Street Policies

Policy 3: The high costs of converting a deficient Collector street to the appropriate standards required for existing and projected traffic should be limited to only those streets where either: (a) high current and projected volumes of traffic are involved; (b) joint funding is possible; (c) significant contributions of private or assessment district funds are involved as part of the cost of developing adjacent lands; or (d) where the rate of serious accidents has been high and where hazards to public safety are great.

No specific proposals to improve or modify existing collector streets are identified in the General Plan.

Minor Street Policies

Policy 3: In view of deficiencies in existing Minor streets, the City should consider forms of funding which include direct public sources (e.g., through redevelopment or assessment districts) as a means of overcoming minor street deficiencies. Curb, gutter, sidewalk and paving needs along Minor streets might alternatively be made the responsibility of affected property owners. Under this approach, the City could assume responsibility for engineering services and additional costs occasioned by higher standards of street construction and drainage than were involved at the time of original street construction. The City might also share equally in total costs where a majority of property owners are willing to accept assessment proceedings or another appropriate method of collective project financing.

Policy 4: Policies for Minor streets are intended to reflect options for reducing through traffic on minor streets between intersections with Arterials. This policy seeks to eliminate the use of Minor streets as thoroughfares through residential areas where they extend parallel to nearby Arterials or Collectors for many blocks and are often used as substitutes for Arterials and Collectors.

No specific proposals to improve or modify existing minor streets are identified in the General Plan.

12.1.1.3 West Lathrop Specific Plan

The River Islands at Lathrop is included in the WLSP (City of Lathrop 2003). The intent of the WLSP, in keeping with the City's General Plan as amended, is that development of the West Lathrop area (a) will include a new street system, (b) will supplement the area's freeway system, and (c) will encourage public transit alternatives for reaching the site and moving around on it. The WLSP contains four objectives intended to implement General Plan Goal No. 6, *Transportation/Circulation/Traffic*.

Objective 6A: Provide a circulation system that accommodates necessary vehicular trips but emphasizes the ease and convenience of pedestrian, bicycle, boat and public transit.

Objective 6B: Create a safe and efficient network of major and minor streets within West Lathrop, connecting it to surrounding areas and supplementing the regional circulation system

Objective 6C: Participate in planning for circulation and/or transportation improvements that benefit West Lathrop and surrounding communities.

Objective 6D: Allow for the efficient movement of goods and people but minimize traffic disruptions of peaceful residential areas.

The WLSP anticipated that several roadway improvements would be developed as part of the River Islands at Lathrop project. The Louise Avenue/I-5 interchange would be improved to provide more on- and off-ramp lanes and additional lanes in the underpass. Golden Valley Parkway would be extended north of the intersection at River Islands Parkway beyond the WLSP area to Lathrop Road when the ongoing traffic monitoring program indicates that traffic levels warrant such an extension. The City would participate on a fair-share basis with Caltrans, the County, and the City of Stockton to extend Golden Valley Parkway north to Stockton as a parallel facility to I-5 to support the goal of preserving the freeway for through traffic functions. The timing of this improvement would be determined by traffic monitoring and policy agreements among the local jurisdictions affected.

Golden Valley Parkway would be extended south and then west of Stewart Tract as an arterial parallel to I-205, with a new interchange connection to I-205 at Paradise/Chrisman Road. The location of this interchange would be coordinated with the City of Tracy and Caltrans to facilitate the final alignment of Chrisman Road. This facility will be available when needed (as determined by traffic monitoring) to ease traffic demands on the Louise Avenue/I-5 interchange.

Transit service would be provided by the San Joaquin Regional Transit District (SJRTD) and would convey travelers to and from Stewart Tract and the existing Altamont Commuter Express (ACE) station in Lathrop. River Islands Parkway and Golden Valley Parkway would expedite regular bus circulation. Bus stops would be situated within easy walking distance from most of the residential and commercial areas. Dial-a-Ride programs operated by SJRTD would assist disabled persons, senior citizens, and visitors.

A Transportation Demand Management (TDM) program would be implemented to encourage commuters to travel together or on public transit so that fewer people drive alone during peak commuting periods. For River Islands at Lathrop, a TDM coordinator would be designated by the employment center with responsibility for facilitation of the TDM program for the River Islands community.

12.1.1.4 Transportation Impact Fee Programs

Three impact fee programs currently fund roadway improvements in the City: the WLSP Regional Transportation Impact Fee (RTIF) program, the City of Lathrop Capital Facilities Fee (CFF) program, and the San Joaquin County RTIF (SJ RTIF). Both the WLSP and SJ RTIF programs are used to fund regional transportation improvements needed in San Joaquin County, excluding overlapping projects. The Lathrop CFF program is used to fund City-wide transportation improvements. In addition, the Tracy/San Joaquin County/Lathrop Cooperative Agreement and Traffic Fee program will be used to fund the transportation improvements in the area of the MacArthur Drive interchange with I-205; such improvements are beyond Lathrop's Sphere of Influence and are not included in the above programs.

The Stewart Tract Traffic Monitoring Program is established between the City of Lathrop and River Islands to monitor and project the operation of the roadway system and to determine the timing and funding of transportation improvements in advance of the actual need to avoid potential impacts.

Together, these fee programs are referenced in this document as *Transportation Impact Fees*. The City will ensure that River Islands pays its applicable Transportation Impact Fees as its fair share contributions for local roadway and freeway improvements.

WLSP Regional Transportation Fee

Subsequent to the City's approval of the WLSP, SJCOG and Caltrans worked with the City to develop the Regional Transportation Fee program in 1997 (San Joaquin Council of Governments 1997). It was adopted as a mitigation program to calculate new development's fair share of regional improvements needed in San Joaquin County: improvements to mainline freeways, freeway interchanges, regional streets, the regional bicycle system, and the bus transit system, as well as rail corridor improvements. Caltrans determined the improvements needed in the County to provide acceptable operation of regional facilities.

Caltrans and SJCOG provided cost estimates for these improvements. The regional fees were developed in consideration of reasonable assumptions regarding anticipated federal and state funding, as well as local impact fee funding. The balance was divided among the development projects anticipated in the County over the next 25 years, and the regional fees collected for new developments will be adjusted on the basis of construction cost increases by the time the project begins.

Under this program, the City decides the order and timing of the construction of facilities in its Sphere of Influence. The program, adopted by the City as Ordinance No. 97-146 on September 16, 1997, applies to the entire WLSP area. Payment of the impact fee is accepted by the City as mitigation of River Islands at Lathrop's impacts on regional improvements, with a few exceptions. This means that River Islands will not be required to construct identified regional improvements, except the I-5/Louise Avenue interchange, the I-205/Paradise-Chrisman Road interchange, or the Golden Valley Parkway between Louise Avenue and Paradise Road. Payment of the impact fee will therefore mitigate the transportation impacts on mainline freeway widening on I-5, SR 120, and I-205.

San Joaquin County Regional Transportation Impact Fee

In an update to the 1997 WLSP RTIF and in accordance with the Mitigation Fee Act (California Government Code Section 66000), SJCOG and several consultants developed the SJ RTIF program ordinance, which was adopted in 2006. Revenues from the fee program are collected by all local agencies that regulate land use, such as cities, as allowed by the SJ RTIF. The funds are used to provide funding for transportation and transit improvements that would mitigate the traffic impacts of the new development by retaining the LOS on the regional transportation network. As with the WLSP RTIF, such improvements include improvements to mainline freeways, freeway interchanges, major arterials, and related transit service. Projects listed in the SJ RTIF are updated every 5 years; the most recent is the SJ RTIF 2011 Update, released in December 2011 (City of Lathrop 2004b; San Joaquin Council of Governments 2011).

Because of the overlapping jurisdictions of the WSLP RTIF and the SJ RTIF, according to Lathrop Municipal Code Ordinance 05-255 Section 2 (3.44.070), fees to fund a project listed in the SJ RTIF are not allowed to be charged to fund the same project listed in the WLSP RTIF.

City of Lathrop Capital Facilities Fee

The regional transportation fee program anticipated some funding from local impact fees to account for local impacts on some regional facilities, such as Golden Valley Parkway and some freeway interchanges. Other facilities of a City-wide nature benefit multiple projects but were not included in the regional fee program. The City will require fees under the CFF program for funding City-wide transportation improvements in the River Islands at Lathrop area that are beyond the scope of the regional transportation fee.

The City's CFF program was last updated in 1995, before annexation of the WLSP. The program provides funding for various elements of infrastructure and public amenities, including intersection widening, traffic signals, other improvements, and freeway interchanges. The CFF program is currently approved only for projects east of I-5. The program noted that it needed to be expanded west of I-5 after new areas are annexed.

The CFF increases over time based on the construction cost index published in the Engineering News Record (ENR). The actual CFF to be collected for new development will be determined when the project's construction begins.

Tracy/San Joaquin County/Lathrop Cooperative Agreement and Traffic Fee

One other category of improvements requires funding: improvements that are beyond Lathrop's Sphere of Influence and are not included in the regional transportation fee and CFF programs. These are improvements in the area of the MacArthur Drive/I-205 interchange. The City (for impacts associated with River Islands at Lathrop) will share responsibility to fund improvements in this area with the City of Tracy and the County. Accordingly, these agencies will create a cooperative agreement and traffic fee to fund their shares of transportation improvements in the area of the MacArthur Drive interchange with I-205.

Stewart Tract Traffic Monitoring Program

In 1996, the City and River Islands established a monitoring program to determine, on an annual basis, an updated evaluation of the current status of the circulation system's operation, and to revise projections of near- and long-term improvement needs for the circulation system based on current LOS conditions and projected new development. This monitoring program was included in the approved Development Agreement for the prior Califia Project. The program established a process for projecting the need for transportation improvements in advance of the actual need to allow the improvement to be constructed to avoid the potential impacts. It is anticipated that this (or a similar) program will be implemented by River Islands and the City in accordance with the Development Agreement.

Payment of Impact Fees

Payments in accordance with the transportation fee programs are expected at the time of building permit issuance. Monies collected from the fees are used either to fund the construction of the relevant improvements if sufficient funds exist for such a purpose, or to provide reimbursement or credit for improvements "fronted" by the project developer. It is envisioned that the timing for improvements will coincide with the necessary fund balance to construct the improvements. Should the timing of development slow or impacts from the development arise sooner than anticipated, River Islands will be required to fully fund the necessary improvements (other than mainline freeway improvements) and receive either reimbursement or credit from the applicable fee program when paid by others benefiting from the improvements. Where the provision of a mainline freeway transportation improvement is required as mitigation, payment of the regional transportation fee will be considered to fulfill the mitigation requirement, so long as the improvement is included in the fee program calculation.

It is anticipated that funds collected for the Lathrop CFF and the Tracy/San Joaquin County/Lathrop Cooperative Agreement and Traffic Fee, like those collected under the WLSP Regional Transportation Fee program, will be held by the City in separate interest-bearing accounts for each fund. It is anticipated that each fund will allow the City to decide the order and timing of the construction of fee-funded facilities.

12.1.2 Existing Conditions

12.1.2.1 Methods Used to Identify Existing Conditions

The EIS analysis builds on past traffic analysis completed for the River Islands SEIR (City of Lathrop 2002), as well as subsequent traffic studies for the SEIR Addenda (City of Lathrop 2005, 2007, 2012) and the Lathrop Traffic Monitoring Program (City of Lathrop 2006). Most of the traffic analysis in the SEIR is still valid and the transportation mitigation, impact fee programs, and any entitlements that were approved as part of the SEIR will continue to be obtained by River Islands. For this EIS, traffic analysis has been updated for the existing year from 2001 to 2009 and for the future buildout year from 2025 to 2031. The proposed action's potential effects on transportation are evaluated for the buildout year by comparing the proposed action traffic conditions to the baseline traffic conditions. The baseline conditions for year 2031 are defined as existing conditions plus Phases 1 and 2A of the River Islands development plus regional growth; the proposed action conditions comprise the baseline conditions plus the proposed action development. Roadways in the project vicinity (Figure 12-1) constitute the study area for this analysis.

12.1.2.2 Existing Street System

In the project vicinity (Figure 12-1), I-5 roughly parallels the southeast boundary of River Islands at Lathrop. I-5 currently consists of three travel lanes in each direction just south of I-205 and north of SR 120 and four to five travel lanes in each direction (9–10 total, including auxiliary lanes) between I-205 and SR 120. The main interchanges serving the project vicinity are Mossdale Road/Manthey Road and Louise Avenue/River Islands Parkway. The Mossdale Road/Manthey Road interchange is a set of hook ramps with an undercrossing connecting the two local roadways. The Louise Avenue interchange is a tight-diamond interchange with both the northbound and southbound ramps controlled by signals at their local street intersections.

I-5 is a major north-south freeway serving the City of Lathrop. North of the City, I-5 continues to Stockton, Sacramento, Oregon, and Washington. South of Lathrop, the freeway continues through the San Joaquin Valley on to Los Angeles, San Diego, and Mexico. Locally, I-5 distributes regional traffic to and from the San Francisco Bay Area via I-205 and to and from Lathrop and the Central Valley via SR 120.

I-205 is a major east–west freeway that connects I-5 to I-580, which continues west to the San Francisco Bay Area through the Altamont Pass. The interchange with I-5 is not fully directional, consisting only of connections from I-5 southbound to I-205 westbound and I-205 eastbound to I-5 northbound. I-205 was recently widened from two to three travel lanes per direction, providing new additional capacity for its entire length. Currently, the MacArthur Drive interchange, southwest of Stewart Tract, is the only interchange serving the immediate vicinity. This interchange consists of a tight diamond configuration, with the eastbound and westbound ramps controlled by traffic signals at their respective local street intersections.

SR 120 is a major east–west freeway that begins at I-5 and locally serves Lathrop and Manteca. The freeway portion of SR 120 continues east and terminates at SR 99, another major north–south freeway serving Lathrop as well as the Central Valley. SR 120 currently consists of two travel lanes per direction.

Louise Avenue is a two- to four-lane arterial that connects the West Lathrop area (including the future River Islands at Lathrop) to I-5 and points east within the City of Lathrop. Louise Avenue currently consists of two travel lanes west of I-5 and four lanes east of the I-5 southbound ramps. West of the new Golden Valley Parkway, the roadway becomes River Islands Parkway, which ultimately will be one of two primary access points to River Islands at Lathrop from the north via Bradshaw's Crossing bridge (Golden Valley Parkway will be the other access point).

Manthey Road is a north–south, two-lane local frontage roadway immediately west of I-5. It connects Stockton to the north with West Lathrop to the south and terminates just south of its existing hook ramps with I-5 southbound.

Mossdale Road is a north–south, two-lane local frontage roadway immediately east of I-5. It provides local land use access in Lathrop between the San Joaquin River and Paradise Cut and connects to I-5 northbound via existing hook ramps. It also connects to Manthey Road via a roadway undercrossing at I-5.

MacArthur Drive is a north–south, four-lane arterial roadway from the I-205 interchange south to the City of Tracy. North of the I-205 interchange, it is a two-lane rural roadway serving mostly agricultural uses and single-family homes. At the I-205 undercrossing, it has a three-lane cross-section that includes a left turn lane for both ramps of the I-205 tight diamond interchange.

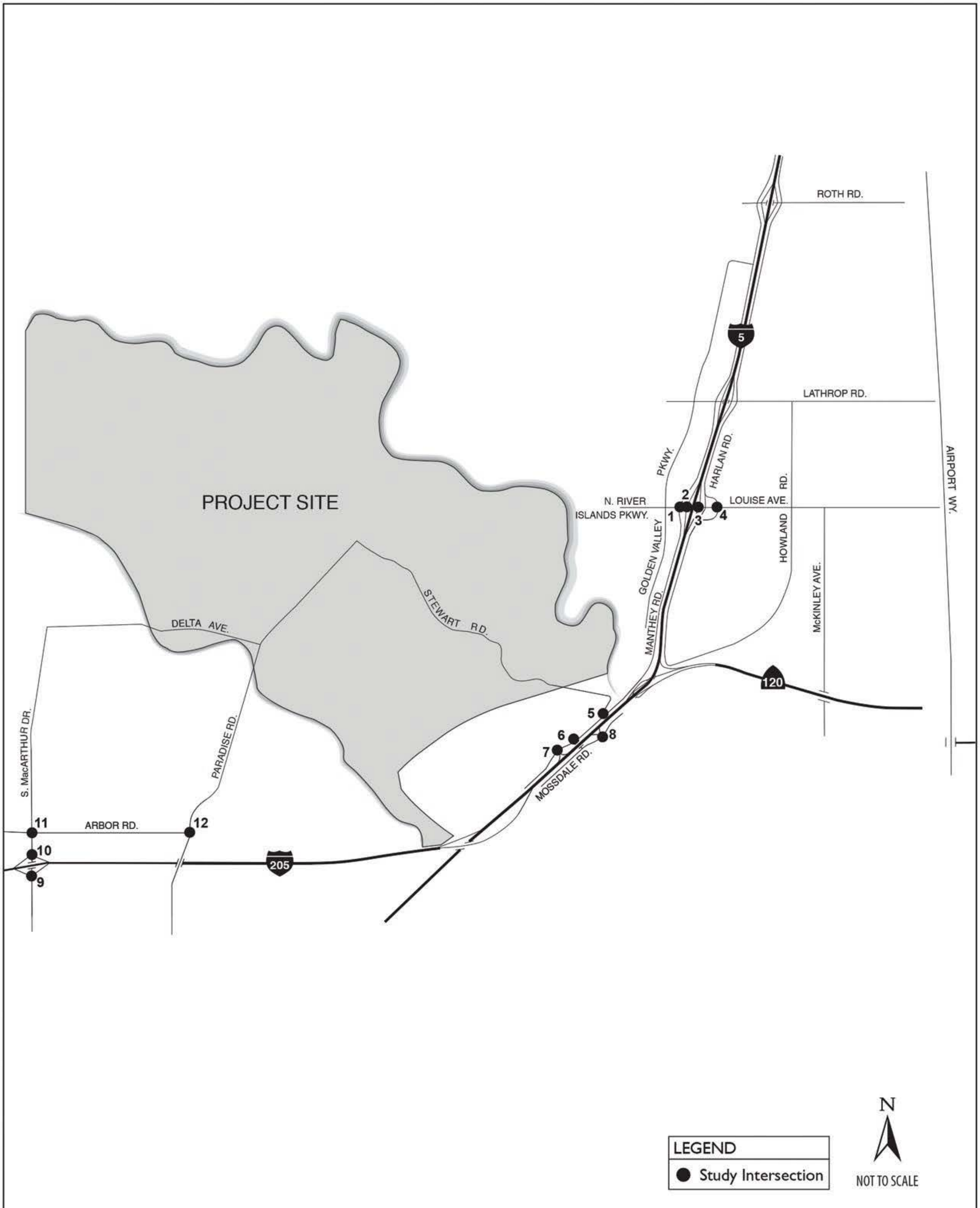
Stewart Road is a two-lane rural roadway that begins at Manthey Road and runs west into Stewart Tract.

Paradise Road is a two-lane, north–south rural roadway that begins at Grant Line Road east of Tracy and extends north over I-205 via a two-lane bridge and over Paradise Cut into the western portion of Stewart Tract.

Arbor Avenue is a two-lane, east–west rural roadway beginning at Paradise Road south of Stewart Tract. It extends west toward the City of Tracy and parallels I-205, crossing MacArthur Drive at a four-way stop-controlled intersection.

12.1.2.3 Analysis Locations

The traffic study focused on evaluating operating conditions at intersections, roadway segments, and freeway facilities that could be affected by the proposed action. The facilities selected are consistent with those selected for analysis in the River Islands SEIR (City of Lathrop 2002) as well as



Source: TJKM, 2010

Figure 12-1
Existing Street System

subsequent traffic studies for the SEIR addenda (City of Lathrop 2005, 2007). The study facilities are identified below.

Intersections

Existing traffic operations were evaluated at the 12 existing intersections listed below (Figure 12-1).

- Manthey Road/Louise Avenue
- I-5 southbound ramps/Louise Avenue
- I-5 northbound ramps/Louise Avenue
- Harlan Road/Louise Avenue
- Manthey Road/Stewart Road
- Manthey Road/I-5 Underpass
- Manthey Road/I-5 southbound ramps
- Mossdale Road/I-5 northbound ramps
- MacArthur Drive/I-205 eastbound ramps
- MacArthur Drive/I-205 westbound ramps
- MacArthur Drive/Arbor Avenue
- Paradise Road/Arbor Avenue

The existing and future study intersections listed below were analyzed for 2031 conditions (Figure 12-2 and Figure 12-3).

Intersections External to River Islands at Lathrop

- Golden Valley Parkway/River Islands Parkway
- I-5 southbound ramps/Louise Avenue
- I-5 northbound ramps/Louise Avenue
- Harlan Road/Louise Avenue
- Golden Valley Parkway/Towne Centre Drive
- Golden Valley Parkway/Brookhurst Boulevard
- McKee Boulevard/River Islands Parkway
- Silvera Access/River Islands Parkway
- MacArthur Drive/I-205 eastbound ramps
- MacArthur Drive/I-205 westbound ramps
- Paradise Road/I-205 eastbound ramps
- Paradise Road/Arbor Avenue
- Paradise Road/I-205 westbound ramps

Intersections Internal to River Islands at Lathrop

- Paradise Road/S. Woodlands Drive
- Paradise Road/N. Woodlands Drive
- Lakeside Drive/N. River Islands Parkway (W)
- Lakeside Drive/N. River Islands Parkway (E)
- Old River Road/N. River Islands Parkway
- D-27 Street/N. River Islands Parkway
- Broad Street/N. River Islands Parkway
- Commercial Street/N. River Islands Parkway
- Water Street/N. River Islands Parkway
- Broad Street/Canal Street
- Lake Harbor Boulevard/S. River Islands Parkway
- D-27 Street/S. River Islands Parkway
- Broad Street/S. River Islands Parkway
- Commercial Street/S. River Islands Parkway
- Golden Valley Parkway/Lake Harbor Boulevard
- D-27 Street/Golden Valley Parkway
- Broad Street/Golden Valley Parkway
- S. River Islands Parkway/Golden Valley Parkway

Roadway Segments

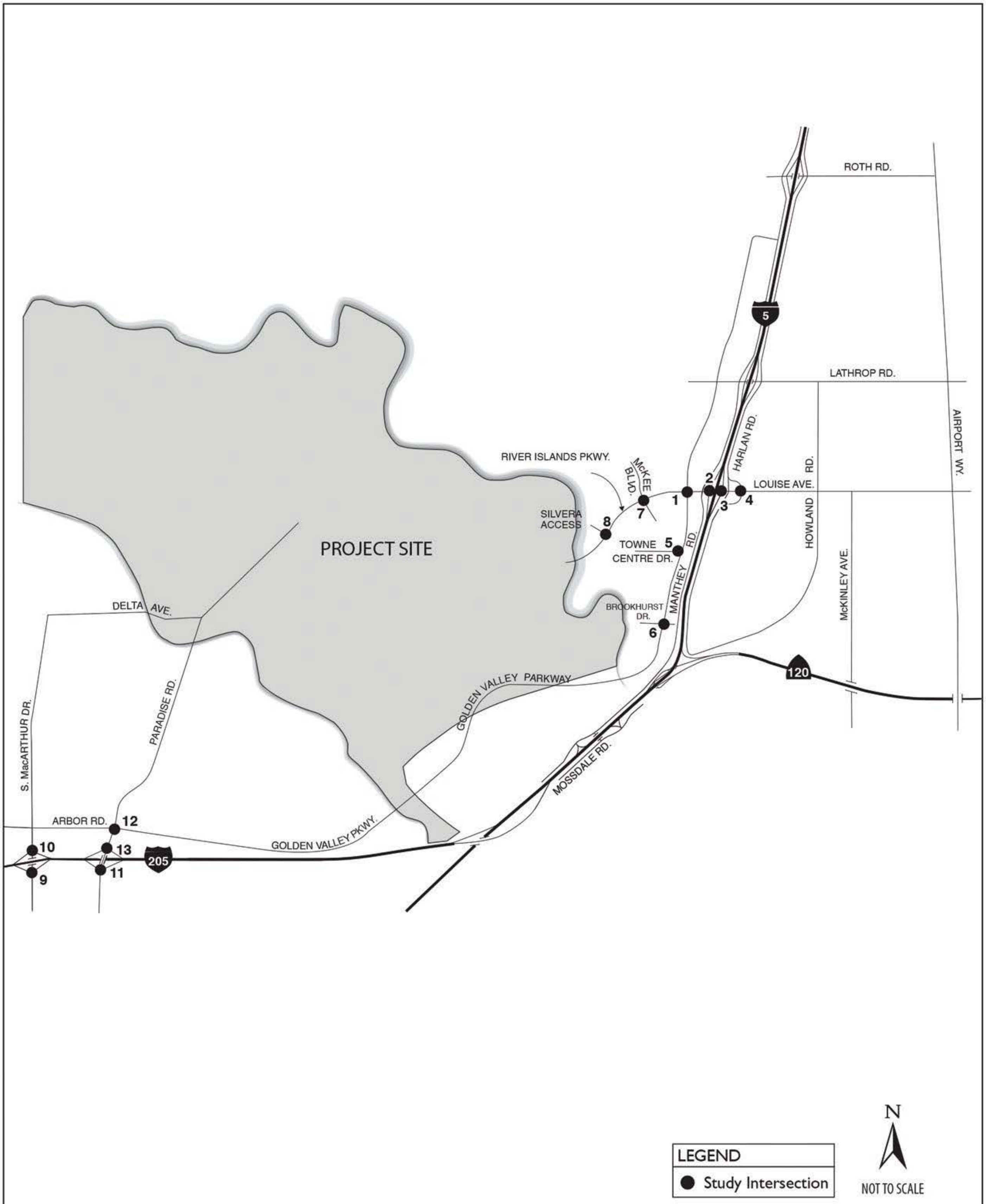
Traffic operations were evaluated for existing and future year conditions at the following roadway segments in the study area.

- Paradise Road between Arbor Avenue and Paradise Cut
- Paradise Road between Arbor Avenue and I-205
- Arbor Avenue between Paradise Road and MacArthur Drive
- MacArthur Drive between Arbor Avenue and I-205

Freeway Mainline Segments

Traffic operations were evaluated for existing and future year conditions at the following freeway mainline segments within the study area.

- I-5 north of Louise Avenue interchange
- I-5 between Louise Avenue and SR 120 interchanges
- I-5 between SR 120 and Manthey Road/Mossdale Road interchanges
- I-5 between Manthey Road/Mossdale Road and I-205 interchanges



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Source: TJKM, 2010

Figure 12-2
Future External Analysis Intersections

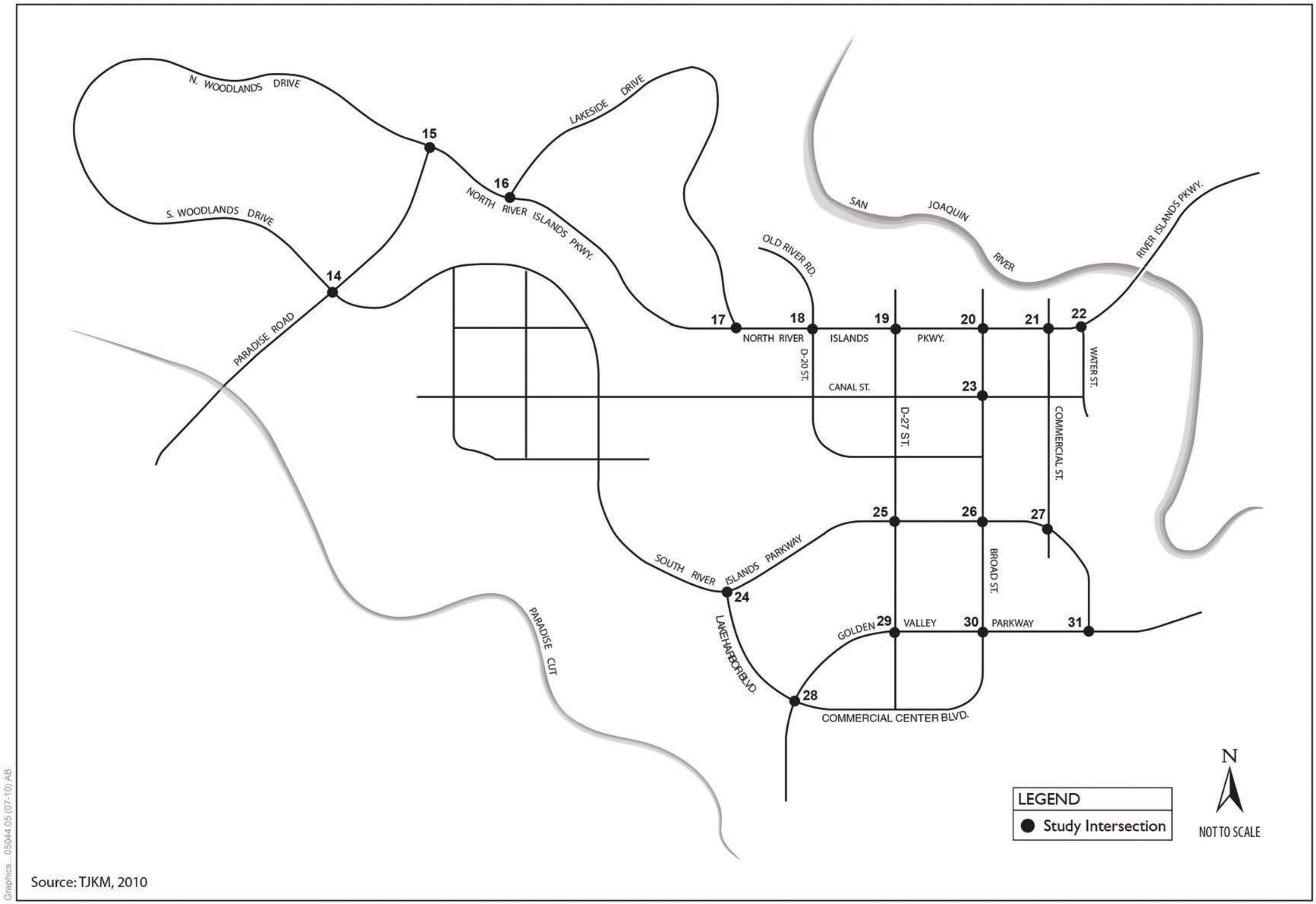

Figure 12-3
Future Internal Analysis Intersections

- I-5 south of I-205 interchange
- I-205 between I-5 and MacArthur Drive interchanges

Traffic operations were evaluated for future year conditions at the following two segments.

- I-205 west of MacArthur Drive interchange
- SR 120 east of I-5 interchange

Freeway Weaving Segments

Traffic operations for local freeway weaving segments were evaluated for existing conditions only, consistent with the River Islands SEIR. For the SEIR, Caltrans requested weaving analysis for existing conditions, because at the time it was expected that some traffic from initial River Islands at Lathrop development would use the I-5/Manthey Road/Mossdale Road hook ramps until the primary gateways (River Islands Parkway, Golden Valley Parkway) are constructed in future years. This interim access condition was expected to effectively create a weaving condition with upstream and downstream I-205 and SR 120 access ramps at I-5. Accordingly, for this study only existing conditions are analyzed for the following freeway weaving segments.

I-5 Northbound

- I-5 northbound between I-205 on-ramp merge and Mossdale Road off-ramp diverge
- I-5 northbound between Mossdale Road on-ramp merge and SR 120 off-ramp diverge

I-5 Southbound

- I-5 southbound between SR 120 on-ramp merge and Manthey Road off-ramp diverge
- I-5 southbound between Manthey Road on-ramp merge and I-205 off-ramp diverge

Freeway Ramp Merge/Diverge Locations

Traffic operations were evaluated for existing and future year conditions at the following freeway ramp merge and diverge locations within the study area.

- I-5/Louise Avenue interchange—northbound and southbound on-ramps and off-ramps
- I-5/Manthey Road interchange—southbound on-ramp and off-ramp
- I-5/Mossdale Road interchange—northbound on-ramp and off-ramp
- I-205/MacArthur Drive interchange—eastbound and westbound on-ramps and off-ramps
- I-205/Paradise Road interchange—eastbound and westbound on-ramps and off-ramps (year 2031 only)

12.1.2.4 Existing Traffic Volumes

Existing intersection turning movement counts were collected in September 2009 during weekday a.m. and p.m. peak periods (7–9 a.m. and 4–6 p.m., respectively) at the 12 existing study intersections and the following three freeway mainline locations. Peak hour traffic volumes for the above study intersections are shown on Figure 12-4.

- I-5 between Louise Avenue and SR 120 interchanges

- SR 120 between I-5 and Guthmiller Road Interchanges
- I-205 between I-5 and MacArthur Drive interchanges

12.1.2.5 Level of Service Methodology

Intersections

Methods described in the *Highway Capacity Manual* (Transportation Research Board 2000) were used to calculate the LOS for signalized and stop-controlled intersections. Table 12-1 summarizes the LOS criteria for signalized and stop-controlled intersections. LOS for signalized intersections is determined by the average amount of delay experienced by vehicles at the intersection. For stop-controlled intersections, LOS depends on the average delay experienced by drivers on the stop-controlled approaches. Thus, for two-way or T-intersections, LOS is based on the average delay experienced by vehicles entering the intersection on the minor (stop-controlled) approaches. For all-way stop-controlled intersections, LOS is determined by the average delay for all movements through the intersection. The LOS criteria for stop-controlled intersections have different threshold values than those for signalized intersections, primarily because drivers expect different levels of performance from distinct types of transportation facilities. In general, stop-controlled intersections are expected to carry lower volumes of traffic than signalized intersections. Thus, for the same LOS, a lower level of delay is acceptable at stop-controlled intersections than at signalized intersections.

Table 12-1. LOS Criteria for Intersections

	Average Delay per Vehicle (seconds/vehicle)	
LOS Designation	Signalized Intersections	Stop-Controlled Intersections
A	≤ 10	≤ 10
B	> 10–20	> 10–15
C	> 20–35	> 15–25
D	> 35–55	> 25–35
E	> 55–80	> 35–50
F	> 80	> 50

Source: Transportation Research Board 2000.

Roadway Segments

The *Highway Capacity Manual* methodology for two-way, two-lane highways (Transportation Research Board 2000) is used to calculate the LOS for all study roadway segments under existing conditions. This methodology uses vehicles' percent time spent following (PTSF) to determine LOS on a two-lane rural roadway facility. For study roadway segments that are expected to expand from two to four lanes under year 2031 conditions, the *Highway Capacity Manual* methodology for multilane highways is used to calculate the roadway LOS. This methodology uses vehicle density (in passenger vehicles per mile per lane [pvpmpl]) to determine LOS on a multilane highway. Table 12-2 summarizes the LOS criteria for two-lane and multilane highways.

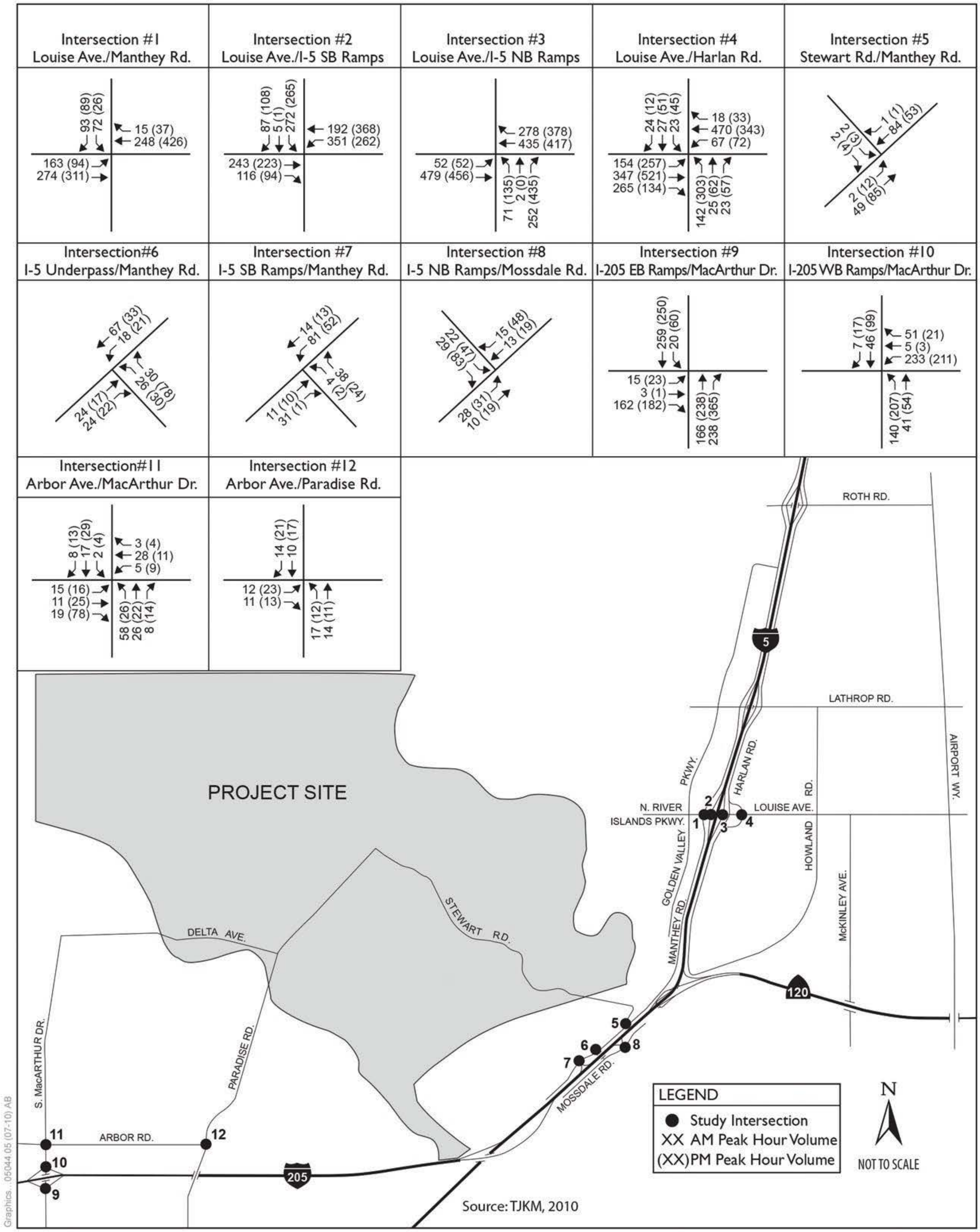

Figure 12-4
Intersection Traffic Volumes–Existing Conditions

Table 12-2. LOS Criteria for Roadways

LOS Designation	Two-Lane Highways Percent Time Spent Following	Multilane Highways Maximum Density (pvpmpl)
A	40	11
B	55	18
C	70	26
D	85	35
E	> 85	45
F	Varies	Varies

Source: Transportation Research Board 2000.

Notes: Percent time spent following values based on assumed Class II roadway classification; pvpmpl = passenger vehicles per mile per lane; density values based on assumed 45 mph free flow speed.

Freeways

The *Highway Capacity Manual* methodology (Transportation Research Board 2000) was used to analyze the LOS for freeway mainline segments, freeway weaving sections, and freeway ramp merge and diverge locations. The methodology uses vehicle density (pvpmpl) to determine LOS on these types of facilities. Table 12-3 shows the LOS criteria for freeway mainline segments, freeway weaving sections, and freeway merge/diverge locations.

Table 12-3. LOS Criteria for Freeways

	Maximum Density (pvpmpl)		
LOS Designation	Freeway Mainline Segment	Freeway Weaving Section	Freeway Merge/ Diverge Locations
A	11	10	10
B	18	20	20
C	26	28	28
D	35	35	35
E	45	43	>35
F	Varies	Varies	Demand exceeds capacity

Source: Transportation Research Board 2000.

Notes: pvpmpl = passenger vehicles per mile per lane; density values based on assumed 45 mph free flow speed.

12.1.2.6 Existing Levels of Service

Intersection LOS

Table 12-4 summarizes the results of the intersection analysis under existing conditions. Currently, all study intersections operate at acceptable levels of service during weekday a.m. and p.m. peak hours.

Table 12-4. Intersection LOS—Existing (2009) Conditions

		AM Peak Hour		PM Peak Hour	
Intersection	Control	Delay	LOS	Delay	LOS
Manthey Road/Louise Avenue	One-way stop	27.7	D	17.7	C
I-5 southbound ramps/Louise Avenue	Signal	24.9	C	15.5	B
I-5 northbound ramps/Louise Avenue	Signal	8.7	A	10.8	B
Harlan Road/Louise Avenue	Signal	15.8	B	20.8	C
Manthey Road/Stewart Road	All-way stop	7.1	A	7.2	A
Manthey Road/I-5 Underpass	One-way stop	9.6	A	9.3	A
Manthey Road/I-5 southbound ramps	One-way stop	9.0	A	8.7	A
Mossdale Road/I-5 northbound ramps	One-way stop	9.3	A	9.6	A
MacArthur Drive/I-205 eastbound ramps	Signal	10.3	B	9.4	A
MacArthur Drive/I-205 westbound ramps	Signal	25.2	C	16.3	B
MacArthur Drive/Arbor Avenue	All-way stop	8.2	A	7.9	A
Paradise Road/Arbor Avenue	One-Way Stop	9.0	A	9.1	A

Notes: Delay = average seconds per vehicle; LOS = level of service.

Roadway LOS

Table 12-5 shows LOS for the study rural roadway segments under existing conditions. Currently, all existing study roadway segments are operating at LOS A during the weekday a.m. and p.m. peak hours, which is within acceptable roadway operations standards.

Table 12-5. Roadway LOS—Existing (2009) Conditions

	AM Peak Hour		PM Peak Hour	
Roadway Segment	V/C	LOS	V/C	LOS
Paradise Road between Arbor Avenue and Paradise Cut	0.02	A	0.04	A
Paradise Road between Arbor Avenue and I-205	0.02	A	0.03	A
Arbor Avenue between Paradise Road and MacArthur Drive	0.03	A	0.02	A
MacArthur Drive between Arbor Avenue and I-205	0.05	A	0.05	A

Notes: V/C = volume to capacity ratio; LOS = level of service.

Freeway Mainline LOS

Table 12-6 shows LOS for the study freeway mainline sections under existing conditions. Currently, all freeway mainline segments are operating at LOS D or better, which is within acceptable Caltrans freeway service level standards. It should be noted that since the River Islands SEIR (City of Lathrop 2002) was completed, I-205 was widened from four to six lanes. This widening has improved the unacceptable LOS that was identified in the SEIR under existing conditions.

Table 12-6. Freeway Mainline LOS—Existing (2009) Conditions

			AM Peak Hour		PM Peak Hour	
Freeway Segment	Direction	Freeway Lanes	Density (pvpmpl)	LOS	Density (pvpmpl)	LOS
I-5 north of Louise Avenue interchange	NB	3	13.8	B	19.4	C
	SB	3	18.0	C	17.0	B
I-5 between Louise Avenue and SR 120	NB	3	13.8	B	20.1	C
	SB	3	18.6	C	16.9	B
I-5 between SR 120 and Manthey/Mossdale hook ramps	NB	4	13.1	B	20.8	C
	SB	5	18.4	C	10.7	A
I-5 between Manthey/Mossdale hook ramps and I-205	NB	5	10.5	A	16.8	B
	SB	5	18.6	C	10.8	A
I-5 south of I-205	NB	2	8.9	A	12.6	B
	SB	3	12.0	B	5.5	A
I-205 between I-5 and MacArthur Drive interchange	EB	3	11.0	A	19.5	C
	WB	3	18.3	C	12.5	B
I-205 west of MacArthur Dr.	EB	3	10.6	A	19.1	C
	WB	3	17.6	B	12.5	B
SR 120 east of I-5	EB	2	18.0	B	27.6	D
	WB	2	27.4	D	17.8	B

Notes: NB = northbound; SB = southbound; EB = eastbound; WB = westbound; pvpmpl = passenger vehicles per mile per lane; LOS = level of service.

Freeway Weaving LOS

Table 12-7 shows LOS for the study freeway weaving sections under existing conditions. Currently, all weaving segments are operating acceptably at LOS D or better, with the exception of the I-5 northbound weaving section between the Mossdale Road on-ramp and SR 120 off-ramp (LOS E in the p.m. peak hour).

Table 12-7. Freeway Weaving LOS—Existing (2009) Conditions

	AM Peak Hour		PM Peak Hour	
Location	Density (pvpmpl)	LOS	Density (pvpmpl)	LOS
I-5 northbound				
I-205 merge to Mossdale Road off-ramp diverge (3,160 feet)	16.4	B	34.3	D
Mossdale Road on-ramp merge to SR 120 diverge (1,620 feet)	21.4	C	36.0	**E**
I-5 southbound				
SR 120 merge to Manthey Road off-ramp diverge (2,200 feet)	26.3	C	17.9	B
Manthey Road on-ramp merge to I-205 diverge (2,900 feet)	32.8	D	20.4	C

Notes: pvpmpl = passenger vehicles per mile per lane; LOS = level of service.
Bold indicates operations below LOS standards.

Freeway Ramp LOS

Table 12-8 shows the results of a freeway ramp merge/diverge LOS analysis of the study freeway on-ramps and off-ramps under existing conditions. Currently, all ramp merge and diverge locations are operating at LOS D or better, which is within acceptable Caltrans standards.

Table 12-8. Freeway Ramp LOS—Existing (2009) Conditions

Interchange	Ramp	Ramp Lanes	Freeway Lanes	AM Peak Hour LOS	PM Peak Hour LOS
I-5/Louise Avenue	NB Off diverge	1	3	C	D
	NB On merge	1	3	C	D
	SB Off diverge	1	3	C	C
	SB On merge	1	3	C	C
I-5/Manthey Road	SB Off diverge	1	5	B	B
	SB On merge	1	5	C	B
I-5/Mossdale Road	NB Off diverge	1	5	B	C
	NB On merge	1	4	B	C
I-205/MacArthur Drive	EB Off diverge	1	3	B	C
	EB On merge	1	3	B	C
	WB Off diverge	1	3	C	B
	WB On merge	1	3	C	B

Notes: NB = northbound; SB = southbound; EB = eastbound; WB = westbound; LOS = level of service.

12.1.2.7 Existing Public Transit

There currently are no public transit services or facilities in the RID Area. SJRTD provides bus transit service and ACE provides rail transit service in downtown Lathrop.

SJRTD Routes 90 and 97 travel along I-5 in the Lathrop area and use the Lathrop Road and Louise Avenue interchanges to access the Lathrop street system east of the freeway. Route 90 extends north to downtown Stockton and south (and west) to Tracy and provides 9 buses in each direction only on weekdays. Route 97 connects Lathrop with the nearby town of Tracy and the Stockton Metropolitan Airport, and provides three buses to the airport and four buses from the airport on weekdays. (San Joaquin Regional Transit District 2012.)

An ACE train station in Lathrop provides commuter rail service from Stockton through Lathrop to the Tri-Valley, Fremont, and San Jose. There are four westbound trains in the morning and four eastbound trains in the afternoon, seven days a week (Altamont Commuter Express 2012).

12.2 Environmental Consequences

12.2.1 Methods for Analysis of Effects

12.2.1.1 Traffic Analysis Scenarios

Estimates of future traffic conditions both with and without the proposed action of the River Islands development were necessary to evaluate the potential effect of buildout and operation of the proposed action or alternatives on the local street system. The baseline scenario reflects future traffic conditions with only earlier phases of the project (i.e., Phases 1 and 2A) completed; the future proposed action and alternative scenarios reflect future traffic conditions with full buildout of River Islands at Lathrop. Table 12-9 shows the total land use assumptions (metrics for developing traffic projects) at buildout.

Table 12-9. River Islands at Lathrop Land Use Assumptions

Development Phase	Neighborhood	Residential Units		Commercial Area (KSF)		
		SF	MF	Retail	Service	Other
Earlier Phases (Phase 1/2A)	East Village	2,103	203	0	0	0
	Employment Center	0	0	161	920	1,539
	Lakeside	1,000	0	0	0	0
	Town Center	636	344	213	118	48
	Total	3,739	547	374	1,038	1,588
Proposed Action	Employment Center	0	0	135	768	982
	Lake Harbor	300	200	0	0	0
	Old River Road	700	200	0	0	0
	West Village	1,350	1,350	57	32	25
	Woodlands	1,521	1,099	0	0	0
	Total	3,871	2,849	192	800	1,007
Overall Totals		**7,610**	**3,396**	**566**	**1,839**	**2,595**

Notes: SF = single-family residential; MF = multifamily residential; KSF = 1,000 square feet.

For purposes of this traffic analysis, the evaluation of adverse effects is defined by comparing the proposed action and alternatives to the baseline scenario in 2031. The analysis scenarios are described below.

- **2031 Baseline.** This scenario analyzes model-generated traffic volumes that are based on expected background development growth by 2031 in West Lathrop, Mossdale Village, Central Lathrop, and greater San Joaquin County, as well as expected roadway improvements. The baseline scenario also assumes full buildout of earlier phases of the project.
- **2031 Proposed Action.** The proposed action scenario represents the 2031 baseline conditions plus full buildout of the proposed action.
- **2031 Alternatives.** As explained in Chapter 2, *Proposed Action and Alternatives*, these scenarios (including the No Action Alternative) would result in the same amount of River Island

development as the proposed action. Accordingly, the potential effects of all alternatives on the local street system would be similar to those of the proposed action.

12.2.1.2 Traffic Volume Projection

This section describes methods and assumptions used to project traffic volumes for the 2031 baseline and proposed action scenarios. Under the 2031 baseline scenario, earlier phases of the River Islands development are assumed to be completed, as well as additional buildout development in the surrounding planning areas and neighborhoods of West Lathrop, Mossdale Village, and Central Lathrop. As shown in Table 12-9, earlier phases of the project are expected to consist of approximately 4,286 single- and multi-family residential units; approximately 3 million square feet of commercial uses (retail, service, office, and related uses); three schools; and one fire station.

The baseline scenario is used as a basis for evaluating potential traffic impacts anticipated with full buildout of the proposed action in year 2031. The 2031 proposed action scenario represents the 2031 baseline conditions plus the additional traffic generated by the proposed action. As shown in Table 12-9, the proposed action is expected to consist of approximately 6,720 residential units (3,871 single-family and 2,849 multi-family) and approximately 2,000,000 square feet of commercial development. The roadway network and nearby area development are assumed to be the same under this traffic scenario as under the 2031 baseline conditions.

A travel demand model combining Lathrop and SJCOG models was developed to include refined and updated land use and transportation network assumptions in the study area and was used to project the 2031 traffic volumes for the baseline and proposed action scenarios.

Area Development Assumptions

Based on the prior concurrence of SJCOG and City staff and due to current economic conditions, it was assumed that all development surrounding Stewart Track in the Lathrop planning areas and San Joaquin County as a whole was projected to be built out by year 2031. Development assumptions include full build of the West Lathrop, Mossdale Village, and Central Lathrop development planning areas.

Roadway Network Assumptions

Based on the Lathrop Traffic Monitoring Program (City of Lathrop 2006) and the SJCOG Regional Transportation Plan (RTP) (San Joaquin Council of Governments 2007), the following programmed and funded roadway improvements in the RTP in the vicinity of River Islands at Lathrop are expected to be in place by 2031.

- I-205: Widening from six to eight lanes between I-5 and I-580.
- I-5: Widening from six to eight lanes between SR 120 and French Camp.
- I-5 (Mossdale): Widening from 9 to 12 through lanes between SR 120 and I-205.
- SR 120: Widening from four to six lanes (inside) between I-5 and SR 99.
- Reconstruction of I-5/Louise Avenue interchange, which is a modified diamond interchange, with new a westbound to southbound loop ramp.
- Construction of new interchange at I-205/Paradise-Chrisman Road.

The intersection traffic controls and lane geometries are based on those anticipated in the River Islands SEIR (City of Lathrop 2002), as well as the Lathrop Traffic Monitoring Program (City of Lathrop 2006) and subsequent traffic studies of internal River Islands at Lathrop intersections. For the Golden Valley Parkway/River Islands Parkway intersection and the two I-5/Louise Avenue ramp intersections, the buildout intersection geometries were developed in accordance with the I-5/Louise Avenue Project Study Report (TJKM Transportation Consultants 2004) and anticipated retail commercial development in the vicinity, which provide the basis for analysis.

Site Access/Circulation

Regional freeway access to River Islands at Lathrop would be provided from I-5 at the Louise Avenue interchange and I-205 at the existing MacArthur Drive interchange and the future Paradise-Chrisman Road interchange. Local access to River Islands at Lathrop would be provided by four bridge crossings. From the northeast, River Islands Parkway and Golden Valley Parkway would be extended across the San Joaquin River from their current termini in Mossdale Village, with both crossings consisting of four lanes. The River Islands Parkway Bridge would enter the Phase 1 mixed-use neighborhoods of Town Center and East Village, while the northeast Golden Valley Parkway crossing would directly access the Employment Center neighborhood of Phase 1.

From the southwest, two bridges would span Paradise Cut into River Islands at Lathrop. The existing Paradise Road crossing would be widened from two to four lanes and enter the primarily residential Woodlands and mixed-use West Village neighborhoods of the proposed action. Golden Valley Parkway, after passing through the Employment Center, would cross over Paradise Cut on another four-lane bridge and continue to its future terminus at the Paradise Road/Arbor Avenue intersection, just north of I-205. Primary arterial roadways in the completed River Islands at Lathrop would be North River Islands Parkway, South River Islands Parkway, Golden Valley Parkway, North Woodlands Drive, and South Woodlands Drive.

2031 Baseline Traffic Volumes

The travel demand model was executed for the baseline scenario assuming that the above roadway improvements, the earlier phases of River Islands at Lathrop, and other area development would be in place by 2031. Turning movement volumes, traffic controls, and lane geometries anticipated for intersections both external and internal to River Islands at Lathrop for the 2031 baseline conditions are shown in Figure 12-5 and Figure 12-6, respectively.

2031 Proposed Action Traffic Volumes

Projected traffic for the proposed action was generated by the travel demand model and was added to the 2031 baseline volumes to generate volumes for the 2031 proposed action conditions. Turning movement volumes, traffic controls, and lane geometries anticipated for intersections both external and internal to River Islands at Lathrop for the 2031 proposed action conditions s are shown in Figure 12-7 and Figure 12-8, respectively. The intersection traffic controls and lane geometries assumed to be present are the same as those under the 2031 baseline scenario.

12.2.2 Definition of Significant Effects

Effects to transportation and circulation can occur as a result of both construction and operational activities. The River Islands SEIR (City of Lathrop 2002) previously established significance criteria for the proposed River Islands development; these were based primarily on standards established by City of Lathrop Public Works, the City's General Plan, Caltrans standards, San Joaquin County standards, and City of Tracy standards. The proposed action would cause an significant effect on transportation and circulation if it would result in exceedance of one or more of the following thresholds.

- Degrade the baseline operations at a signalized or all-way stop-controlled intersection in Lathrop or Tracy from LOS D (or better) to LOS E or F, or degrade the baseline operation at a City of Lathrop side street stop-controlled location from LOS E (or better) to LOS F.
- Increase the baseline traffic by 1% or more at a signalized or all-way stop-controlled intersection in Lathrop or Tracy already operating at LOS E or F.
- Degrade the baseline operations along a roadway or at a signalized, all-way stop-controlled, or side street stop-controlled intersection in San Joaquin County from LOS C (or better) to LOS D, E, or F.
- Increase the baseline traffic by 1% or more along a roadway or at a signalized, all-way stop-controlled, or side street stop-controlled intersection in San Joaquin County already operating at LOS D, E, or F.
- Degrade the baseline operations at a freeway mainline segment or freeway ramp merge/diverge location from LOS D (or better) to LOS E or F, or degrade baseline operation at a Lathrop side street stop-controlled location from LOS E (or better) to LOS F.
- Increase the baseline traffic by 1% or more at a freeway mainline segment or freeway ramp merge/diverge location already operating at LOS E or F.
- Substantially increase auto, pedestrian, or bicycle rider safety concerns.
- Fail to provide for or allow flexibility to provide for public transit service along major internal streets of the River Islands at Lathrop internal circulation system.

12.2.3 Effects and Mitigation Approaches

Because of the cumulative nature of traffic analysis and the close causal connection between vehicle use and identified effects, all effects discussed in this chapter are considered direct effects, resulting from both construction- and operation-related activities. No indirect effects were identified.

12.2.3.1 Alternative 1—Proposed Action

Based on the definition of adverse effects described above, the proposed action would have adverse effects on transportation and circulation. Adverse effects and potential mitigation measures for all facilities are discussed below. As described in *Transportation Impact Fee Programs* above, the City will ensure that River Islands pays its applicable transportation impact fees for its fair-share contributions to improvements at local roadways and freeways that will be affected by River Islands at Lathrop.

Degradation of intersection LOS from operational traffic (significant)

Table 12-10 summarizes the results of the intersection LOS analysis under 2031 baseline and proposed action conditions.

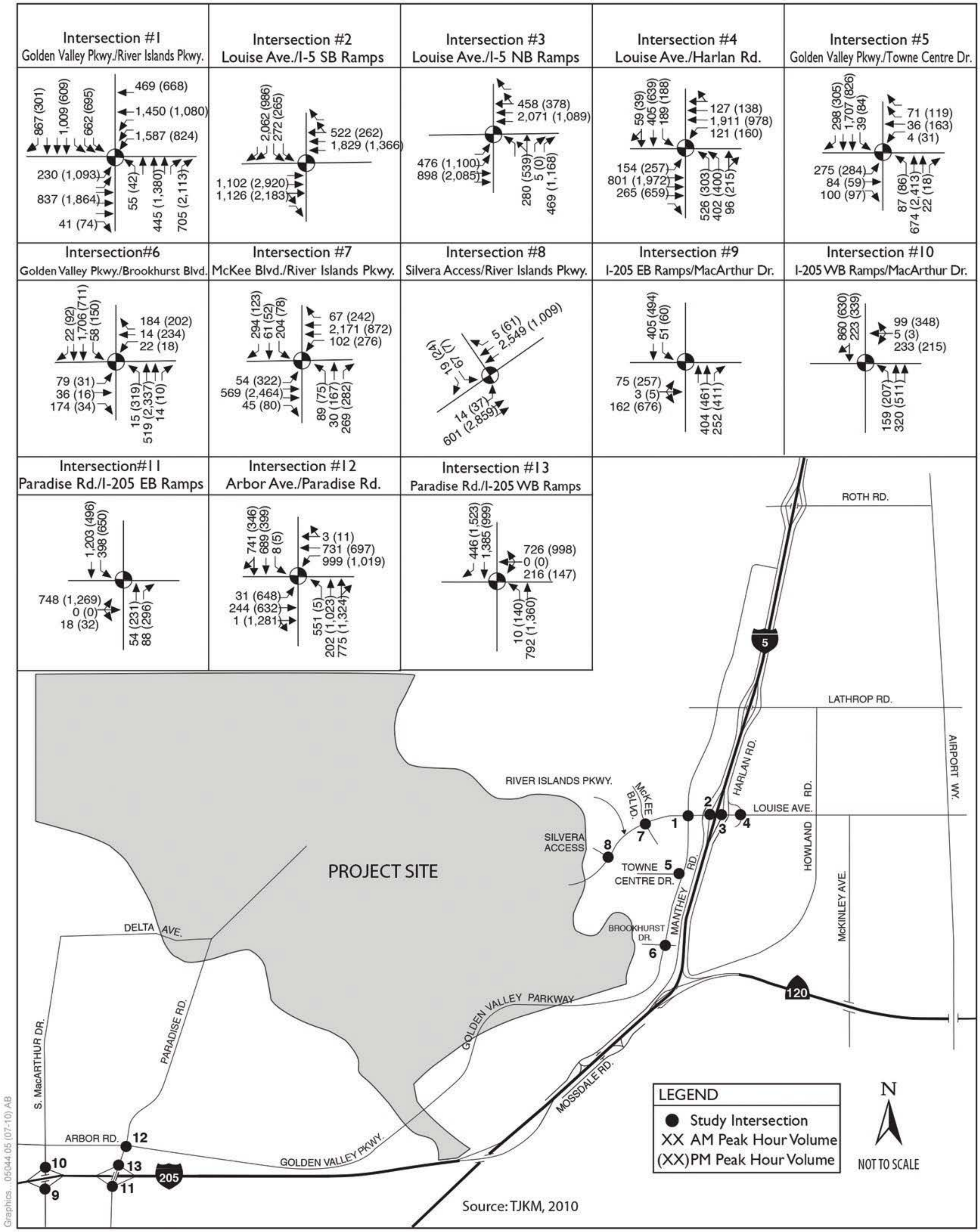

Figure 12-5
External Intersection Volumes and Lane Geometry– 2031 Baseline Conditions

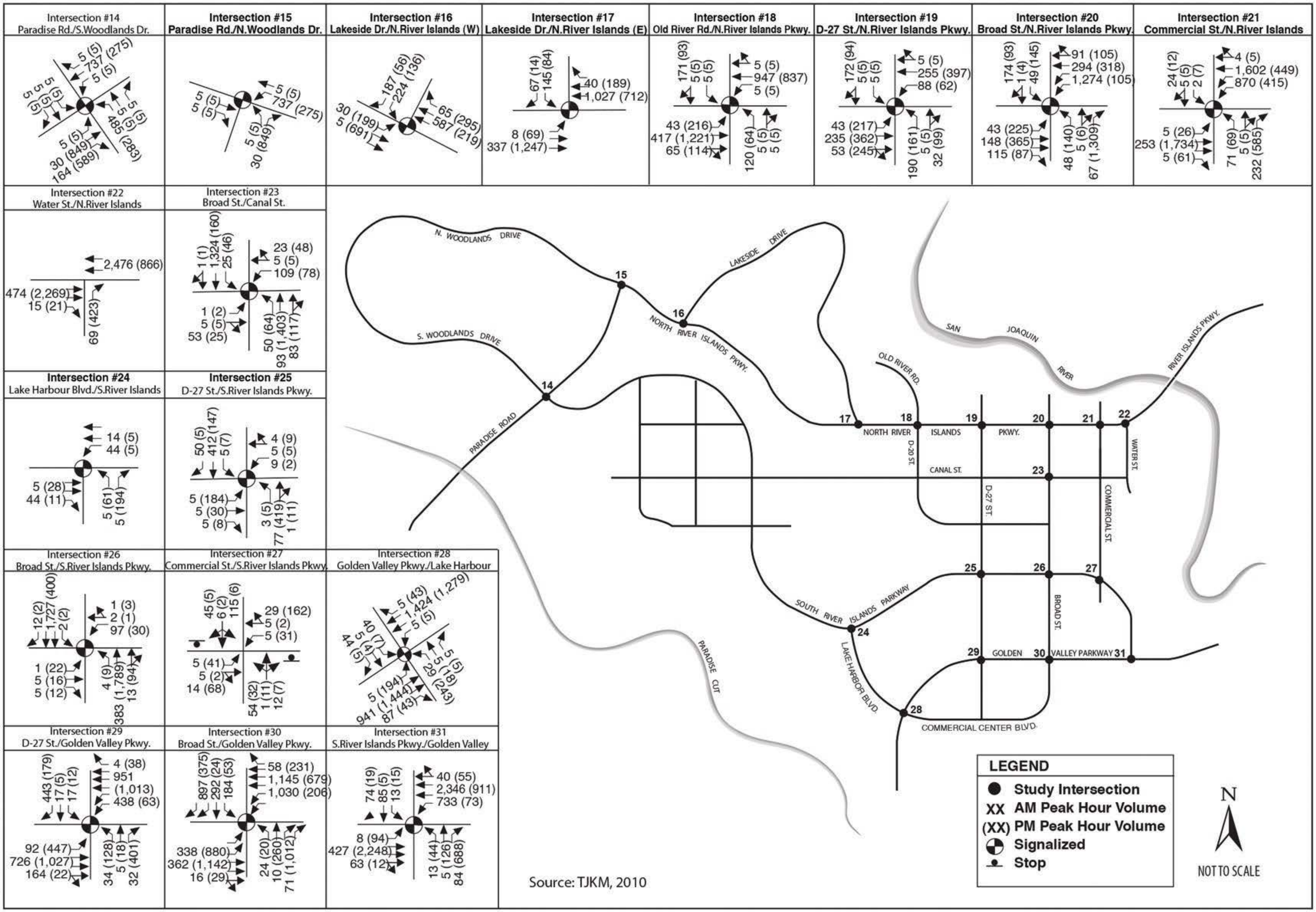

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Figure 12-6
Internal Intersection Volumes and Lane Geometry–2031 Baseline Conditions

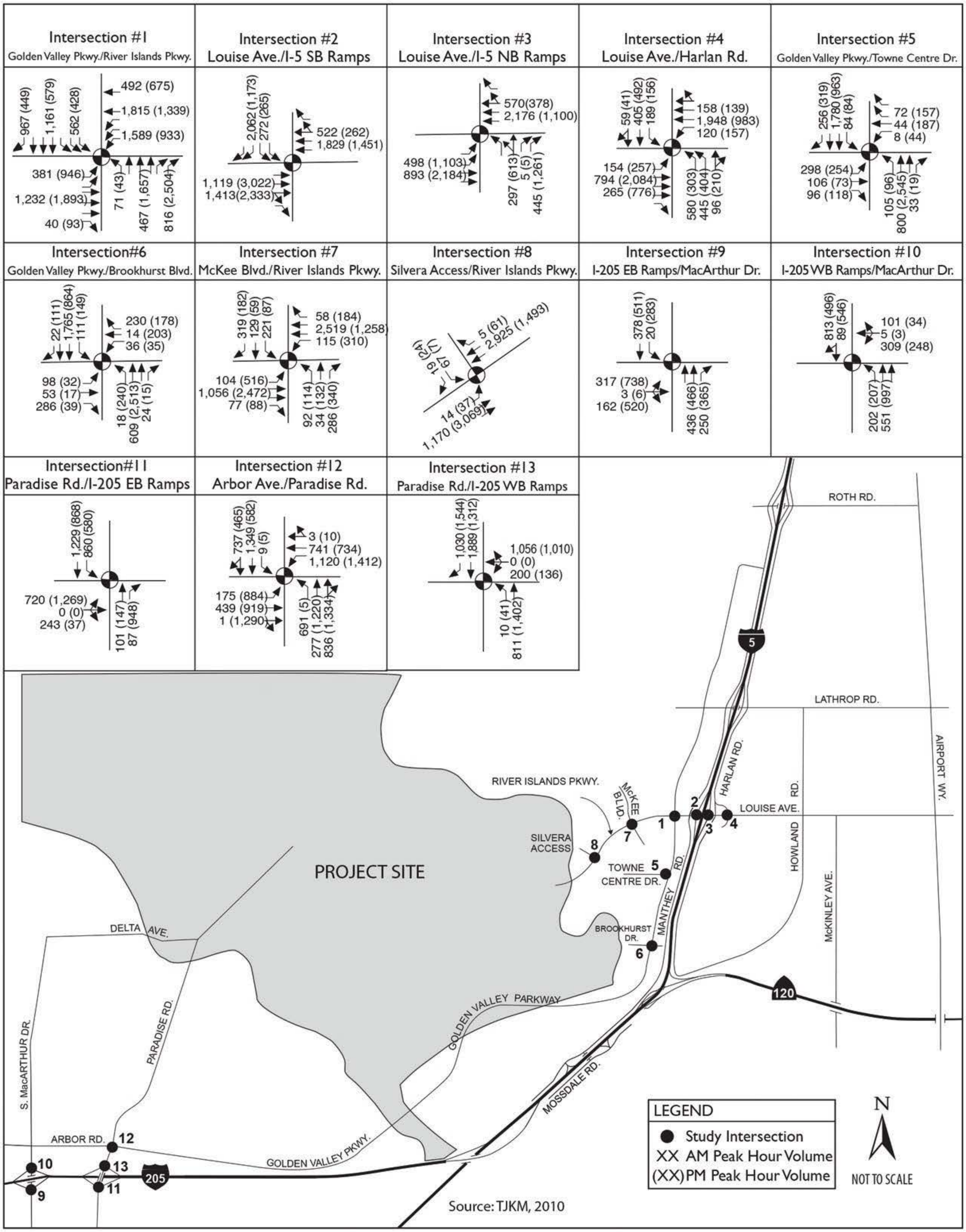

Figure 12-7
External Intersection Volumes and Lane Geometry–
2031 Proposed Action Conditions

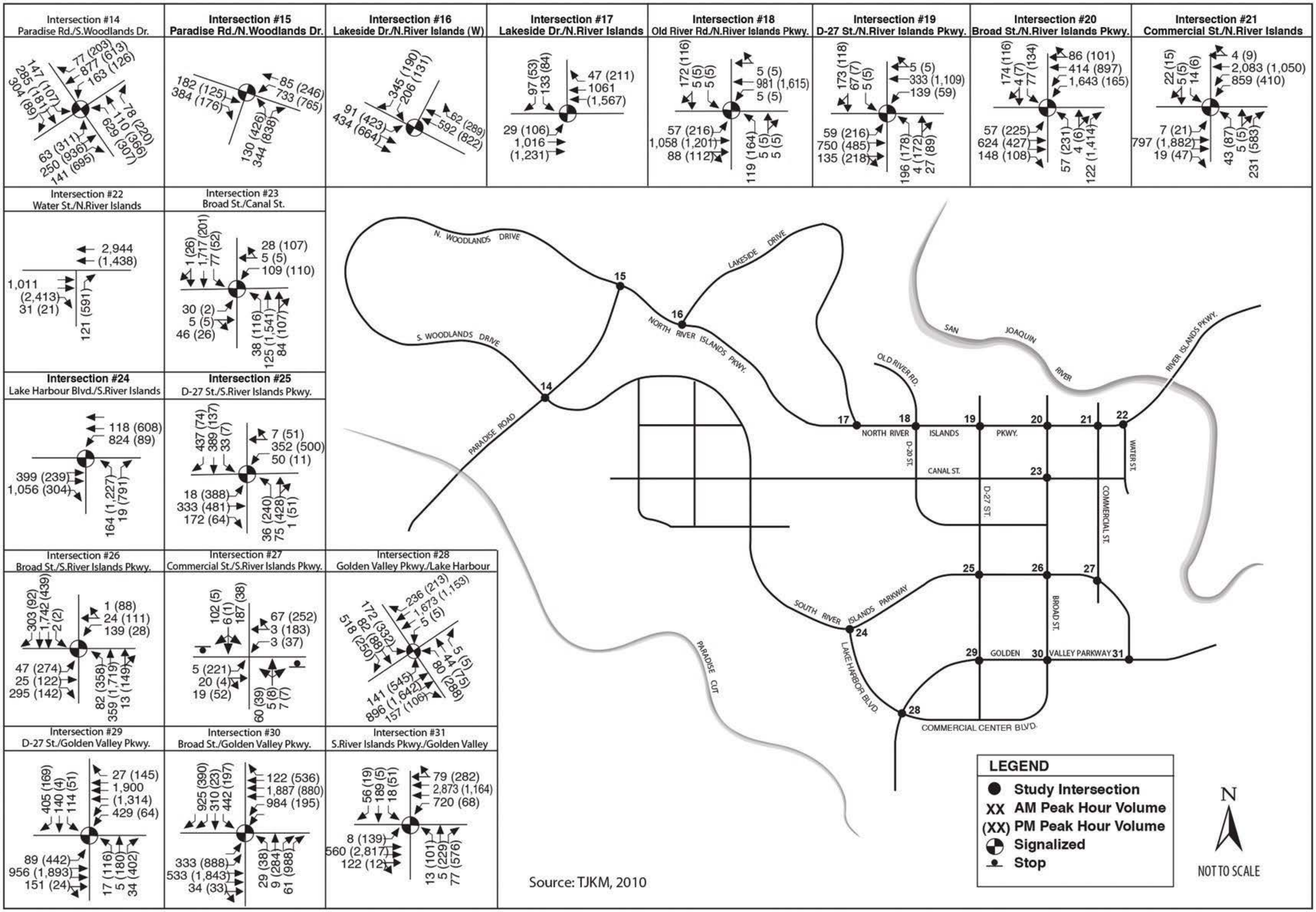

Figure 12-8
Internal Intersection Volumes and Lane Geometry–2031 Proposed Action Conditions

Table 12-10. Intersection LOS—2031 Baseline and Proposed Action

		2031 Baseline				2031 Proposed Action				
		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		
Intersection	Control	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Significant Effect
Intersections External to River Island Site										
Golden Valley Pkwy/River Islands Pkwy	Signal	59.0	**E**	120+	**F**	109.2	**F**[a]	190.1	**F**[a]	**Yes**[b]
I-5 southbound ramps/ Louise Ave	Signal	108.7	**F**	110.6	**F**	128.1	**F**[a]	154.0	**F**[a]	**Yes**[b]
I-5 northbound ramps/ Louise Ave	Signal	15.8	B	100.4	**F**	17.0	B	116.7	**F**[a]	**Yes**[b]
Harlan Rd/Louise Ave	Signal	92.3	**F**	90.6	**F**	107.7	**F**	95.4	**F**	**Yes**[b]
Golden Valley Pkwy/ Towne Centre Drive	Signal	29.5	C	93.3	**F**	30.2	C	107.0	**F**	**Yes**[b]
Golden Valley Pkwy/ Brookhurst Blvd	Signal	13.0	B	47.4	D	17.0	B	54.5	D	No
McKee Blvd/River Islands Pkwy	Signal	26.2	C	72.5	**E**	54.7	D	69.7	**E**	**Yes**[b]
Silvera Access/River Islands Pkwy	Signal	4.6	A	6.3	A	8.3	A	11.8	B	No
MacArthur Drive/I-205 eastbound ramps	Signal	10.5	B	81.0	**F**	18.7	B	120+	**F**	**Yes**[b]
MacArthur Drive/I-205 westbound ramps	Signal	106.5	**F**	120+	**F**	39.5	D	58.3	**E**	**Yes**[b]
Paradise Road/I-205 eastbound ramps	Signal	97.3	**F**	120+	**F**	120+	**F**	120+	**F**	**Yes**[b]
Paradise Rd/Arbor Ave	Signal	120+	**F**	120+	**F**	120+	**F**	120+	**F**	**Yes**[b]
Paradise Rd/I-205 westbound ramps	Signal	120+	**F**	120+	**F**	120+	**F**	120+	**F**	**Yes**[b]
Intersections Internal to River Island Site										
Paradise Rd/S. Woodlands Drive	Signal	17.0	B	15.7	B	37.1	D	51.1	D	No
Paradise Rd/N. Woodlands Drive	Signal	3.2	A	28.0	C	20.9	C	19.8	B	No
Lakeside Drive/N. River Islands Pkwy (W)	Signal	18.6	B	10.1	B	16.1	B	23.0	C	No
Lakeside Drive/N. River Islands Pkwy (E)	Signal	7.8	A	4.8	A	8.2	A	7.9	A	No
Old River Rd/N. River Islands Pkwy	Signal	14.9	B	10.3	B	14.3	B	22.6	C	No

		2031 Baseline				2031 Proposed Action				
		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		
Intersection	Control	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Significant Effect
D-27 St/N. River Islands Pkwy	Signal	32.5	C	22.2	C	25.7	C	11.7	B	No
Broad St/N. River Islands Pkwy	Signal	13.5	B	24.1	C	28.2	C	42.7	D	No
Commercial St/N. River Islands Pkwy	Signal	13.2	B	21.8	C	15.3	B	27.1	C	No
Water St/N. River Islands Pkwy	Free	7.2	A	12.8	B	7.8	A	22.3	C	No
Broad St/Canal St	Signal	5.6	A	4.3	A	5.3	A	7.3	A	No
Lake Harbor Blvd/S. River Islands Pkwy	Signal	20.5	C	13.4	B	51.9	D	29.7	C	No
D-27 St/S. River Islands Pkwy	Signal	21.1	C	15.5	B	25.9	C	52.9	D	No
Broad St/S. River Islands Pkwy	Signal	8.1	A	7.4	A	54.1	D	40.1	D	No
Commercial St/S. River Islands Pkwy	Two-way stop	9.6	A	10.6	B	10.8	B	24.8	C	No
Golden Valley Pkwy/Lake Harbor Blvd	Signal	8.0	A	17.0	B	42.9	D	38.6	D	No
D-27 St/Golden Valley Pkwy	Signal	30.9	C	29.5	C	19.3	B	32.0	C	No
Broad St/Golden Valley Pkwy	Signal	19.4	B	25.0	C	28.8	C	47.6	D	No
S. River Islands Pkwy/ Golden Valley Pkwy	Signal	12.9	B	54.1	D	20.4	C	51.5	D	No

Notes: Delay = average seconds per vehicle; LOS = level of service.

Bold indicates unacceptable operating conditions.

[a] Assumed geometry is buildout and cannot be physically expanded further. Effects/mitigations discussed in next section.

[b] The 2031 proposed action traffic volumes increase from the baseline conditions by 1% or more.

The proposed action would result in significant effects on the intersections listed below. These intersections are expected to exceed the LOS standards under both 2031 baseline and proposed action conditions, and the traffic volumes for the proposed action conditions would increase by 1% or more from the baseline conditions.

- Golden Valley Parkway/River Islands Parkway
- I-5 southbound ramps/Louise Avenue
- I-5 northbound ramps/Louise Avenue

- Harlan Road/Louise Avenue
- Golden Valley Parkway/Towne Centre Drive
- McKee Boulevard/River Islands Parkway
- MacArthur Drive/I-205 eastbound ramps
- MacArthur Drive/I-205 westbound ramps
- Paradise Road/I-205 eastbound ramps
- Paradise Road/Arbor Avenue
- Paradise Road/I-205 westbound ramps

The baseline traffic controls and lane geometry at the three intersections listed below would be indirectly constrained by anticipated buildout of commercial development immediately adjacent to them; therefore, it is physically and perhaps financially infeasible to expand these intersections to mitigate degraded LOS. Alternative measures to mitigate project-related effects, such as TDM measures, may be implemented, but they may not substantially reduce adverse effects. Therefore, effects at these locations are significant and unavoidable.

- Golden Valley Parkway/River Islands Parkway
- I-5 southbound ramps/Louise Avenue
- I-5 northbound ramps/Louise Avenue

The following mitigation measures would address the identified significant effects on intersection operations. (Note that the Corps does not have authority to impose mitigation through its permitting process; rather, the relevant local agency must enforce mitigation measures. Mitigation of traffic effects are consistent with mitigation measures set forth in the SEIR.)

Mitigation Measure TC-1: Widen the Harlan Road/Louise Avenue intersection

Add one eastbound left turn lane, one northbound through lane, one westbound right turn lane, and one southbound right turn lane.

Mitigation Measure TC-2: Reconfigure the Golden Valley Parkway/Towne Centre Drive intersection

Convert the northbound right turn lane to shared through/right turn lane.

Mitigation Measure TC-3: Reconfigure the McKee Boulevard/River Islands Parkway intersection

Convert the eastbound right turn lane to shared through/right turn lane.

Mitigation Measure TC-4: Widen the MacArthur Drive/I-205 eastbound ramps intersection

Add one eastbound left turn lane.

Mitigation Measure TC-5: Widen and modify the MacArthur Drive/I-205 westbound ramps intersection

Add one southbound right turn lane and restripe the southbound shared through/right lane to through lane

Mitigation Measure TC-6: Widen the Paradise Road/I-205 eastbound ramps intersection

Add one eastbound left turn lane, add one southbound through lane, add one northbound through lane, and make the northbound right turn a free movement.

Mitigation Measure TC-7: Widen the Paradise Road/I-205 westbound ramps intersection

Add one westbound right turn lane, one northbound through lane, and one southbound through lane, and make the southbound right turn a free movement.

Mitigation Measure TC-8: Widen the Paradise Road/Arbor Avenue intersection

Add one eastbound left turn lane and one eastbound free right turn lane; add two westbound left turn lanes and one westbound right turn lane; add two northbound left turn lanes, one northbound through lane, and two northbound right turn lanes with overlap; add one southbound through lane and two southbound right turn lanes.

Table 12-11 provides a summary of the resulting mitigated LOS for affected study intersections under the 2031 proposed action conditions. Figure 12-9 illustrates the proposed intersection mitigations under this scenario.

Implementation of Mitigation Measures TC-1 to TC-7 would improve the intersection operations at these locations to be within the acceptable LOS standards. Implementation of Mitigation Measure TC-8 would improve the intersection operation at this location, but the LOS would still exceed the San Joaquin County LOS standard.

Table 12-11. Intersection LOS—2031 Proposed Action with Mitigation

		AM Peak Hour		PM Peak Hour	
Intersection	Control	Delay	LOS	Delay	LOS
Golden Valley Parkway/River Islands Parkway	Signal	109.2	**F***	190.1	**F***
I-5 southbound ramps/Louise Avenue	Signal	128.1	**F***	154.0	**F***
I-5 northbound ramps/Louise Avenue	Signal	17.0	B	116.7	**F***
Harlan Road/Louise Avenue	Signal	54.5	D	54.0	D
Golden Valley Parkway/Towne Centre Drive	Signal	29.4	C	33.3	C
McKee Boulevard/River Islands Parkway	Signal	54.5	D	32.7	C
MacArthur Drive/I-205 eastbound ramps	Signal	11.9	B	40.2	D
MacArthur Drive/I-205 westbound ramps	Signal	27.7	C	18.3	B
Paradise Road/I-205 eastbound ramps	Signal	39.8	D	37.1	D
Paradise Road/Arbor Avenue	Signal	54.7	D	43.4	D
Paradise Road/I-205 westbound ramps	Signal	40.9	D	41.4	D

Notes: Delay = average seconds per vehicle; LOS = level of service. **Bold** indicates unacceptable operating conditions.

* Assumed geometry is buildout and cannot be physically expanded further. Alternative mitigations such as TDM measures are recommended, there would still be a significant effect.

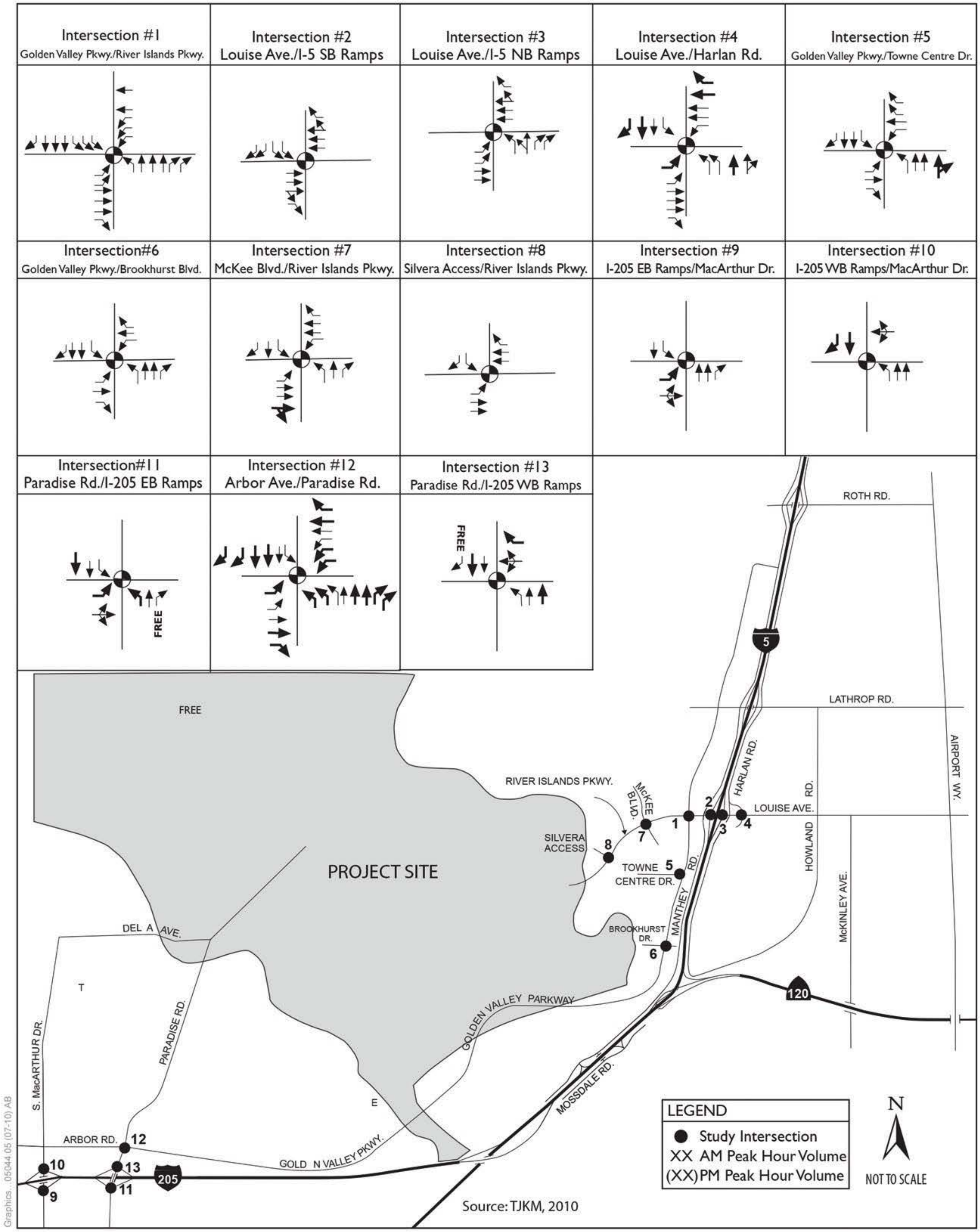

Figure 12-9
Intersection Lane Geometry–
2031 Proposed Action with Mitigation

Degradation of roadway LOS from operational traffic (significant)

Table 12-12 summarizes the results of the roadway segment LOS analysis under 2031 baseline and proposed action conditions.

Table 12-12. Roadway LOS—2031 Baseline and Proposed Action

Roadway Segment	Direction	No. of Lanes	2031 Baseline Conditions				2031 Proposed Action Conditions				Significant Effect
			AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		
			Density	LOS	Density	LOS	Density	LOS	Density	LOS	
Paradise Rd between Arbor Ave and Paradise Cut	NB	2	2.6	A	17.8	B	5.3	A	25.1	C	No
	SB	2	15.3	B	7.3	A	23.0	C	12.5	B	
Paradise Rd between Arbor Ave and I-205	NB	2	18.2	C	23.0	C	21.4	C	27.2	**D**	Yes
	SB	2	20.1	C	20.7	C	29.4	**D**	24.4	C	
Arbor Ave between Paradise Rd and MacArthur Drive	EB	2	1.7	A	18.9	C	7.4	A	22.0	C	No
	WB	2	19.7	C	8.0	A	22.6	C	11.1	B	
MacArthur Drive between Arbor Ave and I-205	NB	1	0.28 (v/c)	B	0.49 (v/c)	D	0.49 (v/c)	D	0.67 (v/c)	D	No
	SB	1									

Notes: NB = northbound; SB = southbound; EB = eastbound; WB = westbound; Density = passenger vehicles per mile per lane (pvpmpl); v/c = volume to capacity ratio; LOS = level of service.

Multilane highway methodology used for all segments except MacArthur Drive, where two-lane rural highway methodology was used: v/c ratio provides basis for LOS.

Bold indicates unacceptable operating conditions.

The two-lane segment of MacArthur Drive is expected to operate at LOS D or better under both conditions, which is within the City of Tracy's acceptable LOS standard. Under the proposed action conditions, Paradise Road between Arbor Avenue and I-205 is expected to operate at LOS D, which exceeds San Joaquin County's acceptable standard of LOS C. The LOS results show that the proposed action would result in significant effects on Paradise Road between Arbor Avenue and I-205. Mitigation Measure TC-9 would address this effect.

Mitigation Measure TC-9. Widen Paradise Road between Arbor Avenue and I-205

Widen the roadway segment from two to three lanes in both directions (from four- to six-lane roadway). Implementation of Mitigation Measure TC-9 would improve the roadway operation to within the acceptable San Joaquin County LOS standard. Table 12-13 provides a summary of the resulting mitigated LOS for the affected roadway segment under 2031 proposed action conditions.

Table 12-13. Roadway LOS—2031 Proposed Action with Mitigation

Roadway Segment	Direction	Number of Lanes	AM Peak Hour		PM Peak Hour	
			Density	LOS	Density	LOS
Paradise Road between Arbor Ave and I-205	NB	3	14.3	B	18.1	C
	SB	3	19.6	C	16.3	B

Notes: NB = northbound; SB = southbound; Density = passenger vehicles per mile per lane (pvpmpl); LOS = level of service.

Degradation of freeway mainline LOS from operational traffic (significant)

Table 12-14 summarizes the LOS results for the study freeway mainline sections under 2031 baseline and proposed action conditions.

Table 12-14. Freeway Mainline LOS—2031 Baseline and Proposed Action

Freeway Segment	Direction	No. of Lanes	2031 Baseline				2031 Proposed Action				Significant Effect
			AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		
			Density	LOS	Density	LOS	Density	LOS	Density	LOS	
I-5 north of Louise Ave interchange	NB	4	18.6	C	>45	**F**	19.0	C	>45	**F**	**Yes**[a]
	SB	4	>45	**F**	23.4	C	44.4	**E**	25.1	C	
I-5 between Louise Ave and SR 120	NB	4	16.9	B	33.6	D	16.6	B	34.8	D	No
	SB	4	37.3	**E**	22.2	C	34.6	D	23.7	C	
I-5 between SR 120 and Manthey/ Mossdale hook ramps	NB	6	15.3	B	>45	**F**	15.1	B	>45	**F**	**Yes**[a]
	SB	6	>45	**F**	20.0	C	>45	**F**	20.3	C	
I-5 between Manthey/ Mossdale hook ramps and I-205	NB	6	15.9	B	>45	**F**	15.7	B	>45	**F**	**Yes**[a]
	SB	6	>45	**F**	19.1	C	>45	**F**	19.6	C	
I-5 south of I-205	NB	3	14.2	B	32.8	C	14.7	B	38.0	**E**	**Yes**[a]
	SB	3	25.3	C	20.6	C	26.7	D	22.7	C	
I-205 between I-5 and Paradise Rd interchange	EB	4	13.1	B	>45	**F**	13.2	B	>45	**F**	**Yes**[a]
	WB	4	>45	**F**	15.1	B	>45	**F**	15.4	B	
I-205 between Paradise Rd interchange and MacArthur Drive interchange	EB	4	16.1	B	>45	**F**	15.4	B	>45	**F**	**Yes**[a]
	WB	4	>45	**F**	18.3	C	>45	**F**	18.6	C	
I-205 west of MacArthur Drive	EB	4	15.6	B	>45	**F**	16.0	B	>45	**F**	**Yes**[a]
	WB	4	>45	**F**	19.6	C	>45	**F**	19.9	C	

Freeway Segment	Direction	No. of Lanes	2031 Baseline AM Peak Hour Density	2031 Baseline AM Peak Hour LOS	2031 Baseline PM Peak Hour Density	2031 Baseline PM Peak Hour LOS	2031 Proposed Action AM Peak Hour Density	2031 Proposed Action AM Peak Hour LOS	2031 Proposed Action PM Peak Hour Density	2031 Proposed Action PM Peak Hour LOS	Significant Effect
SR 120 east of I-5	EB	3	10.1	A	>45	**F**	9.9	A	>45	**F**	**Yes**[a]
	WB	3	>45	**F**	13.4	B	>45	**F**	13.5	B	

Notes: NB = northbound; SB = southbound; EB = eastbound; WB = westbound; Density = passenger vehicles per mile per lane (pvpmpl); LOS = level of service.

Bold indicates unacceptable operating conditions.

[a] The 2031 proposed action traffic volumes increase from the baseline conditions by 1% or more.

The results show that the proposed action would result in significant effects on the following mainline segments. These freeway mainline segments are expected to operate exceeding LOS standards under both 2031 baseline and 2031 proposed action conditions, and the traffic volumes for the proposed action conditions would increase from the baseline conditions by 1% or more.

- I-5 north of Louise Avenue interchange
- I-5 between SR 120 and Manthey/Mossdale interchange
- I-5 between Manthey/Mossdale interchange and I-205
- I-5 south of I-205
- I-205 between I-5 and Paradise Avenue interchanges
- I-205 between Paradise Avenue and MacArthur Drive interchanges
- I-205 west of MacArthur Drive
- SR 120 east of I-5

The following mitigation measure would address the identified significant effects on freeway mainline operations.

Mitigation Measure TC-10. Widen I-5 north of Louise Avenue interchange

Widen the freeway mainline from four to five lanes in both directions.

Mitigation Measure TC-11. Widen I-5 between SR 120 and Manthey/Mossdale Road interchange

Widen the freeway mainline from six to eight lanes in both directions. However, this measure may not be feasible since the resulting 16-lane freeway would effectively eliminate the Manthey Road/Mossdale Road hook ramps. Impacts on the Manthey/Mossdale Road interchange are minimized with 800 DU limitations on ramps.

Mitigation Measure TC-12. Widen I-5 between Manthey/Mossdale Road interchange and I-205

Widen the freeway mainline from six to eight lanes in both directions. However, this measure may not be feasible because the resulting 16-lane freeway would effectively eliminate the

Manthey Road/Mossdale Road hook ramps. Impacts on the Manthey/Mossdale Road interchange are minimized with 800 DU limitations on ramps.

Mitigation Measure TC-13. Widen I-5 south of I-205

Widen the northbound freeway mainline from three to four lanes.

Mitigation Measure TC-14. Widen I-205 between I-5 and Paradise Avenue interchanges

Widen the freeway mainline from four to five lanes in both directions.

Mitigation Measure TC-15. Widen I-205 between Paradise Avenue and MacArthur Drive interchanges

Widen the freeway mainline from four to five lanes in both directions.

Mitigation Measure TC-16. Widen I-205 west of MacArthur Drive interchange

Widen the freeway mainline from four to six lanes in both directions.

Mitigation Measure TC-17. Widen SR 120 east of I-5

Widen the freeway mainline from three to four lanes in the eastbound direction and from three to five lanes in the westbound direction.

Implementation of Mitigation Measures TC-10 to TC-17 would improve the freeway mainline operations at these locations to be within the acceptable Caltrans LOS standard. However, the actual freeway improvements may not be implemented by Caltrans rapidly enough to reduce the significant effects. Therefore, these effects are considered significant and unavoidable. Table 12-15 provides a summary of the resulting LOS for affected freeway mainline segments under the 2031 proposed action conditions.

Table 12-15. Freeway Mainline LOS—2031 Proposed Action with Mitigation

Freeway Segment	Direction	Freeway Lanes	AM Peak Hour		PM Peak Hour	
			Density	LOS	Density	LOS
I-5 north of Louise Ave Interchange	NB	5	15.2	B	29.6	D
	SB	5	28.8	D	19.7	C
I-5 between SR 120 and Manthey/ Mossdale hook ramps	NB	8	11.3	B	28.9	D
	SB	8	32.3	D	15.2	B
I-5 between Manthey/Mossdale hook ramps and I-205	NB	8	11.8	B	29.9	D
	SB	8	28.5	D	14.7	B
I-5 south of I-205	NB	4	11.1	B	24.4	D
I-205 between I-5 and Paradise Rd interchange	EB	5	10.5	A	29.6	D
	WB	5	29.5	D	12.3	B
I-205 between Paradise Rd interchange and MacArthur Drive interchange	EB	5	12.3	B	31.7	D
	WB	5	34.8	D	14.9	B
I-205 west of MacArthur Drive	EB	6	10.7	A	26.8	D
	WB	6	28.7	D	13.2	B
SR 120 east of I-5	EB	4	7.4	A	28.5	D
	WB	4	25.1	D	8.1	A

Notes: NB = northbound; SB = southbound; EB = eastbound; WB = westbound; Density = passenger vehicles per mile per lane (pvpmpl); LOS = level of service.

Degradation of freeway ramp LOS from operational traffic (significant)

Table 12-16 summarizes the results of the freeway ramp merge/diverge LOS analysis for study freeway on-ramps and off-ramps under 2031 baseline and proposed action conditions.

Table 12-16. Freeway Ramp LOS—2031 Baseline and Proposed Action

				2031 Baseline		2031 Proposed Action		
Interchange	Ramp	Ramp Lanes	Freeway Lanes	AM Peak Hour LOS	PM Peak Hour LOS	AM Peak Hour LOS	PM Peak Hour LOS	Significant Effect
I-5/Louise Ave	NB off diverge	2	4	C	**F**	C	**F**	**Yes**[a]
	NB on merge	2	4	C	**F**	C	**F**	
	SB off diverge	2	4	**F**	D	**F**	**F**	
	SB on merge	2	4	**F**	**F**	**F**	**F**	
I-5/Manthey Rd	SB off diverge	1	6	**F**	D	**F**	D	**Yes**[a]
	SB on merge	1	6	**F**	C	**F**	C	
I-5/Mossdale Rd	NB off diverge	1	6	C	**F**	C	**F**	**Yes**[a]
	NB on merge	1	6	C	**F**	C	**F**	
I-205/ MacArthur Drive	EB off diverge	1	4	C	**F**	C	**F**	**Yes**[a]
	EB on merge	1	4	C	**F**	C	**F**	
	WB off diverge	1	4	**F**	C	**F**	C	
	WB on merge	1	4	**F**	C	**F**	C	
I-205/Paradise Rd	EB off diverge	1	4	C	**F**	C	**F**	**Yes**[a]
	EB on merge	1	4	C	**F**	C	**F**	
	WB off diverge	1	4	**F**	C	**F**	D	
	WB on merge	1	4	**F**	D	**F**	D	

Note: NB = northbound; SB = southbound; EB = eastbound; WB = westbound; LOS = level of service.
Bold indicates unacceptable operating conditions.
[a] The 2031 proposed action traffic volumes increase from the baseline conditions by 1% or more.

The results show that the proposed action would result in significant effects on all the study diverge and merge locations listed below. These freeway ramps are expected to operate exceeding the LOS standards under both 2031 baseline and proposed action conditions, and the traffic volumes for the proposed action conditions would increase from the baseline conditions by 1% or more.

- I-5/Louise Avenue northbound off-ramp
- I-5/Louise Avenue northbound on-ramp
- I-5/Louise Avenue southbound off-ramp
- I-5/Louise Avenue southbound on-ramp
- I-5/Manthey Road southbound off-ramp
- I-5/Manthey Road southbound on-ramp
- I-5/Mossdale Road northbound off-ramp
- I-5/Mossdale Road northbound on-ramp

- I-205/MacArthur Drive eastbound off-ramp
- I-205/MacArthur Drive eastbound on-ramp
- I-205/MacArthur Drive westbound off-ramp
- I-205/MacArthur Drive westbound on-ramp
- I-205/Paradise Road eastbound off-ramp
- I-205/Paradise Road eastbound on-ramp
- I-205/Paradise Road westbound off-ramp
- I-205/Paradise Road westbound on-ramp

As described in Mitigation Measures TC-11 and TC-12, further widening the I-15 mainline segments through the following ramps would in effect eliminate the Manthey Road/Mossdale Road hook ramps; therefore, it is not feasible to improve the conditions at the these ramps. Consequently, these effects are considered significant and unavoidable.

- I-5/Manthey Road southbound off-ramp
- I-5/Manthey Road southbound on-ramp
- I-5/Mossdale Road northbound off-ramp
- I-5/Mossdale Road northbound on-ramp

The following mitigation measures would address the identified significant effects on freeway ramp operations.

Mitigation Measure TC-10. Widen I-5 north of Louise Avenue interchange

Implementation of Mitigation Measure TC-10 would improve the freeway ramp operation at the following locations. However, the actual freeway improvements may not be implemented by Caltrans rapidly enough to reduce the adverse effects. Therefore, these effects are considered significant and unavoidable.

- I-5/Louise Avenue northbound off-ramp
- I-5/Louise Avenue northbound on-ramp
- I-5/Louise Avenue southbound off-ramp
- I-5/Louise Avenue southbound on-ramp

Mitigation Measure TC-18. Widen ramps at the I-205/MacArthur Drive interchange

Widen the following ramps from one to two lanes.

- I-205/MacArthur Drive eastbound off-ramp
- I-205/MacArthur Drive eastbound on-ramp
- I-205/MacArthur Drive westbound off-ramp
- I-205/MacArthur Drive westbound on-ramp

Implementation of Mitigation Measures TC-15 and TC-16 along with TC-18 would improve the freeway ramp operation at the following locations. However, the actual freeway improvements may not be implemented by Caltrans rapidly enough to reduce the significant effects. Therefore, these effects are considered significant and unavoidable.

Mitigation Measure TC-19. Widen ramps at the I-205/ Paradise Road interchange

Widen the ramps listed below from one to two lanes.

- I-205/Paradise Road eastbound off-ramp
- I-205/Paradise Road eastbound on-ramp
- I-205/Paradise Road westbound off-ramp
- I-205/Paradise Road westbound on-ramp

Implementation of Mitigation Measures TC-14 and TC-15 along with TC-19 would improve the freeway ramp operation at these locations. However, the actual freeway improvements may not be implemented by Caltrans rapidly enough to reduce the significant effects. Therefore, these effects are considered significant and unavoidable.

Table 12-17 provides a summary of the resulting mitigated LOS for affected freeway ramp merge and diverge locations under the 2031 proposed action conditions.

Table 12-17. Freeway Ramp LOS—2031 Proposed Action with Mitigation

Interchange	Ramp	Ramp Lanes	Freeway Lanes	AM Peak Hour LOS	PM Peak Hour LOS
I-5/Louise Ave	NB off diverge	2	5	B	D
	NB on merge	2	5	C	**F**
	SB off diverge	2	5	**F**	D
	SB on merge	2	5	D	**E**
I-5/Manthey Rd	SB off diverge	1 *	8 *	*	*
	SB on merge	1 *	8 *	*	*
I-5/Mossdale Rd	NB off diverge	1 *	8 *	*	*
	NB on merge	1 *	8 *	*	*
I-205/MacArthur Drive	EB off diverge	2	5	B	**F**
	EB on merge	2	5	B	D
	WB off diverge	2	5	D	B
	WB on merge	2	5	**F**	B
I-205/Paradise Rd	EB off diverge	2	5	B	**F**
	EB on merge	2	5	B	D
	WB off diverge	2	5	D	C
	WB on merge	2	5	**F**	C

Notes: NB = northbound; SB = southbound; EB = eastbound; WB = westbound; LOS = level of service.

Bold indicates that results of mitigation are still expected to result in unacceptable operations. Further widening is infeasible and as a result would create a significant and unavoidable impact.

* Further widening of mainline at Manthey Road and Mossdale Road hook ramp locations would effectively eliminate these ramps, and thus are not analyzed for mitigation.

Potential effects on internal vehicle circulation (significant)

Internal vehicle circulation under the 2031 proposed action conditions would function adequately with acceptable LOS at all major signalized internal intersections (Table 12-10). However, with regional development and the resultant congested peak period freeway operation, it is likely that some subregional through traffic would use the River Islands at Lathrop roadway system during these periods. Use of River Islands collector roadways by through traffic could affect safety conditions. This would constitute a significant effect on internal vehicle circulation.

The following mitigation measure would address the significant effects on internal vehicle circulation.

Mitigation Measure TC-20. Require full onsite circulation environmental analysis for all subsequent tentative maps

In accordance with mitigation developed in the River Islands SEIR (City of Lathrop 2002), the City will require full onsite circulation environmental analysis for all subsequent tentative maps. Implementation of Mitigation Measure TC-20 would reduce the potential effects on onsite circulation by altering the design of the roadway system to eliminate the safety concerns of the City's contracted traffic engineer.

Potential effects on onsite pedestrian circulation (significant)

River Islands at Lathrop's pedestrian circulation plan proposes sidewalks along both sides of all internal streets, with the exception of all single-loaded stub streets (where a sidewalk on one side would be provided) and all alleys (where no sidewalks would be provided). Pedestrian/bicycle trails would also be provided along some levees and adjacent to some portions of internal waterways.

A series of loop trails (8–10 feet wide) would be provided with shared use for pedestrians and bicycle riders. Trails (8 feet wide) would also be provided along both sides of the canal that extends west from the town center. Paseos or local 8-foot-wide trails within neighborhoods would also be provided under the proposed action. These trails and paseos would provide access to all village and community parks, schools, commercial areas, and employment centers (City of Lathrop 2002).

The overall pedestrian circulation plan appears adequate with one possible exception. The 8- to 10-foot-wide trails are of widths typically provided for cyclists only. In locations with moderate to high pedestrian volumes, there could be conflicts between pedestrians and bike riders. This could constitute a significant effect.

The following mitigation measure would address the significant effects on onsite pedestrian circulation.

Mitigation Measure TC-20. Require full onsite circulation environmental analysis for all subsequent tentative maps

Implementation of Mitigation Measure TC-20 would reduce the potential effects on onsite pedestrian circulation by altering the design of the pedestrian circulation system to eliminate the safety concerns of the City's contracted traffic engineer.

Potential effects on onsite bicycle circulation (significant)

River Islands at Lathrop's bicycle circulation plan proposes a mix of multi-use trails and bicycle lanes. All four- and six-lane arterials and all two-lane major collector streets would have signed and striped bike lanes. The loop and paseo trail system described above would serve bicyclists as well as pedestrians. Thus, bicyclists would also have off-street or signed and striped on-street facilities providing access to all parks, schools, commercial areas, and employment centers within the development (City of Lathrop 2002).

The overall bicycle circulation plan appears adequate with two possible exceptions. There could be conflicts between bicyclists and pedestrians on those sections of the 8- or 10-foot-wide loop trail system with moderate to heavy pedestrian use. Bicyclists not observing basic traffic laws could pose safety concerns for pedestrians and auto drivers at all locations where they would interface with pedestrians and auto traffic. This could constitute a significant effect.

The following mitigation measure would address the significant effects on onsite bicycle circulation.

Mitigation Measure TC-20. Require full onsite circulation environmental analysis for all subsequent tentative maps

Implementation of Mitigation Measure TC-20 would reduce the potential effects on onsite bicycle circulation by altering the design of the bicycle circulation roadway system and signage program to eliminate the safety concerns of the City's contracted traffic engineer.

Provisions for public transit (less than significant)

Based on the River Islands SEIR (City of Lathrop 2002), River Islands has contacted SJRTD and has committed to work with that agency to provide an internal circulation plan for the residential and commercial areas that would facilitate and encourage use of public transit. This would include providing areas for likely bus stops (in accordance with transit agency criteria) as well as bus stop shelters. The River Islands at Lathrop TDM program would also encourage employees to use local transit service, which could indirectly effect regional transit operations. Bus transit service would be provided by SJRTD to the ACE commuter train station as well as to Stockton, Tracy, and other sections of Lathrop. Although River Islands at Lathrop is adjacent to the San Joaquin River and would include several marinas, there are no definitive plans for public boat service. However, it is assumed that some residents would use their private boats for local travel within the River Islands community as well as for regional recreational travel. Therefore, the proposed action would have a less-than-significant effect on the provision of public transit.

Disruption of street operation by construction traffic (significant)

Estimates of construction traffic were based on the construction data River Islands provided for the air quality analysis (Chapter 14). It was estimated that during average construction years, 300–400 construction workers could access the project site on any given workday, depending on the construction activities and schedules; during the assumed peak construction year, 400–700 construction workers could access the site on any given workday. An average of 25 trucks per day could access the site during the average construction year, and an average of 50 trucks per day could access the site during the peak construction year. This additional traffic generated by construction workers and trucks could result in the significant effects listed below.

- Reduced roadway capacity and an increase in construction-related congestion could result in localized increases in traffic congestion that exceed applicable LOS standards.
- Construction activities could disrupt existing transit service in the vicinity. Effects may include temporary route detours, reduced or no service to certain destinations, or service delays.
- Construction activities would increase parking demand in the vicinity and could result in parking demand exceeding the available supply.
- Construction activities would disrupt pedestrian and bicycle travel. Temporary sidewalk or roadway closures would create gaps in pedestrian and bicycle routes; such closures could interfere with safe travel.
- Construction activities would increase the mix of heavy construction vehicles with general-purpose traffic. The higher proportion of heavy trucks could lead to an increase in safety hazards.

The following mitigation measure would address these significant effects.

Mitigation Measure TC-21. Implement a traffic control plan

The City will ensure that the construction contractor prepares a traffic control plan (to be approved by the City) before construction. The traffic control plan will include the components listed below.

- A street layout showing the location of construction activity and surrounding streets to be used as detour routes, including special signage.
- A tentative start date and construction duration for each phase of construction.
- The name, address, and emergency contact number for those responsible for maintaining the traffic control devices during the course of construction.
- Written approval to implement traffic control from other agencies, as needed.

Additionally, the traffic control plan will include the following stipulations.

- Provide access for emergency vehicles at all times.
- Avoid creating additional delay at intersections operating at congested conditions, either by choosing routes that avoid these locations or by constructing during nonpeak times of day.
- Maintain access for driveways and private roads, except for brief periods of construction, in which case property owners will be notified.
- Provide adequate off-street parking areas at designated staging areas for construction-related vehicles.
- Maintain pedestrian and bicycle access and circulation during proposed project construction where safe to do so. If construction encroaches on a sidewalk, a safe detour will be provided for pedestrians at the nearest crosswalk. If construction encroaches on a bike lane, warning signs will be posted indicating that bicycles and vehicles are sharing the roadway.
- Traffic controls may include flag persons wearing Occupational Safety and Health Administration–approved vests and using a “Stop/Slow” paddle to warn motorists of construction activity.

- Maintain access to SJRTD transit services and ensure that public transit vehicles are detoured.
- Post standard construction warning signs in advance of the construction area and at any intersection that provides access to the construction area.
- Post construction warning signs, in accordance with local standards or those set forth in the *Manual on Uniform Traffic Control Devices* (Federal Highway Administration 2001), in advance of the construction area and at any intersection that provides access to the construction area.
- During lane closures, notify the County Sheriff's Department and LMFPD of construction locations to ensure that alternative evacuation and emergency routes are designed to maintain response times during construction periods, if necessary.
- Provide written notification to contractors regarding appropriate routes to and from construction sites, and weight and speed limits for local roads used to access construction sites. Submit a copy of all such written notifications to the City.
- Repair or restore the road ROW to its original condition or better upon completion of construction activities.

Implementation of Mitigation Measure TC-21 would minimize traffic effects during construction by maintaining access, minimizing construction-related traffic delays on the most heavily travelled roadways, and providing information to the public of expected delays that may occur.

12.2.3.2 Alternative 2—No Alteration of Paradise Cut

As described in Chapter 2, *Proposed Action and Alternatives*, the earthwork involved with altering Paradise Cut would not take place under Alternative 1. However, construction would still be necessary to alter the landside of the existing Paradise Cut levee, and all the housing and commercial development described under the proposed action would also take place under Alternative 2. Consequently, operational effects on intersection, roadway segment, and freeway operations; internal vehicle circulation; and onsite pedestrian and bicycle circulation would be the same as under the proposed action.

Degradation of intersection LOS from operational traffic (significant)

The effects of operational traffic on intersection LOS would be the same under Alternative 2 as under the proposed action. Mitigation Measures TC-1 through TC-8 would address this significant effect.

Degradation of roadway LOS from operational traffic (significant)

The effects of operational traffic on roadway LOS would be the same under alternative 2 as under the proposed action. Mitigation Measure TC-9 would address this significant effect.

Degradation of freeway mainline LOS from operational traffic (significant)

The effects of operational traffic on freeway mainline LOS would be the same under Alternative 2 as under the proposed action. Mitigation Measures TC-10 through TC-17 would address this significant effect.

Degradation of freeway ramp LOS from operational traffic (significant)

The effects of operational traffic on freeway ramp LOS would be the same under Alternative 2 as under the proposed action. Mitigation Measures TC-10, TC-18, and TC-19 would address this significant effect.

Potential effects on internal vehicle circulation (significant)

Potential effects on internal vehicle circulation under 2031 buildout conditions would be the same under Alternative 2 as under the proposed action. Mitigation Measure TC-20 would address this significant effect.

Potential effects on onsite pedestrian circulation (significant)

The potential effects on onsite pedestrian circulation would be the same under Alternative 2 as under the proposed action. Mitigation Measure TC-20 would address this significant effect.

Potential effects on onsite bicycle circulation (significant)

The effects on onsite bicycle circulation would be the same under Alternative 2 as under the proposed action. Mitigation Measure TC-20 would address this significant effect.

Provisions for public transit (less than significant)

The effects associated with provisions for public transit would be the same under Alternative 2 as under the proposed alternative. There would be less-than-significant effects.

Disruption of street operation by construction traffic (significant)

The disruption of street operation associated with construction traffic under Alternative 2 would be similar to that under the proposed action, although earthmoving activities in Paradise Cut would not take place. Mitigation Measure TC-21 would address these significant effects.

12.2.3.3 Alternative 3—Avoidance of Central Drainage Ditch

Under Alternative 3, earthwork involved with altering the central drainage ditch would not take place. Development would still occur up to the central drainage ditch, but the ditch itself would not be altered. All the housing and commercial development described under the proposed action would also take place under Alternative 3. In addition, protection of the central drainage ditch would necessitate the construction of up to 10 bridges to accommodate internal traffic across the ditch. Because traffic modeling was not conducted for this alternative (in part because specific designs have not been prepared), it is not possible to quantify the precise effects either of construction or operation. Nevertheless, it is assumed that the internal circulation system under this alternative would be designed to ensure operation at acceptable LOS standards.

Accordingly, operational effects on intersection, roadway segment, and freeway operations; internal vehicle circulation; and onsite pedestrian and bicycle circulation would be the same as under the proposed action. Construction traffic associated with levee activities and private development activities would result in construction effects similar to those under the proposed action. It is likely that, because of the more complex construction operations involved in construction of multiple bridges, the potential for significant construction effects would be greater under Alternative 3 than under the proposed action.

Degradation of intersection LOS from operational traffic (significant)

The effects of operational traffic on intersection LOS would be the same under Alternative 3 as under the proposed action. Mitigation Measures TC-1 through TC-8 would address this significant effect.

Degradation of roadway LOS from operational traffic (significant)

The effects of operational traffic on roadway LOS would be the same under alternative 3 as under the proposed action. Mitigation Measure TC-9 would address this significant effect.

Degradation of freeway mainline LOS from operational traffic (significant)

The effects of operational traffic on freeway mainline LOS would be the same under Alternative 3 as under the proposed action. Mitigation Measures TC-10 through TC-17 would address this significant effect.

Degradation of freeway ramp LOS from operational traffic (significant)

The effects of operational traffic on freeway ramp LOS would be the same under Alternative 3 as under the proposed action. Mitigation Measures TC-10, TC-18, and TC-19 would address this significant effect.

Potential effects on internal vehicle circulation (significant)

Potential effects on internal vehicle circulation under 2031 buildout conditions would similar under Alternative 3 to those under the proposed action; however, traffic patterns would necessarily vary because of avoidance of the central drainage ditch and construction of up to 10 clear-span bridges to provide access between the two sections of the RID Area. Mitigation Measure TC-20 would address this significant effect.

Potential effects on onsite pedestrian circulation (significant)

The potential effects on onsite pedestrian circulation would be the same under Alternative 3 as under the proposed action. Mitigation Measure TC-20 would address this significant effect.

Potential effects on onsite bicycle circulation (significant)

The effects on onsite bicycle circulation would be the same under Alternative 3 as under the proposed action. Mitigation Measure TC-20 would address this significant effect.

Provisions for public transit (less than significant)

The effects associated with provisions for public transit would be the same under Alternative 3 as under the proposed alternative. There would be less than significant effects.

Disruption of street operation by construction traffic (significant)

The disruption of street operation associated with construction traffic under Alternative 3 would be similar to that under the proposed action; however, there is the potential for increased disruption because of the more extensive construction activity associated with avoidance of the central drainage ditch and construction of up to 10 clear-span bridges. Mitigation Measure TC-21 would address these significant effects.

12.2.3.4 Alternative 4—Proposed Action with Expanded Flood Risk Reduction

Alternative 4 would be similar to the proposed action except that the flood risk reduction components would include the following additional elements.

- Constructing a new bypass channel or channels west of the existing Paradise Cut flood bypass.
- Implementing more extensive widening in Paradise Cut.
- Widening Paradise Weir and constructing an additional weir upstream of the existing weir.
- Creating new flood storage areas.

Because additional activities would be conducted outside Stewart Tract, the level of traffic effects associated with construction activities could be greater. Because this alternative has not been developed beyond the conceptual stage, it is not possible to quantify the extent, timing, or duration of such effects; a separate analysis would be conducted if this alternative is selected.

Degradation of intersection LOS from operational traffic (significant)

The effects of operational traffic on intersection LOS would be the same under Alternative 4 as under the proposed action. Mitigation Measures TC-1 through TC-8 would address this significant effect.

Degradation of roadway LOS from operational traffic (significant)

The effects of operational traffic on roadway LOS would be the same under alternative 4 as under the proposed action. Mitigation Measure TC-9 would address this significant effect.

Degradation of freeway mainline LOS from operational traffic (significant)

The effects of operational traffic on freeway mainline LOS would be the same under Alternative 4 as under the proposed action. Mitigation Measures TC-10 through TC-17 would address this significant effect.

Degradation of freeway ramp LOS from operational traffic (significant)

The effects of operational traffic on freeway ramp LOS would be the same under Alternative 4 as under the proposed action. Mitigation Measures TC-10, TC-18, and TC-19 would address this significant effect.

Potential effects on internal vehicle circulation (significant)

Potential effects on internal vehicle circulation under 2031 buildout conditions would be the same under Alternative 4 as under the proposed action. Mitigation Measure TC-20 would address this significant effect.

Potential effects on onsite pedestrian circulation (significant)

The potential effects on onsite pedestrian circulation would be the same under Alternative 4 as under the proposed action. Mitigation Measure TC-20 would address this direct adverse effect.

Potential effects on onsite bicycle circulation (significant)

The effects on onsite bicycle circulation would be the same under Alternative 4 as under the proposed action. Mitigation Measure TC-20 would address this significant effect.

Provisions for public transit (less than significant)

The effects associated with provisions for public transit would be the same under Alternative 4 as under the proposed alternative. There would be less-than-significant effects.

Disruption of street operation by construction traffic (significant)

The disruption of street operation associated with construction traffic under Alternative 4 would be similar to that under the proposed action, although more extensive construction activities associated with the expanded flood risk reduction measures could lead to additional disruption. Such activities would require additional traffic analysis when these features are designed should this alternative be selected. Mitigation Measure TC-21 would address these significant effects.

12.2.3.5 Alternative 5—No Action

Under the No Action Alternative, placement of fill and construction of levees not requiring Corp permits would occur. There would be no alterations to the PCC or PCIP Areas. An interior 0.5% (200-year) ring levee system rather than extended levees would be constructed, and no habitat creation or restoration would take place. The Golden Valley Parkway Bridges would be constructed under authority of the City of Lathrop. All the housing and commercial development described under the proposed action would also take place under the No Action Alternative. Consequently, operational effects on intersection, roadway segment, and freeway operations; internal vehicle circulation; and onsite pedestrian and bicycle circulation would be the same as under the proposed action.

Degradation of intersection LOS from operational traffic (significant)

The effects of operational traffic on intersection LOS would be the same under Alternative 5 as under the proposed action. Mitigation Measures TC-1 through TC-8 would address this significant effect.

Degradation of roadway LOS from operational traffic (significant)

The effects of operational traffic on roadway LOS would be the same under alternative 5 as under the proposed action. Mitigation Measure TC-9 would address this significant effect.

Degradation of freeway mainline LOS from operational traffic (significant)

The effects of operational traffic on freeway mainline LOS would be the same under Alternative 5 as under the proposed action. Mitigation Measures TC-10 through TC-17 would address this significant effect.

Degradation of freeway ramp LOS from operational traffic (significant)

The effects of operational traffic on freeway ramp LOS would be the same under Alternative 5 as under the proposed action. Mitigation Measures TC-10, TC-18, and TC-19 would address this significant effect.

Potential effects on internal vehicle circulation (significant)

Potential effects on internal vehicle circulation under 2031 buildout conditions would similar under Alternative 5 to those under the proposed action; however, traffic patterns would necessarily vary because of avoidance of the central drainage ditch and construction of up to 10 clear-span bridges to provide access between the two sections of the RID Area. Mitigation Measure TC-20 would address this significant effect.

Potential effects on onsite pedestrian circulation (significant)

The potential effects on onsite pedestrian circulation would be the same under Alternative 5 as under the proposed action. Mitigation Measure TC-20 would address this significant effect.

Potential effects on onsite bicycle circulation (significant)

The effects on onsite bicycle circulation would be the same under Alternative 5 as under the proposed action. Mitigation Measure TC-20 would address this significant effect.

Provisions for public transit (less than significant)

The effects associated with provisions for public transit would be the same under Alternative 5 as under the proposed alternative. These effects would be less than significant.

Disruption of street operation by construction traffic (significant)

The disruption of street operation associated with construction traffic under Alternative 5 would be similar to that under the proposed action; however, there is the potential for increased disruption because of the more extensive construction activity associated with avoidance of the central drainage ditch and construction of up to 10 clear-span bridges. Mitigation Measure TC-21 would address these significant effects.

12.3 References

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Chapter 13
Noise

This chapter evaluates noise effects of the proposed action and alternatives. Related discussions are found in Chapter 12, *Transportation and Circulation,* and Chapter 21, *Cumulative Effects*.

13.1 Background

13.1.1 Terminology

13.1.1.1 Noise

Noise is commonly defined as unwanted sound that annoys or disturbs people and potentially causes an adverse psychological or physiological effect on human health. Because noise is an environmental pollutant that can interfere with human activities, evaluation of noise is necessary when considering the environmental impacts of a project.

Sound is mechanical energy (vibration) transmitted by pressure waves over a medium such as air or water, and noise is generally defined as unwanted sound that annoys or disturbs people. Sound is characterized by various parameters that include the rate of oscillation of sound waves (frequency), the speed of propagation, and the pressure level or energy content (amplitude). In particular, the sound pressure level is the most common descriptor used to characterize the loudness of an ambient (existing) sound level. Although the decibel (dB) scale, a logarithmic scale, is used to quantify sound intensity, it does not accurately describe how sound intensity is perceived by human hearing. The human ear is not equally sensitive to all frequencies in the entire spectrum, so noise measurements are weighted more heavily for frequencies to which humans are sensitive in a process called *A-weighting*, written as *dBA* and referred to as *A-weighted decibels*. Table 13-1 provides definitions of sound measurements and other terminology used in this chapter, and Table 13-2 summarizes typical A-weighted sound levels for different noise sources.

In general, human sound perception is such that a change in sound level of 1 dB cannot typically be perceived by the human ear, a change of 3 dB is just noticeable, a change of 5 dB is clearly noticeable, and a change of 10 dB is perceived as doubling or halving the sound level.

Different types of measurements are used to characterize the time-varying nature of sound. These measurements include the equivalent sound level (L_{eq}), the minimum and maximum sound levels (L_{min} and L_{max}), percentile-exceeded sound levels (such as L_{10}, L_{20}), the day-night sound level (L_{dn}), and the community noise equivalent level (CNEL). L_{dn} and CNEL values differ by less than 1 dB. As a matter of practice, L_{dn} and CNEL values are considered to be equivalent and are treated as such in this assessment.

For a point source such as a stationary compressor or construction equipment, sound attenuates based on geometry at a rate of 6 dB per doubling of distance. For a line source such as free-flowing traffic on a freeway, sound attenuates at a rate of 3 dB per doubling of distance (California Department of Transportation 2006). Atmospheric conditions including wind, temperature gradients, and humidity can change how sound propagates over distance and can affect the level of sound received at a given location.

The degree to which the ground surface absorbs acoustical energy also affects sound propagation. Sound that travels over an acoustically absorptive surface such as grass attenuates at a greater rate than sound that travels over a hard surface such as pavement. The increased attenuation is typically in the range of 1–2 dB per doubling of distance. Barriers such as buildings and topography that block the line of sight between a source and receiver also increase the attenuation of sound over distance.

Table 13-1. Definition of Sound Measurements

Sound Measurements	Definition
Decibel (dB)	A unitless measure of sound on a logarithmic scale, which indicates the squared ratio of sound pressure amplitude to a reference sound pressure amplitude. The reference pressure is 20 micro-pascals.
A-weighted decibel (dBA)	An overall frequency-weighted sound level in decibels that approximates the frequency response of the human ear.
Maximum sound level (L_{max})	The maximum sound level measured during the measurement period.
Minimum sound level (L_{min})	The minimum sound level measured during the measurement period.
Equivalent sound level (L_{eq})	The equivalent steady state sound level that in a stated period of time would contain the same acoustical energy.
Percentile-exceeded sound level (L_{xx})	The sound level exceeded *X%* of a specific time period. L_{10} is the sound level exceeded 10% of the time.
Day-night level (L_{dn})	The energy average of the A-weighted sound levels occurring during a 24-hour period, with 10 dB added to the A-weighted sound levels occurring during the period from 10 p.m. to 7 a.m.
Community noise equivalent level (CNEL)	The energy average of the A-weighted sound levels occurring during a 24-hour period with 5 dB added to the A-weighted sound levels occurring during the period from 7 p.m. to 10 p.m. and 10 dB added to the A-weighted sound levels occurring during the period from 10 p.m. to 7 a.m.
Peak particle velocity (PPV)	A measurement of ground vibration defined as the maximum speed (measured in inches per second) at which a particle in the ground is moving relative to its inactive state. PPV is usually expressed in inches/sec.
Frequency: Hertz (Hz)	The number of complete pressure fluctuations per second above and below atmospheric pressure.

Table 13-2. Typical A-weighted Sound Levels

Common Outdoor Activities	Noise Level (dBA)	Common Indoor Activities
	110	Rock band
Jet flyover at 1,000 feet		
	100	
Gas lawnmower at 3 feet		
	90	
Diesel truck at 50 feet at 50 mph		Food blender at 3 feet
	80	Garbage disposal at 3 feet
Noisy urban area, daytime		
Gas lawnmower, 100 feet	70	Vacuum cleaner at 10 feet
Commercial area		Normal speech at 3 feet
Heavy traffic at 300 feet	60	
		Large business office
Quiet urban daytime	50	Dishwasher in next room
Quiet urban nighttime	40	Theater, large conference room (background)
Quiet suburban nighttime		
	30	Library
Quiet rural nighttime		Bedroom at night, concert hall (background)
	20	
		Broadcast/recording studio
	10	
	0	

Source: California Department of Transportation 2009.

13.2 Affected Environment

13.2.1 Regulatory Framework

Noise associated with the construction and use of residential and commercial development is regulated at the state and local levels.

13.2.1.1 State

Title 24 of the CCR establishes standards governing interior noise levels that apply to all new multifamily residential units in California. These standards require that acoustical studies be performed before construction at building locations where the existing L_{dn} exceeds 60 dBA. Such acoustical studies are required to establish mitigation measures that will limit maximum L_{dn} levels to 45 dBA in any inhabitable room. Although there are no generally applicable interior noise standards pertinent to all uses, many communities in California have adopted an L_{dn} of 45 as an upper limit on interior noise in all residential units.

In addition, the State of California requires each local government entity to include a noise element as part of its general plan. The *State of California General Plan Guidelines* (State of California 2003) provide guidance that cities and counties can use to develop land use compatibility standards for noise.

13.2.1.2 City of Lathrop Noise Standards

City of Lathrop Noise Element

The City's General Plan was updated in 2004. The *Hazard Management Element* combines the Safety and Noise Elements into a single element. Section B, *Noise*, of the *Hazard Management Element* identifies goals to protect citizens from the harmful effects of exposure to excessive noise, and to protect the economic base of the City by preventing the encroachment of incompatible land uses near noise-producing roadways, industries, the railroad, and other sources. The noise standards in the 2004 General Plan are functionally the same as those in the 1991 General Plan that were used in the River Islands SEIR (City of Lathrop 2002).

> **Noise Policy No.1:** Areas within the City shall be designated as noise-impacted if exposed to existing or projected future noise levels exterior to buildings exceeding 60 dB CNEL or the performance standards…

The standards specified in the noise policy are reproduced as Table 13-3.

Table 13-3. City of Lathrop Maximum Allowable Exterior Noise Level Standards—Non-Preempted (i.e., Transportation) Sources

	Nighttime[a] (10:00 p.m. to 7:00 a.m.)			Daytime[a] (7:00 a.m. to 10:00 p.m.)		
Receiving Land Use	Rural Suburban	Suburban	Urban	Rural Suburban	Suburban	Urban
One- and two-family residential	40	45	50	50	55	60
Multifamily residential	45	50	55	50	55	60
Public space	50	55	60	50	55	60
Limited commercial	–	55	–	–	60	–
Commercial	–	60	–	–	65	–
Light industrial	–	70	–	–	70	–
Heavy industrial	–	75	–	–	75	–

Source: City of Lathrop 2004.
[a] A-weighted decibels, dBA.

> **Noise Policy No.2:** New development of residential or other noise sensitive land uses will not be permitted in noise-impacted areas unless effective mitigation measures are incorporated into project designs to reduce noise to the following levels:
>
> a. Noise sources preempted from local control, such as railroad and highway traffic:
>
> - 60 dB CNEL or less in outdoor activity areas;
> - 45 dB CNEL within interior living spaces or other noise-sensitive interior spaces.

- Where it is not possible to achieve reductions of exterior noise to 60 dB CNEL or less by using the best available and practical noise reduction technology, an exterior noise level of up to 65 dB CNEL will be allowed.
- Under no circumstances will interior noise levels be allowed to exceed 45 dB CNEL with windows and doors closed.

b. For noise from other sources, such as local industries:

- 60 dB CNEL or less in outdoor activity areas;
- 45 dB CNEL or less within interior living spaces, plus the performance standards contained in Table VI-l [reproduced as Table 13-3 in this EIS].

Noise Policy No.3: New development of industrial, commercial or other noise generating land uses will not be permitted if resulting exterior noise levels will exceed 60 dB CNEL in areas containing residential or other noise-sensitive land uses. Additionally, new noise generating land uses which are not preempted from local noise regulation by the State of California will not be permitted if resulting noise levels will exceed the performance standards contained in Table VI-1 [reproduced as Table 13-3 in this EIS] in areas containing residential or other noise-sensitive land uses.

Noise Policy No.4: Noise level criteria applied to land uses other than residential or other noise-sensitive uses shall be consistent with the recommendations of the California Office of Noise Control.

13.2.1.3 West Lathrop Specific Plan

The WLSP contains two objectives related to noise that are applicable to the proposed action:

Objective 9A: Arrange and design the land uses and street corridors to maximize safety and minimize the impact of traffic noise.

Objective 9B: Buffer residential areas from I-5, using intervening land uses and/or roadways, landscaped berms and street trees.

Under this objective, the WLSP directs that on Stewart Tract (as well as in Mossdale Village) land uses that are not adversely affected by noise from I-5 and the railroad lines be located near these noise sources. These land uses, both by their form and scale and by occupying freeway frontage, would act as buffers for more noise-sensitive land uses.

13.2.1.4 City of Lathrop Noise Ordinance

The City's Noise Ordinance is contained in Chapter 8.20 of the Lathrop Municipal Code. Section 8.20.100 prohibits the operation of machinery, equipment, fans, air conditioning, and similar devices that would cause the noise level at the property line of any property to exceed the ambient base noise level by more than 5 dB. The ambient base noise level is the greater of the ambient noise or the values shown in Table 13-4. Ambient noise is the noise level obtained when the noise level is averaged over 15 minutes without the inclusion of noise from isolated identifiable sources.

Section 8.20.110 prohibits, unless a permit has been obtained, construction work in a residential zone or within 500 feet of a residential zone between 10 p.m. and 7 a.m. on Sunday through Thursday and between 11 p.m. and 9 a.m. on Friday, Saturday, and legal holidays.

The City does not specifically exempt construction noise from the limits of section 8.20.100 and those presented in Table 13-4, which are established for regulating long-term noise sources. This exemption is specifically stated in the noise ordinances of most jurisdictions. However, discussion with members of the City's staff indicated that the limits of Section 8.20.100 are not intended to be applied to construction activities.

Table 13-4. City of Lathrop Ambient Base Noise Levels

		Community Environment Classification (dBA)		
Zone	Time	Very Quiet (Rural, Suburban)	Slightly Quiet (Suburban, Urban)	Noisy (Urban)
R1 and R2	10 p.m.–7 a.m.	40	45	50
	7 a.m.–7 p.m.	50	55	60
	7 p.m.–10 p.m.	45	50	55
R3 and R4	10 p.m.–7 a.m.	45	50	55
	7 a.m.–10 p.m.	50	55	60
Commercial	10 p.m.–7 a.m.	50	55	60
	7 a.m.–10 p.m.	55	60	65
M1	Anytime	70	70	70
M2	Anytime	75	75	75

dBA = A-weighted decibel level.

13.2.2 Noise-Sensitive Land Uses

Noise-sensitive land uses are generally considered those uses where noise exposure could result in health-related risks to individuals, as well as places 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. Additional land uses such as parks, historic sites, cemeteries, and recreation areas are also considered sensitive to increases in exterior noise levels. Schools, churches, hotels, libraries, and other places where low interior noise levels are essential are also considered noise-sensitive land uses.

Existing noise-sensitive land uses in the vicinity of the proposed action consist primarily of rural residential dwellings. No additional noise-sensitive land uses have been identified close to the proposed action area that would be potentially affected by short-term or long-term increases in ambient noise levels. Residences in the general project vicinity that have the potential to be affected by traffic noise increases include residences west of MacArthur Drive south of I-205, and north of Louise Avenue east of I-5.

13.2.3 Existing Conditions

13.2.3.1 Methods Used to Identify Existing Conditions

The existing noise environment within the proposed action area is influenced primarily by surface transportation noise emanating from vehicular traffic on area roadways and rail traffic on the UPRR tracks.

An ambient noise survey was conducted on June 12, 2002, to document the existing noise environment at various locations in the proposed action area. Measurements were taken for a period of 15 minutes at each location during the nonpeak traffic hours using a Larson Davis model 820 sound level meter placed at approximately 4.5 feet above the ground surface. Figure 13-1 depicts the locations at which ambient noise measurements were taken during the survey. Because

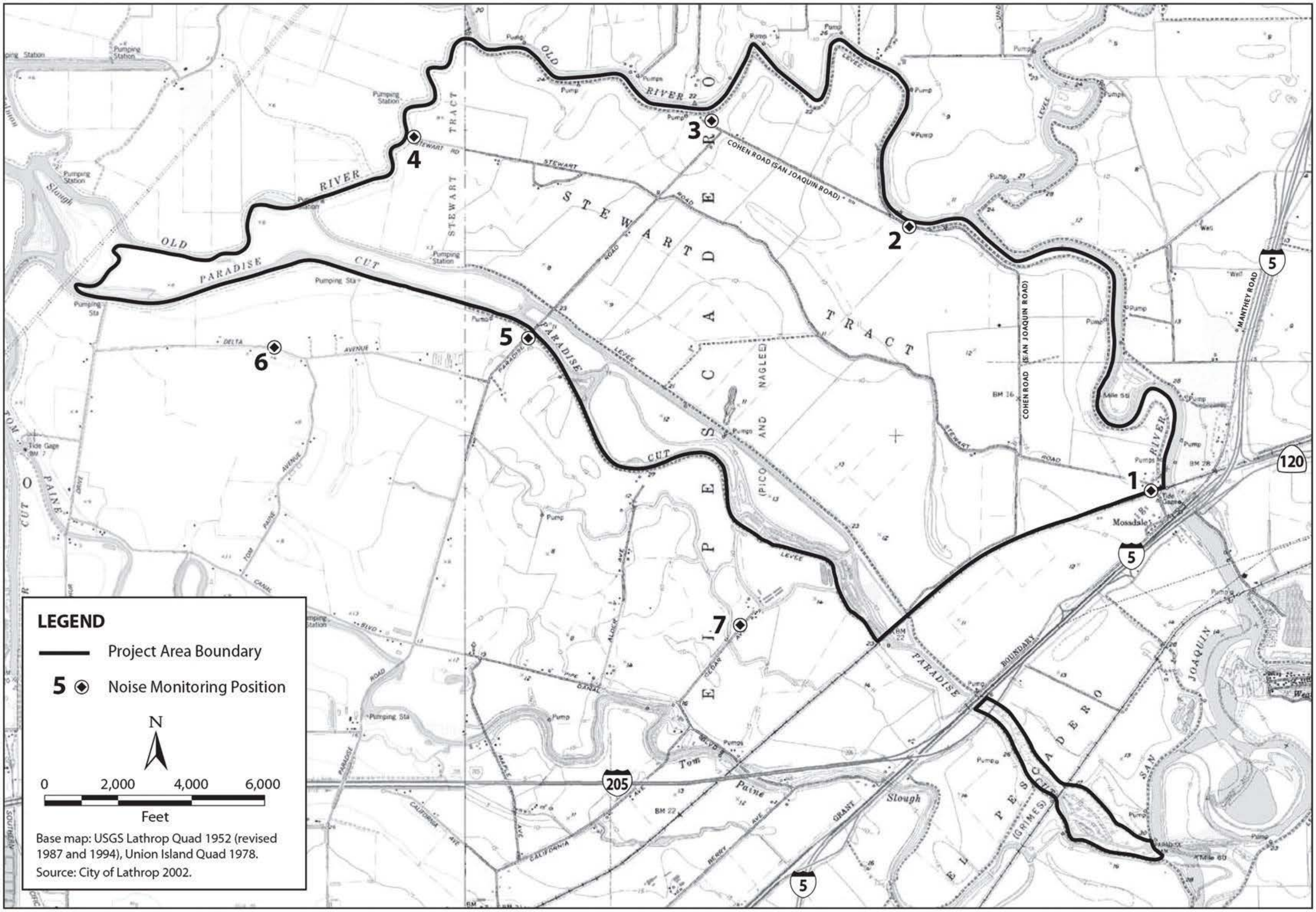

Figure 13-1
Noise Monitoring Positions

no new substantial development has occurred in the area since these measurements were taken, these measurements are considered to be representative of current conditions.

Secondary noise sources contributing to the existing background noise levels include occasional agriculture-related activities; watercraft operating on Old River, San Joaquin River, and other area waterways; and aircraft flyovers (although the project site is not located within the 60-dBA noise contour of any nearby public airports or private airstrips). Noise levels associated with the primary noise sources (roadways and railroads) are discussed separately and in more detail below.

13.2.3.2 Roadway Traffic

Ambient noise levels at the project site and surrounding area are influenced primarily by vehicular traffic on 1-5 and I-205. Ambient noise levels measured at the locations shown in Figure 13-1 are summarized in Table 13-5. Based on the measurements conducted, average daytime noise levels (in dBA L_{eq}) in the project vicinity generally range from the mid-40s to upper 50s, dependent primarily on distance from nearby roadways.

Table 13-5. Ambient Noise Survey Results, June 2002

			Noise Level (dBA)		
Site	Location	Time	L_{min}	L_{max}	L_{eq}
1	73 Stewart Road	10:30 a.m.–10:45 a.m.	47.7	75.6	57.1
2	16777 Cohen Road	11:22 a.m.–11:37 a.m.	36.4	77.9	54.9
3	Paradise Avenue and Cohen Road	11:50 a.m.–12:05 p.m.	35.6	62.7	44.6
4	Stewart Road near Old River	12:20 p.m.–12:35 p.m.	33.2	63.2	44.5
5	Paradise Road near Paradise Cut	12:55 p.m.–1:10 p.m.	32.2	80.5	53.5
6	Delta Avenue and Tom Payne Avenue	1:20 p.m.–1:35 p.m.	29.9	72.4	50.9
7	20800 Cedar Avenue	2:00 p.m.–2:15 p.m.	35.3	60.0	44.5

Source: City of Lathrop 2002.

Notes: Measurements were taken for a period of 15 minutes at each location using a Larson Davis 820 Type I integrating sound level meter situated approximately 4.5 feet above the ground.

dBA = A-weighted decibel level.

Vehicular traffic noise levels along area roadways were calculated using the Federal Highway Administration (FHWA) Traffic Noise Model (TNM) Version 2.1 and the soft site assumption. The *soft site assumption* indicates that the ground is assumed to have vegetation or disturbed soil that absorbs sound energy (as opposed to pavement or water that reflects almost 100% of sound energy). Traffic data used in the analysis were obtained from the data generated by TJKM Transportation Consultants (Appendix E).

Table 13-6 presents CNEL values calculated at 50 feet from the centerline of major area roadways in the project area along with the distance to the 60 CNEL contour line. The predicted noise levels do not take into account shielding or reflection of noise from existing structures. As a result, the noise contours should be considered to represent bands of similar noise exposure rather than absolute lines of demarcation. Actual noise levels will vary from day to day, dependent on a number of factors, including local traffic volumes, shielding from existing structures, variations in attenuation rates attributable to changes in surface parameters, and meteorological conditions. TNM uses sound propagation assumptions that have been updated relative to the superseded FHWA model used in the River Islands SEIR (City of Lathrop 2002). Accordingly, distances to 60 CNEL contours are substantially different from those reported in the SEIR (City of Lathrop 2002).

Table 13-6. Existing Traffic Noise Level Modeling Results

Roadway	Segment Location	Existing Conditions (CNEL)	Distance to 60 CNEL Contour (feet)
I-5	North of Louise	82.1	804
I-5	Louise Avenue SR 120	82.1	810
I-5	SR 120 to Manthey Hook	83.1	888
I-5	Manthey Hook to I-205	83.1	891
I-5	South of I-205	77.9	531
I-205	I-5 to Paradise Road	79.8	539
I-205	Paradise Road to MacArthur Drive	79.8	539
I-205	West of MacArthur	79.7	536
SR 120	East of I-5	80.3	639
Louise Avenue	East of I-5	65.9	107
Paradise Road	South of I-205	53.5	<50
MacArthur Road	South of I-205	65.8	105

Union Pacific Railroad

Only the UPRR alignment west of 1-5 is evaluated in this analysis. The UPRR alignment east of 1-5 is too distant from potential project-related sensitive receptors to influence the noise environment. The UPRR line follows the southeastern boundary of the RID Area and is currently used exclusively for freight transportation. On average, approximately two trains per day travel along this segment at speeds of approximately 20 miles per hour. The Federal Transit Administration's (FTA's) *Transit Noise and Vibration Impact Assessment Guidelines* (1995) were used for the calculation of wayside noise levels generated by the trains traveling along this rail segment. Wayside noise levels were calculated partly on average train speeds, train length, track conditions, and the number of trains traveling along the segment during a 24-hour period. Table 13-7 presents the calculated average daily noise levels for this segment of the UPRR at 50 feet. Based on the modeling conducted, existing wayside noise levels along this segment of the UPRR are estimated at approximately 69 dBA CNEL at 50 feet from the track centerline.

Table 13-7. Union Pacific Railroad Existing Noise Levels

	Wayside Noise Levels (dBA L_{dn}/CNEL)	
Railway	50 Feet from Track Centerline	Distance to 60 dBA Contour (feet)
Union Pacific Railroad[1]	69.1	450

Source: City of Lathrop 2002.

[1] Based on an average of two trains per day, 20 cars per train, and a speed of 20 miles per hour. Assumes jointed track at grade, average single event noise levels and rail cars of 92 dBA and 82 dBA, respectively, at 50 feet (Federal Transit Administration 1995).

13.3 Environmental Consequences

13.3.1 Methods for Analysis of Effects

The River Islands SEIR (City of Lathrop 2002) provided a project-level CEQA impact analysis of noise conditions associated with River Islands at Lathrop. Local approvals and entitlements necessary to complete all phases of the project have been obtained by River Islands.

There are no changes in the project description that would substantially change the conclusions of the noise analysis in the River Islands SEIR. Accordingly, most of the noise analysis presented in the SEIR is still valid and is repeated here. One important difference is that the horizon year for the project has changed from 2025 to 2031. Also, existing conditions, defined for the RID Area as conditions existing at the issuance date of the NEPA NOI, are different for the proposed action addressed by this EIS. The traffic noise analysis for existing conditions and horizon-year conditions has been updated in this EIS. In addition, baseline traffic conditions are defined as existing conditions plus growth that is unrelated to the proposed action. In other words, baseline conditions are defined as existing conditions plus earlier phases of the project (i.e., Phases 1 and 2A) plus regional growth.

Data included in the project description of the SEIR (Chapter 3, *Description of the Proposed Project*) were used to determine potential locations of sensitive noise receptors and potential noise-generating land uses on the project site. Noise levels generated from stationary and mobile sources on and near the project site were estimated using applicable models.

Anticipated noise conditions on the project site were then compared against City noise standards and other suitable criteria to determine potential conflicts between sensitive receptors and projected noise levels.

13.3.2 Definition of Significant Effects

For purposes of this analysis, the following applicable thresholds have been used to determine whether implementing the proposed action would result in significant affects.

- **Short-term construction noise impacts.** Construction noise impacts would be considered significant if construction noise levels would exceed the City of Lathrop Noise Ordinance standards or construction were to occur in or within 500 feet of a residential zone during the nighttime or weekend hours prohibited by the noise ordinance (i.e., between 10 p.m. and 7 a.m. on Sunday through Thursday and between 11 p.m. and 9 a.m. on Fridays, Saturdays, and legal holidays).
- **Long-term operational stationary source noise impacts.** Long-term stationary source noise impacts would be considered significant if the proposed action would result in noise levels that exceed the City's Noise Ordinance standards at nearby noise-sensitive land uses.
- **Long-term traffic noise impacts.** Long-term traffic noise impacts would be considered significant if implementation of the proposed action would result in a noticeable increase (i.e., 3 dBA or greater) in traffic noise levels.
- **Land use compatibility with projected noise levels.** Development of the proposed land uses would have a significant impact if the proposed action would contribute to projected noise levels that would exceed the City's normally acceptable land use compatibility criteria.

13.3.3 Effects and Mitigation Approaches

All noise-related effects analyzed in this chapter are considered to be direct effects. No indirect effects were identified.

13.3.3.1 Alternative 1—Proposed Action

Increases in short-term construction-generated noise (significant)

Construction noise in any one particular area would be temporary and would include noise from activities such as site preparation, levee modifications, truck hauling of material, pouring of concrete, and use of powered hand tools. 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, and portable generators, 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 community activities (e.g., industrial activities, vehicle traffic) decrease, construction activities performed during these more noise-sensitive periods of the day can directly result in increased annoyance and potential sleep disruption to occupants of nearby residential dwellings.

EPA has found that the average noise levels associated with construction activities typically range from approximately 76 dBA to 84 dBA L_{eq}, with intermittent individual equipment noise levels ranging from approximately 75 dBA to more than 88 dBA for brief periods. Table 13-8 lists typical uncontrolled noise levels generated by individual construction equipment at a distance of 50 feet. However, it should be noted that these equipment noise levels are more than 30 years old. Newer equipment models typically have noise control features (such as mufflers, engine shrouds, and insulation) and, as a result, are anticipated to generate noise levels that are substantially lower than those presented in Table 13-8. Consequently, it is reasonable to assume that the equipment noise levels shown in Table 13-8 would represent worst-case construction-generated noise levels.

Table 13-8. Noise Levels Generated by Typical Construction Equipment

Type of Equipment	Range of Sound Levels (dBA at 50 feet)	Suggested Sound Levels for Analysis (dBA at 50 feet)
Pile driver	81–96	93
Rock drill	83–99	96
Jack hammer	75–85	82
Pneumatic tools	78–88	85
Pumps	68–80	77
Dozer	85–90	88
Tractor	77–82	80
Front-end loader	86–90	88
Hydraulic backhoe	81–90	86
Hydraulic excavator	81–90	86
Grader	79–89	86
Air compressor	76–86	86
Truck	81–87	86

Source: City of Lathrop 2002.

Noise from localized point sources (such as construction sites) typically decreases by approximately 6 dBA with each doubling of distance from source to receptor. Given this noise attenuation rate and assuming no noise shielding from either natural or artificial features (e.g., trees, buildings, fences), outdoor receptors within approximately 1,600 feet of construction sites could experience maximum instantaneous noise levels greater than 60 dBA when onsite construction-related noise levels exceed approximately 90 dBA at the project site boundary. Depending on the activities being performed, as well as the duration and hours during which activities occur, construction-generated noise levels at nearby existing or project-related residences could violate the City's Noise Ordinance standards, and activities occurring during the more noise-sensitive evening and nighttime hours could result in increased levels of annoyance and sleep disruption to occupants of nearby residences. As a result, noise-generating construction activities would be considered to result in a significant effect. For bridge construction, there is a possibility that an oscillating process rather than vibratory hammers would be used for pile installation; however, the overall direct effect of noise from construction could still be significant. Mitigation Measure NOI-1 would address this effect.

Mitigation Measure NOI-1. Minimize short-term construction-related noise

In keeping with the City's Noise Ordinance, construction activities in or within 500 feet of a residential zone (i.e., an area containing occupied residences) will be prohibited between 10 p.m. and 7 a.m. Sunday through Thursday and between 11 p.m. and 9 a.m. on Fridays, Saturdays, and legal holidays.

In addition, all construction vehicles or equipment, fixed or mobile, will be equipped with properly operating and maintained mufflers and acoustical shields or shrouds, in accordance with manufacturers' recommendations. Construction equipment and truck routes will be arranged to minimize travel adjacent to occupied residences. Stationary construction equipment and staging areas will be located as far as possible from sensitive receptors, and temporary acoustic barriers may be installed around stationary equipment if necessary.

Stationary source noise generated by onsite land uses (significant)

The proposed River Islands at Lathrop land use concept features a mix of land uses, including residential, commercial, office, and public/institutional. The sources and levels of noise typically associated with these land uses are discussed below.

Residential Land Uses

Occupancy of proposed residential dwellings would expose nearby residences to minor increases in ambient noise levels. Noise typically associated with residential uses includes amplified music, voices, and lawn and garden equipment. Such activities would result in only minor increases in ambient noise levels—primarily during the day and evening hours and less frequently at night as perceived at the closest residential receptors. Noise levels generated by stationary sources, primarily residential central air conditioning units, typically average approximately 60 dBA at 3 feet from the source (U.S. Environmental Protection Agency 1971). Depending on distance between residential dwellings, noise levels associated with air conditioning units located in side yard areas of residences could potentially exceed the City's maximum allowable noise level of 50 dBA at neighboring one- and two-family residences in urban settings (Table 13-3). This would constitute a significant effect.

Commercial and Public Land Uses

As previously discussed, the proposed action includes plans for the development of a town center, employment center, and a small (10-acre) office/retail center, comprising various commercial and public land uses, on a total of approximately 360 acres. However, the specific types of land uses to be developed have not yet been determined. Potential sources of noise associated with these types of land uses can vary substantially. Whereas noise associated with office and public land uses might be limited to occasional parking lot–related noise (e.g., opening and closing of doors, people talking), commercial and light-industrial land uses may include additional noise sources, such as the use of forklifts for the loading and unloading of materials, as well as the operation of hydraulic lifts and air compressors at automotive repair facilities. Noise from such equipment can reach intermittent levels of approximately 90 dBA at 50 feet from the source (U.S. Environmental Protection Agency 1971). Early morning truck deliveries could also be a source of elevated noise levels at nearby receptors.

Operational noise levels associated with the proposed town center, employment center, and office/retail center could potentially exceed the City's maximum allowable exterior noise standards at nearby existing and future noise-sensitive receptors. In addition, increases in single-event noise levels, such as backup alarms from material delivery trucks, occurring during the more noise-sensitive evening and nighttime hours, could result in increased levels of disturbance and sleep disruption to occupants of nearby residential dwellings. This would be a significant effect.

Schools and Neighborhood Parks

The proposed development includes development of approximately 136 acres for school-related uses (including associated joint use park facilities) and approximately 190 acres dedicated as parks. Noise typically associated with schools and parks includes the voices of adults and children, the opening and closing of vehicle doors in parking lots, and mechanical noise associated with building ventilation systems. During periods when children are using exterior recreational areas, exterior noise levels can exceed 60 dBA L_{eq} at 50 feet. In addition, mechanical noise associated with the operation of the ventilation equipment required to service school facilities could generate high noise levels depending on the type of equipment and extent of use (hours of operation).

Use of large heating and ventilation systems can result in noise levels of approximately 90 dBA at 3 feet from the source. Community parks, middle schools, and high schools can result in additional noise extending into the evening and nighttime hours associated with the operation of recreational facilities during competitive sporting events such as soccer games, football games, and track and field events. Noise sources commonly associated with these types of events include elevated voices from crowds, exterior public address systems, and musical instruments. Noise levels typically associated with recreational events, including noise from spectators and players, can reach approximately 75 dBA at 50 feet. If an amplified speaker system is used during sporting events, additional increases in ambient noise levels could occur. Depending on distances between source and receptor, noise generated by these land uses has the potential to exceed the City's maximum allowable exterior noise standards at nearby existing and proposed land uses. Sensitive receptors most likely to be affected would be homes near the proposed school and community park complexes in the Town Center, West Village, and Woodlands districts. This would be a significant effect.

Golf Courses

The proposed action includes development of approximately 310 acres as golf courses and related facilities. Activities occurring on golf courses have the potential to produce two types of noise that could be detectable at nearby sensitive receptors: noise associated with the striking of golf balls and human conversation, and noise associated with the operation of maintenance equipment.

Golfing Activities

Based on measurements conducted at a driving range, intermittent sound levels generated by a golf club striking a golf ball are approximately 61 dBA L_{max} (EDAW 1997). The instantaneous noise level at the time of impact would attenuate to 39 dBA at 40 feet from the source. It is important to note that the measured sound levels were instantaneous and that their contribution to average ambient noise levels would be substantially less than indicated, when averaged over a 1-hour period, because of the sporadic nature of the activity and the short duration of the noise event.

Regarding other potential noise sources on golf courses, electric golf carts would be nearly inaudible at distances greater than 25 feet, and normal human conversation typically falls in the 50- to 60-dBA range. Conversation would be sporadic and would not be expected to exceed 60 dBA at 25 feet. Consequently, although human voices and noise generated by the striking of golf balls might be detectable at nearby sensitive receptors for brief periods, substantial increases (i.e., 3 dBA or greater) in average hourly ambient noise levels would not be anticipated. Golfing activities would result in a less-than-significant effect.

Maintenance Equipment

Equipment used for maintenance of golf courses includes lawnmowers, tillers, and sprayers. Representative manufacturers' specifications for decibel levels measured at the operator's seat of these types of equipment are listed in Table 13-9, with a description of function and predicted noise levels. Mowing operations at golf courses typically occur several times per week and produce irregular sound levels because of fairly rapid movement and limited time exposure relative to nearby land uses. Noise levels from maintenance equipment are also influenced by factors such as direction of movement, location, speed, and local wind conditions. Noise levels shown in Table 13-9 are the highest levels expected, based on direct exposure measurement of stationary equipment.

Table 13-9. Typical Golf Course Maintenance Equipment Noise Levels (L_{eq})

Equipment and Function	Location of Primary Function	Sound Level at Operator's Position	Estimated Sound Level at 50 feet
Mower (Reelmaster 5000)	Fairways	86 dBA	62 dBA
Mower (Groundmaster 325D)	Rough	90 dBA	66 dBA
Multi Pro 1100 Sprayer	All areas	84 dBA	60 dBA

Source: City of Lathrop 2002.

Notes: Sound levels at operator's position are based on manufacturer's specifications. Predicted sound levels at 50 feet assume a near-noise field of 3 feet and a 6 dBA reduction in noise levels per doubling of distance from the source.

Assuming a maximum noise level of 90 dBA associated with the potential mowing of rough areas along the outer perimeter of the golf course, noise-sensitive land uses within approximately 100 feet of the golf course (i.e., some homes in the Lakeside and Woodlands districts) could be exposed to levels in excess of 60-dBA L_{eq}. Depending on the distance between source and receptor and the hour of day during which such activities were to occur, operational noise levels associated with maintenance equipment could potentially exceed the City's maximum allowable noise standards or result in a noticeable increase in ambient noise levels at nearby noise-sensitive receptors. This would be a significant effect.

Summary of Stationary Source Noise

Stationary source noise levels associated with several proposed land uses could directly result in noise levels that would exceed the City's maximum allowable Noise Ordinance standards. In addition, increases in single event noise levels, such as backup alarms from material delivery trucks at commercial land uses and exterior public address systems at schools and recreational facilities, could directly result in increased levels of disturbance and sleep disruption to occupants of nearby residential dwellings, particularly during the more noise-sensitive evening and nighttime hours. Noise from stationary sources is therefore considered to result in a significant effect. Mitigation Measure NOI-2 would address this effect.

Mitigation Measure NOI-2. Minimize stationary source noise generated by onsite land uses

As individual facilities, subdivisions, and other project elements are permitted by the City, the City will evaluate the element for compliance with the City's Noise Ordinance and noise policies in the General Plan. Where individual project elements do not clearly comply with interior noise standards included in these guidelines, measures will be implemented to reduce projected interior and exterior noise levels to within acceptable levels. Such measures include but are not limited to the following.

- Installing dual-pane, noise-rated windows, mechanical air systems, exterior wall insulation, and other noise-reducing building materials.
- Locating mechanical equipment such as air conditioning and ventilation systems, and area source operations such as loading docks, parking lots, and recreational use areas, as far as possible from existing and future noise-sensitive land uses, or shielding existing and future noise-sensitive land uses from such equipment and operations.

In addition, the following measures will apply to noise-generating activities associated with the golf course.

- Onsite landscape maintenance equipment will be equipped with properly operating exhaust mufflers and engine shrouds in accordance with manufacturers' specifications.
- The operation of onsite landscape maintenance equipment within 500 feet of noise-sensitive land uses will be limited to the least noise-sensitive periods of the day—i.e., between the hours of 7 a.m. and 7 p.m.
- Areas of golf courses that require frequent turf maintenance (e.g., fairways, tees) will be located at a minimum distance of 100 feet from the property line of nearby existing residences.

Increases in traffic noise levels (less than significant)

The proposed action will result in increased trip generation and traffic relative to baseline future conditions. Baseline future conditions are defined as existing conditions plus earlier phases of the project approved through CEQA plus regional growth. Predicted noise levels do not take into account shielding or reflection of noise from existing structures. Consequently, the noise contours should be considered to represent bands of similar noise exposure rather than absolute lines of demarcation. Actual noise levels will vary from day to day depending on a number of factors, including local traffic volumes, shielding from existing structures, variations in attenuation rates attributable to changes in surface parameters, and meteorological conditions. Table 13-10 compares predicted traffic noise levels under the proposed action to baseline conditions for existing roadways.

Table 13-10. Traffic Noise Increases Associated with the Proposed Action

Roadway	Segment Location	Baseline CNEL	Proposed Action CNEL	Difference CNEL
I-5	North of Louise	85.4	87.1	1.8
I-5	Louise Avenue SR 120	84.9	86.6	1.7
I-5	SR 120 to Manthey Hook	87.0	88.9	1.9
I-5	Manthey Hook to I-205	87.0	89.0	2.0
I-5	South of I-205	83.5	85.4	1.9
I-205	I-5 to Paradise Road	82.9	85.1	2.2
I-205	Paradise Road to MacArthur Drive	83.4	85.4	2.0
I-205	West of MacArthur	83.7	85.7	2.0
SR 120	East of I-5	82.6	84.7	2.2
Louise Avenue	East of I-5	66.2	66.2	0.0
Paradise Road	South of I-205	71.0	71.4	0.4
MacArthur Road	South of I-205	69.0	69.3	0.3

The projected traffic noise increases are 2.2 dBA or less along area roadways, which is less than the 3-dBA increase normally perceptible by the human ear. Accordingly, the proposed action is expected to result in a less-than-significant effect related to traffic noise increases.

Compatibility of proposed land uses with projected onsite noise levels (significant)

Noise levels within the proposed action area are influenced primarily by traffic noise associated with vehicle traffic along area highways and, to a lesser extent, rail traffic along the UPRR. Noise generated by other sources, such as agricultural operations and watercraft, may also influence noise levels in some areas.

Roadway Traffic Noise Levels

Table 13-11 summarizes predicted traffic noise levels under the proposed action. Distances to the 60, 65, and 70 CNEL contours are also provided.

Table 13-11. Predicted Traffic Noise Levels under the Proposed Action

		Proposed Action			
Roadway	Segment Location	CNEL	60 CNEL	65 CNEL	70 CNEL
I-5	North of Louise	88.4	1,392	808	489
I-5	Louise Avenue SR 120	87.8	1,319	766	461
I-5	SR 120 to Manthey Hook	90.1	1,664	966	590
I-5	Manthey Hook to I-205	90.2	1,681	975	596
I-5	South of I-205	86.6	1,173	681	401
I-205	I-5 to Paradise Road	86.4	945	560	322
I-205	Paradise Road to MacArthur Drive	85.4	972	576	332
I-205	West of MacArthur	85.7	1,023	594	342
SR 120	East of I-5	84.7	1,036	601	345
Louise Avenue	East of I-5	66.2	111	66	<50
Paradise Road	South of I-205	71.4	190	113	67
MacArthur Road	South of I-205	69.3	153	91	53
Paradise Road	I-205 to South River Islands Parkway	70.3	169	100	59
	South River Islands Parkway to North Woodlands Drive	69.0	149	89	51
South River Islands Parkway	Golden Valley Parkway to Commercial Street	63.6	85	48	<50
	Commercial Street to Broad Street	62.7	78	42	<50
	Broad Street to D-27 Street	66.0	109	64	<50
	D-27 Street to Lake Harbor Blvd.	68.0	133	80	<50
	West of Lake Harbor Blvd.	69.4	154	92	53
	East of Lake Harbor Blvd.	68.4	139	84	<50
S. Woodlands Drive	Paradise Road (south) to Paradise Road (north)	66.1	109	65	<50
North River Islands Parkway	Paradise Road (north) Lakeside Drive (west)	68.7	143	86	<50
	Lakeside Drive (west) to Lakeside Drive (east)	69.5	155	92	54
	Lakeside Drive (east) to Old River Road	70.7	178	105	62
	Old River Road to D-27 Street	69.7	159	94	56
	D-27 Street to Broad Street	68.2	136	82	<50
	Broad Street to Commercial Street	70.5	174	103	61
	Commercial Street to Water Street	71.5	192	114	68
	Water Street to I-5	72.1	204	121	73
Lake Harbor Boulevard	South River Islands Parkway to Golden Valley Parkway	68.5	141	85	<50
Commercial Center Boulevard	East of Golden Valley Parkway	63.2	82	45	<50
	South of Golden Valley Parkway	67.5	127	77	<50

		Proposed Action			
Roadway	Segment Location	CNEL	60 CNEL	65 CNEL	70 CNEL
Broad Street	Golden Valley Parkway (east) to South River Islands Parkway	69.7	159	94	56
	South River Islands Parkway to Canal Street	69.3	153	91	53
	Canal Street to North River Islands Parkway	68.5	140	84	<50
D-27 Street	Commercial Center Road to Golden Valley Parkway	64.6	94	55	<50
	Golden Valley Parkway to South River Islands Parkway	65.4	102	61	<50
	South River Islands Parkway to North River Islands Parkway	65.2	98	59	<50
Commercial Street	South of North River Islands Parkway	66.2	110	65	<50
	North of South River Islands Parkway	62.9	79	<50	<50
Old River Road	North River Island Parkway north	61.2	65	<50	<50
	North River Island Parkway south	60.4	60	<50	<50
Water Street	North River Island Parkway south	63.5	85	<50	<50
Canal Street	West of Broad Street	58.3	<50	<50	<50
	East of Broad Street	61.5	68	<50	<50
Lakeside Drive		64.3	91	53	<50

Noise levels in the proposed action area are affected primarily by vehicle traffic on I-5. The traffic noise modeling results in Table 13-11 indicates that the 60-dBA CNEL noise contour for I-5 extends more than 1,600 feet into the southeastern portion of the project site. Areas primarily affected by I-5 traffic noise include the proposed Employment Center and Town Center districts, as well as the southeastern portion of the East Village district. Predicted noise levels at proposed onsite single-family dwellings, such as those planned along a portion of South River Islands Parkway, could potentially exceed the City's normally acceptable land use compatibility standard of 60-dBA CNEL. Predicted traffic noise levels at other proposed noise-sensitive land uses, including multifamily dwellings, motels, and hotels, within approximately 1,000 feet of 1-5, could potentially exceed the City's 65-dBA CNEL land use compatibility threshold for these land uses.

In addition, although outside the projected 60-dBA CNEL noise contour for I-5, the remaining proposed land uses—residences, schools, parks, recreational facilities, and commercial and public land uses—could be affected by noise associated with vehicles traveling along the proposed onsite roadways. As indicated in Table 13-11, the 60-dBA CNEL noise contour along major proposed area roadways, such as North River Islands Parkway, may extend well beyond the roadway ROW. Consequently, traffic noise levels along proposed area roadways may also result in noise levels that would exceed the City's land use compatibility standards and result in a significant effect.

Railroad Noise Levels

Table 13-12 summarizes predicted railroad noise levels based on assumptions and analysis presented in EDAW 2002. The results in Table 13-12 indicate that residential dwellings within approximately 1,300 feet of the rail line and commercial, office, and public land uses developed within approximately 130 feet of the rail line could potentially exceed the City's maximum allowable land use compatibility noise standards of 60- and 70-dBA CNEL, respectively, resulting in a significant effect.

Table 13-12. Union Pacific Railroad Predicted Noise Levels

Railway	Wayside Noise Levels (dBA L_{dn}/CNEL) 50 Feet from Track Centerline	Distance to CNEL Contour (feet) 60 dBA	70 dBA
Union Pacific Railroad[a]	73.8	1,300	130

Source: City of Lathrop 2002.

[a] Based on an average of two trains per day, 20 cars per train, and a speed of 20 miles per hour. Assumes jointed track at grade, average single event noise levels and rail cars of 92 dBA and 82 dBA, respectively, at 50 feet (Federal Transit Administration 1995).

Additional Noise Sources

The project site is also affected on an intermittent basis by various other sources of noise, including agricultural activities on adjacent parcels, watercraft on adjacent waterways, nearby non–project-related construction activities, and occasional aircraft overflights. However, it should be noted that the project site is not located in the 60-dBA noise contour of any nearby public airports or private airstrips. Exposure to aircraft noise typically occurs for only short periods and, as a result, aircraft noise does not contribute significantly to average daily noise levels at the site. Various types of heavy equipment are used adjacent to the project site for agricultural activities and for construction and removal of the temporary fish barrier operated by DWR at the Head of Old River. The operation of these types of equipment can generate noise levels of approximately 85 dBA L_{eq} at 50 feet (City of Lathrop 2002). Depending on the duration and time of day when these activities occur, resultant noise levels at nearby noise-sensitive receptors could potentially exceed the City's land use compatibility noise standards. DWR may replace the Head of Old River temporary fish barrier with a permanent facility in the future. If this occurs, noise generated by the biannual construction and removal of the temporary barrier would no longer occur.

Noise levels associated with the operation of watercraft can vary from approximately 74 dBA to more than 90 dBA at 50 feet, with throttles at half- and full-open positions, respectively. Although the creation of no-wake zones adjacent to project docks would limit watercraft-related noise generation, some homes located on high-ground perimeters at the ends of the no-wake zones could be exposed to noise levels exceeding the City's land use compatibility noise standards as boats accelerate when leaving the speed-restricted area. This exposure would result in a significant effect.

Land Use Compatibility Summary

Based on the transportation noise analyses conducted, predicted onsite transportation noise levels for 1-5 and the UPRR could exceed the City's applicable land use compatibility noise standards for those proposed land uses located close to these sources. In addition, noise generated by nearby agricultural operations, installation and removal of the Head of Old River temporary fish barrier, and operation of watercraft also may directly result in noise levels that could exceed applicable land use compatibility noise standards at nearby noise-sensitive receptors. Consequently, significant effects related to land use compatibility could occur. Mitigation Measure NOI-3 would address this effect.

Mitigation Measure NOI-3. Minimize sensitive receptor exposure to exterior noise

As individual facilities, subdivisions, and other project elements are permitted by the City, the City will evaluate the element for compliance with the City's Noise Ordinance and noise policies in the General Plan. Where individual project elements do not clearly comply with interior noise standards included in these guidelines, measures such as the use of dual-pane windows, mechanical air systems, exterior wall insulation, and other noise-reducing building materials and methods will be required as appropriate to reduce interior noise exposure to the normally acceptable levels identified by the City (Exhibit 4.6-1). Where individual project elements do not clearly comply with exterior noise standards included in the City guidelines (Table 13-3), measures such as use of sound walls, vegetative screening, buildings for screening, and setbacks between noise sources and receptors will be implemented as appropriate to minimize exterior noise levels. Where there is a question regarding premitigation or postmitigation noise levels in a particular area, site-specific noise studies may be conducted to determine compliance/noncompliance with City guidelines.

Title 24 of the CCR requires the preparation of an acoustical analysis for multifamily residences that demonstrates how interior noise levels will achieve a 45-dBA CNEL/L_{dn} where the exterior noise levels exceed 60-dBA CNEL/L_{dn}. Accordingly, a Title 24 analysis will be prepared as part of the final design of any proposed multifamily residential dwellings. To the extent necessary, noise control measures will be designed according to the type of building construction and specified sound rating for each building element to achieve an interior noise level of 45 dBA CNEL/L_{dn}.

Implementation of this mitigation measure would reduce significant noise affects associated with land use compatibility conflicts. However, exterior noise levels are anticipated to exceed applicable noise standards even after mitigation at high-ground corridors near I-5, the Head of Old River, and the confluence of Old River and Paradise Cut.

13.3.3.2 Alternative 2—No Alteration of Paradise Cut

Alternative 2 would eliminate all alterations to Paradise Cut. Instead, to provide the needed flood risk reduction measures, the Paradise Cut levee would be altered and augmented on the landside. In addition, all the proposed housing and commercial development described for the proposed action would occur.

Increases in short-term construction-generated noise (significant)

Effects of construction-generated noise would be the same under Alternative 2 as under the proposed action. Mitigation Measure NOI-1 would address this significant effect.

Stationary source noise generated by onsite land uses (significant)

Stationary source noise associated with onsite land uses would be the same under Alternative 2 as under the proposed action. Mitigation Measure NOI-2 would address this significant effect.

Increases in traffic noise levels (less than significant)

Traffic patterns and volume under Alternative 2 would be the same as under the proposed action. Consequently, this effect would be less than significant.

Compatibility of proposed land uses with projected onsite noise levels (significant)

Onsite noise levels would be the same under Alternative 2 as under the proposed action. Mitigation Measure NOI-3 would address this significant effect.

13.3.3.3 Alternative 3—Avoidance of Central Drainage Ditch

Under Alternative 3, the proposed action would be modified to avoid the central drainage ditch. Development would occur up to the central drainage ditch, but the ditch itself would not be modified. All the proposed private and commercial development described under the proposed action would still occur. Overall, noise effects related to onsite stationary sources, increases in traffic noise, and compatibility of proposed land uses would be as described for the proposed action.

Increases in short-term construction-generated noise (significant)

Avoidance of the central drainage ditch would require additional infrastructure (e.g., clear span bridges, utilities) to connect the bifurcated development area. These additional construction activities could result in an increased amount of noise effects. Mitigation Measure NOI-1 would address this significant effect.

Stationary source noise generated by onsite land uses (significant)

Stationary source noise associated with onsite land uses would be the same under Alternative 3 as under the proposed action. Mitigation Measure NOI-2 would address this significant effect.

Increases in traffic noise levels (less than significant)

Traffic patterns and volume under Alternative 3 would be the same as under the proposed action. Consequently, this effect would be less than significant.

Compatibility of proposed land uses with projected onsite noise levels (significant)

Onsite noise levels would be the same under Alternative 2 as under the proposed action. Mitigation Measure NOI-3 would address this significant effect.

13.3.3.4 Alternative 4—Proposed Action with Expanded Flood Risk Reduction

Under Alternative 4, River Islands at Lathrop would be constructed as described for the proposed action, but the flood risk reduction component would be modified to include the following additional elements.

- Constructing a new bypass channel or channels west of the existing Paradise Cut flood bypass.
- Implementing more extensive widening in Paradise Cut.
- Widening Paradise Weir and constructing an additional weir upstream of the existing weir.
- Creating new flood storage areas.

Increases in short-term construction-generated noise (significant)

Alternative 4 would entail extensive earthwork and construction outside Stewart Tract to develop the expanded flood risk reduction components. Consequently, this alternative could result in increased short-term construction-related effects. If this alternative is selected, additional noise analysis would be necessary subsequent to design of proposed measures. Mitigation Measure NOI-1 would address this significant effect.

Stationary source noise generated by onsite land uses (significant)

Stationary source noise associated with onsite land uses would be the same under Alternative 4 as under the proposed action. Mitigation Measure NOI-2 would address this significant effect.

Increases in traffic noise levels (less than significant)

Traffic patterns and volume under Alternative 4 would be the same as under the proposed action. Consequently, this effect would be less than significant.

Compatibility of proposed land uses with projected onsite noise levels (significant)

Onsite noise levels would be the same under Alternative 4 as under the proposed action. Mitigation Measure NOI-3 would address this significant effect.

13.3.3.5 Alternative 5—No Action

Under the No Action Alternative, the components that would not require Corps permits would be constructed. There would be no alterations to the PCC or PCIP Areas, an interior 0.5% (200-year) ring levee system would be constructed instead of the extended levees, and no habitat creation or restoration would take place. Placement of fill and construction of levees not requiring Corp permits would occur and the Golden Valley Parkway Bridges would be constructed under authority of the City of Lathrop. In addition, a new project element under the No Action Alternative, the 500-foot trestle, would be constructed (Figure 2-9). The private development under the proposed action would occur in addition to development approved under earlier phases of the project.

Increases in short-term construction-generated noise (significant)

Effects of construction-generated noise would be the same under Alternative 2 as under the proposed action. Mitigation Measure NOI-1 would address this significant effect.

Stationary source noise generated by onsite land uses (significant)

Stationary source noise associated with onsite land uses would be the same under Alternative 2 as under the proposed action. Mitigation Measure NOI-2 would address this significant effect.

Increases in traffic noise levels (less than significant

Traffic patterns and volume under Alternative 2 would be the same as under the proposed action. Consequently, this effect would be less than significant.

Compatibility of proposed land uses with projected onsite noise levels (significant)

Onsite noise levels would be the same under Alternative 2 as under the proposed action. Mitigation Measure NOI-3 would address this significant adverse effect.

13.4 References

California Department of Transportation. 2006. *Technical Noise Supplement to the Caltrans Traffic Noise Analysis Protocol*. Sacramento, CA.

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Chapter 14
Air Quality

This chapter analyzes the proposed action's and alternatives' potential effects related to air quality, particularly with respect to criteria pollutants and toxic air contaminants (TACs). Related discussions are found in Chapter 6, *Water Resources and Flood Protection*; Chapter 12, *Transportation and Circulation*; and Chapter 21, *Cumulative Effects*.

The key sources of data listed below were used in the preparation of this chapter.

- San Joaquin Valley Air Pollution Control District (SJVAPCD) *Current District Rules and Regulations* (2008).
- U.S. Environmental Protection Agency (EPA) *Green Book Nonattainment Areas for Criteria Pollutants* (2012a).
- California Air Resources Board (ARB) *Air Quality Data Statistics* and *Area Designation Maps* (2012a, 2012b).

Specific reference information is provided in the text.

14.1 Affected Environment

This section discusses federal, state, and local regulations related to air quality that would apply to the proposed action. It then describes existing conditions related to air quality in the proposed action area.

14.1.1 Regulatory Framework

Air pollution control programs were established in California before federal requirements were enacted. However, federal Clean Air Act (CAA) legislation in the 1970s resulted in a gradual merging of state and federal air quality programs, particularly those relating to industrial sources. Air quality management programs developed by California since the late 1980s generally have responded to requirements established by the CAA.

The enactment of the California Clean Air Act (CCAA) in 1988 and the CAA Amendments of 1990 have produced additional changes in the structure and administration of air quality management programs. The CCAA requires preparation of an air quality attainment plan for any area that violates state standards for carbon monoxide (CO), sulfur dioxide (SO_2), nitrogen dioxide (NO_2), or ozone. Locally prepared attainment plans are not required for areas that violate the state standards for particulate matter 10 microns or less in diameter (PM10), but ARB is currently addressing PM10 attainment issues.

The proposed action area is within California's San Joaquin Valley Air Basin (SJVAB). The air quality management agencies of direct importance in San Joaquin County are EPA, ARB, and the SJVAPCD. EPA has established federal standards for which ARB and SJVAPCD have primary implementation responsibility. ARB and SJVAPCD are responsible for ensuring that state standards are met. SJVAPCD is responsible for establishing and enforcing local air quality rules and regulations that address the requirements of federal and state air quality laws, as well as implementing strategies for air quality improvement and recommending mitigation measures for new growth and development. At the local level, air quality is managed through land use and development planning practices, which are implemented in the county through the general planning process.

California and the federal government have established standards for several different pollutants. For some pollutants, separate standards have been set for different measurement periods. Most standards have been set to protect public health. For some pollutants, standards have been based on other values (such as protection of crops, protection of materials, or avoidance of nuisance conditions). State and federal standards for a variety of pollutants are summarized in Table 14-1.

14.1.1.1 Federal Regulations

Clean Air Act and Amendments

The CAA, enacted in 1963 and amended several times thereafter (including the 1990 amendments), establishes the framework for modern air pollution control. The CAA directs EPA to establish national ambient air quality standards (NAAQS) for six pollutants: CO, SO_2, NO_2, particulate matter, ozone, and lead. The standards are divided into primary and secondary standards. Primary standards are designed to protect human health, including the health of "sensitive" populations such as asthmatics, children, and the elderly, within an adequate margin of safety. Secondary standards are designed to protect public welfare, including protection against decreased visibility and damage to animals, crops, vegetation, and buildings.

The primary legislation that governs federal air quality regulations is the CAA Amendments of 1990. The CAA Amendments delegate primary responsibility for clean air to EPA. EPA develops rules and regulations to preserve and improve air quality, as well as delegating specific responsibilities to state and local agencies.

Areas that do not meet the federal ambient air quality standards shown in Table 14-1 are called *nonattainment* areas. For these nonattainment areas, the CAA requires states to develop and adopt State Implementation Plans (SIPs), which are air quality plans showing how air quality standards will be attained. The SIP, which EPA reviews and approves, must demonstrate how the federal standards will be achieved. Failing to submit a plan or secure approval could lead to the denial of federal funding and permits for such improvements as highway construction and sewage treatment plants. In California, EPA has delegated authority to prepare SIPs to ARB, which in turn has delegated that authority to individual air districts. In cases where the SIP is submitted by the state but fails to demonstrate achievement of the standards, EPA is directed to prepare a federal implementation plan.

Federal Conformity Requirements

The CAAA of 1990 requires that all federally funded projects come from a plan or program that conforms to the appropriate SIP. Federal actions are subject to either the transportation conformity rule (40 CFR 51[T]), which applies to federal highway or transit projects, or the General Conformity Rule (40 CFR 51[W]), which applies to all other federal actions. Because the proposed action is not a federal highway or transit project, it is subject to the General Conformity Rule.

Table 14-1. Ambient Air Quality Standards Applicable in California

		California Standards[a]		Federal Standards[b]		
Pollutant	Averaging Time	Concentration[c]	Method[d]	Primary[c, e]	Secondary[c, f]	Method[g]
Ozone (O_3)	1 hour	0.09 ppm (180 μg/m^3)	Ultraviolet photometry	–	Same as primary standard	Ultraviolet photometry
	8 hour	0.070 ppm (137 μg/m^3)		0.075 ppm (147 μg/m^3)		
Respirable particulate matter (PM10)	24 hour	50 μg/m^3	Gravimetric or beta attenuation	150 μg/m^3	Same as primary standard	Inertial separation and gravimetric analysis
	Annual arithmetic mean	20 μg/m^3		–		
Fine particulate matter (PM2.5)	24 hour	No Separate Standard		35 μg/m^3	Same as primary standard	Inertial separation and gravimetric analysis
	Annual arithmetic mean	12 μg/m^3	Gravimetric or beta attenuation	15.0 μg/m^3		
Carbon monoxide (CO)	8 hour	9.0 ppm (10mg/m^3)	Non-dispersive infrared photometry (NDIR)	9 ppm (10 mg/m^3)	None	Non-dispersive infrared photometry (NDIR)
	1 Hour	20 ppm (23 mg/m^3)		35 ppm (40 mg/m^3)		
	8 hour (Lake Tahoe)	6 ppm (7 mg/m^3)		–	–	–
Nitrogen dioxide (NO_2)	Annual arithmetic mean	0.030 ppm (57 μg/m^3)	Gas phase chemiluminescence	0.053 ppm (100 μg/m^3)	Same as primary standard	Gas phase chemiluminescence
	1 hour	0.18 ppm (339 μg/m^3)		0.100 ppm (188 μg/m^3)	None	
Sulfur dioxide (SO_2)	Annual arithmetic mean	–	Ultraviolet fluorescence	0.030 ppm (80 μg/m^3)	–	Spectrophotometry (pararosaniline method)
	24 hour	0.04 ppm (105 μg/m^3)		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)		0.075 ppm (196 μg/m^3)	–	–
Lead[i]	30-day average	1.5 μg/m^3	Atomic absorption	–	–	–
	Calendar Quarter	–		1.5 μg/m^3	Same as primary standard	High volume sampler and atomic absorption
	Rolling 3-month average[j]	–		0.15 μg/m^3		

		California Standards[a]		Federal Standards[b]		
Pollutant	Averaging Time	Concentration[c]	Method[d]	Primary[c, e]	Secondary[c, f]	Method[g]
Visibility reducing particles	8 hour	Extinction coefficient of 0.23 per kilometer—visibility of 10 miles or more (0.07–30 miles or more for Lake Tahoe) due to particles when relative humidity is less than 70%. Method: Beta attenuation and Transmittance through filter tape.		No Federal Standards		
Sulfates	24 hour	25 μg/m³	Ion chromatography	No federal standards		
Hydrogen sulfide	1 hour	0.03 ppm (42 μg/m³)	Ultraviolet fluorescence			
Vinyl chloride[i]	24 hour	0.01 ppm (26 μg/m³)	Gas chromatography			

Source: California Air Resources Board 2012a.

[a] California standards for ozone, carbon monoxide (except Lake Tahoe), sulfur dioxide (1 and 24 hour), nitrogen dioxide, suspended particulate matter—PM10, PM2.5, and visibility reducing particles, are values that are not to be exceeded. All others are not to be equaled or exceeded. California ambient air quality standards are listed in the Table of Standards in Section 70200 of Title 17 of the California Code of Regulations.

[b] Federal standards (other than ozone, particulate matter, and those based on annual averages or annual arithmetic mean) are not to be exceeded more than once a year. The ozone standard is attained when the fourth highest eight hour concentration in a year, averaged over three years, is equal to or less than the standard. For PM10, the 24 hour standard is attained when the expected number of days per calendar year with a 24-hour average concentration above 150 μg/m³ is equal to or less than one. For PM2.5, the 24 hour standard is attained when 98 percent of the daily concentrations, averaged over three years, are equal to or less than the standard. Contact U.S. EPA for further clarification and current federal policies.

[c] Concentration expressed first in units in which it was promulgated. 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.

[d] Any equivalent procedure which can be shown to the satisfaction of the ARB to give equivalent results at or near the level of the air quality standard may be used.

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

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

[g] Reference method as described by the EPA. An "equivalent method" of measurement may be used but must have a "consistent relationship to the reference method" and must be approved by the EPA.

[h] To attain this standard, the 3-year average of the 98th percentile of the daily maximum 1-hour average at each monitor within an area must not exceed 0.100 ppm (effective January 22, 2010).

[i] The ARB has identified lead and vinyl chloride as 'toxic air contaminants' with no threshold level 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.

[j] National lead standard, rolling 3-month average: final rule signed October 15, 2008.

General Conformity Requirements

The purpose of the General Conformity Rule is to ensure that federal actions conform to applicable SIPs so that they do not interfere with strategies employed to attain the NAAQS. The rule applies to federal actions in areas designated as nonattainment areas for any of the six criteria pollutants and in some areas designated as maintenance areas. The rule applies to all federal actions except the following.

- Programs specifically included in a transportation plan or program that is found to conform under the federal transportation conformity rule.
- Projects with associated emissions below specified *de minimis* threshold levels.
- Certain other projects that are exempt or presumed to conform.

A general conformity determination would be required if a proposed action's total direct and indirect emissions for each affected pollutant for which the region is classified as a maintenance or nonattainment area for the national standards are below the *de minimis* levels indicated in Tables 14-2 and 14-3. If emissions exceed the *de minimis* levels indicated in Tables 14-2 and 14-3, a general conformity determination must be performed to demonstrate that total direct and indirect emissions for each affected pollutant for which the region is classified as a maintenance or nonattainment area for the national standards would conform with the applicable SIP.

However, if emissions do not exceed the *de minimis* levels indicated in Tables 14-2 and 14-3, the requirements for general conformity do not apply because the proposed action is presumed to conform with the applicable SIP for each affected pollutant. Consequently, no further analysis or determination would be required.

In addition, conformity requirements allow for emissions of one precursor pollutant to be offset by the reduction of emissions of another precursor pollutant. For example, both oxides of nitrogen (NO_X) and volatile organic compounds (VOCs) are ozone precursors in that they are emitted and then react in the atmosphere to form ground-level ozone. In an area that does not meet EPA's ground-level ozone standard, reductions in NO_X emissions could be offset by reductions of VOCs so long as such offsets are allowed by an approved SIP.

The proposed action area is federally classified as an extreme nonattainment area for the federal 8-hour ozone standard, a nonattainment area for the federal PM2.5 standard, a serious maintenance area for the federal PM10 standard, and a moderate maintenance area for the federal CO standard (urbanized areas are classified as maintenance, while the remainder of the County are classified as unclassified/attainment) (U.S. Environmental Protection Agency 2012a). Consequently, to fulfill general conformity requirements, an analysis must be undertaken to identify whether the proposed action's total emissions of ozone (reactive organic gases [ROG] and NO_X), PM10, PM2.5, and CO would exceed the appropriate *de minimis* levels indicated in Table 14-2 and Table 14-3. The *de minimis* thresholds applicable to this proposed action are listed below.

- **NO_X:** 10 tons/year.
- **VOCs:** 10 tons/year.
- **CO:** 100 tons/year.
- **PM10:** 100 tons/year.

- **PM2.5:** 100 tons/year.

It should be noted that after June 15, 2005, federal conformity for ozone is based on the 8-hour standard rather than the 1-hour standard. To represent a worst-case scenario, the conformity determination in this analysis is based on the most stringent *de minimis* classifications from Tables 14-2 and 14-3.

Table 14-2. Federal *de minimis* Threshold Levels for Criteria Pollutants in Nonattainment Areas

Pollutant	Emission Rate (Tons per Year)
Ozone (ROG/VOC or NO_X)	
Serious nonattainment areas	50
Severe nonattainment areas	25
Extreme nonattainment areas	**10**
Other ozone nonattainment areas outside an ozone transport region[a]	100
Other ozone nonattainment areas inside an ozone transport region[a]	
ROG/VOC	50
NO_X	100
CO: All nonattainment areas	100
SO_2 or NO_2: All nonattainment areas	100
PM10	
Moderate nonattainment areas	100
Serious nonattainment areas	70
PM2.5	
Direct emissions	**100**
SO_2	100
NO_X (unless determined not to be a significant precursor)	100
ROG/VOC or ammonia (if determined to be significant precursors)	100
Pb: All nonattainment areas	25

Source: 40 CFR 51.853.
Notes: *de minimis* threshold levels for conformity applicability analysis.

Bold text indicates pollutants for which the region is in nonattainment, and a conformity determination must be made.

[a] Ozone Transport Region comprises Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, and the Consolidated Metropolitan Statistical Area that includes the District of Columbia and northern Virginia (CAA Section 184).

Table 14-3. Federal *de minimis* Threshold Levels for Criteria Pollutants in Maintenance Areas

Pollutant	Emission Rate (Tons per Year)
Ozone (NO_X, SO_2 or NO_2)	
All maintenance areas	100
Ozone (ROG/VOC)	
Maintenance areas inside an ozone transport region[a]	50
Maintenance areas outside an ozone transport region[a]	100
CO: All maintenance areas	**100**
PM10: All maintenance areas	**100**
PM2.5	
Direct emissions	100
SO_2	100
NO_X (unless determined not to be a significant precursor)	100
ROG/VOC or ammonia (if determined to be significant precursors)	100
Pb: All maintenance areas	25

Source: 40 CFR 51.853.

Notes: *de minimis* threshold levels for conformity applicability analysis.

Bold text indicates pollutants for which the region is in maintenance, and a conformity determination must be made.

[a] Ozone Transport Region is comprised of the States of Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, the Consolidated Metropolitan Statistical Area that includes the District of Columbia and northern Virginia (Section 184 of the Clean Air Act).

14.1.1.2 State Regulations

Responsibility for achieving California's air quality standards, which are more stringent than federal standards, is placed on ARB and local air districts and is to be achieved through district-level air quality management plans that will be incorporated into the SIP. In California, EPA has delegated authority to prepare SIPs to ARB, which in turn has delegated that authority to individual air districts.

ARB traditionally has established state air quality standards, maintaining oversight authority in air quality planning, developing programs for reducing emissions from motor vehicles, developing air emission inventories, collecting air quality and meteorological data, and approving SIPs.

Responsibilities of air districts include overseeing stationary source emissions, approving permits, maintaining emissions inventories, maintaining air quality stations, overseeing agricultural burning permits, and reviewing air quality–related sections of environmental documents required by CEQA.

The CCAA of 1988 substantially added to the authority and responsibilities of air districts. The CCAA designates air districts as lead air quality planning agencies, requires air districts to prepare air quality plans, and grants air districts authority to implement transportation control measures. The CCAA focuses on attainment of the state ambient air quality standards, which, for certain pollutants and averaging periods, are more stringent than the comparable federal standards.

The CCAA requires designation of attainment and nonattainment areas with respect to state ambient air quality standards. The CCAA also requires that local and regional air districts expeditiously adopt and prepare an air quality attainment plan if the district violates state air quality standards for CO, SO_2, NO_2, or ozone. These Clean Air Plans are specifically designed to attain these standards and must be designed to achieve an annual 5% reduction in district-wide emissions of each nonattainment pollutant or its precursors. Where an air district is unable to achieve a 5% annual reduction in district-wide emissions of each nonattainment pollutant or its precursors, the adoption of "all feasible measures" on an expeditious schedule is acceptable as an alternative strategy (Health and Safety Code Section 40914[b][2]). No locally prepared attainment plans are required for areas that violate the state PM10 standards, but ARB is currently addressing PM10 attainment issues.

The CCAA requires that the state air quality standards be met as expeditiously as practicable but, unlike the federal CAA, does not set precise attainment deadlines. Instead, the act establishes increasingly stringent requirements for areas that will require more time to achieve the standards.

The CCAA emphasizes the control of "indirect and area-wide sources" of air pollutant emissions. The CCAA gives local air pollution control districts explicit authority to regulate indirect sources of air pollution and to establish traffic control measures (TCMs). The CCAA does not define *indirect and area-wide sources*. However, Section 110 of the CAA defines an indirect source as:

> a facility, building, structure, installation, real property, road, or highway, which attracts, or may attract, mobile sources of pollution. Such term includes parking lots, parking garages, and other facilities subject to any measure for management of parking supply.

TCMs are defined in the CCAA as "any strategy to reduce trips, vehicle use, vehicle miles traveled, vehicle idling, or traffic congestion for the purpose of reducing vehicle emissions."

ARB's *Air Quality and Land Use Handbook: A Community Health Perspective* (2005) provides ARB recommendations for the siting of new sensitive land uses (including residences) near freeways, distribution centers, ports, refineries, chrome-plating facilities, dry cleaners, and gasoline stations. The handbook recommends that new development be placed at distances from such facilities. The recommendations contained in ARB's *Air Quality and Land Use Handbook* are not required by any regulations and are entirely voluntary.

14.1.1.3 Local Plans and Regulations

SJVAPCD has adopted emission thresholds to determine the level of significance of a project's emissions. In addition, the proposed action may be subject to the following SJVAPCD rules. This list of rules may not be all encompassing, as additional SJVAPCD rules may apply to the project as specific developments are identified. These are rules that have been adopted by SJVAPCD to reduce emissions throughout the San Joaquin Valley. Failure to comply with any applicable SJVAPCD rule would be a violation of said rule and subject to SJVAPCD enforcement action.

- **SJVAPCD Rule 2201 (New and Modified Stationary-Source Review Rule).** This rule applies to all new stationary sources and all modifications to existing stationary sources subject to SJVAPCD permit requirements that, after construction, emit or may emit one or more pollutants regulated by the rule.
- **SJVAPCD Rule 2020 (Exemptions, Permits).** This rule exempts laboratory testing equipment used for chemical and physical analysis from permit requirements in SJVAPCD, provided that they emit no hazardous air pollutants and less than 2.0 pounds per day (75 pounds per year) of

any other pollutant. This means that laboratories that emit even small quantities of hazardous air pollutants would be required to apply for and obtain permits from SJVAPCD.

- **SJVAPCD Rule 3110 (Air Toxic Fees).** This is a program for facilities that emit toxic air contaminants. It is noted here that hospitals that do not use ethylene oxide for sterilizers are defined as *de minimus* facilities and are not subject to fee requirements.
- **SJVAPCD Rule 3135 (Dust Control Plan Fees).** This rule requires the project applicant to submit a fee in addition to a dust control plan. The purpose of this rule is to recover SJVAPCD's cost for reviewing these plans and conducting compliance inspections.
- **SJVAPCD Rule 4002 (National Emission Standards for Hazardous Air Pollutants).** This rule applies to any portion of an existing building that will be renovated, partially demolished, or removed. Prior to any demolition activity, an asbestos survey of existing structures on the project site may be required to identify the presence of any asbestos-containing building material (ACBM). Any identified ACBM having the potential for disturbance must be removed by a certified asbestos contractor in accordance with California Occupational Safety and Health Administration requirements.
- **SJVAPCD 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.
- **SJVAPCD Rule 4102 (Nuisance).** This rule applies to any source operation that emits or may emit air contaminants or other materials. In the event that the project or construction of the project creates a public nuisance, it could be in violation and subject to SJVAPCD enforcement action.
- **SJVAPCD Rule 4103 (Open Burning).** This rule regulates the burning of agricultural material. Rule 4103 explicitly states that agricultural material shall not be burned when the land use is converted from agriculture to nonagricultural purposes.
- **SJVAPCD Rule 4306 (Boilers, Steam Generators, and Process Heaters—Phase 3).** This rule requires all boilers and steam generators with a heat input rating greater than 5 million British thermal units per hour to achieve certain exhaust limits for NO_X and CO. This rule was established in 2003 as part of the strategy for achieving ozone attainment.
- **SJVAPCD Rule 4601 (Architectural Coatings).** This rule limits VOCs from architectural coatings. This rule specifies storage, cleanup, and labeling requirements for architectural coatings.
- **SJVAPCD Rule 4641 (Cutback, Slow-Cure, and Emulsified Asphalt, Paving, and Maintenance Operations).** If asphalt paving will be used, paving operations will be subject to this rule. This rule applies to the manufacture and use of cutback asphalt, slow-cure asphalt, and emulsified asphalt for paving and maintenance operations.
- **SJVAPCD Rule 4663 (Organic Solvent Cleaning, Storage, and Disposal).** This rule includes restrictions on the types of solvents that may be used and restrictions on the organic content of solvents used for cleaning, especially for cleaning related to medical devices and pharmaceuticals.
- **SJVAPCD Rule 4701 (Internal Combustion Engines—Phase 1).** This rule limits the emissions of NO_X, CO, and VOCs from internal combustion engines. These limits are not applicable to

standby engines as long as they are used fewer than 200 hours per year (e.g., for testing during non-emergencies).

- **SJVAPCD Rule 4702 (Internal Combustion Engines—Phase 2).** This rule limits the emissions of NO_X, CO, and VOCs from spark-ignited internal combustion engines.
- **SJVAPCD Rule 4901 (Wood-Burning Fireplaces and Wood-Burning Heaters).** This rule prohibits the sale of wood heaters that are not EPA-certified and incorporates density limits (devices installed per acre) on the number of wood stoves, wood heaters, and fireplaces in new construction. Specifically, no person shall:
  - install a wood-burning fireplace in a new residential development with a density greater than two dwelling units per acre,
  - 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,
  - install more than one wood-burning fireplace or wood-burning heater per dwelling unit in any new residential development with a density equal to or less than two dwelling units per acre, or
  - sell or transfer any real property that contains a wood-burning heater without first ensuring that each wood-burning heater included in the real property is EPA Phase II certified, pellet fueled, permanently rendered inoperable, or removed.
- **SJVAPCD Rule 4902 (Residential Water Heaters).** The purpose of this rule is to limit NO_X emissions from residential water heaters.
- **SJVAPCD Regulation VIII (Fugitive PM10 Prohibitions).** This is a series of rules (Rules 8011–8081) designed to reduce PM10 emissions (predominantly dust/dirt) generated by human activities, including construction, road construction, bulk materials storage, landfill operations, and other activities. These rules and their related categories are listed below.
  - Rule 8011: General Requirements
  - Rule 8021: Construction, Demolition, Excavation, Extraction, and Other Earthmoving Activities
  - Rule 8031: Bulk Materials
  - Rule 8041: Carryout and Trackout
  - Rule 8051: Open Areas
  - Rule 8061: Paved and Unpaved Roads
  - Rule 8071: Unpaved Vehicle/Equipment Traffic Areas
  - Rule 8081: Agricultural Sources
- **SJVAPCD Rule 9510 (Indirect-Source Review).** This rule fulfills SJVAPCD emission-reduction commitments in PM10 and ozone attainment plans through design features and onsite measures. Rule 9510 requires emission reductions for construction and operational emissions. For construction emissions, Rule 9510 requires a 20% reduction of total NO_X emissions and a 45% reduction of the total PM10 exhaust emissions. For operational emissions, Rule 9510 requires 33.3% of the project's operational baseline NO_X and 50% of the project's operational

baseline PM10 emissions to be reduced over a period of 10 years. If the required emissions reductions are not achieved through traditional means, projects may purchase offsets on a per-ton basis from SJVAPCD through Rule 9510's offsite emissions reduction fee program to comply with the requirements of Rule 9510. Rule 9510 applies to any applicant who seeks to gain final discretionary approval for a development project, or any portion thereof, that, upon full buildout, will include any one of the following characteristics.

- 50 residential units.
- 2,000 square feet of commercial space.
- 25,000 square feet of light industrial space.
- 100,000 square feet of heavy industrial space.
- 20,000 square feet of medical office space.
- 39,000 square feet of general office space.
- 9,000 square feet of educational space.
- 10,000 square feet of government space.
- 20,000 square feet of recreational space.
- 9,000 square feet of space not identified above.

- **Guide for Assessing and Mitigating Air Quality Impacts.** The SJVAPCD's adopted *Guide for Assessing and Mitigating Air Quality Impacts* (GAMAQI) (San Joaquin Valley Air Pollution Control District 2002) is an advisory document that provides lead agencies (such as San Joaquin County), consultants, and project applicants with analysis guidance and uniform procedures for addressing air quality in environmental documents. The document describes the criteria that SJVAPCD uses when reviewing and commenting on the adequacy of environmental documents. It recommends thresholds for use in determining if projects would have significant adverse environmental impacts, identifies methodologies for predicting project emissions and impacts, and identifies measures that can be used to avoid or reduce air quality impacts.

  The SJVAPCD is currently in the process of revising its GAMAQI. A public draft of the revised guidelines was released in April 2012. The draft GAMAQI provides updated emissions thresholds and analysis procedures based on the most recent air quality monitoring data, federal and state regulations, and state of practice.

14.1.2 Existing Conditions

14.1.2.1 Methods Used to Identify Existing Conditions

Information on meteorological conditions and air quality for the proposed action area was gathered from SJVAPCD's adopted and draft GAMAQI documents, and the ARB and EPA websites. Existing conditions for CO hotspots at local intersections affected by the proposed action were obtained from TJKM's traffic report (Appendix E).

14.1.2.2 Regional Climate and Meteorology

The area's climate is considered "inland Mediterranean" and is characterized by warm, dry summers and cool winters. Summer high temperatures in the northern San Joaquin Valley often exceed 100°F, averaging in the low 90s.

Although marine air generally flows into the basin from the Delta, the surrounding mountain ranges restrict air movement through and out of the valley. Wind speed and direction influence the dispersion and transportation of ozone precursors, PM10, and CO: the more wind flow, the less accumulation of these pollutants.

The vertical dispersion of air pollutants in the SJVAB is limited by the presence of persistent temperature inversion (warm air over cool air). Because of differences in air density, the air above and below the inversion does not mix. Ozone and its precursors mix and react to produce higher concentrations under an inversion, and trap directly emitted pollutants such as CO.

Precipitation and fog tend to reduce or limit pollutant concentrations. Ozone needs sunlight for its formation, and clouds and fog block the required radiation. CO is slightly water soluble, so precipitation and fog tend to "reduce" CO concentrations in the atmosphere. PM10 may be "washed" from the atmosphere by precipitation. Precipitation in the valley decreases from north to south, with about 20 inches in the north, 10 inches in the middle, and less than 6 inches in the south.

14.1.2.3 Sensitive Receptors

SJVAPCD defines a sensitive receptor as a facility that houses or attracts children, the elderly, people with illnesses, or others who are especially sensitive to the effects of air pollutants where there is reasonable expectation of continuous human exposure according to the averaging period for ambient air quality standards (e.g., 24 hours, 8 hours, 1 hour). Existing residences on Stewart Tract would be removed as part of the proposed action. The existing residential subdivision, approximately 0.1 mile east of Stewart Tract (across the San Joaquin River), and Mossdale Elementary School, approximately 0.25 mile east of Stewart Tract, would be considered sensitive receptors. In addition, a number of rural residences within 0.25 mile of the proposed action area would be considered sensitive receptors.

14.1.2.4 Overview of Criteria Pollutants

The federal and state governments have established ambient air quality standards for the following six criteria pollutants: ozone, CO, NO_2, SO_2, particulate matter (PM10 and particulate matter 2.5 microns or less in diameter [PM2.5]), and lead. Ozone, NO_2, and particulate matter are generally considered to be "regional" pollutants, as these pollutants or their precursors affect air quality on a regional scale. Pollutants such as CO, SO_2, lead, and particulate matter are considered to be local pollutants that tend to accumulate in the air locally. Particulate matter is considered to be a local as well as a regional pollutant.

Within the SJVAB, CO, PM10, PM2.5, and ozone are considered pollutants of concern. Brief descriptions of these pollutants are provided below, and a complete summary of California Ambient Air Quality Standards (CAAQS) and NAAQS is provided in Table 14-1. Toxic air contaminants (TACs) are also discussed below, although no state or federal ambient air quality standards exist for these pollutants.

Ozone

Ozone is a respiratory irritant that increases susceptibility to respiratory infections. It is also an oxidant that can cause substantial damage to vegetation and other materials. Ozone is a severe eye, nose, and throat irritant. It also attacks synthetic rubber, textiles, plants, and other materials. Ozone causes extensive damage to plants by leaf discoloration and cell damage.

Ozone is not emitted directly into the air, but is formed by a photochemical reaction in the atmosphere. Ozone precursors—ROG and NO_X—react in the atmosphere in the presence of sunlight to form ozone. Because photochemical reaction rates depend on the intensity of ultraviolet light and air temperature, ozone is primarily a summer air pollution problem. The ozone precursors, ROG and NO_X, are mainly emitted by mobile sources and by stationary combustion equipment.

State and federal standards for ozone have been set for an 8-hour averaging time. The state 8-hour standard is 0.070 parts per million (ppm), not to be exceeded, while the federal 8-hour standard is 0.075 ppm, not to be exceeded more than three times in any 3-year period. The state has established a 1-hour ozone standard of 0.09 ppm, not to be exceeded, and the federal 1-hour ozone standard of 0.12 ppm has recently been replaced by the 8-hour standard. State and federal standards are summarized in Table 14-1.

Reactive Organic Gases and Volatile Organic Compounds

Hydrocarbons are organic gases that are made up of hydrogen and carbon atoms. There are several subsets of organic gases, including ROGs and VOCs. ROGs are defined by state rules and regulations; VOCs are defined by federal rules and regulations. For the purposes of this assessment, hydrocarbons are classified and referred to as ROGs. Both ROGs and VOCs are emitted from the incomplete combustion of hydrocarbons or other carbon-based fuels, or as a product of chemical processes. The major sources of hydrocarbons are combustion engine exhaust, oil refineries, and oil-fueled power plants; other common sources are petroleum fuels, solvents, drycleaning solutions, and paint (through evaporation).

The health effects of hydrocarbons result from the formation of ozone. High levels of hydrocarbons in the atmosphere can interfere with oxygen intake by reducing the amount of available oxygen though displacement. Carcinogenic forms of hydrocarbons are considered TACs. There are no separate health standards for ROGs, although some are also toxic; an example is benzene, which is both an ROG and a carcinogen.

Nitrogen Oxides

Nitrogen oxides are a family of highly reactive gasses that are a primary precursor to the formation of ground-level ozone, and react in the atmosphere to form acid rain. NO_2, often used interchangeably with NO_X, is a brownish, highly reactive gas that is present in all urban environments. The major human 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 (U.S. Environmental Protection Agency 2012a). 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 ozone, the NO_2 concentration in a particular geographical area may not be representative of 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, such as 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 to prolonged respiratory impairment, with such symptoms as chronic bronchitis and decreased lung function (U.S. Environmental Protection Agency 2012a).

Carbon Monoxide

CO has little effect on plants and materials, but it can have significant effects on human health. CO is a public health concern because it combines readily with hemoglobin and thus reduces the amount of oxygen transported in the bloodstream. Effects on humans range from slight headaches to nausea to death.

Motor vehicles are the primary source of CO emissions in most areas. In the Central Valley region, high CO levels are of greatest concern during the winter, when periods of light winds combine with the formation of ground-level temperature inversions from evening through early morning. These conditions trap pollutants near the ground, reducing the dispersion of vehicle emissions. Moreover, motor vehicles exhibit increased CO emission rates at low air temperatures.

State and federal CO standards have been set for 1- and 8-hour averaging times. The state 1-hour standard is 20 ppm, not to be exceeded, whereas the federal 1-hour standard is 35 ppm, not to be exceeded more than 1 day per year. The state 8-hour standard is 9.0 ppm, not be exceeded, and the federal 8-hour standard is 9 ppm, not to be exceeded more than 1 day per year. State and federal standards are summarized in Table 14-1.

Sulfur Oxides

Sulfur oxides are any of several compounds of sulfur and oxygen, of which the most important in the context of air quality is SO_2. 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

Particulates can damage human health and retard plant growth. They also reduce visibility, soil buildings and materials, and cause corrosion. Health concerns associated with suspended particulate matter focus on particles small enough to be drawn into the lungs when inhaled: PM10 and PM2.5.

Particulate emissions are generated by a wide variety of sources in the proposed action area, including agricultural activities, industrial operations, vehicles (e.g., dust suspended by vehicle traffic and construction equipment), and secondary aerosols (formed by reactions in the atmosphere).

The state and federal ambient air quality standard for particulate matter applies to two classes of particulates: PM10 and PM2.5. The state PM10 standards are 50 micrograms per cubic meter ($\mu g/m^3$) as a 24-hour average and 20 $\mu g/m^3$ as an annual arithmetic mean. The federal PM10 standard is 150 $\mu g/m^3$ as a 24-hour average. The state PM2.5 standard is 12 $\mu g/m^3$ as an annual arithmetic mean. The federal PM2.5 standards are 15 $\mu g/m^3$ for the annual average and 35 $\mu g/m^3$ for the 24-hour average. State and federal standards are summarized in Table 14-1.

Toxic Air Contaminants

TACs are pollutants that have the potential to result in an increase in mortality or serious illness or that may pose a present or potential hazard to human health. Health effects of TACs range from cancer and other fatal diseases to birth defects, neurological damage, and damage to the body's natural defense system. Although ambient air quality standards exist for criteria pollutants, no ambient standards exist for TACs.

Many pollutants are identified as TACs because of their potential to increase the risk of developing cancer or because of their acute or chronic health risks. For TACs that are known or suspected carcinogens, ARB has consistently found that there are no levels or thresholds below which exposure is free of risk. However, individual TACs vary greatly in the risk they present. At a given level of exposure, one TAC may pose a hazard that is many times greater than another. For certain TACs, a *unit risk factor* can be developed to evaluate cancer risk. For acute and chronic health risks, a similar factor, called a *hazard index*, is used to evaluate risk. These risks are expressed in terms of the *maximally exposed individual* (MEI).

In the early 1980s, ARB established a statewide comprehensive air toxics program to reduce exposure to TACs. The Toxic Air Contaminant Identification and Control Act (Assembly Bill [AB]] 1807) created California's program to reduce exposure to air toxics. The Air Toxics "Hot Spots" Information and Assessment Act (AB 2588) supplements the AB 1807 program by requiring a statewide air toxics inventory, notification of people exposed to a significant health risk, and facility plans to reduce these risks. The TAC of most concern with regard to the proposed action is diesel exhaust particulate matter, which ARB identified as a TAC in August 1998.

Odor

Odor effects are typically associated with odor-generating facilities or new sensitive receptors proposed near existing odor-generating facilities. Some examples of odor-generating facilities are wastewater treatment facilities, landfills, composting facilities, petroleum refineries, dairies, and food processing facilities (San Joaquin Valley Air Pollution Control District 2002). The City has established a Right-to-Farm Ordinance that protects agricultural landowners from nuisance complaints related to normal agricultural operations. (e.g., cultivation, irrigation, spraying, fertilizing, and other activities related to normal agricultural operations).

The proposed action does not include the development of any facilities that are considered odor-generating, and it would not locate new sensitive receptors near an existing source of odors. While surrounding agricultural activities could potentially result in minor odors if manure is used as fertilizer, no odor effects are anticipated to occur due to the development buffers that would be maintained between sensitive receptors and adjacent agricultural operations, as well as the City's

Right-to-Farm Ordinance, which protects agricultural landowners from nuisance complaints. Consequently, no odor impacts are anticipated and odor impacts are not discussed further.

14.1.2.5 Federal and State Attainment Status for San Joaquin Air Basin

If monitored pollutant concentrations in an area meet state or federal standards over a designated period of time, the area is classified as an *attainment area* for that pollutant. If monitored pollutant concentrations violate the standards, the area is classified as a *nonattainment area* for that pollutant. If the data are inadequate to determine whether a pollutant is violating the standard, the area is designated as unclassified.

EPA has classified San Joaquin County as an extreme nonattainment area for the 1-hour ozone standard and an extreme nonattainment area for the 8-hour ozone standard. However, EPA revoked the 1-hour ozone standard on June 15, 2005; therefore, the County is no longer subject to the standard. For the CO standard, EPA has classified the Stockton Urbanized Area (May 16, 1984, 49 FR 20651) as a moderate (≤12.7 ppm) maintenance area, and the rest of the County as an unclassified/attainment area. EPA has classified the County as a serious maintenance area for PM10 and a nonattainment area for PM2.5.

ARB has classified the County as a severe nonattainment area for the 1-hour ozone standard, a nonattainment area for the 8-hour ozone standard, an unclassified/attainment area for CO, and a nonattainment area for PM10 and PM2.5. The County's attainment status for each of these pollutants relative to the NAAQS and CAAQS is summarized in Table 14-4.

Table 14-4. Federal and State Attainment Status for San Joaquin County

Pollutant	Federal	State
1-hour ozone	Not applicable[a]	Severe nonattainment
8-hour ozone	Extreme nonattainment	Nonattainment
CO	Moderate (≤ 12.7 ppm) maintenance area for the Stockton Urbanized Area (May 16, 1984, 49 FR 20651); unclassified/attainment area for the rest of San Joaquin County	Unclassified/ Attainment
NO_2	Unclassified/attainment	Attainment
PM10	Serious maintenance for the San Joaquin Valley planning area; unclassified/attainment for the rest of San Joaquin County	Nonattainment
PM2.5	Nonattainment	Nonattainment
SO_2	Unclassified/attainment	Attainment

Sources: California Air Resources Board 2012b; U.S. Environmental Protection Agency 2012b.

[a] Previously in nonattainment area; no longer subject to the 1-hour standard because of EPA revocation of the 1-hour standard on June 15, 2005.

14.1.2.6 Monitoring Data

Monitoring data concentrations are typically expressed in terms of ppm or $\mu g/m^3$. The nearest air quality monitoring station in the vicinity of the proposed action area is the Stockton-Hazelton monitoring station at 1593 East Hazelton Street in Stockton; it monitors ozone, CO, PM10, PM2.5, and NO_2. Air quality monitoring data from the Stockton-Hazelton monitoring station are summarized in Table 14-5. These numbers represent air quality monitoring data for the last 5 years (2007–2011) in which complete data are available.

Table 14-5. Ambient Air Quality Monitoring Data Measured at the Stockton-Hazelton Monitoring Station (2007–2011)

Pollutant Standards	2007	2008	2009	2010	2011
Ozone					
Maximum 1-hour concentration (ppm)	0.093	0.105	0.116	0.120	0.089
Maximum 8-hour concentration (ppm)	0.081	0.09	0.096	0.095	0.068
Number of days standard exceeded[a]					
CAAQS 1-hour (>0.09 ppm)	0	2	2	2	0
CAAQS 8-hour (>0.070 ppm)	4	7	4	3	0
NAAQS 8-hour (>0.075 ppm)	3	4	2	2	0
Carbon Monoxide (CO)					
Maximum 8-hour concentration (ppm)	2.31	1.86	2.29	1.60	2.16
Maximum 1-hour concentration (ppm)	3.6	2.6	3.4	2.8	3.2
Number of days standard exceeded[a]					
NAAQS 8-hour (≥9 ppm)	0	0	0	0	0
CAAQS 8-hour (≥9.0 ppm)	0	0	0	0	0
NAAQS 1-hour (≥35 ppm)	0	0	0	0	0
CAAQS 1-hour (≥20 ppm)	0	0	0	0	0
Nitrogen Dioxide (NO_2)					
State maximum 1-hour concentration (ppm)	0.07	0.076	0.068	0.082	0.062
State second-highest 1-hour concentration (ppm)	0.067	0.069	0.06	0.067	0.059
Annual average concentration (ppm)	0.016	0.017	0.015	0.014	0.015
Number of days standard exceeded					
CAAQS 1-hour (0.18 ppm)	0	0	0	0	0
Particulate Matter (PM10)[b]					
National[c] maximum 24-hour concentration (μg/m^3)	71.0	104.5	58.7	54.3	66.1
National[c] second-highest 24-hour concentration (μg/m^3)	68.0	83.0	57.0	49.7	53.0
State[d] maximum 24-hour concentration (μg/m^3)	75.0	105.0	58.8	55.4	70.1
State[d] second-highest 24-hour concentration (μg/m^3)	73.0	83.7	58.6	48.7	57.8
National annual average concentration (μg/m^3)	26.6	29.9	23.0	19.4	23.3
State annual average concentration (μg/m^3)[e]	27.7	31.1	23.6	19.9	24.1
Number of days standard exceeded[a]					
NAAQS 24-hour (>150 μg/m^3)[f]	0	0	0	0	0
CAAQS 24-hour (>50 μg/m^3)[f]	24	49	18	6	24
Particulate Matter (PM2.5)					
National[c] maximum 24-hour concentration (μg/m^3)	52	81.2	48.4	41.0	60.0
National[c] second-highest 24-hour concentration (μg/m^3)	50	61.7	41.7	38.0	53.1
State[d] maximum 24-hour concentration (μg/m^3)	66.8	91.0	56.0	43.0	–
State[d] second-highest 24-hour concentration (μg/m^3)	59.4	78.9	51.1	42.6	–
National annual average concentration (μg/m^3)	12.9	14.3	11.3	10.9	11.3
State annual average concentration (μg/m^3) [e]	13.5	14.4	13.4	–	–
Number of days standard exceeded[a]					
NAAQS 24-hour (>35 μg/m^3)	34	28	16	5	11
Sulfur Dioxide (SO_2)					
No data available	–	–	–	–	–

Notes for Table 14-5

Source: California Air Resources Board 2012c; U.S. Environmental Protection Agency 2012c.

Notes:

ppm	=	parts per million.
NAAQS	=	National Ambient Air Quality Standards.
CAAQS	=	California Ambient Air Quality Standards.
$\mu g/m^3$	=	micrograms per cubic meter.
mg/m^3	=	milligrams per cubic meter.
>	=	greater than.
–	=	There was insufficient (or no) data available to determine the value.

[a] Violations of the CAAQS and NAAQS are determined by the number of threshold violations. Consequently, a single exceedance is not necessarily a violation.

[b] National statistics are based on standard conditions data. In addition, national statistics are based on samplers using federal reference or equivalent methods.

[c] State statistics are based on local conditions data, except in the South Coast Air Basin, for which statistics are based on standard conditions data. In addition, State statistics are based on California approved samplers.

[d] Measurements usually are collected every 6 days.

[e] State criteria for ensuring that data are sufficiently complete for calculating valid annual averages are more stringent than the national criteria.

[f] Mathematical estimate of how many days concentrations would have been measured as higher than the level of the standard had each day been monitored. Values have been rounded.

As shown in Table 14-5, the Stockton-Hazelton monitoring station has experienced 6 violations of the state 1-hour ozone standard, 18 violations of the state 8-hour ozone standard, 11 violations of the federal 8-hour ozone standard, no violations of the federal or state CO standards, 121 violations of the state 24-hour PM10 standard, and 97 violations of the federal 24-hour PM2.5 standard during the 5-year monitoring period.

14.2 Environmental Consequences

14.2.1 Methods for Analysis of Effects

To assess the effects of the proposed action and alternatives on state and regional emissions of criteria pollutants, emissions from construction and operation of the proposed action were quantified using standard and accepted software tools, techniques, and emission factors as available from EPA and ARB. A full description of methods and assumptions for criteria pollutant emission quantification can be found in Appendix F-1.

Construction of the proposed action would generate emissions of ROG, NO_X, CO, PM10, and PM2.5 that would result in short-term impacts on ambient air quality in the proposed action area. Emissions would originate from mobile and stationary construction equipment exhaust, employee vehicle exhaust, dust from clearing the land, exposed soil eroded by wind, and ROGs from architectural coatings and asphalt paving. Construction-related emissions would vary substantially depending on the level of activity, area disturbed, length of the construction period, specific construction operations, types of equipment, number of personnel, wind and precipitation conditions, and soil moisture content. These emissions would be temporary and would cease when construction activities are complete. Emissions from construction activities were estimated using conservative assumptions to ensure that emissions were not underestimated.

The California Emissions Estimator Model (CalEEMod) (version 2011.1.1) model was used to calculate emissions from construction activities according to the schedule provided by River Islands (Appendix F-2). Key construction activities captured in the model include: operation of construction equipment used for grading, paving, construction of residential and commercial development, and construction of public infrastructure and finishing; lake and levee soil hauling and construction; construction of public amenities; and construction of roads and bridges. Appendix F-1 presents an expanded discussion of the assumptions and techniques used in the emissions modeling (the CalEEMod output files are in Appendix F-3).

Operation of the proposed action would generate emissions of ROG, NO_X, CO, PM10, and PM2.5 that would result in long-term impacts on ambient air quality in the proposed action area. Two types of air pollutant sources are expected during operation of the proposed action: mobile and area sources. Mobile sources are sources of emissions associated with vehicle trips and boating activities. Area sources in the context of River Islands at Lathrop would include emissions from residential and commercial natural gas combustion for heating requirements (i.e., water heater and furnace); hearth fuel combustion; landscaping activities; consumer products (e.g., automotive products, household cleaners, personal care products); periodic paint emissions from facility upkeep; golf course maintenance; and lake/levee maintenance.

Operational emissions associated with the proposed action and alternatives were estimated using the CalEEMod, the OFFROAD 2007 model, and off-line Excel-based calculations. Components of the River Islands at Lathrop community were assumed to become operational on the schedule provided by River Islands at Lathrop (Appendix F-2). Emissions resulting from mobile sources were calculated using vehicle miles traveled (VMT) data provided by the traffic consultant (Appendix E). Emissions from area sources including hearths, landscaping activities, consumer products, and architectural coatings were modeled using CalEEMod default values. Emissions from natural gas combustion, golf course maintenance, boating activities, and lake and levee maintenance were calculated using a variety of emission factors and modeling protocols, including EPA's AP-42 emission factor document and the OFFROAD 2007 model.

For each project alternative, the same assumptions and methods for estimating construction and operational emissions were used. These assumptions and methods are described above and in greater detail in Appendix F-1. However, each alternative differs slightly in terms of construction activities and operations. The assumptions used to estimate construction and operational emissions for each project alternative are presented below in Table 14-6.

Table 14-6. Construction and Operational Assumptions for the Alternatives

Alternative	Construction Assumptions	Operational Assumptions
2	• 225 additional acres graded (10% increase) • 10% increase in fugitive PM10 emissions • 10% increase in residential road and utility construction emissions • No construction of docks along Paradise Cut; 30% reduction in dock construction	• 225 additional residential development area—potential higher energy consumption due to more low-density dwelling units • No docks along Paradise Cut; 30% reduction in boating activities
3	• Ten additional bridges: double bridge construction emissions • Altered lake construction (amount unknown) • More extensive grading (amount unknown)	• 150 acres less residential development area—potential lower energy consumption due to more high-density dwelling units • Less boating activities (amount unknown) • More water and sewer pumping (amount unknown)
4[a]	Additional flood risk reduction measures	Additional flood risk reduction measures
5— No Action	10 additional bridge: increased bridge construction emissions; additional emissions associated with import of fill from offsite sources	none

[a] Because Alternative 4 has been developed only at a program level, modeling was not feasible.

Based on the assumptions above, operational and construction emissions for each alternative would differ slightly. Table 14-7 shows percent increases or decreases (compared to the proposed action) in emissions estimates for each alternative.

Table 14-7. Change in Construction and Operational Emissions for the Project Alternatives

Alternative	% Change in Total Construction Emissions	% Change in Total Operational Emissions
Alternative 2	up to 1% less	up to 3% less
Alternative 3	up to 10% more	>0% (amount unknown)
Alternative 4	up to 10% more	>0% (amount unknown)
No Action	up to 10% more	Unknown

14.2.1.1 Carbon Monoxide Hot-Spot Analysis

An evaluation to determine whether CO hot spots would occur at roadway intersections in the vicinity of the proposed action was conducted through CO dispersion modeling. The effects of operations-related CO emissions were evaluated using the CALINE4 dispersion model developed by Caltrans. CALINE4 treats each segment of a roadway as a separate emission source producing a plume of pollutants that disperses downwind. Pollutant concentrations at any specific location are calculated using the total contribution from overlapping pollution plumes originating from the sequence of roadway segments. CO modeling was conducted for five conditions: existing, interim-year no action, interim-year with action, buildout-year no action, and buildout-year with action. All alternatives to the proposed action are identical in terms of CO hotspots. Detailed methodology of the CO analysis is provided in Appendix F-1 (the CALINE4 output files are provided in Appendix F-4).

14.2.1.2 Toxic Air Contaminants

A screening-level air quality risk assessment was conducted for the proposed action. This analysis was prepared generally following the California Environmental Protection Agency (CalEPA) Office of Environmental Health Hazard Assessment's guidance document *The Air Toxics Hot Spots Program Guidance Manual for Preparation of Human Health Risk Assessment* (Office of Environmental Health Hazard Assessment 2008).

The screening analysis was conducted for sensitive receptors in the vicinity of the proposed action area within distances ranging between 50 and 10,000 feet from construction activities using the SCREEN3 model. These sensitive receptor locations were selected for the screening analysis to represent the locations where sensitive receptors (residents and Mossdale Elementary School) could be exposed to the maximum levels of diesel particulate matter (DPM) from construction equipment and truck hauling activities. The screening analysis was conducted for 10 sensitive receptor distance locations.

Because the proposed action is currently in the initial stages of planning and development, the exact location and duration of construction activities are unknown. These two factors are important for analyzing health risks. Consequently, to provide a range of possible health risks from construction activities, the analysis incorporated two scenarios. The first—or *average*—scenario uses an averaged DPM emission rate, calculated from emissions that would occur during the entire construction period (2015 through 2034) over the entire construction site (2,954 acres). This scenario accounts for the unknown location of construction activities, and represents average health risks from construction. The second—or *worst-case*—scenario assumed that the maximum annual DPM emissions (which would occur in 2023) would occur consistently over the lifetime of construction (2015 through 2034) over the area of construction (300 acres) for that maximum annual year. This scenario represents a conservative estimate of emissions and health risks because the DPM emission rate is much higher than under the average scenario, due to the use of the maximum annual DPM emissions distributed over a smaller area.

For health risks resulting from unmitigated DPM emissions, the SCREEN3 input emission rate (grams per second per square meter [$g/s\text{-}m^2$]) for the average scenario was based on the total unmitigated PM10 emissions from diesel exhaust associated with off-road construction activity (9.25 tons of PM10 exhaust) and the total area of the construction site (2,956 acres) for an emission rate of 5.37×10^{-9} $g/s\text{-}m^2$. The SCREEN3 input emission rate ($g/s\text{-}m^2$) for the worst-case scenario was based on the maximum annual unmitigated exhaust PM10 emissions from off-road construction activity (1.19 tons of PM10 exhaust in 2020) and the total area of the construction site (300 acres) for an emission rate of 1.03×10^{-7} $g/s\text{-}m^2$. These emission rates, along with the receptor locations presented above, the size of the construction site, and worst-case meteorology, were entered into SCREEN3 to determine the DPM health risks associated with unmitigated off-road construction emissions (the SCREEN3 output files are located in Appendix F-5).

14.2.2 Definition of Significant Effects

The potential for a proposed action's pollutant emissions to create adverse effects can be assessed, in a general way, based on its potential to violate air quality standards (Table 14-1). That is, violation of any applicable air quality standard represents a significant effect, and if the area affected by a proposed action is already in nonattainment, a substantial increase in any pollutant for which standards have already been violated would constitute an significant effect. Similarly, conflict with or obstruction of an applicable air quality plan can also be interpreted as a significant effect on air quality. In addition, even if air quality standards are not violated, a significant effect is typically identified if a number of people—particularly sensitive receptors such as children, the elderly, or the chronically ill—would be exposed to substantial levels of any pollutant with known or likely health effects; or if a substantial number of people would be exposed to objectionable odors.

To accurately analyze the impacts on air quality associated with the proposed action and alternatives, a dual analysis was conducted. The first analysis evaluated direct and indirect mass criteria pollutant emissions originating from the proposed action and alternatives under NEPA. The second analysis entailed a general conformity determination for mass criteria pollutant emissions directly originating from the proposed action. These analyses are described in more detail below.

14.2.2.1 NEPA Analysis

To fulfill NEPA requirements, an analysis must be undertaken to quantify the total mass emissions of ozone, PM10, PM2.5, and CO associated with the River Islands at Lathrop project and its alternatives (the project in its entirety) in relation to the *de minimis* levels indicated in Table 14-2 and Table 14-3. Emissions associated with the proposed action and its alternatives are defined as direct and indirect emissions resulting from construction and operation of all development under each alternative. Unlike for the general conformity analysis below, it is not required that these emissions fall below the *de minimis* thresholds.

For NEPA purposes, direct emissions consist of those emissions directly resulting from the Corps's permitting and approval processes (i.e., any emissions resulting directly from levee construction), while indirect emissions consist of those emissions indirectly associated with the Corps's permitting and approval processes (i.e., emissions associated with construction and operation of the River Islands at Lathrop development). Consequently, the indirect emissions associated with the Corps's action are not evaluated under General Conformity but are evaluated under NEPA.

14.2.2.2 General Conformity Analysis

As previously indicated, the action area is federally classified as an extreme nonattainment area for the 8-hour ozone standard, a nonattainment area for the PM2.5 standard, a serious maintenance area for the PM10 standard, and a moderate maintenance area for the CO standard. Consequently, to fulfill general conformity requirements, an analysis must be undertaken to identify whether the proposed action's total emissions of ozone, PM10, PM2.5, and CO are below the appropriate *de minimis* levels indicated in Tables 14-2 and 14-3. For this purpose, the proposed action's total emissions are defined as direct emissions resulting from the Corps action. These emissions include any associated with streamside or in-water construction (such as building the docks and levees) as well as levee maintenance, but do not include emissions associated with construction or operation of any residential or commercial facilities. The indirect emissions (River Islands at Lathrop project) associated with the Corps's action is not evaluated under General Conformity but is evaluated under NEPA.

This dual analysis is appropriate because, while both conformity and NEPA require analysis of direct and indirect emissions associated with the Corps's action, indirect emissions do not include emissions associated with the construction and operation of the development under General Conformity. This is because General Conformity defines indirect emissions as those which the Corps has continuing program responsibility or ability to practically control. If the federal action is a required initial step for a subsequent activity that causes emissions, as is the case here, the federal agency has no ability to practically control any resulting emissions from the subsequent activity. Consequently, for the purposes of General Conformity, the analysis only evaluates direct and indirect emissions associated with the Corps's action (e.g., levee construction and alteration) and does not analyze emissions associated with construction and operation of the development.

Additional impacts on air quality due to CO hotspots and health risks were also evaluated. CO impacts are considered significant if 1-hour and 8-hour concentrations exceed federal and state standards (the federal and state 1-hour standards are 35 and 20 ppm, respectively; the federal and state 8-hour standards are 9 and 9.0 ppm, respectively). In addition, projects that would expose sensitive receptors to substantial levels of TACs would be considered to have a significant effect. Substantial levels are defined as the probability of contracting cancer for the MEI exceeding 10 in one million, or the ground-level concentrations of non-carcinogenic TAC resulting in a Hazard Index greater than 1 for the MEI.

14.2.3 Effects and Mitigation Approaches

14.2.3.1 Alternative 1—Proposed Action

NEPA Analysis

River Islands at Lathrop emissions in excess of federal *de minimis* thresholds (significant)

Project construction would generate ozone precursors (ROG and NO_X), CO, and particulate matter emissions from mobile and stationary construction equipment exhaust, employee vehicle exhaust, dust from clearing the land, exposed soil eroded by wind, and VOCs from architectural coatings and asphalt paving. In addition, VOC emissions would also occur during each "finishing" phase of construction activity, during asphalt paving, and during the application of architectural coatings (i.e., paints). The largest quantity of fugitive PM10 emissions would occur during periods of site grading and excavation activities.

Criteria pollutant emissions resulting from construction of River Islands at Lathrop are presented in Table 14-8. Appendix F-1 provides a detailed description of the construction emissions methodology.

Table 14-8. Emissions from Construction of the River Islands at Lathrop Project (tons/year)

Annual Emissions[a]	ROG/VOC	NO_X	CO	SO_2	PM10	PM2.5
2015	0.20	1.44	0.94	0.00	0.07	0.06
2016	0.18	1.26	0.93	0.00	0.06	0.05
2017	1.56	**15.28**	7.56	0.03	9.58	1.68
2018	0.63	4.25	3.02	0.01	0.60	0.32
2019	3.72	**27.30**	21.87	0.07	15.11	2.49
2020	8.69	**47.22**	51.25	0.16	25.02	3.67
2021	5.85	**29.71**	26.08	0.08	17.27	2.85
2022	4.01	**26.24**	25.22	0.08	25.60	2.78
2023	**10.93**	**43.63**	53.94	0.18	37.05	3.76
2024	4.04	**24.03**	25.46	0.09	89.05	2.69
2025	4.55	**24.40**	29.82	0.11	17.93	2.50
2026	1.85	**13.60**	12.86	0.05	12.61	1.71
2027	3.28	**19.89**	23.24	0.08	18.27	2.29
2028	3.41	**17.86**	20.39	0.08	15.93	1.99
2029	6.68	**16.97**	16.13	0.06	30.75	2.27
2030	3.02	**16.84**	20.49	0.07	74.83	2.90
2031	4.75	**26.65**	38.86	0.18	24.59	2.47
2032	3.73	**17.88**	34.18	0.14	23.66	1.21
2033	**11.46**	7.05	14.89	0.05	3.19	0.33
2034	5.68	2.77	6.55	0.02	1.20	0.09
2035	0.20	1.40	0.94	0.00	0.07	0.06
Federal *de minimis* thresholds	10.00	10.00	100.00	100.00	100.00	100.00

Source: CalEEMod v2011.1.1.

[a] Construction emissions were modeled for the River Islands at Lathrop Project. Emissions for the project alternatives were not explicitly modeled due to a lack of specific data. However, the percent differences in emissions from the River Islands at Lathrop Project were estimated for each alternative.

Operation of River Islands at Lathrop and its alternatives would generate on-road vehicle travel and off-road boating operation, which would result in mobile-source emissions that include ozone precursor pollutants (ROG and NO_X), CO, PM10, and PM2.5. In addition, project emissions would result from area sources such as onsite landscaping equipment emissions; natural gas combustion (to facilitate cooking and heating); fireplace use; operation of miscellaneous sources for the golf courses; lake/levee maintenance; and use of consumer products. Each of these sources was taken into account in calculating the project's long-term operational emissions. The CalEEMod, which was applied in this analysis, uses project-specific trip generation information, along with vehicle fleet mix, trip length, and trip-start information. The estimates of trip generation were modeled to be consistent with the traffic impact analysis prepared for this project (Appendix E). Area source emissions were also modeled with CalEEMod, as well as emission factors obtained from other sources. A detailed methodology of the operational analysis is provided in Appendix F-1.

Criteria pollutant emissions associated with operation of River Islands at Lathrop from inception to completion are presented in Table 14-9, while Table 14-10 and Figure 14-1 present a detailed evaluation of operational emissions and their sources associated at full buildout. In addition to

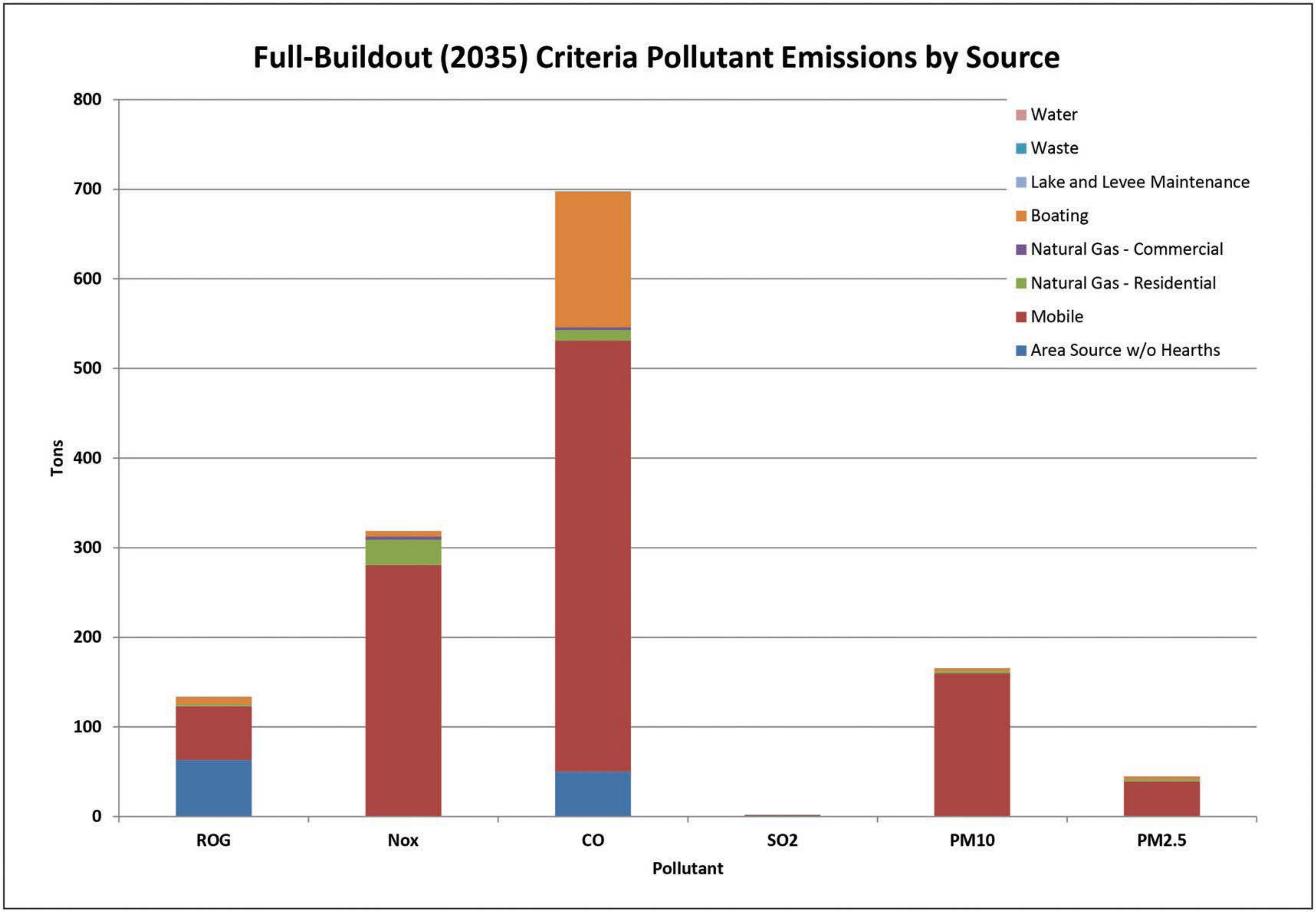

Figure 14-1
Full-Buildout (2035) Criteria Pollutant Emissions by Source

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operational emissions, Figure 14-1 also includes amortized construction emissions.[1] Appendix F-1 provides a detailed description of the construction emissions methodology.

Table 14-9. Emissions from Operation of the River Islands at Lathrop Project (tons/year)

Annual Emissions[a]	ROG	NO_X	CO	SO_2	PM10	PM2.5
2015	0.57	0.31	6.17	0.00	0.10	0.10
2016	1.13	0.62	12.33	0.00	0.20	0.20
2017	1.27	0.85	17.23	0.00	0.31	0.31
2018	1.69	1.13	22.98	0.00	0.41	0.41
2019	2.99	2.00	40.69	0.00	0.73	0.73
2020	8.32	**17.80**	80.93	0.07	7.09	2.50
2021	**13.13**	**31.58**	**116.94**	0.14	13.05	4.16
2022	**16.02**	**38.27**	**138.13**	0.17	16.62	5.28
2023	**21.23**	**50.02**	**169.52**	0.23	22.42	6.94
2024	**30.50**	**75.69**	**226.16**	0.36	34.97	10.31
2025	**35.59**	**88.10**	**259.05**	0.43	42.06	12.29
2026	**36.37**	**88.64**	**270.80**	0.43	42.29	12.51
2027	**47.17**	**117.75**	**332.78**	0.58	56.67	16.38
2028	**59.32**	**148.67**	**399.41**	0.74	71.60	20.39
2029	**72.90**	**182.94**	**471.66**	0.91	88.27	24.83
2030	**78.02**	**188.08**	**478.92**	1.05	**101.61**	28.28
2031	**78.04**	**188.34**	**479.05**	1.05	**101.62**	28.28
2032	**91.34**	**219.79**	**531.58**	1.22	**117.11**	32.29
2033	**105.77**	**254.63**	**589.62**	1.39	**133.95**	36.62
2034	**119.88**	**287.16**	**644.28**	1.56	**149.86**	40.74
2035	**133.59**	**318.80**	**697.50**	1.72	**165.33**	44.73
Federal *de minimis* Thresholds	10.00	10.00	100.00	100.00	100.00	100.00

Source: CalEEMod Version 2011.1.1.

[a] Emissions that exceed federal *de minimis* thresholds are **boldfaced.** Operational emissions were modeled for River Islands at Lathrop. Emissions for the alternatives were not explicitly modeled due to a lack of specific data. However, the percent differences in emissions from River Islands at Lathrop were estimated for each alternative.

[1] Total construction emissions from 2015 to 2035 were amortized over the 40-year lifetime of the project (added up and divided by 40) and added to the 2035 full buildout annual operational emissions.

Table 14-10. Emissions from Operation of the River Islands at Lathrop Project at Full Buildout (2035) (tons/year)

Source	ROG	NO_X	CO	SO_2	PM10	PM2.5
Area Source[a]	0.57	0.31	6.17	0.00	0.10	0.10
Mobile Source[b]	1.13	0.62	12.33	0.00	0.20	0.20
Residential Natural Gas	2.18	28.28	12.03	0.00	2.29	2.29
Commercial Natural Gas	0.25	3.47	2.92	0.00	0.26	0.26
Boating Activities	8.10	6.13	151.44	0.02	2.95	2.94
Lake and Levee Maintenance[c]	0.02	0.26	0.13	0.00	0.00	0.00
Total Emissions	133.59	318.80	697.51	1.72	165.33	44.73

[a] *Area source* includes residential landscaping, architectural coatings, and consumer products and does not include hearths.

[b] Mobile sources include on-road vehicle use and off-road equipment use, including those during in golf course operations.

[c] Lake maintenance occurs annually once lakes are built (2031). Levee maintenance occurs once every 10 years once levees are built (2031).

Because construction and operation of the proposed action and alternatives would occur concurrently, combined annual emissions for construction and operation are presented in Table 14-11 and Figure 14-2. Table 14-11 and Figure 14-2 also summarize whether a significant effect would occur, given the assumptions outlined in Table 14-6 above. A more detailed table of emissions, including operational emissions broken into different source categories, can be found in Appendix F-1.

Table 14-11. Total Emissions from Construction and Operation of River Islands at Lathrop and Alternatives (tons/year)

Annual Emissions[a]	ROG	NO_X	CO	SO_2	PM10	PM2.5
2015	0.76	1.75	7.11	0.00	0.17	0.16
2016	1.31	1.88	13.27	0.00	0.26	0.25
2017	2.83	**16.13**	24.80	0.03	9.89	1.98
2018	2.32	5.38	26.00	0.01	1.02	0.73
2019	6.72	**29.30**	62.56	0.07	15.84	3.22
2020	**17.01**	**65.02**	**132.19**	0.22	32.11	6.17
2021	**18.98**	**61.29**	**143.02**	0.22	30.33	7.02
2022	**20.02**	**64.51**	**163.36**	0.25	42.22	8.06
2023	**32.16**	**93.65**	**223.46**	0.41	59.47	10.70
2024	**34.54**	**99.72**	**251.62**	0.45	**124.03**	13.00
2025	**40.14**	**112.49**	**288.87**	0.54	59.99	14.79
2026	**38.22**	**102.24**	**283.65**	0.48	54.90	14.22
2027	**50.45**	**137.64**	**356.02**	0.67	74.95	18.67
2028	**62.72**	**166.52**	**419.79**	0.81	87.52	22.38
2029	**79.58**	**199.91**	**487.79**	0.97	**119.02**	27.10
2030	**81.04**	**204.92**	**499.41**	1.11	**176.44**	31.17
2031	**82.79**	**214.99**	**517.91**	1.22	**126.21**	30.75

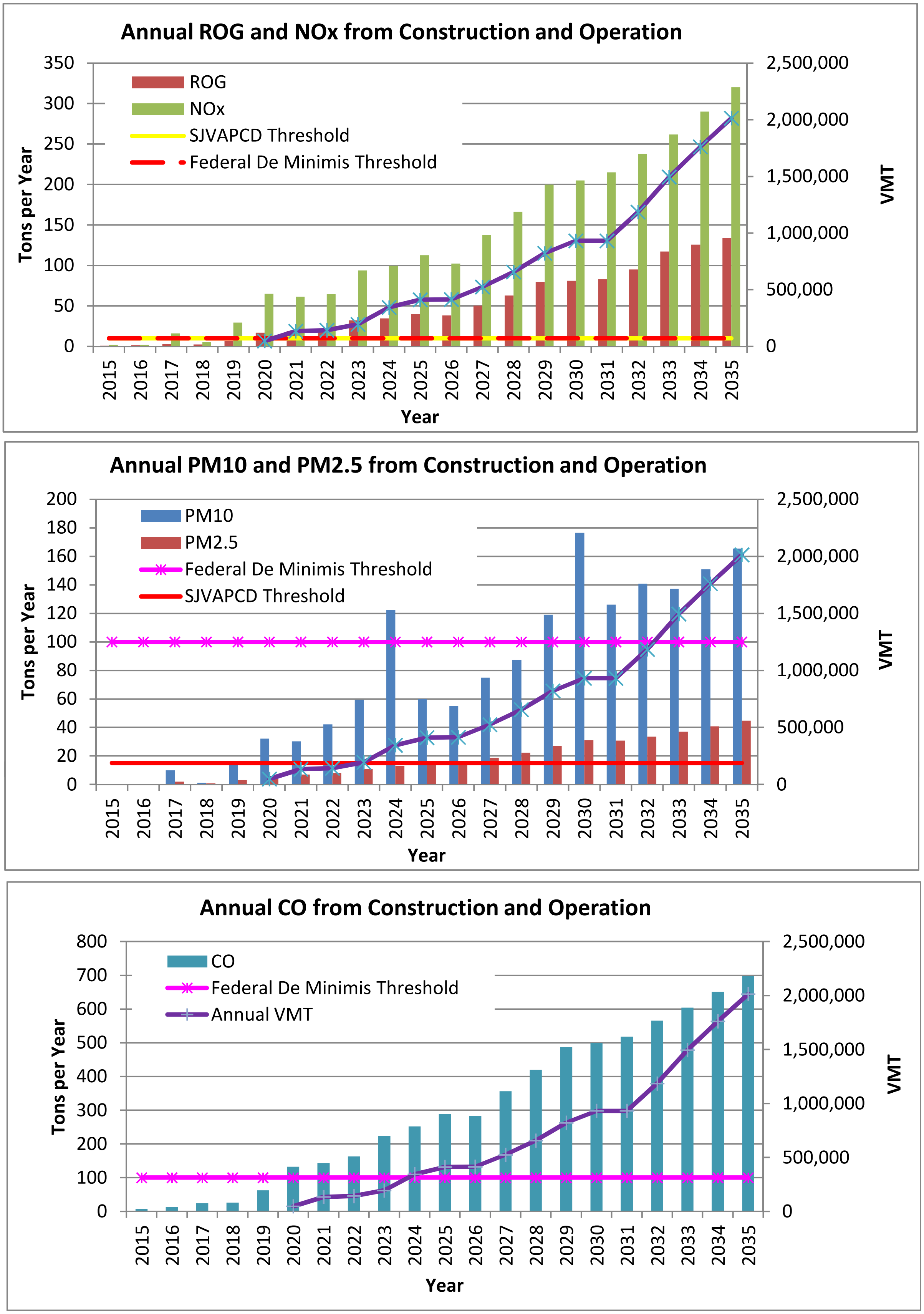

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Figure 14-2
Annual Construction and Operational Emissions

Annual Emissions[a]	ROG	NO_X	CO	SO_2	PM10	PM2.5
2032	**95.07**	**237.68**	**565.76**	1.35	**140.77**	33.50
2033	**117.23**	**261.68**	**604.51**	1.44	**137.14**	36.95
2034	**125.55**	**289.93**	**650.83**	1.58	**151.06**	40.83
2035	**133.79**	**320.20**	**698.44**	1.72	**165.40**	44.79
Federal *de minimis* thresholds	10.00	10.00	100.00	100.00	100.00	100.00
Significant Effect[b]						
Alternative 1	Yes	Yes	Yes	No	Yes	No
Alternative 2	Yes	Yes	Yes	No	Yes	No
Alternative 3	Yes	Yes	Yes	No	Yes	No
Alternative 4	Yes	Yes	Yes	No	Yes	No
Alternative 5	Yes	Yes	Yes	No	Yes	No

[a] Emissions that exceed federal *de minimis* thresholds are **boldfaced**. These emissions indicate where River Islands at Lathrop and alternatives would have an adverse affect.

[b] Adverse effects of each alternative were evaluated based on the assumptions outlined in Table 14-6 above.

Table 14-8 provides a summary of the construction-related emissions associated with the peak construction years. The highest single year of emissions varies by pollutant; this is because activity for individual construction phases varies by year (e.g., considerable architectural coating work occurs in 2033, resulting in high ROG emissions, while most grading activities occur in 2024 resulting in high PM10 and PM2.5 emissions).

As discussed above, River Islands at Lathrop is located in an area classified as nonattainment with regard to the NAAQS. Consequently, a conformity analysis is required. As shown in Table 14-11 and Figure 14-2, implementation of River Islands at Lathrop would exceed the federal *de minimis* threshold of 10 tons per year of ROG and NO_X and the threshold of 100 tons per year of CO and PM10. As explained in the GAMAQI, compliance with the SJVAPCD's Regulation VIII would mitigate construction-related PM10 dust emissions. The proposed action is subject to the SJVAPCD's Indirect Source Review (ISR) Rule 9510 because it comprises more than 50 residential lots. The ISR requires developers to reduce 20% of construction-exhaust NO_X, 45% of construction-exhaust PM10, 33% of operational NO_X over 10 years, and 50% of operational PM10 over 10 years. However, even after implementation of all applicable rules and regulations as well as mitigation measures, combined emissions from the River Islands at Lathrop project would still exceed the *de minimis* thresholds.

As shown in Table 14-11 and Figure 14-2, combined construction and operational emissions would exceed the federal *de minimis* thresholds for ROG, NO_X, CO, and PM10 for at least 1 year. Therefore, the direct impact of River Islands at Lathrop on air quality regarding ROG, NO_X, CO, and PM10 emissions, with respect to the federal *de minimis* thresholds, would be significant. Mitigation Measures AQ-1 through AQ-3 would help to reduce emissions associated with River Islands at Lathrop, but not below the federal *de minimis* thresholds.

Additional detail is presented in Table 14-12 (at the end of this chapter), which presents annual emissions of criteria pollutants for construction and operation from the first year of construction (2015) to the year of full buildout (2035). For each year, the table also presents daily VMT, dwelling units operational, commercial square footage operational, the SJVAPCD and federal *de minimis* thresholds, emissions over each threshold, and whether the emissions represent a significant direct effect.

In addition to the following mitigation measures, Mitigation Measure CC-1 in Chapter 14, *Climate Change*, will also reduce criteria pollutant emissions from operation of River Islands at Lathrop and alternatives. Many measures that reduce greenhouse gas emissions, such as the use of alternative-fueled vehicles, also have the benefit of reducing criteria pollutant emissions.

Mitigation Measure AQ-1. Reduce fugitive dust emissions resulting from construction

SJVAPCD has developed Regulation VIII (Fugitive PM10 Prohibitions) to reduce anthropogenic fugitive dust emissions. SJVAPCD developed rules under Regulation VIII (Rules 8011 through 8081) pursuant to EPA guidance for serious PM10 nonattainment areas. SJVAPCD requires that all feasible control measures (depending on the size of the construction area and the nature of the construction operations) be incorporated and implemented. To control the generation of construction-related PM10 emissions, construction contractors will be required to prepare a dust control plan and submit it to SJVAPCD for approval at least 30 days before any earthmoving or construction activities. Construction activities will not commence until the dust control plan has been approved or conditionally approved. Implementation of the dust control plan will satisfy Regulation VIII requirements. Potential measures that may be included in the dust control plan include those listed below (this is not necessarily an exhaustive list).

- Structural demolition.
  - Water the following areas for the duration of demolition activities.
    - Building exterior surfaces.
    - Unpaved surface areas where equipment will operate.
    - Razed building materials.
    - Unpaved surface areas within 100 feet of structure during demolition (water or dust suppressants).
- Pre-activity.
  - Pre-water the work site and phase work to reduce the amount of disturbed surface area at any one time.
- Active operations.
  - Apply water to dry areas during leveling, grading, trenching, and earthmoving activities.
  - Construct and maintain wind barriers and apply water or dust suppressants to the disturbed surface areas.
- Inactive operations, including after work hours, weekends, and holidays.
  - Apply water or dust suppressants on disturbed surface areas to form a visible crust, and restrict vehicle access to maintain the visible crust.
- Temporary stabilization of areas that remain unused for 7 or more days.
  - Restrict vehicular access and apply and maintain water or dust suppressants on all unvegetated areas.
  - Establish vegetation on all previously disturbed areas.
  - Apply gravel and maintain at all previously disturbed areas.

    - Pave previously disturbed areas.
- Unpaved access and haul roads, traffic, and equipment storage areas.
    - Apply water or dust suppressants to unpaved haul and access roads.
    - Post speed limit signs of not more than 15 miles per hour at each entrance, and again every 500 feet.
    - Apply water or dust suppressants to vehicle traffic and equipment storage areas.
- Wind events.
    - Water application equipment will apply water to control fugitive dust during wind events, unless it is unsafe to do so.
    - Outdoor construction activities that disturb the soil will cease whenever visible dust emissions cannot be effectively controlled.
- Outdoor handling of bulk materials.
    - Apply water or dust suppressants when handling bulk materials.
    - Install and maintain wind barriers with less than 50% porosity, and apply water or dust suppressants.
- Outdoor storage of bulk materials.
    - Apply water or dust suppressants to storage piles.
    - Cover storage piles with tarps, plastic, or other suitable material and anchor them in such a manner that prevents the cover from being removed by wind action.
    - Install and maintain wind barriers with less than 50% porosity around storage piles, and apply water or dust suppressants.
    - Use a three-sided structure (of less than 50% porosity) that is at least as high as the storage piles.
- Onsite transport of bulk materials.
    - Limit vehicle speed on the work site.
    - Load all haul trucks such that the freeboard is not less than 6 inches when transported across any paved public access road.
    - Apply a sufficient amount of water to the top of the load to limit visible dust emissions.
    - Cover haul trucks with a tarp or other suitable cover.
- Offsite transport of bulk materials
    - Clean or cover the interior of emptied truck cargo compartments before leaving the site.
    - Prevent spillage or loss of bulk materials from holes or other openings in the cargo compartment's floor, sides, and tailgates.
    - Cover haul trucks with a tarp or other suitable cover or load them such that the freeboard is not less than 6 inches when transported on any paved public access road to or from the project site, and apply a sufficient amount of water to the top of the load to limit visible dust emissions.

- Outdoor transport using a chute or conveyor.
  - Fully enclose chutes or conveyors.
  - Use water spray equipment to sufficiently wet the materials.
  - Wash or screen transported materials to remove fines (PM10 or smaller).

Mitigation Measure AQ-2. Reduce construction-related exhaust emissions

The following mitigation measures, which are recommended by SJVAPCD, can be implemented to reduce emissions from heavy-duty construction equipment exhaust.

- Use construction equipment powered by engines meeting, at a minimum, Tier II emission standards, as set forth in §2423 of Title 13 of the California Code of Regulations, and Part 89 of Title 40 CFR. Off-road construction equipment used onsite will achieve fleet average emissions equal to or less than the Tier II emissions standard of 4.8 g/hp-hr NO_X. This can be achieved through any combination of uncontrolled engines and engines complying with Tier II and above engine standards.
- Use alternative-fueled or catalyst-equipped diesel construction equipment.
- Electrify equipment.
- Minimize idling time (e.g., 10-minute maximum).
- Limit the hours of operation of heavy-duty equipment and/or the amount of equipment in use.
- Replace fossil-fueled equipment with electrically driven equivalents (provided they are not powered by a portable generator).
- Curtail construction during periods of high ambient pollutant concentrations; this may include cessation of construction activity during the peak hour of vehicular traffic on adjacent roadways.
- Implement activity management (e.g., rescheduling activities to reduce short-term impacts).

Mitigation Measure AQ-3. Reduce operational emissions

SJVAPCD recommends various mitigation measures to reduce air quality impacts associated with project operations. River Islands will implement the following mitigation measures, where applicable and feasible, as recommended in the SJVAPCD *Guide for Assessing and Mitigating Air Quality Impacts* (San Joaquin Valley Air Pollution Control District 2002). It should be noted that many of these measures are already included in the proposed action design: however, they are repeated here to allow for a complete listing of the SJVAPCD guidelines. In addition, Chapter 14, C*limate Change*, includes a list of project design features that would reduce operational emissions.

The following measures are suggested to reduce motor vehicle emissions.

- Provide transit-enhancing infrastructure that includes: transit shelters, benches, etc.; street lighting; route signs and displays; and/or bus turnouts/bulbs.
- Provide park-and-ride lots and/or satellite telecommuting centers.

- Provide pedestrian-enhancing infrastructure that includes: sidewalks and pedestrian paths, direct pedestrian connections, street trees to shade sidewalks, pedestrian safety designs/infrastructure, street furniture and artwork, street lighting, and pedestrian signalization and signage.
- Provide bicycle-enhancing infrastructure that includes: bikeways/paths connecting to a bikeway system, secure bicycle parking, and employee lockers and showers.
- Implement carpool/vanpool program with features such as carpool ridematching for employees, assistance with vanpool formation, and provision of vanpool vehicles.
- Provide onsite shops and services for employees, such as a cafeteria, bank/ATM, dry cleaners, and convenience market.
- Provide onsite child care, or contribute to offsite child care within walking distance.
- Establish midday shuttle service from worksite to food service establishments/commercial areas.
- Provide shuttle service to transit stations/multimodal centers.
- Provide preferential parking (e.g., near building entrance, sheltered area) for carpool and vanpool vehicles.
- Implement parking fees for single occupancy vehicle commuters.
- Implement parking cash-out program for employees (i.e., nondriving employees receive transportation allowance equivalent to value of subsidized parking).
- Provide transit incentives.
- Implement compressed work week schedule (e.g., 4/40, 9/80).
- Implement home-based telecommuting program.

The following measures are suggested to reduce area source emissions.

- Use solar or low-emission, central, or tankless water heaters.
- Orient buildings to take advantage of solar heating and natural cooling and use passive solar designs.
- Increase wall and attic insulation beyond Title 24 requirements.
- Provide electric maintenance equipment.
- Eliminate or limit the amount of traditional fireplaces installed (i.e., use natural gas fireplaces/inserts or at least EPA-certified woodstoves or inserts instead of open hearth fireplaces). SJVAPCD Rule 4901 prohibits the sale of wood heaters that are not EPA-certified and incorporates density limits (devices installed per acre) on the number of woodstoves, wood heaters, and fireplaces in new construction.

Potential for health risks from exposure of sensitive receptors to carbon monoxide (less than significant)

In an urban setting, vehicle exhaust is the primary source of CO. The highest CO concentrations are generally found near congested intersections where vehicles tend to queue. Under typical meteorological conditions, CO concentrations tend to decrease as distance from the emissions source (i.e., congested intersection) increases. CO generated by project traffic could directly expose nearby sensitive receptors to substantial pollutant concentrations, indirectly resulting in potential adverse health effects.

For purposes of providing a conservative, worst-case impact analysis, CO concentrations are typically analyzed at congested intersection locations, because if no violations of CO standards are observed there (i.e., worst-case conditions), violations would not be expected to occur at more distant sensitive receptor locations. Project-related CO concentrations were analyzed for existing year 2012, interim year 2020, and buildout year 2034 with and without project conditions for PM peak travel hours.

CO modeling following the Caltrans CO protocol (U.C. Davis 1997) was conducted to evaluate whether the proposed action would directly cause or contribute to localized violations of the state or federal ambient air quality standards in the vicinity. CO concentrations at sensitive receptors near congested roadways and intersections were estimated using CALINE4 dispersion modeling. Table 14-13 (at the end of this chapter) summarizes CO modeling results for interim year (2020) and full buildout year (2034) with-project and without-project conditions. A detailed methodology of the CO analysis is provided in Appendix F-1. All alternatives are identical in terms of CO concentrations.

As shown in Table 14-13, the proposed action would not exceed the 1- or 8-hour CAAQS or NAAQS that have been established for CO. Consequently, no direct or indirect impacts from 1- or 8-hour local CO concentrations due to mobile source emissions are anticipated. Because significant effects would not occur at the intersections with the highest traffic volumes, no significant effects are anticipated to occur at any other locations in the study area because the conditions yielding CO hot spots would not be worse than those occurring at the analyzed intersections. Consequently, the net increase in traffic that would occur under the proposed action would result in less-than-significant direct or indirect effects on the sensitive receptors considered in this analysis.

Potential health risks from exposure of sensitive receptors to diesel particulate matter from construction equipment (significant)

Diesel-fueled engines would be used during construction of the proposed action. Potential sources of DPM include exhaust emissions from on-road vehicles; off-road vehicles (e.g., trucks, front-end loaders, dozers, graders, backhoes, compactors); and portable equipment (e.g., compressors, cranes, generators). The DPM of greatest health concern is that in the categories of coarse (PM10) and ultra-fine (PM2.5). These coarse and fine particles may be composed of elemental carbon with adsorbed materials, such as organic compounds, sulfate, nitrate, metals, and other trace elements. The coarse and fine particles are respirable, which means that they can avoid many of the human respiratory system's defense mechanisms and enter deeply into the lungs. Consequently, as discussed below, the use of diesel-powered engines for construction could directly expose nearby sensitive receptors to substantial pollutant concentrations, indirectly resulting in potential adverse health effects.

Residential dwellings are of primary concern because of the potential for increased and prolonged exposure of individuals to DPM concentrations from construction activities. Existing sensitive land uses in the vicinity of the proposed action consist primarily of rural residential dwellings. Existing residences in the proposed action area would be removed as part of the proposed action. The existing residential subdivision and Mossdale Elementary School immediately east of Stewart Tract would be considered sensitive receptors. In addition, a number of rural residences within 0.25 mile of the proposed action area would be considered sensitive receptors. Health risks resulting from DPM emissions from off-road construction equipment and idling haul and delivery trucks are presented in Tables 14-14 and 14-15.

Table 14-14. Average Construction-Related Health Risks for the Proposed Action

Estimated Health Impact for Receptors Adjacent to Construction Activities	Cancer Risk (per 1,000,000)	Chronic Hazard Index	Threshold Exceeded?
Maximum health impact (8,000 feet from construction activities)	14.50	0.02	Yes
50 feet from construction activities[a]	12.11	0.02	Yes
100 feet from construction activities[a]	12.13	0.02	Yes
250 feet from construction activities[a]	12.18	0.02	Yes
500 feet from construction activities[a]	12.26	0.02	Yes
1,000 feet from construction activities[a]	12.43	0.02	Yes
1,320 feet from construction activities[b]	12.54	0.02	Yes
2,000 feet from construction activities[c]	12.75	0.02	Yes
5,000 feet from construction activities	13.66	0.02	Yes
10,000 feet from construction activities	8.76	0.02	No
SJVAPCD thresholds	10	1	NA

Source: SCREEN3.

Note: The largest health risks occur far from the fenceline of construction activity because DPM emissions are emitted from a large area (2,954 acres) and only accumulate under worst-case meteorological conditions at distance from the site. Nearby receptors may not experience the highest concentrations because DPM does not accumulate as much at their locations. However, adverse health risks could potentially occur at each receptor within 1,500 feet of construction, because the precise location and intensity of construction activities are unknown.

[a] Represents residents living on Stewart Tract during construction.

[b] Represents nearby offsite residences.

[c] Represents Mossdale Elementary School.

As discussed above in *Methods for Analysis of Effects*, the proposed action is in the early stages of planning and development and the exact location and duration of construction activities are unknown. Consequently, to provide a range of possible health risks from construction activity, the analysis incorporated an *average* scenario (average rate of DPM emissions from all years of construction over the entire construction site) and a *worst-case* scenario (maximum annual DPM emissions (which would occur in 2020) over the lifetime of construction over the area of construction for that year). It is likely that actual health risks would be somewhere between those reported for the two scenarios.

Table 14-15. Worst-Case Construction-Related Health Risks for the Proposed Action

Estimated Health Impact for Receptors Adjacent to Construction Activities	Cancer Risk (per 1,000,000)	Chronic Hazard Index	Threshold Exceeded?
Maximum health impact (2,559 feet from construction activities)	167.81	0.17	Yes
50 feet from construction activities[a]	139.71	0.15	Yes
100 feet from construction activities[a]	140.52	0.15	Yes
250 feet from construction activities[a]	141.74	0.15	Yes
500 feet from construction activities[a]	145.07	0.15	Yes
1,000 feet from construction activities[a]	151.31	0.16	Yes
1,320 feet from construction activities[b]	154.98	0.16	Yes
2,000 feet from construction activities[c]	162.24	0.17	Yes
5,000 feet from construction activities	51.64	0.06	Yes
10,000 feet from construction activities	32.99	0.04	Yes
SJVAPCD thresholds	10	1	NA

Source: SCREEN3.

Note: The largest health risks occur far from the fenceline of construction activity because DPM emissions are emitted from a large area (300 acres) and only accumulate under worst-case meteorological conditions at distance from the site. Nearby receptors may not experience the highest concentrations because DPM does not accumulate as much at their location. However, adverse health risks could potentially occur at each receptor within 1,500 feet of construction, because the precise location and intensity of construction activities are unknown.

[a] Represents residents living at River Islands during construction.

[b] Represents nearby offsite residences.

[c] Represents Mossdale Elementary School.

As noted in Tables 14-14 and 14-15, the largest health risks from construction activity occur farther from the site (2,700–8,000 feet) because of worst-case meteorological conditions and the large size of the construction area. Health risks for nearby receptors may actually be less or more depending on the actual location and intensity of construction activity, which are not known at this time. However, it is likely that actual health risks are lower than those presented above because of the worst-case assumptions used in the modeling (see *Methods for Analysis of Effects* above).

Tables 14-14 and 14-15 present health risks associated with construction of the proposed action. The analysis determined that, for the average and worst-case scenario, the potential levels of health risk to sensitive receptors as a result of unmitigated construction emissions are above the SJVAPCD thresholds for cancer and non-cancer exposure, constituting a significant indirect effect.

The SJVAPCD-recommended exhaust controls identified in Mitigation Measure AQ-2 would reduce DPM emissions from off-road equipment by minimizing idling and requiring PM exhaust controls. This mitigation measure would reduce the project's worst-case construction-related emissions of DPM, but not below the SJVAPCD thresholds.[2] Mitigated construction-related DPM emissions would still directly expose receptors to adverse health risks and exceed the thresholds for cancer and non-

[2] Based on the worst-case analysis, construction-related DPM emissions would need to be reduced as much as 95% to be below the SJVAPCD threshold for cancer.

cancer health risks at the most susceptible receptor location. This would be a significant direct and indirect effect.

General Conformity Analysis

Corps action emissions in excess of federal *de minimis* thresholds (less than significant)

To determine whether a conformity determination is necessary, the criteria pollutant emissions directly or indirectly attributed to the Corps's action were estimated. These emissions include any associated with streamside or in-water construction (such as building the docks and levees) as well as levee maintenance, but do not include emissions associated with construction of any residential or commercial facilities nor their operation. Table 14-16 presents combined construction and operational emissions attributed to the Corps and compares these emissions to the federal *de minimis* thresholds.

Table 14-16. Total Emissions Attributed to Construction and Operation of the Proposed Action (tons/year)

Annual Emissions	ROG	NO_X	CO	SO_2	PM10	PM2.5
2015	0.20	1.44	0.94	0.00	0.07	0.06
2016	0.18	1.26	0.93	0.00	0.06	0.05
2017	0.17	1.10	0.92	0.00	0.05	0.04
2018	0.16	0.96	0.91	0.00	0.05	0.04
2019	1.39	8.04	9.59	0.03	4.11	0.46
2020	0.95	5.74	5.02	0.02	2.91	0.49
2021	0.66	3.69	3.79	0.01	2.57	0.30
2022	0.63	3.31	3.75	0.01	2.56	0.28
2023	0.60	2.97	3.72	0.01	2.54	0.27
2024	0.57	2.69	3.69	0.01	2.53	0.25
2025	0.55	2.43	3.67	0.01	2.52	0.24
2026	0.55	2.43	3.67	0.01	2.52	0.24
2027	0.55	2.43	3.67	0.01	2.52	0.24
2028	0.55	2.43	3.67	0.01	2.52	0.24
2029	0.55	2.43	3.67	0.01	2.52	0.24
2030	0.27	0.93	1.82	0.01	2.45	0.19
2031	0.29	1.19	1.95	0.01	2.45	0.19
2032	0.02	0.26	0.13	0.00	0.00	0.00
2033	0.02	0.26	0.13	0.00	0.00	0.00
2034	0.02	0.26	0.13	0.00	0.00	0.00
2035	0.20	1.44	0.93	0.00	0.07	0.06
Federal *de minimis* thresholds	10	10	100	100	100	100
Significant effect[b]	No	No	No	No	No	No

[a] Significant effects for each alternative were evaluated based on the assumptions outlined in Table 14-6 above.

Because implementation of the proposed action would not result in emissions directly or indirectly attributed to the Corps in excess of the federal *de minimis* threshold for any criteria pollutant, a general conformity determination is not required; the proposed action is presumed to conform with the applicable SIP for each affected pollutant. Because these emissions do not exceed the *de minimis* thresholds, there is no significant direct effect. However, implementation of Mitigation Measure AQ-2 is recommended, given the magnitude of NO_X emissions.

14.2.3.2 Alternative 2—No Alteration of Paradise Cut

NEPA Analysis

River Islands at Lathrop emissions in excess of federal *de minimis* thresholds (significant)

Tables 14-8, 14-9, and 14-11 present construction, operational, and combined emissions for the proposed action. Criteria pollutant emissions associated with Alternative 2 were not explicitly modeled. Instead, an estimate of the percent increase or decrease (compared to the proposed action) in emissions for each alternative was prepared (Table 14-7). As shown in this table, the change in total construction emissions under Alternative 2 is estimated to be -1%; the change in total operational emissions is estimated to be -3%. A change in criteria pollutant emissions of -1% to -3% would result in direct impacts on air quality similar to those presented in Table 14-11.

As shown in Table 14-11, combined construction and operational emissions associated with Alternative 2 would exceed the federal *de minimis* thresholds for ROG, NO_X, CO, PM10 and PM2.5 for multiple years. This would be a significant direct effect. Mitigation Measures AQ-1, AQ-2, AQ-3, and CC-1 would address this effect.

Increased health risks from exposure of sensitive receptors to carbon monoxide (less than significant)

As noted above, all alternatives to the proposed action are identical in terms of CO hotspots. Consequently, Alternative 2 would not have a significant direct adverse effect on 1- or 8-hour local CO concentrations generated by mobile source emissions, and consequently would not indirectly expose sensitive receptors to substantial concentrations of CO. Direct and indirect effects would be less than significant.

Increased health risks from exposure of sensitive receptors to diesel particulate matter from construction equipment (significant)

Health risks associated with Alternative 2 were not explicitly modeled, because the actual amount and location of construction activities would not differ significantly from those under the proposed action. Based on Table 14-7, the change in total construction emissions, including DPM, from those under the proposed action is estimated to be -1%. A direct change in DPM emissions of -1% would indirectly result in health risks similar to those presented in Tables 14-14 and 14-15. As shown in these tables, the potential levels of health risk to sensitive receptors as a result of unmitigated construction emissions are above the SJVAPCD CEQA thresholds for cancer and non-cancer exposure, constituting a significant indirect effect.

As noted above, the SJVAPCD-recommended exhaust controls identified in Mitigation Measure AQ-2 would reduce DPM emissions from off-road equipment by minimizing idling and requiring PM exhaust controls, but not below the SJVAPCD CEQA thresholds. Mitigated construction-related DPM emissions would still exceed the thresholds for cancer and non-cancer health risks at the most susceptible receptor location. Accordingly, construction-related emissions of DPM under Alternative 2 would constitute a significant direct and indirect effect.

General Conformity Analysis

Corps action emissions in excess of federal *de minimis* thresholds (less than significant)

Emissions attributed to the Corps action under Alternative 2 would not exceed the federal *de minimis* thresholds (i.e., there would not be a significant change in construction or operational emissions associated with the Corps under this alternative). Consequently, a general conformity determination is not required, as the proposed action is presumed to conform with the applicable SIP for each affected pollutant.

Because equipment operated under Alternative 2 would not exceed the federal *de minimis* thresholds, the direct effect would be less than significant. Nevertheless, Mitigation Measure AQ-2 is recommended given the magnitude of NO_X emissions.

14.2.3.3 Alternative 3—Avoidance of Central Drainage Ditch

NEPA Analysis

River Islands at Lathrop emissions in excess of federal *de minimis* thresholds (significant)

Tables 14-8, 14-9, and 14-11 present construction, operational, and combined emissions for the proposed action. Criteria pollutant emissions associated with Alternative 3 were not explicitly modeled. Instead, an estimate of the percent increase or decrease (compared to the proposed action) in emissions for each alternative was prepared (Table 14-7). As shown in this table, the change in total construction emissions from the proposed action is estimated to be +10%; the change in total operational emissions is estimated to be >0%. A change in criteria pollutant emissions of +10% would result in impacts on air quality greater than but generally similar to those presented in Table 14-11.

As shown in Table 14-11, combined construction and operational emissions associated with Alternative 3 would exceed the federal *de minimis* thresholds for ROG, NO_X, CO, PM10 and PM2.5 for multiple years. This would be a significant direct effect. Mitigation Measures AQ-1, AQ-2, AQ-3, and CC-1 would address these effects.

Increased health risks from exposure of sensitive receptors to carbon monoxide (less than significant)

As noted above, all alternatives are identical in terms of CO hotspots. Consequently, Alternative 3 would not have a direct adverse effect on 1- or 8-hour local CO concentrations generated by mobile source emissions, and consequently will not indirectly expose sensitive receptors to substantial concentrations of CO. Direct and indirect effects would be less than significant.

Increased health risks from exposure of sensitive receptors to diesel particulate matter from construction equipment (significant)

Health risks associated with Alternative 3 were not explicitly modeled, because the actual amount and location of construction activities would not differ significantly from those under the proposed action. As shown in Table 14-7, the change in total construction emissions, including DPM, from the proposed action is estimated to be +10%. A direct change in DPM emissions of +10% would indirectly result in health risks similar to those presented in Tables 14-14 and 14-15. As shown in these tables, the potential levels of health risk to sensitive receptors as a result of unmitigated construction emissions are above the SJVAPCD CEQA thresholds for cancer and non-cancer exposure, constituting a significant indirect effect.

As noted above, the SJVAPCD-recommended exhaust controls identified in Mitigation Measure AQ-2 would reduce DPM emissions from off-road equipment by minimizing idling and requiring PM exhaust controls, but not below the SJVAPCD CEQA thresholds. Mitigated construction-related DPM emissions would still exceed the thresholds for cancer and non-cancer health risks at the most susceptible receptor location. Accordingly, construction-related emissions of DPM under Alternative 3 would constitute a significant direct and indirect effect.

General Conformity Analysis

Corps action emissions in excess of federal *de minimis* thresholds (less than significant)

Emissions attributed to the Corps action under Alternative 3 would not exceed the federal *de minimis* thresholds (i.e., there would not be a significant change in construction or operational emissions associated with the Corps under this alternative). Consequently, a general conformity determination is not required, as the proposed action is presumed to conform with the applicable SIP for each affected pollutant.

Because equipment operated under Alternative 3 would not exceed the federal *de minimis* thresholds, this direct effect would be less than significant. Nevertheless, Mitigation Measure AQ-2 is recommended given the magnitude of NO_X emissions.

14.2.3.4 Alternative 4—Proposed Action with Expanded Flood Protection

NEPA Analysis

River Islands at Lathrop emissions in excess of federal *de minimis* thresholds (significant)

Tables 14-8, 14-9, and 14-11 present construction, operational, and combined emissions for the proposed action. Criteria pollutant emissions associated with Alternative 4 were not explicitly modeled. Instead, an estimate of the percent increase or decrease (compared to the proposed action) in emissions for each alternative was prepared (Table 14-7). As shown in this table, the change in total construction emissions from the proposed action is estimated to be +10%; the change in total operational emissions is estimated to be >0%. A change in criteria pollutant emissions of up to +10% would result in effects on air quality greater than but generally similar to those presented in Table 14-11.

As shown in Table 14-11, combined construction and operational emissions associated with Alternative 4 would exceed the federal *de minimis* thresholds for ROG, NO_X, CO, PM10 and PM2.5 for multiple years. This would be a significant direct effect. Mitigation Measures AQ-1, AQ-2, AQ-3, and CC-1 would address these effects.

Increased health risks from exposure of sensitive receptors to carbon monoxide (less than significant)

As noted above, all alternatives are identical in terms of CO hotspots. Consequently, Alternative 4 would not have a direct adverse effect on 1- or 8-hour local CO concentrations generated by mobile source emissions, and consequently would not indirectly expose sensitive receptors to substantial concentrations of CO. These direct and indirect effects would be less than significant.

Increased health risks from exposure of sensitive receptors to diesel particulate matter from construction equipment (significant)

Health risks associated with Alternative 4 were not explicitly modeled, because the actual amount and location of construction activities would not differ significantly from those under the proposed action. As shown in Table 14-7, the change in total construction emissions, including DPM, from the proposed action is estimated to be +10%. A direct change in DPM emissions of +10% would indirectly result in health risks similar to those presented in Tables 14-14 and 14-15. As shown in these tables, the potential levels of health risk to sensitive receptors as a result of unmitigated construction emissions are above the SJVAPCD CEQA thresholds for cancer and non-cancer exposure, constituting a significant indirect effect.

As noted above, the SJVAPCD-recommended exhaust controls identified in Mitigation Measure AQ-2 would reduce DPM emissions from off-road equipment by minimizing idling and requiring PM exhaust controls, but not below the SJVAPCD CEQA thresholds. Mitigated construction-related DPM emissions would still exceed the thresholds for cancer and non-cancer health risks at the most susceptible receptor location. Accordingly, construction-related emissions of DPM under Alternative 3 would constitute a significant direct and indirect effect.

General Conformity Analysis

Corps action emissions in excess of federal *de minimis* thresholds (less than significant)

Emissions attributed to the Corps action under Alternative 4 would not exceed the federal *de minimis* thresholds (i.e., there would not be a significant change in construction or operational emissions associated with the Corps under this alternative). Consequently, a general conformity determination is not required, as the proposed action is presumed to conform with the applicable SIP for each affected pollutant.

Because equipment operated under Alternative 4 would not exceed the federal *de minimis* thresholds, the direct effect would be less than significant. Nevertheless, Mitigation Measure AQ-2 is recommended given the magnitude of NO_X emissions.

14.2.3.5 Alternative 5—No Action

NEPA Analysis

River Islands at Lathrop emissions in excess of federal *de minimis* thresholds (significant)

Tables 14-8, 14-9, and 14-11 present construction, operational, and combined emissions for the proposed action. Criteria pollutant emissions associated with the No Action Alternative were not explicitly modeled. Instead, an estimate of the percent increase or decrease (compared to the proposed action) in emissions for each alternative was prepared (Table 14-7). As show in this table, the change in total construction emissions from the proposed action is estimated to be 10%; the change in total operational emissions is unknown. A change in criteria pollutant emissions of +10% would result in effects on air quality similar to those presented in Table 14-11.

As shown in Table 14-11, combined construction and operational emissions associated with Alternative 5 would exceed the federal *de minimis* thresholds for ROG, NO_X, CO, and PM10for multiple years. This would be a significant direct effect. Mitigation Measures AQ-1, AQ-2, AQ-3, and CC-1 would address this effect.

Increased health risks from exposure of sensitive receptors to carbon monoxide (less than significant)

As noted above, all alternatives are identical in terms of CO hotspots. The No Action Alternative would not have a less-than-significant direct effect on 1- or 8-hour local CO concentrations generated by mobile source emissions, and consequently would not indirectly expose sensitive receptors to substantial concentrations of CO. The direct and indirect effects would be less than significant.

Increased health risks from exposure of sensitive receptors to diesel particulate matter from construction equipment (significant)

Health risks associated with Alternative 5 were not explicitly modeled, because the actual amount and location of construction activities would not differ significantly from the proposed action. Based on Table 14-7 above, the change in total construction emissions, including DPM, from the proposed action is estimated to be +10%. A direct change in DPM emissions of +10% would indirectly result in health risks similar to those presented in Tables 14-14 and 14-15. As shown in these tables, the potential levels of health risk to sensitive receptors as a result of unmitigated construction emissions are above the SJVAPCD CEQA thresholds for cancer and non-cancer exposure, constituting a significant indirect effect.

As noted above, the SJVAPCD-recommended exhaust controls identified in Mitigation Measure AQ-2 would reduce DPM emissions from off-road equipment by minimizing idling and requiring PM exhaust controls, but not below the SJVAPCD CEQA thresholds. Mitigated construction-related DPM emissions would still exceed the thresholds for cancer and non-cancer health risks at the most susceptible receptor location. Accordingly, construction-related emissions of DPM under Alternative 3 would constitute a significant direct and indirect effect.

General Conformity Analysis

Corps action emissions in excess of federal *de minimis* thresholds (no effect)

Because there would be no Corps action under the No Action Alternative, no general conformity analysis is required. There would be no effect.

14.3 References

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Table 14-12. Annual Total Unmitigated Emissions from Proposed Action (tons/year)

	ROG	NO_X	CO	SO_2	PM10	PM2.5
SJVAPCD Thresholds	10.00	10.00	–	–	15.00	–
Federal *de Minimis* Thresholds	10.00	10.00	100.00	100.00	100.00	100.00
2015						
Construction emissions	0.20	1.44	0.94	0.00	0.07	0.06
Operational emissions	0.57	0.31	6.17	0.00	0.10	0.10
Area source[a]	0.00	0.00	0.00	0.00	0.00	0.00
Mobile source	0.00	0.00	0.00	0.00	0.00	0.00
Residential natural gas	0.00	0.00	0.00	0.00	0.00	0.00
Commercial natural gas	0.00	0.00	0.00	0.00	0.00	0.00
Waste Hauling	0.00	0.00	0.00	0.00	0.00	0.00
Boating activities	0.57	0.31	6.17	0.00	0.10	0.10
Lake and levee maintenance[b]	0.00	0.00	0.00	0.00	0.00	0.00
Total Emissions[c]	**0.76**	**1.75**	**7.11**	**0.00**	**0.17**	**0.16**
Dwelling units operational	–					
Commercial ft² operational	–					
Emissions over SJVAPCD threshold	**–**	**–**			**–**	
Emissions over federal de minimis thresholds	**–**	**–**	**–**	**–**	**–**	**–**
Significant effect	***No***	***No***	***No***	***No***	***No***	***No***
2016						
Construction emissions	0.18	1.26	0.93	0.00	0.06	0.05
Operational emissions	1.13	0.62	12.33	0.00	0.20	0.20
Area source[a]	0.00	0.00	0.00	0.00	0.00	0.00
Mobile source	0.00	0.00	0.00	0.00	0.00	0.00
Residential natural gas	0.00	0.00	0.00	0.00	0.00	0.00
Commercial natural gas	0.00	0.00	0.00	0.00	0.00	0.00
Waste Hauling	0.00	0.00	0.00	0.00	0.00	0.00
Boating activities	1.13	0.62	12.33	0.00	0.20	0.20
Lake and levee maintenance[b]	0.00	0.00	0.00	0.00	0.00	0.00
Total emissions[c]	**1.31**	**1.88**	**13.27**	**0.00**	**0.26**	**0.25**
Dwelling units operational	–					
Commercial ft² operational	–					
Emissions over SJVAPCD threshold	**–**	**–**			**–**	
Emissions over federal de minimis thresholds	**–**	**–**	**–**	**–**	**–**	**–**
Significant effect	***No***	***No***	***No***	***No***	***No***	***No***

	ROG	NO_X	CO	SO_2	PM10	PM2.5
SJVAPCD Thresholds	10.00	10.00	–	–	15.00	–
Federal *de Minimis* Thresholds	10.00	10.00	100.00	100.00	100.00	100.00
2017						
Construction emissions	1.56	**15.28**	7.56	0.03	9.58	1.68
Operational emissions	1.27	0.85	17.23	0.00	0.31	0.31
Area source[a]	0.00	0.00	0.00	0.00	0.00	0.00
Mobile source	0.00	0.00	0.00	0.00	0.00	0.00
Residential natural gas	0.00	0.00	0.00	0.00	0.00	0.00
Commercial natural gas	0.00	0.00	0.00	0.00	0.00	0.00
Waste Hauling	0.00	0.00	0.00	0.00	0.00	0.00
Boating activities	1.27	0.85	17.23	0.00	0.31	0.31
Lake and levee maintenance[b]	0.00	0.00	0.00	0.00	0.00	0.00
Total emissions[c]	2.83	16.13	24.80	0.03	9.89	1.98
Dwelling units operational	–					
Commercial ft² operational	–					
Emissions over SJVAPCD threshold	***–***	***6.13***			***–***	
Emissions over federal de minimis thresholds	***–***	***6.13***	***–***	***–***	***–***	***–***
Significant effect	***No***	***Yes***	***No***	***No***	***No***	***No***
2018						
Construction emissions	0.63	4.25	3.02	0.01	0.60	0.32
Operational emissions	1.69	1.13	22.98	0.00	0.41	0.41
Area source[a]	0.00	0.00	0.00	0.00	0.00	0.00
Mobile source	0.00	0.00	0.00	0.00	0.00	0.00
Residential natural gas	0.00	0.00	0.00	0.00	0.00	0.00
Commercial natural gas	0.00	0.00	0.00	0.00	0.00	0.00
Waste Hauling	0.00	0.00	0.00	0.00	0.00	0.00
Boating activities	1.69	1.13	22.98	0.00	0.41	0.41
Lake and levee maintenance[b]	0.00	0.00	0.00	0.00	0.00	0.00
Total emissions[c]	2.32	5.38	26.00	0.01	1.02	0.73
Dwelling units operational	–					
Commercial ft² operational	–					
Emissions over SJVAPCD threshold	***–***	***–***			***–***	
Emissions over federal de minimis thresholds	***–***	***–***	***–***	***–***	***–***	***–***
Significant effect	***No***	***No***	***No***	***No***	***No***	***No***

	ROG	NO_X	CO	SO_2	PM10	PM2.5
SJVAPCD Thresholds	10.00	10.00	–	–	15.00	–
Federal *de Minimis* Thresholds	10.00	10.00	100.00	100.00	100.00	100.00
2019						
Construction emissions	3.72	27.30	21.87	0.07	15.11	2.49
Operational emissions	2.99	2.00	40.69	0.00	0.73	0.73
Area source[a]	0.00	0.00	0.00	0.00	0.00	0.00
Mobile source	0.00	0.00	0.00	0.00	0.00	0.00
Residential natural gas	0.00	0.00	0.00	0.00	0.00	0.00
Commercial natural gas	0.00	0.00	0.00	0.00	0.00	0.00
Waste Hauling	0.00	0.00	0.00	0.00	0.00	0.00
Boating activities	2.99	2.00	40.69	0.00	0.73	0.73
Lake and levee maintenance[b]	0.00	0.00	0.00	0.00	0.00	0.00
Total emissions[c]	6.72	29.30	62.56	0.07	15.84	3.22
Dwelling units operational	–					
Commercial ft² operational	–					
Emissions over SJVAPCD threshold	**–**	***19.30***			***0.84***	
Emissions over federal de minimis thresholds	**–**	***19.30***	**–**	**–**	**–**	**–**
Significant effect	**No**	**Yes**	**No**	**No**	**Yes**	**No**
2020						
Construction emissions	8.69	47.22	51.25	0.16	25.02	3.67
Operational emissions	8.32	17.80	80.93	0.07	7.09	2.50
Area source[a]	1.27	0.02	1.88	0.00	0.01	0.00
Mobile source	3.10	14.43	25.84	0.06	6.07	1.49
Residential natural gas	0.06	0.75	0.32	0.00	0.06	0.06
Commercial natural gas	0.00	0.00	0.00	0.00	0.00	0.00
Waste Hauling	0.00	0.00	0.00	0.00	0.00	0.00
Boating activities	3.89	2.60	52.89	0.01	0.95	0.95
Lake and levee maintenance[b]	0.00	0.00	0.00	0.00	0.00	0.00
Total emissions[c]	17.01	65.02	132.19	0.22	32.11	6.17
Dwelling units operational	250					
Commercial ft² operational	–					
Emissions over SJVAPCD threshold	***7.01***	***55.02***			***17.11***	
Emissions over federal de minimis thresholds	***7.01***	***55.02***	***32.19***	**–**	**–**	**–**
Significant effect	**Yes**	**Yes**	**No**	**No**	**Yes**	**No**

	ROG	NO_X	CO	SO_2	PM10	PM2.5
SJVAPCD Thresholds	10.00	10.00	–	–	15.00	–
Federal *de Minimis* Thresholds	10.00	10.00	100.00	100.00	100.00	100.00
2021						
Construction emissions	5.85	29.71	26.08	0.08	17.27	2.85
Operational emissions	13.13	31.58	116.94	0.14	13.05	4.16
Area source[a]	2.39	0.04	3.12	0.00	0.02	0.00
Mobile source	5.86	27.01	48.36	0.13	11.76	2.89
Residential natural gas	0.10	1.29	0.55	0.00	0.10	0.10
Commercial natural gas	0.00	0.00	0.00	0.00	0.00	0.00
Waste Hauling	0.00	0.00	0.00	0.00	0.00	0.00
Boating activities	4.77	3.19	64.86	0.01	1.17	1.16
Lake and levee maintenance[b]	0.00	0.00	0.00	0.00	0.00	0.00
Total emissions[c]	**18.98**	**61.29**	**143.02**	**0.22**	**30.33**	**7.02**
Dwelling units operational	416					
Commercial ft^2 operational	46,000					
Emissions over SJVAPCD threshold	***8.98***	***51.29***			***15.33***	
Emissions over federal de minimis thresholds	***8.98***	***51.29***	***43.02***	–	–	–
Significant effect	**Yes**	**Yes**	**Yes**	**No**	**Yes**	**No**
2022						
Construction emissions	4.01	26.24	25.22	0.08	25.60	2.78
Operational emissions	16.02	38.27	138.13	0.17	16.62	5.28
Area source[a]	4.13	0.06	4.99	0.00	0.03	0.01
Mobile source	7.09	32.41	58.02	0.16	15.00	3.68
Residential natural gas	0.18	2.34	1.00	0.00	0.19	0.19
Commercial natural gas	0.00	0.05	0.04	0.00	0.00	0.00
Waste Hauling	0.00	0.01	0.00	0.00	0.00	0.00
Boating activities	4.61	3.41	74.09	0.01	1.40	1.40
Lake and levee maintenance[b]	0.00	0.00	0.00	0.00	0.00	0.00
Total emissions[c]	**20.02**	**64.51**	**163.36**	**0.25**	**42.22**	**8.06**
Dwelling units operational	666					
Commercial ft^2 operational	46,000					
Emissions over SJVAPCD threshold	***10.02***	***54.51***			***27.22***	
Emissions over federal de minimis thresholds	***10.02***	***54.51***	***63.36***	–	–	–
Significant effect	**Yes**	**Yes**	**Yes**	**No**	**Yes**	**No**

	ROG	NO_X	CO	SO_2	PM10	PM2.5
SJVAPCD Thresholds	10.00	10.00	–	–	15.00	–
Federal *de Minimis* Thresholds	10.00	10.00	100.00	100.00	100.00	100.00
2023						
Construction emissions	10.93	43.63	53.94	0.18	37.05	3.76
Operational emissions	21.23	50.02	169.52	0.23	22.42	6.94
Area source[a]	6.37	0.08	6.86	0.00	0.04	0.01
Mobile source	9.26	42.41	75.52	0.22	20.47	5.03
Residential natural gas	0.27	3.54	1.51	0.00	0.29	0.29
Commercial natural gas	0.00	0.05	0.04	0.00	0.00	0.00
Waste Hauling	0.00	0.01	0.00	0.00	0.00	0.00
Boating activities	5.33	3.93	85.59	0.01	1.62	1.61
Lake and levee maintenance[b]	0.00	0.00	0.00	0.00	0.00	0.00
Total emissions[c]	**32.16**	**93.65**	**223.46**	**0.41**	**59.47**	**10.70**
Dwelling units operational	916					
Commercial ft^2 operational	46,000					
Emissions over SJVAPCD threshold	***22.16***	***83.65***			***44.47***	
Emissions over federal de minimis thresholds	***22.16***	***83.65***	***123.46***	–	–	–
Significant effect	**Yes**	**Yes**	**Yes**	**No**	**Yes**	**No**
2024						
Construction emissions	4.04	24.03	25.46	0.09	89.05	2.69
Operational emissions	30.50	75.69	226.16	0.36	34.97	10.31
Area source[a]	9.77	0.12	10.60	0.00	0.06	0.01
Mobile source	14.24	65.44	115.79	0.35	32.62	8.01
Residential natural gas	0.43	5.52	2.35	0.00	0.45	0.45
Commercial natural gas	0.01	0.11	0.10	0.00	0.01	0.01
Waste Hauling	0.00	0.02	0.00	0.00	0.00	0.00
Boating activities	6.06	4.47	97.32	0.01	1.84	1.83
Lake and levee maintenance[b]	0.00	0.00	0.00	0.00	0.00	0.00
Total emissions[c]	**34.54**	**99.72**	**251.62**	**0.45**	**124.03**	**13.00**
Dwelling units operational	1,416					
Commercial ft^2 operational	107,000					
Emissions over SJVAPCD threshold	***24.54***	***89.72***			***109.03***	
Emissions over federal de minimis thresholds	***24.54***	***89.72***	***151.62***	–	***24.03***	–
Significant effect	**Yes**	**Yes**	**Yes**	**No**	**Yes**	**No**

	ROG	NO_X	CO	SO_2	PM10	PM2.5
SJVAPCD Thresholds	10.00	10.00	–	–	15.00	–
Federal *de Minimis* Thresholds	10.00	10.00	100.00	100.00	100.00	100.00
2025						
Construction emissions	4.55	24.40	29.82	0.11	17.93	2.50
Operational emissions	35.59	88.10	259.05	0.43	42.06	12.29
Area source[a]	11.57	0.15	12.84	0.00	0.07	0.02
Mobile source	16.72	76.14	134.42	0.42	39.39	9.67
Residential natural gas	0.51	6.60	2.81	0.00	0.53	0.53
Commercial natural gas	0.01	0.18	0.15	0.00	0.01	0.01
Waste Hauling	0.00	0.02	0.00	0.00	0.00	0.00
Boating activities	6.77	5.00	108.83	0.01	2.06	2.05
Lake and levee maintenance[b]	0.00	0.00	0.00	0.00	0.00	0.00
Total emissions[c]	**40.14**	**112.49**	**288.87**	**0.54**	**59.99**	**14.79**
Dwelling units operational	1,716					
Commercial ft² operational	171,000					
Emissions over SJVAPCD threshold	***30.14***	***102.49***			***44.99***	
Emissions over federal de minimis thresholds	***30.14***	***102.49***	***188.87***	–	–	–
Significant effect	**Yes**	**Yes**	**Yes**	**No**	**Yes**	**No**
2026						
Construction emissions	1.85	13.60	12.86	0.05	12.61	1.71
Operational emissions	36.37	88.64	270.80	0.43	42.29	12.51
Area source[a]	11.62	0.15	12.84	0.00	0.07	0.02
Mobile source	16.72	76.14	134.42	0.42	39.39	9.67
Residential natural gas	0.51	6.60	2.81	0.00	0.53	0.53
Commercial natural gas	0.01	0.19	0.16	0.00	0.01	0.01
Waste Hauling	0.00	0.02	0.00	0.00	0.00	0.00
Boating activities	7.50	5.54	120.56	0.01	2.28	2.27
Lake and levee maintenance[b]	0.00	0.00	0.00	0.00	0.00	0.00
Total emissions[c]	**38.22**	**102.24**	**283.65**	**0.48**	**54.90**	**14.22**
Dwelling units operational	1,716					
Commercial ft² operational	181,000					
Emissions over SJVAPCD threshold	***28.22***	***92.24***			***39.90***	
Emissions over federal de minimis thresholds	***28.22***	***92.24***	***183.65***	–	–	–
Significant effect	**Yes**	**Yes**	**Yes**	**No**	**Yes**	**No**

	ROG	NO_X	CO	SO_2	PM10	PM2.5
SJVAPCD Thresholds	10.00	10.00	–	–	15.00	–
Federal *de Minimis* Thresholds	10.00	10.00	100.00	100.00	100.00	100.00
2027						
Construction emissions	3.28	19.89	23.24	0.08	18.27	2.29
Operational emissions	47.17	117.75	332.78	0.58	56.67	16.38
Area source[a]	16.63	0.20	17.80	0.00	0.10	0.02
Mobile source	22.55	102.50	181.36	0.57	53.29	13.08
Residential natural gas	0.73	9.41	4.00	0.00	0.76	0.76
Commercial natural gas	0.01	0.19	0.16	0.00	0.01	0.01
Waste Hauling	0.00	0.02	0.00	0.00	0.00	0.00
Boating activities	7.25	5.42	129.45	0.01	2.51	2.50
Lake and levee maintenance[b]	0.00	0.00	0.00	0.00	0.00	0.00
Total emissions[c]	**50.45**	**137.64**	**356.02**	**0.67**	**74.95**	**18.67**
Dwelling units operational	2,379					
Commercial ft^2 operational	181,000					
Emissions over SJVAPCD threshold	***40.45***	***127.64***			***59.95***	
Emissions over federal de minimis thresholds	***40.45***	***127.64***	***256.02***	–	–	–
Significant effect	**Yes**	**Yes**	**Yes**	**No**	**Yes**	**No**
2028						
Construction emissions	3.41	17.86	20.39	0.08	15.93	1.99
Operational emissions	59.32	148.67	399.41	0.74	71.60	20.39
Area source[a]	21.84	0.26	22.80	0.00	0.13	0.03
Mobile source	28.62	130.02	230.25	0.72	67.73	16.63
Residential natural gas	0.94	12.22	5.20	0.00	0.99	0.99
Commercial natural gas	0.02	0.24	0.20	0.00	0.02	0.02
Waste Hauling	0.00	0.02	0.00	0.00	0.00	0.00
Boating activities	7.90	5.91	140.95	0.01	2.73	2.72
Lake and levee maintenance[b]	0.00	0.00	0.00	0.00	0.00	0.00
Total emissions[c]	**62.72**	**166.52**	**419.79**	**0.81**	**87.52**	**22.38**
Dwelling units operational	3,041					
Commercial ft^2 operational	227,000					
Emissions over SJVAPCD threshold	***52.72***	***156.52***			***72.52***	
Emissions over federal de minimis thresholds	***52.72***	***156.52***	***319.79***	–	–	–
Significant effect	**Yes**	**Yes**	**Yes**	**No**	**Yes**	**No**

	ROG	NO_X	CO	SO_2	PM10	PM2.5
SJVAPCD Thresholds	10.00	10.00	–	–	15.00	–
Federal *de Minimis* Thresholds	10.00	10.00	100.00	100.00	100.00	100.00
2029						
Construction emissions	6.68	16.97	16.13	0.06	30.75	2.27
Operational emissions	72.90	182.94	471.66	0.91	88.27	24.83
Area source[a]	27.77	0.32	27.71	0.00	0.15	0.04
Mobile source	35.41	160.74	284.95	0.89	83.92	20.60
Residential natural gas	1.16	15.02	6.39	0.00	1.21	1.21
Commercial natural gas	0.03	0.45	0.38	0.00	0.03	0.03
Waste Hauling	0.00	0.02	0.01	0.00	0.00	0.00
Boating activities	8.53	6.38	152.22	0.02	2.95	2.94
Lake and levee maintenance[b]	0.00	0.00	0.00	0.00	0.00	0.00
Total emissions[c]	**79.58**	**199.91**	**487.79**	**0.97**	**119.02**	**27.10**
Dwelling units operational	3,704					
Commercial ft² operational	427,000					
Emissions over SJVAPCD threshold	***69.58***	***189.91***			***104.02***	
Emissions over federal de minimis thresholds	***69.58***	***189.91***	***387.79***	–	***19.02***	–
Significant effect	**Yes**	**Yes**	**Yes**	**No**	**Yes**	**No**
2030						
Construction emissions	3.02	16.84	20.49	0.07	74.83	2.90
Operational emissions	78.02	188.08	478.92	1.05	101.61	28.28
Area source[a]	32.76	0.37	32.60	0.00	0.18	0.04
Mobile source	35.32	163.02	286.12	1.03	97.01	23.82
Residential natural gas	1.38	17.83	7.59	0.00	1.44	1.44
Commercial natural gas	0.03	0.45	0.38	0.00	0.03	0.03
Waste Hauling	0.00	0.02	0.01	0.00	0.00	0.00
Boating activities	8.53	6.38	152.22	0.02	2.95	2.94
Lake and levee maintenance[b]	0.00	0.00	0.00	0.00	0.00	0.00
Total emissions[c]	**81.04**	**204.92**	**499.41**	**1.11**	**176.44**	**31.17**
Dwelling units operational	4,366					
Commercial ft² operational	427,000					
Emissions over SJVAPCD threshold	***71.04***	***194.92***			***161.44***	
Emissions over federal de minimis thresholds	***71.04***	***194.92***	***399.41***	–	***76.44***	–
Significant effect	**Yes**	**Yes**	**Yes**	**No**	**Yes**	**No**

	ROG	NO_X	CO	SO_2	PM10	PM2.5
SJVAPCD Thresholds	10.00	10.00	–	–	15.00	–
Federal *de Minimis* Thresholds	10.00	10.00	100.00	100.00	100.00	100.00
2031						
Construction emissions	4.75	26.65	38.86	0.18	24.59	2.47
Operational emissions	78.04	188.34	479.05	1.05	101.62	28.28
Area source[a]	40.35	0.43	36.99	0.00	0.20	0.05
Mobile source	41.21	191.31	333.31	1.20	112.21	27.55
Residential natural gas	1.58	20.44	8.70	0.00	1.65	1.65
Commercial natural gas	0.09	1.19	1.00	0.00	0.09	0.09
Waste Hauling	0.00	0.02	0.01	0.00	0.00	0.00
Boating activities	8.53	6.38	152.22	0.02	2.95	2.94
Lake and levee maintenance[b]	0.02	0.26	0.13	0.00	0.00	0.00
Total emissions[c]	**82.79**	**214.99**	**517.91**	**1.22**	**126.21**	**30.75**
Dwelling units operational	4,366					
Commercial ft^2 operational	427,000					
Emissions over SJVAPCD threshold	***72.79***	***204.99***			***111.21***	
Emissions over federal de minimis thresholds	***72.79***	***204.99***	***417.91***	–	***26.21***	–
Significant effect	**Yes**	**Yes**	**Yes**	**No**	**Yes**	**No**
2032						
Construction emissions	3.73	17.88	34.18	0.14	23.66	1.21
Operational emissions	91.34	219.79	531.58	1.22	117.11	32.29
Area source[a]	40.35	0.43	36.99	0.00	0.20	0.05
Mobile source	41.21	191.31	333.31	1.20	112.21	27.55
Residential natural gas	1.58	20.44	8.70	0.00	1.65	1.65
Commercial natural gas	0.09	1.19	1.00	0.00	0.09	0.09
Waste Hauling	0.00	0.03	0.01	0.00	0.00	0.00
Boating activities	8.10	6.13	151.44	0.02	2.95	2.94
Lake and levee maintenance[b]	0.02	0.26	0.13	0.00	0.00	0.00
Total emissions[c]	**95.07**	**237.68**	**565.76**	**1.35**	**140.77**	**33.50**
Dwelling units operational	4,954					
Commercial ft^2 operational	843,667					
Emissions over SJVAPCD threshold	***85.07***	***227.68***			***125.77***	
Emissions over federal de minimis thresholds	***85.07***	***227.68***	***465.76***	–	***40.77***	–
Significant effect	**Yes**	**Yes**	**Yes**	**No**	**Yes**	**No**

	ROG	NO_X	CO	SO_2	PM10	PM2.5
SJVAPCD Thresholds	10.00	10.00	–	–	15.00	–
Federal *de Minimis* Thresholds	10.00	10.00	100.00	100.00	100.00	100.00
2033						
Construction emissions	11.46	7.05	14.89	0.05	3.19	0.33
Operational emissions	105.77	254.63	589.62	1.39	133.95	36.62
Area source[a]	48.03	0.48	41.38	0.00	0.23	0.06
Mobile source	47.70	222.71	385.20	1.37	128.75	31.61
Residential natural gas	1.78	23.06	9.81	0.00	1.86	1.86
Commercial natural gas	0.14	1.95	1.64	0.00	0.15	0.15
Waste Hauling	0.00	0.04	0.02	0.00	0.00	0.00
Boating activities	8.10	6.13	151.44	0.02	2.95	2.94
Lake and levee maintenance[b]	0.02	0.26	0.13	0.00	0.00	0.00
Total emissions[c]	**117.23**	**261.68**	**604.51**	**1.44**	**137.14**	**36.95**
Dwelling units operational	5,541					
Commercial ft² operational	1,285,334					
Emissions over SJVAPCD threshold	***107.23***	***251.68***			***122.14***	
Emissions over federal de minimis thresholds	***107.23***	***251.68***	***504.51***	–	***37.14***	–
Significant effect	**Yes**	**Yes**	**Yes**	**No**	**Yes**	**No**
2034						
Construction emissions	5.68	2.77	6.55	0.02	1.20	0.09
Operational emissions	119.88	287.16	644.28	1.56	149.86	40.74
Area source[a]	55.83	0.53	45.77	0.00	0.25	0.06
Mobile source	53.75	251.79	433.70	1.54	144.37	35.44
Residential natural gas	1.98	25.67	10.92	0.00	2.08	2.08
Commercial natural gas	0.20	2.74	2.30	0.00	0.21	0.21
Waste Hauling	0.00	0.04	0.02	0.00	0.00	0.00
Boating activities	8.10	6.13	151.44	0.02	2.95	2.94
Lake and levee maintenance[b]	0.02	0.26	0.13	0.00	0.00	0.00
Total emissions[c]	**125.55**	**289.93**	**650.83**	**1.58**	**151.06**	**40.83**
Dwelling units operational	6,129					
Commercial ft² operational	1,748,000					
Emissions over SJVAPCD threshold	***115.55***	***279.93***			***136.06***	
Emissions over federal de minimis thresholds	***115.55***	***279.93***	***550.83***	–	***51.06***	–
Significant effect	**Yes**	**Yes**	**Yes**	**No**	**Yes**	**No**

	ROG	NO_X	CO	SO_2	PM10	PM2.5
SJVAPCD Thresholds	10.00	10.00	–	–	15.00	–
Federal *de Minimis* Thresholds	10.00	10.00	100.00	100.00	100.00	100.00
2035						
Construction emissions	0.20	1.40	0.94	0.00	0.07	0.06
Operational emissions	133.59	318.80	697.50	1.72	165.33	44.73
Area source[a]	63.41	0.58	50.15	0.00	0.28	0.07
Mobile source	59.63	280.03	480.81	1.70	159.54	39.17
Residential natural gas	2.18	28.28	12.03	0.00	2.29	2.29
Commercial natural gas	0.25	3.47	2.92	0.00	0.26	0.26
Waste Hauling	0.01	0.05	0.02	0.00	0.00	0.00
Boating activities	8.10	6.13	151.44	0.02	2.95	2.94
Lake and levee maintenance[b]	0.02	0.26	0.13	0.00	0.00	0.00
Total emissions[c]	**133.79**	**320.20**	**698.44**	**1.72**	**165.40**	**44.79**
Dwelling units operational	6,716					
Commercial ft^2 operational	2,164,667					
Emissions over SJVAPCD threshold	***123.79***	***310.20***			***150.40***	
Emissions over federal de minimis thresholds	***123.79***	***310.20***	***598.44***	–	***65.40***	–
Significant effect	**Yes**	**Yes**	**Yes**	**No**	**Yes**	**No**

Source: CalEEMod.

[a] Area source includes hearths, residential landscaping, architectural coatings, and consumer products.

[b] Lake maintenance occurs annually once lakes are built (2028). Levee maintenance occurs once every ten years once levees are built (2028).

[c] Total emissions = construction emissions plus operational emissions.

Table 14-13. Modeled Carbon Monoxide Levels at Receptors in the Vicinity of the Proposed Action Area (ppm)

Intersection	Receptor[a]	Existing (2012)		Interim Baseline (2020)		Interim with Action (2020)		Future Baseline (2034)		Future with Action (2034)	
		1–hour CO[b, c]	8–hour CO[c, d]	1–hour CO[b, c]	8–hour CO[c, d]	1–hour CO[b, c]	8–hour CO[c, d]	1–hour CO[b, c]	8–hour CO[c, d]	1–hour CO[b, c]	8–hour CO[c, d]
Golden Valley Parkway/River Islands Parkway (external)[e]	1	–	–	5.50	3.41	5.50	3.41	4.61	2.90	4.70	2.95
	2	–	–	5.04	3.13	5.04	3.13	4.33	2.73	4.42	2.79
	3	–	–	5.58	3.45	5.65	3.50	4.33	2.73	4.70	2.95
	4	–	–	6.03	3.73	6.11	3.77	4.79	3.01	4.98	3.12
I-5 Southbound Ramps/Louise Avenue (external)	5	5.05	3.14	5.27	3.27	5.27	3.27	4.42	2.79	4.51	2.84
	6	4.22	2.64	5.80	3.59	5.73	3.54	4.70	2.95	4.79	3.01
	7	4.22	2.64	6.49	4.00	6.49	4.00	5.08	3.18	5.17	3.23
	8	4.67	2.91	4.51	2.81	4.51	2.81	4.05	2.56	4.05	2.56
Paradise Road/Arbor Avenue (external)[e]	9	–	–	4.59	2.86	4.59	2.86	4.14	2.62	4.33	2.73
	10	–	–	4.36	2.72	5.19	3.22	4.42	2.79	4.61	2.90
	11	–	–	4.43	2.77	5.19	3.22	4.51	2.84	4.70	2.95
	12	–	–	5.27	3.27	5.65	3.50	4.61	2.90	4.79	3.01
D-27 Street/Golden Valley Parkway (internal)[e]	13	–	–	3.83	2.40	3.83	2.40	3.67	2.34	3.86	2.45
	14	–	–	3.67	2.31	3.75	2.36	3.58	2.28	3.86	2.45
	15	–	–	3.98	2.49	4.05	2.54	3.77	2.39	4.05	2.56
	16	–	–	3.45	2.18	3.45	2.18	3.49	2.22	3.58	2.28
Broad Street/Golden Valley Parkway (internal)[e]	17	–	–	3.98	2.49	4.21	2.63	3.77	2.39	4.05	2.56
	18	–	–	3.98	2.49	3.98	2.49	3.77	2.39	3.95	2.50
	19	–	–	4.28	2.68	4.51	2.81	3.95	2.50	4.23	2.67
	20	–	–	3.90	2.45	4.13	2.59	3.77	2.39	3.95	2.50
S. River Islands Parkway/Golden Valley Parkway (internal)	21	2.97	1.83	4.05	2.54	4.05	2.54	3.77	2.39	4.05	2.56
	22	2.97	1.83	3.90	2.45	3.90	2.45	3.67	2.34	3.95	2.50
	23	2.97	1.83	4.59	2.86	4.66	2.91	4.05	2.56	4.33	2.73
	24	3.05	1.83	3.75	2.36	3.75	2.36	3.67	2.34	3.77	2.39

Intersection	Receptor[a]	Existing (2012)		Interim Baseline (2020)		Interim with Action (2020)		Future Baseline (2034)		Future with Action (2034)	
		1–hour CO[b, c]	8–hour CO[c, d]	1–hour CO[b, c]	8–hour CO[c, d]	1–hour CO[b, c]	8–hour CO[c, d]	1–hour CO[b, c]	8–hour CO[c, d]	1–hour CO[b, c]	8–hour CO[c, d]
I-5 Northbound Ramps/Louise Avenue (external)[f]	25	5.51	4.67	–	–	–	–	–	–	–	–
	26	4.52	4.98	–	–	–	–	–	–	–	–
	27	5.05	5.59	–	–	–	–	–	–	–	–
	28	4.67	4.37	–	–	–	–	–	–	–	–
Harlan Road/Louise Avenue (external)[f]	29	3.42	2.91	–	–	–	–	–	–	–	–
	30	2.82	3.09	–	–	–	–	–	–	–	–
	31	3.14	3.46	–	–	–	–	–	–	–	–
	32	2.91	2.73	–	–	–	–	–	–	–	–

Sources: CALINE4; EMFAC2011; U.S. Environmental Protection Agency 2012b.

[a] Receptors 1–24 are 3 meters from the traveled way of each intersection at the boundary of the mixing zone.

[b] Background concentrations of 3.13 ppm and 2.01 ppm were added to the modeling 1–hour and 8–hour results, respectively.

[c] The federal and state 1–hour standards are 35 and 20 ppm, respectively.

[d] The federal and state 8–hour standards are 9 and 9.0 ppm, respectively.

[e] These intersections were not modeled for existing conditions because they are not the intersections with the worst level of service (LOS) and highest traffic volumes for the existing year.

[f] These intersections were not modeled for interim or future year conditions because they are not the intersections with the worst level of service (LOS) and highest traffic volumes for the interim or future years.

Chapter 15
Climate Change

This chapter discusses the relationship of the proposed action and alternatives to greenhouse gas (GHG) emissions: the likely effects of reasonably foreseeable changes in regional climate on the proposed action and alternatives, estimates of GHG emissions that would result from construction and operation of the proposed action and alternatives, and a qualitative description of how a changing climate may affect the proposed action area.

Key sources of data used in the preparation of this chapter are listed below.

- Description of the proposed action and alternatives (Chapter 2 of this EIS).
- Technical Assumptions Memo (Appendix F-2).
- *California Climate Action Team Biennial Report to the Governor and Legislature* (2010).
- *Evaluation of Potential Effects of Global Climate Change on the River Islands Project* (EDAW 2007).
- *Draft Subsequent Environmental Impact Report for the River Islands at Lathrop Project* (City of Lathrop 2002) and addenda (City of Lathrop 2005, 2007, 2012).

15.1 Affected Environment

This section describes the regulations applicable to GHGs; existing climatic conditions; and the GHG inventories at national, state, and local levels for 2006 (considered to be baseline conditions for the purposes of this analysis). A description of current local climatic conditions is presented, along with a description of the reasonably foreseeable changes to local climate.

15.1.1 Regulatory Framework

15.1.1.1 Federal Regulations

Only recently has climate change been widely recognized as posing an imminent threat to the natural environment, people, and the economy. Accordingly, the federal regulatory setting, as it pertains to GHG emissions and climate change, is complex and evolving. The proposed action and alternatives are not currently subject to any federal GHG emissions regulations.

Although there is currently no federal overarching law or policy related to climate change or the emissions of GHGs, recent activity suggests that federal regulation of GHG emissions may be forthcoming. EPA would likely play a critical role in upcoming regulations related to GHGs, although it is not clear at this time to what extent EPA will regulate GHGs without congressional action. The following sections summarize recent legal cases, legislation, and policies related to GHG emissions at the federal level.

Massachusetts vs. EPA (2007)

Twelve U.S. states and cities, including California, in conjunction with several environmental organizations, sued to force EPA to regulate GHGs as a pollutant pursuant to the Clean Air Act (CAA) in *Massachusetts et al. v. Environmental Protection Agency* (549 US 497 [2007]). The court ruled that the plaintiffs had standing to sue, GHGs fit within the CAA's definition of a pollutant, and EPA's justification for not regulating GHGs was insufficiently grounded with regards to the CAA.

EPA "Endangerment" Finding and "Cause or Contribute" Finding (2009)

In its "Endangerment" finding, the EPA Administrator found that GHGs in the atmosphere threaten the public health and welfare of current and future generations. The Administrator also found that the combined emissions of these well-mixed[1] GHGs from new motor vehicles and new motor vehicle engines contribute to the GHG pollution that threatens public health and welfare. In its "Cause or Contribute" finding, the Administrator found that the combined emissions of these well-mixed GHGs from new motor vehicles and new motor vehicle engines contribute to the GHG pollution that threatens public health and welfare (U.S. Environmental Protection Agency 2009a).

Although the Finding of Endangerment does not place requirements on industry, it is an important step in EPA's process to develop GHG regulations. This action is a prerequisite to finalizing EPA's proposed new corporate average fuel economy standards for light-duty vehicles, which EPA proposed in a joint proposal including the Department of Transportation's proposed corporate average fuel-economy standards EPA is still currently in its rule development process for the updated light-duty standards, and the comment period for which was extended to February 13, 2012.

EPA Proposed Rule to Establish Significance Thresholds for GHGs (2009)

In 2002, President George W. Bush set a national policy goal of reducing the GHG emission intensity (tons of GHG emissions per million dollars of gross domestic product) of the U.S. economy by 18% by 2012. No binding reductions were associated with the goal. Rather, EPA established a variety of voluntary programs and partnerships with GHG emitters, specifically industries producing and using synthetic gases, in an effort to reduce emissions of these particularly potent GHGs.

On September 30, 2009, EPA proposed a new rule that would establish significance thresholds for six GHGs. The rule would define when CAA permits under the New Source Review (NSR), and Title V operation permit programs would be required for new and existing facilities. The proposed threshold is 25,000 tons of carbon dioxide equivalent (CO_2e) per year. Facilities exceeding this threshold would be required to obtain a permit that would demonstrate they are using BMPs. EPA estimates that 14,000 large sources would need to obtain permits, the majority of which would be municipal solid waste landfills (U.S. Environmental Protection Agency 2009b).

[1] The term *well-mixed* is used to describe relative ambient concentration patterns of GHGs relative to those of criteria pollutants. Concentrations of criteria pollutants show large concentration gradients with increasing distance from a point source. Consequently, local control measures are highly effective at reducing local ambient concentrations. Atmospheric concentrations of GHGs show very little change in concentration when measured at any global location.

EPA Mandatory Reporting Rule for GHGs (2009)

Under this rule, suppliers of fossil fuels or industrial GHGs, manufacturers of vehicles and engines, and facilities that emit 25,000 metric tons or more per year of GHGs are required to report annual GHG emissions to EPA. The first annual reports for the largest emitting facilities, covering calendar year 2010, will be submitted to EPA in 2011. The mandatory reporting rule does not limit GHG emissions; rather, it establishes a standard framework for emissions reporting and tracking of large emitters (U.S. Environmental Protection Agency 2009c).

Council on Environmental Quality—Draft NEPA Guidance on Consideration of the Effects of Climate Change and Greenhouse Gas Emissions (2010)

In February 2010, CEQ issued a memorandum affirming the applicability of NEPA (40 CFR parts 1500–1508) to GHGs and climate change impacts and issuing draft guidance advising federal agencies to consider opportunities to reduce GHG emissions caused by proposed federal actions and to further adapt these actions to climate change impacts throughout the NEPA process (Council on Environmental Quality 2010). Specifically, the draft guidance recommends that federal agencies consider and qualitatively and quantitatively disclose in the NEPA analysis the effects of climate change for actions that directly emit more than 25,000 metric tons (MT) CO_2e annually. CEQ does not proposes this as a significance threshold for adverse effects, but rather as a trigger point for when an analysis of GHG emissions and disclosure of that analysis should be included in the NEPA document. CEQ guidance directs the quantification of the cumulative emissions over the lifetime of the action. In assessing the potential effects of climate change on the proposed action, CEQ recommends that agencies allow the sensitivity, location, and timeframe of the proposed action to guide the extent to which these effects are analyzed under NEPA.

United States Environmental Protection Agency Regulation of GHG Emissions under the Clean Air Act (2010–2012, ongoing)

Under authority of the CAA, EPA is beginning to regulate GHG emissions starting with large stationary sources. In 2010, EPA set GHG thresholds to define when permits under the New Source Review Prevention of Significant Deterioration (PSD) and Title V Operating Permit programs are required for new and existing industrial facilities. In 2012, EPA proposed a carbon pollution standard for new power plants.

15.1.1.2 State Regulations

The State of California has adopted legislation, and regulatory agencies have enacted policies, addressing climate change and GHG emissions mitigation. Much of this legislation and policy activity is not directed at citizens or jurisdictions but rather establishes a broad framework for the state's long-term GHG mitigation and climate change adaptation program. The governor has also issued several executive orders related to the state's evolving climate change policy.

Currently, there is no state-level regulation articulating a project-level limit on GHG emissions. However, several pieces of recent legislation require analysis and mitigation of GHGs through the CEQA process, while other pieces of legislation have been enacted to improve energy efficiency (24 CCR 11, California Green Building Standards) and reduce GHGs associated with automobile use (Senate Bill [SB] 375). Many of the regulations described below would affect subsequent indirect activities associated with River Islands at Lathrop.

Assembly Bill 1493 Pavley Standards (2005)

Known as "Pavley I," AB 1493 standards are the nation's first GHG standards for automobiles. AB 1493 requires ARB to adopt vehicle standards that will lower GHG emissions from new light-duty autos to the maximum extent feasible beginning in 2009. AB 1493 will reduce GHG emissions from automobiles and light-duty trucks by 30% from 2002 levels by 2016. Additional strengthening of the Pavley standards (Pavley II, now referred to as the "Advanced Clean Cars" measure) has been proposed; consequently, EPA and ARB are currently working together on a joint rulemaking to establish GHG emissions standards for 2017–2025 model-year passenger vehicles. The Interim Joint Technical Assessment Report for the standards evaluated four potential future standards ranging from 47 to 62 miles per gallon in 2025 (U.S. Environmental Protection Agency et al. 2010). In June 2009, EPA granted California's waiver request enabling the state to enforce its GHG emissions standards for new motor vehicles beginning with the current model year. EPA and ARB were still working on this proposal as of February 2012.

Executive Order S-03-05 (2005)

Executive Order (EO) S-03-05 established the following GHG emission reduction targets for California's state agencies.

- By 2010, reduce GHG emissions to 2000 levels.
- By 2020, reduce GHG emissions to 1990 levels.
- By 2050, reduce GHG emissions to 80% below 1990 levels.

Executive orders are binding only on state agencies. Accordingly, EO S-03-05 will guide state agencies' efforts to control and regulate GHG emissions but will have no direct binding effect on local efforts. The Secretary of CalEPA is required to report biannually to the governor and state legislature on the impacts of climate change on California, mitigation and adaptation plans, and progress made toward reducing GHG emissions to meet the targets established in this executive order.

Senate Bills 1078 (2002) and 107 (2009) and Executive Order S-14-08–Renewable Portfolio Standard (2008)

SB 1078 and SB 107, California's Renewable Portfolio Standard (RPS), obligates investor-owned utilities (IOUs), energy service providers (ESPs), and Community Choice Aggregations (CCAs) to procure an additional 1% of retail sales per year from eligible renewable sources until 20% is reached, no later than 2010. The California Public Utilities Commission (CPUC) and California Energy Commission (CEC) are jointly responsible for implementing the program. EO S-14-08 set forth a longer range target of procuring 33% of retail sales by 2020. SB X 1-2, called the California Renewable Energy Resources Act, obligates all California electricity providers to obtain at least 33% of their energy from renewable resources by 2020.

Assembly Bill 32—California Global Warming Solutions Act (2006)

The California Global Warming Solutions Act of 2006, widely known as AB 32, requires ARB to develop and enforce regulations for the reporting and verification of statewide GHG emissions. AB 32 is widely seen as the impetus for much of the awareness of and actions to address climate change within the state. AB 32 codified the state's GHG emissions target by requiring that the state's global warming emissions be reduced to 1990 levels by 2020. California needs to reduce GHG emissions by approximately 29% of business as usual (BAU) projection (based on compliance with requirements in effect under applicable federal and state law) of year 2020 GHG emissions to achieve this goal. Since AB 32 was adopted, ARB, CEC, CPUC, and the Building Standards Commission have been developing regulations that will help meet the goals of AB 32 and EO S-03-05. The Scoping Plan for AB 32 identifies specific measures and actions to reduce GHG emissions to 1990 levels by 2020, and requires ARB and other state agencies to develop and enforce regulations and other initiatives for reducing GHGs. The Scoping Plan outlines the schedule by which the state actions will take place and further identifies the key role that local governments have in reaching the state's GHG reduction target. This has prompted several California air districts to develop guidelines for addressing and mitigating GHG emissions at the project level as part of the CEQA process. Additionally, many local jurisdictions have or are developing Climate Action Plans (CAPs), which chart the local jurisdiction's path to emissions reductions. Projects within a jurisdiction must demonstrate conformity with the CAP once it is adopted.

Executive Order S-01-07—Low Carbon Fuel Standard (2007)

EO S-01-07 essentially mandates (1) that a statewide goal be established to reduce the carbon intensity of California's transportation fuels by at least 10% by 2020, and (2) that a Low Carbon Fuel Standard (LCFS) for transportation fuels be established in California. The executive order initiates a research and regulatory process at ARB. Based on an implementation plan developed by CEC, ARB will be responsible for implementing the LCFS. On December 29, 2011, a federal judge issued a preliminary injunction blocking enforcement of the LCFS, ruling that the LCFS violates the federal regulation that says only Congress can regulate interstate commerce, as the LCFS discriminates against out-of-state fuel suppliers. ARB has appealed this ruling.

Senate Bill 375—Sustainable Communities Strategy, Chapter 728, Statutes of 2008 (2008)

SB 375 provides for a new planning process that coordinates land use planning, regional transportation plans, and funding priorities to help California meet the GHG reduction goals established in AB 32. SB 375 requires that regional transportation plans (RTPs), developed by metropolitan planning organizations (MPOs) relevant to the project area (SJCOG in the case of the proposed action), incorporate a *sustainable communities strategy* (SCS). The goal of the SCS is to reduce regional GHG emissions through land use and transportation planning such that development patterns would lead to reduced vehicle trips and associated emissions. ARB will set regional GHG reduction targets that will in turn be the focus of each SCS, which establishes development patterns that will achieve the GHG reduction targets specified in the SCS. Proposed targets were released on August 9, 2010, and finalized by ARB on February 17, 2011. SB 375 also includes provisions for streamlined CEQA review for some infill projects, such as transit-oriented development. Those provisions will not become effective until an SCS is adopted.

The regional GHG reduction target for SJCOG is a 5% reduction in GHG emissions by 2020. SJCOG is in the process of developing an SCS and is expected to adopt an RTP incorporating the SCS in 2013.

California Energy Efficiency Standards for Residential and Non-Residential Buildings—Title 24 Updates (2008)

Energy Conservation Standards for new residential and nonresidential buildings were adopted by the California Energy Resources Conservation and Development Commission in June 1977 and most recently revised in 2008 (24 CCR 6). Title 24 requires that building shells and building components be designed to conserve energy. The standards are updated periodically to allow consideration and possible incorporation of new energy efficiency technologies and methods. This program has been partially responsible for keeping California's per capita energy use relatively constant over the past 30 years while nationally averaged per capita energy use has increased by 5–8% since 1984 (U.S. Energy Information Administration 2010).

On July 17, 2008, the California Building Standards Commission adopted the nation's first green building standards. The California Green Building Standards Code (proposed Part 11, Title 24) was adopted as part of the California Building Standards Code (24 CCR). Part 11 establishes voluntary standards that became mandatory in the 2010 edition of the code, including planning and design for sustainable site development, energy efficiency (in excess of the California Energy Code requirements), water conservation, material conservation, and internal air contaminants. The currently applicable standards were adopted in 2008. The next standards were adopted in late May 2012 and come into force in 2014.

15.1.1.3 Local Plans and Regulations

River Islands at Lathrop is within the City of Lathrop in San Joaquin County and would be subject to rules and regulations set forth by the City and the County. Additionally, the proposed action area is under the jurisdiction of SJVAPCD, which has recently adopted district-wide guidance and policy related to GHG emissions.

SJVAPCD Climate Change Action Plan (2009)

The proposed action and alternatives are subject to SJVAPCD rules and regulations. Like to other air districts in California, SJVAPCD has adopted guidance for the analysis of GHGs under CEQA.

On August 21, 2008, SJVAPCD adopted its Climate Change Action Plan (CCAP). The goals of the CCAP are listed below.

- Assist local land use agencies with CEQA issues relative to projects with increased GHG emissions.
- Assist valley businesses in complying with the mandates of AB 32.
- Ensure that climate protection measures do not cause increases in toxic or criteria air pollutants that adversely affect public health or environmental justice communities.

As part of the CCAP, SJVAPCD adopted several documents in December 2009 to guide project proponents, permit applicants, and lead agencies in assessing and reducing the impacts of a specific project's GHG emissions on global climate change. Designed primarily for CEQA compliance, these documents include *Final Staff Report – Addressing GHG Emissions Impacts under the California Environmental Quality Act*. SJVAPCD has also issued a guidance document, *Guidance for Valley Land Use Agencies in Addressing GHG Emission Impacts for New Projects under CEQA*, to assist Valley land use agencies in addressing project-specific impacts of GHGs in their role as lead agency for CEQA purposes (San Joaquin Valley Air Pollution Control District 2009a). Under SJVAPCD's approach, projects that incorporate best performance standards (BPSs), as defined by SJVAPCD, would be considered to have a less-than-cumulatively significant impact on climate change, and additional quantitative analysis would not be required. Projects that comply with an adopted statewide, regional, or local GHG reduction plan would also be considered less-than-cumulatively significant under CEQA. Projects that do not sufficiently incorporate BPSs are required to quantitatively demonstrate a 29% reduction in GHG emissions from a BAU projection if their effects are to be considered less than significant.

15.1.2 Existing Conditions

This section describes current and projected climatic conditions in the region and identifies the primary climate change impacts that are expected in the region. This section also describes the major GHGs and their sources and discusses current GHG inventories at the federal, state, and county levels.

15.1.2.1 Methods Used to Identify Existing Conditions

Information on climatic conditions and GHG inventories was gathered from SJVAPCD's GAMAQI document, the California Climate Action Team's (CAT's) *Final Climate Action Team Biennial Report to the Governor and Legislature*, several focused reports from the CAT, the National Oceanic and Atmospheric Administration's (NOAA's) Western Regional Climate Data Center, EPA's National Greenhouse Gas Inventory, ARB's California Greenhouse Gas Emission Inventory, and the *San Joaquin County General Plan Update*.

15.1.2.2 Current Regional Climate

The River Islands at Lathrop site is in the northwestern portion of the SJVAB where the San Joaquin–Sacramento Delta empties into San Francisco Bay. Two hundred fifty miles long and 35 miles wide, the SJVAB is bounded on the east, west, and south by mountains, creating a basin that opens to the north at the Delta. The distinctive climate of the region surrounding the site is determined by its terrain and by its geographic location at the northern end of the valley, the only meteorological opening to the SJVAB.

The SJVAB climate is generally characterized as "inland Mediterranean," with warm dry summers, cool, humid winters, and daily temperature variations on the order of 30°F (San Joaquin Valley Air Pollution Control District 2002). The average maximum summer temperature is between 92°F and 94°F and occurs in July or August (Desert Research Institute 2002). The northern SJVAB typically experiences approximately 15–20 days per year of temperatures exceeding 100°F (Gershunov et al. 2009). The average minimum winter temperature is between 36°F and 38°F and occurs in December or January. Winter minimum temperatures, however, are rarely below 32°F (Desert Research Institute 2002). Precipitation falls predominantly as rain between November and March, with total annual rainfall of roughly 12 inches per year (Desert Research Institute 2002; City of Lathrop 2009). The Pacific storm track dips to the south in the winter months, bringing cool moist air into the northern SJVAB.

Due to the presence of mountains on three sides, air circulation throughout the SJVAB is generally poor; consequently, the SJVAB has serious air quality concerns. The prevailing wind pattern in the summer months is from the northwest as ocean air is drawn into the SJVAB through the Carquinez

Strait in response to large prevailing pressure gradients. Winds in the winter months are lighter and more variable and the region often experiences maritime conditions in response to Pacific storms (San Joaquin Valley Air Pollution Control District 2002). The height of the Sierra Nevada keeps cold interior air out of the valley in the winter months.

15.1.2.3 Projected Changes to Regional Climate

EO S-03-05 requires that every 2 years, the CAT, a panel of sector experts from across California state agencies, prepare for the governor and legislature an assessment report of climate change impacts and adaptation strategies for the state. The CAT reports represent the best available science regarding projected changes to climate throughout the state. This section summarizes data presented in the 2009 CAT report, completed in April 2010.[2]

Temperatures in the greater Sacramento region are projected to be approximately 0.5–2.0°C warmer than historical averages by 2030 and between 1 and 6°C warmer by the end of the century (California Climate Action Team 2010a). These projections are consistent with temperature projections across the state. Summer temperatures will likely show a more pronounced increase and will be accompanied by longer, hotter, and more frequent heat wave events (California Climate Action Team 2010a). Precipitation in the region will generally retain the same seasonal pattern, with the majority of precipitation falling in winter months. Climate models show a roughly 10% decrease in annual rainfall compared to historical conditions for much of California by 2050 (California Climate Action Team 2010). This decrease combined with increased evapotranspiration due to higher temperatures will create an overall drier climate in the region. Warming temperatures will hasten peak spring melting of the Sierra snowpack. Earlier melting of snow will affect flows and timing of peak events in California rivers (California Climate Action Team 2010). Because California's water system was designed to simultaneously achieve water storage and flood risk management objectives based on historical melting and runoff patterns, the state's water system may be severely challenged under a future climate regime (California Climate Action Team 2010). Areas prone to flooding, such as the Delta, may be more vulnerable in the future as the state's water storage and flood risk management systems must be adapted to a new climate.

Air quality in the SJVAB, as discussed in Chapter 14, is among the worst in the nation and will likely worsen with the effects of climate change. Many of the chemical reactions that produce ozone and particulate matter, pollutants of principal concern in the SJVAB, are accelerated under higher temperatures. Warmer temperatures may also facilitate meteorological conditions (i.e., inversions) that prevent pollutants from dispersing. Further, warmer temperatures will also increase the rate at which biogenic sources release pollutant precursors. Several studies indicate that the effects of a warmer lower atmosphere could largely offset air quality improvements made through regulation and technological advances (California Climate Action Team 2010).

15.1.2.4 Projected Consequences of Climate Change in the Region

The California Natural Resources Agency (2009) and California Climate Change Center (Moser et al. 2009) identify the following consequences of climate change as primary concerns to the state of California.

- Sea level rise.

[2] A more recent CAT report was published in December 2010, but it did not contain quantitative impact discussions as contained in the CAT report released in April 2010.

- Increased frequency and intensity of wildfires.
- Increased frequency and intensity of extreme heat events.
- Diminished Sierra snowpack.
- Increased frequency of extreme precipitation and/or flooding events.
- Shifts in precipitation patterns and amounts.
- Shifts in plant and animal distributions.

Of these, sea level rise and extreme heat events pose the most significant threats to the proposed action area because of its location. Secondary impacts that will result from climate change include increased energy demand, stresses on agriculture, deterioration in air quality, and water management challenges.

Sea Level Rise

Sea level rise would potentially affect the performance of existing and proposed flood risk reduction elements of the River Islands at Lathrop project. Model runs performed as part of a scientific study at Scripps Institution of Oceanography indicate that global sea level will rise approximately 30–45 centimeters relative to 2000 levels before 2050, increasing the frequency of high sea level events that occur in conjunction with high tides and winter storms on the Pacific coast (Cayan et al. 2009). San Francisco Bay will likely experience a 40 centimeter increase in sea level in the Bay by 2050 and 140 cm by 2100 (Bay Conservation and Development Commission 2009), inundating much of today's 100-year floodplain by 2050 (approximately 180,000 acres of Bay shoreline). A recent study prepared by the San Francisco Bay Conservation and Development Commission (BCDC) shows that much of the area north and east of Honker and Grizzly Bays would be inundated by 2050. The BCDC study did not examine the effects of sea level rise at locations farther south and east in the Delta, such as Stewart Tract. It is unknown exactly how areas farther inland in the Delta would be affected by a 40 cm or 140cm rise in sea level. However, the BCDC report concludes that high water events throughout the Bay area will be more frequent in the future such that today's 100-year flood event will be a typical high tide event in 2050. Higher and more frequent extreme high ocean tide events, combined with changes in the timing and amount of fresh water flow entering the Delta from the east, will further stress flood risk reduction infrastructure in the Delta.

Extreme Heat Events

Warming temperatures will increase the frequency and intensity of extreme heat events in California (Mastrandrea et al. 2009). Peak temperatures, frequency, and event duration will be highest in interior areas. Projections for the northern San Joaquin Valley show that after 2050, 60–80% of years will have at least one extreme heat wave event (Mastrandrea et al. 2009). Extreme heat events increase the incidence of heat-related death and emergency room visits as well as health problems attributable to increased ambient ozone and particulate matter levels. Moreover, extreme heat events place exceptional demands on energy supplies and infrastructure, increasing the likelihood of power outages.

Extreme Rainfall and Precipitation

Many climate models indicate a general drying of the region's climate before 2100; however, several of these models simultaneously indicate that the precipitation that does fall will fall in fewer, more intense events (Kim et al. 2009). More intense precipitation events combined with earlier winter runoff and rising sea levels, discussed above, will stress flood risk reduction infrastructure in the Delta.

Energy Demand and Water Scarcity

Energy demand in California will increase at a greater rate than population because (1) average and extreme temperatures will be warmer, increasing statewide summer cooling demand, and (2) future population growth is anticipated in the warmer central areas of the state. Studies suggest as much as a 17% increase in residential energy expenditures, even accounting for gains in energy efficiency, due solely to climate change in California (California Climate Action Team 2010). Decreased hydrologic power capacity in response to a smaller Sierra snowpack could further challenge the state's energy supply.

15.1.2.5 Greenhouse Gases

In keeping with Intergovernmental Panel on Climate Change (IPCC) and EPA protocols, the emissions of the following greenhouse gases are considered in this analysis: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6). California law and the State CEQA Guidelines specify a similar definition of GHGs (Health and Safety Code 38505[g]; 14 CCR 15364.5). Emissions are reported in MT CO_2e. Table 15-1 lists the global warming potential (GWP) of each GHG, its atmospheric lifetime, and abundance in the atmosphere in parts per million (ppm).

Table 15-1. Residence Time, Global Warming Potentials, and Abundances of Significant GHGs

Gas	GWP (100 years)[a,b]	Residence Time (years)[c]	2005 Atmospheric Abundance (ppm)
CO_2	1	50–200	379
CH_4	21	9–15	1.7
N_2O	310	120	0.32
HFC-23	11,700	264	1.8×10^{-5}
HFC-134a	1,300	14.6	3.5×10^{-5}
HFC-152a	140	1.5	3.9×10^{-6}
CF_4	6,500	50,000	7.4×10^{-5}
C_2F_6	9,200	10,000	2.9×10^{-6}
SF_6	23,900	3,200	5.6×10^{-6}

Sources: Intergovernmental Panel on Climate Change 1996, 2001, 2007.

Notes: CF_4 and C_2F_6 are PFCs.

[a] The global warming potential (GWP) is a measure of a gas's heat-absorbing capacity relative to a reference gas, CO_2, which is defined as having a GWP of 1. It is assessed in the present-day atmosphere with its effect integrated over a period of 100 years, relative to CO_2.

[b] The GWP values presented above are based on the IPCC Second Assessment Report (SAR) and United Nations Framework Convention on Climate Change (UNFCCC) reporting guidelines (Intergovernmental Panel on Climate Change 1996; UNFCCC 2003). Although the IPCC Fourth Assessment Report (AR4) presents different GWP estimates, the current inventory standard relies on SAR GWPs to comply with reporting standards and consistency with regional and national inventories (U.S. Environmental Protection Agency 2010).

[c] The atmospheric residence time of a gas, or lifetime, is equal to the total atmospheric abundance of the gas divided by its rate of removal.

Carbon Dioxide

Primary sources of anthropogenic CO_2 in the atmosphere are the burning of fossil fuels (including motor vehicles), gas flaring, cement production, and land use changes (most importantly deforestation). CO_2 emissions due to the burning of fossil fuels represent nearly 60% of total GHG emissions worldwide, of which approximately 23% is from the transportation sector.

Methane

CH_4 is the second most abundant GHG and is 21 times more effective as a greenhouse gas than CO_2 (Intergovernmental Panel on Climate Change 1996). Anthropogenic emissions of CH_4 are the result of growing rice, raising cattle, combusting natural gas, and mining coal (National Oceanic and Atmospheric Administration 2005). The decomposition of waste in landfills, although not a large source worldwide, can be significant at local levels.

Nitrous Oxide

Anthropogenic sources of N_2O include agricultural processes, nylon production, fuel-fired power plants, nitric acid production, and vehicle emissions. More than 70% of U.S. N_2O emissions are related to agricultural soil management practices, particularly fertilizer application (National Oceanic and Atmospheric Administration 2008).

Hydrofluorocarbons

HFCs are human-made chemicals used in commercial, industrial, and consumer products and have high GWPs (U.S. Environmental Protection Agency 2008). HFCs are generally used as substitutes for ozone-depleting substances (ODS) in automobile air conditioners and refrigerants. The most abundant HFCs are HFC-134a ($3.5x\ 10^{-5}$ ppm), HFC-23 (1.8×10^{-5} ppm), and HFC-152a ($3.9x10^{-6}$ ppm). Concentrations of HFCs have risen from zero to current levels.

Perfluorocarbons

The most abundant PFCs are CF_4, also known as PFC-14 ($7.4x10^{-5}$ ppm), and C_2F_6, also known as PFC-116 ($2.9x10^{-6}$ ppm). These human-made chemicals are emitted largely from aluminum production and semiconductor manufacturing processes. PFCs are extremely stable compounds that are destroyed only by very high-energy ultraviolet rays; this characteristic results in the very long lifetimes of these chemicals, as shown in Table 15-1 (U.S. Environmental Protection Agency 2008).

Sulfur Hexafluoride

SF_6, another human-made chemical, is used as an electrical insulating fluid for power distribution equipment, in the magnesium industry, and in semiconductor manufacturing, and also as a trace chemical for the study of oceanic and atmospheric processes (U.S. Environmental Protection Agency 2008).

15.1.2.6 Greenhouse Gas Inventories

A GHG inventory is a quantification of all GHG emissions and sinks within a selected physical and/or economic boundary. Emissions are generally inventoried within the following broad sectors: transportation, building energy use, waste, agriculture, electricity generation, and water. Sectors may vary depending on the dominant sources within the inventory boundary. GHG inventories for the United States, California, and the unincorporated areas of San Joaquin County are listed in Table 15-2. At the time of writing this document, the City has not performed a GHG inventory. The inventories provided in Table 15-2 are not used to determine adverse effects but are provided as context in an effort to fully disclose the GHG emissions that may result from the proposed action and alternatives.

Table 15-2. GHG Emissions Inventories

Sector	MT CO_2e
U.S. National Greenhouse Gas Inventory (2010)	
Transportation	1,834,000,000
Electric Power Industry	2,306,500,000
Residential Energy Consumption	365,200,000
Commercial Energy Consumption	381,700,000
Industry	1,394,200,000
Agriculture	484,800,000
U.S. Territories	45,500,000
Total U.S. emissions (2006)	6,821,800,000
California State Greenhouse Gas Inventory (2009)	
Transportation	172,920,000
Electricity Power Industry	103,580,000
Residential and Commercial Energy Consumption	42,950,000
Recycling and Waste	7,320,000
Industry	81,360,000
Agriculture and Forestry	32,32,000
High GWP GHGs	16,320,000
Total California emissions (2009)	456,770,000
San Joaquin County Greenhouse Gas Inventory (2007)	
Transportation	3,005,613
Residential Energy Consumption	262,589
Commercial Energy Consumption	538,338
Industry	30,605
Waste	43,851
Agriculture	951,024
Total San Joaquin County emissions (2007)	4,832,020

Sources: San Joaquin County 2008; U.S. Environmental Protection Agency 2012; California Air Resources Board 2011.

GHG emissions that could result from the proposed action and alternatives were calculated and compared in the following sectors.

- Mobile sources.
- Residential and commercial electricity consumption.
- Residential and commercial natural gas consumption.

- Waste generation.
- Water consumption, area sources.
- Other sources (wastewater treatment, public lighting, golf course maintenance, boating, lake and levee maintenance).

GHG emissions were calculated using methodologies consistent with Office of Planning and Research (OPR) guidance for analysis under CEQA (California Governor's Office of Planning and Research 2008) and recommended inventory approaches for local governments (ICLEI 2008). Emissions associated with the proposed action and alternatives are discussed and compared in *Environmental Consequences*.

15.2 Environmental Consequences

15.2.1 Methods for Analysis of Effects

In keeping with CEQ guidance for addressing climate change in NEPA documents (Council on Environmental Quality 2010), this analysis evaluates the following two effects.

- The effect of the GHG emissions from the proposed action and alternatives on climate change.
- The effect of reasonably foreseeable impacts of climate change on the proposed action and alternatives.

To assess the effects of the proposed action and alternatives on state and regional emissions of GHGs, GHG emissions from construction and operation of the proposed action were quantified using standard and accepted software tools, techniques, and GHG inventory protocols and emission factors as available from the California Climate Action Registry (CCAR), EPA, ARB, IPCC, and ICLEI—Local Governments for Sustainability (ICLEI).

The CalEEMod (version 1.1.1) model was used to calculate emissions of CO_2 from construction activities and worker trips according to the construction schedule as provided by River Islands (Appendix F-3). Key construction activities captured in the model are operation of construction equipment used for grading, paving, construction of residential and commercial development, construction of public infrastructure and finishing, lake and levee soil hauling and construction, and construction of public amenities.

Operational emissions associated with the proposed action and alternatives were estimated using the CalEEMod, the OFFROAD2007 model, and off-line Excel-based calculations using emission factors from CCAR, EPA, CARB, IPCC, and ICLEI. Components of the River Islands at Lathrop community were assumed to become operational on the schedule provided by River Islands (Appendix F-2). GHGs resulting from mobile sources were calculated using VMT data provided by the traffic consultant (Appendix E). GHG emissions at full buildout were estimated for the following source sectors: mobile sources, residential and commercial electricity consumption, residential and commercial natural gas consumption, waste generation, water use, wastewater treatment, golf course maintenance, lake and levee maintenance, public lighting, and area sources. A full description of methodology and assumptions for GHG emission quantification can be found in Appendix F-1.

15.2.2 Definition of Significant Effects

As analyzed in this EIS, construction of the proposed action includes both the components that require Corps permitting and those that do not require Corps permitting but that would not proceed without the federal-nexus components. Operation includes all Phase 2B elements. All elements of the proposed action were considered in defining a significant effect.

In the absence of other available guidance at either the national or state level for defining a significant effect related to climate change for NEPA analyses, and in the absence of specific policy from the Corps regarding the definition of a significant effect related to climate change under NEPA, SJVAPCD's CEQA guidance is considered to be the best available resource for examining the proposed action's relationship to climate change.

As previously indicated, CEQ issued draft guidance to lead agencies affirming that NEPA requires the evaluation of climate change impacts in environmental analyses. Further, CEQ (Council on Environmental Quality 2010) directs lead agencies to consider the following two aspects of climate change when determining adverse effects of a proposed action.

- The effects of GHG emissions from a proposed action and alternatives.
- The relationship of climate change effects to a proposed action or alternatives, including the relationship to proposal design, environmental impacts, mitigation, and adaptation measures.

CEQ's draft guidance does not propose a quantitative threshold for determining if GHG emissions of a proposed action would result in a significant effect, nor does it establish a threshold for determining a significant effect of climate change on a proposed action. Instead, the draft guidance recommends that federal agencies consider and disclose (either qualitatively or quantitatively) in the NEPA analysis the effects of climate change for actions that directly emit more than 25,000 MT CO_2e annually, and that the action agency should make the determination of significance under NEPA based on the action-specific analysis of the context and intensity of the environmental impacts. Procedures used in this EIS to determine a significant effect are described below for each aspect listed above.

15.2.2.1 Effects of GHG Emissions from the Proposed Action and Alternatives

CEQ's draft guidance states that annual emissions of 25,000 MT CO_2e may be used as a *trigger* to determine if an evaluation of a proposed action's GHG emissions should be performed and disclosed in a NEPA analysis. However, it is important to note that this 25,000 MT CO_2e trigger is not a threshold for the determination of significant effects but is rather meant to determine when an analysis of GHG emissions and impacts should be performed and disclosed in a NEPA analysis. The assessment of emissions associated with the construction and operation of River Islands at Lathrop, addressed in Section 15.2.3, *Effects and Mitigation Approaches*, indicates that the CEQ trigger would be exceeded and that an evaluation of effects related to GHG emissions from the proposed action and alternatives should be prepared and disclosed.

Since the California legislature passed AB 32, various air districts in California have begun the process of developing or adopting GHG emission thresholds for CEQA that are consistent with the goals set forth by the law. Specifically, the state has committed to reducing GHG emissions to a level that is 15% below 2005 levels or 29% below a BAU projection of emissions for 2020. The River

Islands at Lathrop site is within SJVAPCD's jurisdiction. In the absence of a specific federal definition of what would constitute a significant impact pertaining to GHG emissions and through consultation with the Corps, guidance established by SJVAPCD has been used to determine the level at which GHG emissions would result in a significant effect.

On December 17, 2009, SJVAPCD adopted the *Guidance for Valley Land Use Agencies in Addressing GHG Emissions Impacts for New Projects under CEQA* (San Joaquin Valley Air Pollution Control District 2009b). This document is non-binding. It is used internally within SJVAPCD when the agency acts as lead agency under CEQA and for other lead agencies that opt to follow this guidance for actions within SJVAPCD's jurisdiction. The SJVAPCD guidance indicates that existing science is inadequate to determine whether a significant impact related to climate change would result from a single project. Instead, the SJVAPCD concludes that climate change is cumulative in nature and this cumulative impact is best addressed by requiring that all projects subject to CEQA reduce their GHG emissions through project design elements. SJVAPCD has established a four-tiered approach to evaluating the significance of project impacts related to climate change, briefly described below.

1. **CEQA exemption.** Projects that are exempt from CEQA do not require analysis and are assumed to have a less-than-significant individual and cumulative impact. Projects exempt under CEQA would not be required to implement BPSs and would not require further environmental review (i.e., analysis of project-specific GHG emissions).
2. **Projects complying with an approved GHG emission reduction plan or GHG mitigation program.** Projects complying with an approved GHG emission reduction plan or GHG mitigation program that avoids or substantially reduces GHG emissions within the same geographic area would be determined to have a less-than-significant individual and cumulative impact and would not be required to implement BPSs or quantify project-specific GHG emissions. The GHG emission reduction plan or GHG mitigation program must be specified in law or approved by the lead agency with jurisdiction over the affected resource and supported by a CEQA-compliant environmental review document adopted by the lead agency.
3. **Projects implementing best performance standards.** BPSs are SDJVAPCD-approved, Achieved-In-Practice emission reduction measures that, in combination, will reduce or limit GHG emissions by at least 29% compared to a BAU projection. Projects that implement a suite of BPSs are assumed to have a less-than-significant individual and cumulative impact and would not require quantification of project-specific GHG emissions.
4. **Projects *not* implementing best performance standards.** Projects that do not implement BPSs must quantify project-specific GHG emissions and reduce or mitigate project-specific GHG emissions by at least 29%, compared to a BAU projection. Projects that reduce or mitigate project-specific GHG emissions by at least 29% would be determined to have a less-than-significant individual and cumulative impact.

Projects that fall into categories 1–3 above are exempt from quantification, but this quantification exemption does not apply to projects that must prepare an environmental impact report (EIR) under CEQA. Those projects that either implement BPSs or reduce/mitigate GHG emissions by 29%, compared to BAU projections, would be determined to have a less-than-significant individual and cumulative impact.

ARB defines BAU as emissions occurring in 2020, if the average baseline emissions during 2002–2004 were grown to 2020 levels without actions taken to lessen GHG emissions. Based on ARB's definition of BAU, SJVAPCD defines BAU as 2002–2004 emissions factors, on a unit of activity basis, multiplied by the activity expected to occur in 2020.

The proposed project is not exempt from CEQA or NEPA and neither the City nor County have adopted GHG reduction plans or established GHG reduction targets for 2020, nor has SJVAPCD adopted a list of approved BPSs for development projects. Consequently, according to the SJVAPCD guidelines, the proposed action would result in a significant effect related to GHG emissions if reduction or other minimization measures incorporated into the design, construction, and/or operation of the project are not sufficient to achieve a 29% reduction in GHG emissions relative to BAU, as defined by SJVAPCD. Based on guidance provided by SJVAPCD, projects under SJVAPCD jurisdiction that do not achieve a 29% reduction are considered inconsistent with the state's GHG reduction plan and would result in a significant impact related to climate change.

As of the writing of this analysis, SJVAPCD has not completely formalized or adopted an approved list of BPSs to adequately achieve the 29% emission reductions required by SJVAPCD to successfully reduce GHG emissions from land use development projects to a less-than-significant level on an individual and cumulative basis. In the meantime, SJVAPCD has developed an *Interim GHG Emissions Reductions Calculator* that identifies various draft reduction and minimization measures that may be incorporated into the design, construction, and operation of the project to assess and reduce impacts of project-specific GHG emissions. If available and appropriate reduction measures from the interim GHG emissions reduction calculator are implemented into the design, construction, and operation of the project sufficient to achieve the 29% emission reductions required by the SJVAPCD, the project would be deemed to result in a less-than-significant impact related to climate change.

15.2.2.2 Effects of Climate Change on the Proposed Action and Alternatives

To assess the effects of reasonably foreseeable impacts of climate change on the proposed action and alternatives, this analysis relied on state-level reports, a focused flood risk reduction study of climate change impacts on River Islands at Lathrop (EDAW 2007), and professional judgment. The flood risk reduction study addresses the likelihood of flooding and the integrity of the proposed levee system in the context of several sea level rise scenarios.

There are currently no federal guidelines available for determining a significant effect of climate change on a proposed action. Neither the State of California nor any local agency in California has established a threshold by which to determine a significant effect of climate change on an action or project; however, the State of California has prepared a statewide climate adaptation strategy identifying a statewide, ongoing, and committed process of adapting to a changing climate in the context of other changes in the environment, the economy, and society. The development of the adaptation strategy helps to effectively anticipate future challenges and change actions that will ultimately reduce the vulnerability of residents, resources, and industries to the consequences of a variable and changing climate. The objectives of the adaptation strategy are listed below.

- Analyze climate change risks.
- Identify sector-specific and, to the extent possible, cross-sectoral adaptation strategies that help reduce vulnerabilities and build climate resilience.
- Explore cross-cutting supportive strategies.
- Formalize criteria for prioritizing identified adaptation strategies.

- Specify future direction.
- Provide recommendations for immediate and near-term priorities for implementing identified adaptation strategies.
- Inform and engage the California public about climate change risks and adaptation strategies.

While the state's adaptation strategy does not contain any guidance specific to NEPA/CEQA, it does identify a strategy of integrating land use planning and climate adaptation planning. The state strategy recommends revising the State CEQA Guidelines to direct lead agencies to evaluate the impacts of locating development in areas susceptible to hazardous conditions, including hazards potentially exacerbated by climate change.

The proposed action would result in significant effects related to the impacts of climate change if people, property, or the natural environment are at an increased vulnerability to the reasonably foreseeable impacts of climate change and/or a reduction in the ability of the natural environment to adapt to the reasonably foreseeable impacts of climate change.

15.2.3 Effects and Mitigation Approaches

CEQ's draft GHG guidance recommends methodologies to quantify GHG emissions from federal actions. The methodologies recommended by CEQ's guidance primarily relate to the quantification of large emitting facilities, such as power plants, coal mines, and other large industrial facilities. To perform a project-level analysis of emissions related to construction and operation of a land use project, existing tools that are accepted as current practice and recommended by the various local regulatory air quality agencies within the state were used to quantify GHG emissions resulting from the River Islands at Lathrop project.

The analysis of GHG emissions associated with the proposed action and alternatives entails an evaluation of both direct and indirect emissions associated with the proposed action and alternatives. Direct emissions consist of those emissions directly resulting from the Corps's permitting and approval processes (i.e., emissions associated with levee work resulting from the Corps's action), while indirect emissions consist of those emissions indirectly associated with the Corps's permitting and approval processes (i.e., emissions associated with construction and operation of River Islands at Lathrop). While the Corps may not have continuing program responsibility or ability to practically control emissions resulting from construction and operation of River Islands at Lathrop, NEPA does require an analysis of all reasonably foreseeable direct and indirect emissions associated with federal actions.

This analysis does not evaluate GHG emissions resulting from land use changes associated with the proposed action and alternatives (i.e., conversion of farm and open space land to developed land), as estimating these emission sources is generally considered uncertain and speculative. They are typically included as scope 3 emissions (indirect emissions not associated with the consumption of purchased or acquired electricity, steam, heating, or cooling that are not owned or controlled by the reporting entity or jurisdiction) in recommended GHG inventory methodologies (ICLEI 2008). This analysis does not analyze GHG emissions relative to an identified baseline condition, as is typically done for local jurisdictions (e.g., existing, 1990, 2005, and 2020 levels). GHG emission sources associated with River Islands at Lathrop are not currently active, because this construction would commence in 2012. Consequently, GHG emissions at full buildout are analyzed relative to the emission reductions potential of the project as designed (i.e., the BAU scenario) and are not analyzed relative to existing conditions (i.e., the undeveloped Stewart Tract), under which no relevant emissions are anticipated from the site.

In addition to assessing the effects of the proposed action on GHG emissions, CEQ guidance (Council on Environmental Quality 2010) also directs project proponents to analyze the impacts of climate change on a proposed action. To better inform the Corps's evaluation of the proposed action, a detailed report—*Evaluation of Potential Effects of Global Climate Change on the River Islands Project* (EDAW 2007)—was prepared to address the impacts of climate change, specifically sea level rise, at Stewart Tract. The results of this study are discussed in relation to operation of River Islands at Lathrop after 2035, the first full operational year of the development. Climate models, as well as the flood risk reduction study, commonly forecast impacts and climate conditions in 2050 and 2100. Consequently, emissions during the period of construction (2019–2034) are unknown, but they are certainly less than those predicted for 2050 and 2100. Due to a lack of appropriate data for the time period 2015–2034, the impacts of climate change on the construction component of the proposed action are not discussed. However, it is anticipated that impacts resulting from climate change would be more severe in distant years (i.e., 2035) compared to near-term (i.e., interim years of 2015–2034), as climate change is anticipated to worsen over time due to its cumulative nature.

Although there is currently no threshold by which to compare a proposed action's emissions, NEPA guidance indicates that projects should reduce emissions and adapt their actions to climate change impacts throughout the NEPA process. Consequently, mitigation measures are proposed to help minimize and ameliorate potential effects on the proposed action.

GHG emissions result from both construction and operation of the proposed action. Table 15-3 provides a summary of construction-related GHG emissions by year for 2015–2034, as construction is anticipated to commence in 2012 and end in 2031. Table 15-4 presents operational emissions by year for 2016–2035. 2035 represents the buildout year of the entire project, when all project components are anticipated to be fully constructed and operational. During 2015–2034, operational components are assumed to be fully operational the year following cessation of construction (e.g., those project components built in 2015 are assumed to be fully operational in 2016). Consequently, this analysis evaluates the combined construction and operational emissions for each interim year between 2015 and 2034, as well as total operational emissions associated with project buildout in 2035.

Table 15-3. Total Estimated GHG Emissions from Construction of River Islands at Lathrop by Year

Year of Construction	Off-Road Emissions (metric tons/yr)[a]			On-Road Emissions (metric tons/yr)[b]		Total Emissions (metric tons/yr) (CO_2e)
	CO_2	CH_4	N_2O	CO_2	Other (CO_2e)[c]	
2015	294	0.02	0.009	8	0.4	306
2016	294	0.01	0.004	7	0.35	303
2017	918	0.05	0.022	1,484	74.2	2,484
2018	918	0.05	0.022	23	1.15	950
2019	3,306	0.19	0.085	2,994	149.7	6,480
2020	5,041	0.29	0.130	8,458	422.9	13,968
2021	4,820	0.25	0.112	2,723	136.15	7,719
2022	4,083	0.20	0.090	3,659	182.95	7,957
2023[d]	7,086	0.35	0.157	8,711	435.55	16,289
2024	4,792	0.21	0.094	3,159	157.95	8,143
2025	3,859	0.16	0.072	5,890	294.5	10,069
2026	2,223	0.09	0.040	2,106	105.3	4,449
2027	3,380	0.14	0.063	3,942	197.1	7,542
2028	2,805	0.11	0.049	3,798	189.9	6,810
2029	3,648	0.15	0.067	1,894	94.7	5,661
2030	5,136	0.19	0.085	1,675	83.75	6,925
2031	2,520	0.09	0.040	11,805	590.25	14,930
2032	2,945	0.11	0.049	7,992	399.6	11,354
2033	1,701	0.06	0.027	2,205	110.25	4,026
2034	698	0.03	0.013	872	43.6	1,618
Total	**60,469**	**2.77**	**1.23**	**73,407**	**3,670**	**137,981**
Amortized Emissions[e]	1,512	0.07	0.03	1,835	92	3449

Sources: CalEEMod (v2011.1.1)

Note: Construction is complete in 2034. CalEEMod does not model N2O emissions from mobile sources.

[a] From construction equipment (diesel).

[b] From vendor trips, on-road trucks, and worker commutes (mix of fuels).

[c] Other GHGs include CH_4, N_2O and HFCs from on-road passenger vehicles (construction worker trips), which represent 5% of total GHG emissions (calculated by dividing CO_2 emissions by 0.95 and multiplying the resulting number by 0.05).

[d] Year of maximum construction emissions.

[e] Amortized over the projected 40-year lifetime of the project (this is likely conservative).

Table 15-4. Total Estimated GHG Emissions from Operation of River Islands at Lathrop by Year

Year of Operation	Mobile Source (metric tons/yr)[a]			Buildings and Municipal (metric tons/yr)[b]				Total Emissions (metric tons/yr) (CO_2e)
	CO_2	CH_4	N_2O	CO_2	CH_4	N_2O	SF_6	
2015	40.5	0.03	0.01	0.0	0.00	0.00	0.00	44.4
2016	81.0	0.06	0.02	0.0	0.00	0.00	0.00	88.7
2017	122.5	0.07	0.03	0.0	0.00	0.00	0.00	133.1
2018	163.4	0.09	0.04	0.0	0.00	0.00	0.00	177.5
2019	289.3	0.16	0.07	0.0	0.00	0.00	0.00	314.3
2020	6,141.2	0.39	0.09	1,310.3	4.70	0.02	0.00	7,599.9
2021	11,799.8	0.59	0.11	2,470.2	8.75	0.04	0.00	14,527.7
2022	14,925.7	0.66	0.13	4,376.3	15.44	0.07	0.00	19,726.3
2023	20,161.4	0.84	0.14	6,540.9	22.14	0.11	0.00	27,299.7
2024	31,706.1	1.19	0.16	10,463.4	42.59	0.17	0.00	43,253.2
2025	38,059.1	1.32	0.18	12,720.4	51.50	0.21	0.00	52,084.4
2026	38,146.1	1.36	0.20	12,866.0	51.64	0.21	0.00	52,329.8
2027	51,340.9	1.68	0.21	17,900.1	68.18	0.30	0.00	70,968.2
2028	65,050.5	2.06	0.23	23,138.6	85.37	0.38	0.01	90,347.4
2029	80,404.3	2.48	0.25	29,037.0	104.71	0.48	0.01	112,086.8
2030	90,555.9	2.60	0.25	34,071.1	121.25	0.56	0.01	127,675.5
2031	90,555.9	2.60	0.25	34,227.9	121.25	0.57	0.01	127,834.7
2032	104,694.3	2.91	0.24	41,797.1	187.30	0.69	0.01	151,030.9
2033	120,110.9	3.29	0.24	49,675.4	259.93	0.82	0.01	175,959.7
2034	134,638.7	3.65	0.24	57,466.2	322.86	0.94	0.02	199,706.9
2035	148,751.7	3.99	0.24	65,058.2	387.66	1.06	0.02	222,876.3
Total	**1,047,739.25**	**32.06**	**3.35**	403,160.7	1,855.27	6.64	0.10	1,496,065.3

Sources: EMFAC2011; CalEEMod (v.2011.1.1); The Climate Registry 2012; USEPA 2012; Climate Registry Information System 2012.

Note: Full build out operations scenarios were used.

[a] Emissions from on-road vehicles, based on VMT provided by the transportation engineer, and boating activity

[b] Emissions from residential and commercial electricity consumption, residential and commercial natural gas consumption, waste generation, water use, wastewater treatment, golf course maintenance, lake and levee maintenance, public lighting, and area sources.

Table 15-5 and Figure 15-1 summarize combined construction and operational emissions for 2015–2035. Table 15-5 and Figure 15-1 indicate that 2035 represents the worst-case emissions year, with emissions resulting solely from project operations, since the project will be fully built out and operational in 2035. Table 15-6 and Figure 15-2 present a detailed summary of annual operational emissions presented by source sector (residential, commercial, and municipal energy use; mobile source; direct municipal source; and area source) for the 2035 buildout year. The data in Table 15-6 and Figure 15-2 are considered to be representative of typical, annual operational emissions. Table 15-6 and Figure 15-2 also present total construction emissions amortized over the entire period of construction (2019–2035) to provide a conservative analysis of total emissions (construction and operational) that could occur over the project's assumed lifetime of 40 years, based on 2035 emissions data. It should be noted that these emissions represent a conservative estimate of emissions, and emissions over the 40-year assumed lifetime of the project are likely to be lower than those reported in Table 15-6 and Figure 15-2, as the emission calculations are based on static

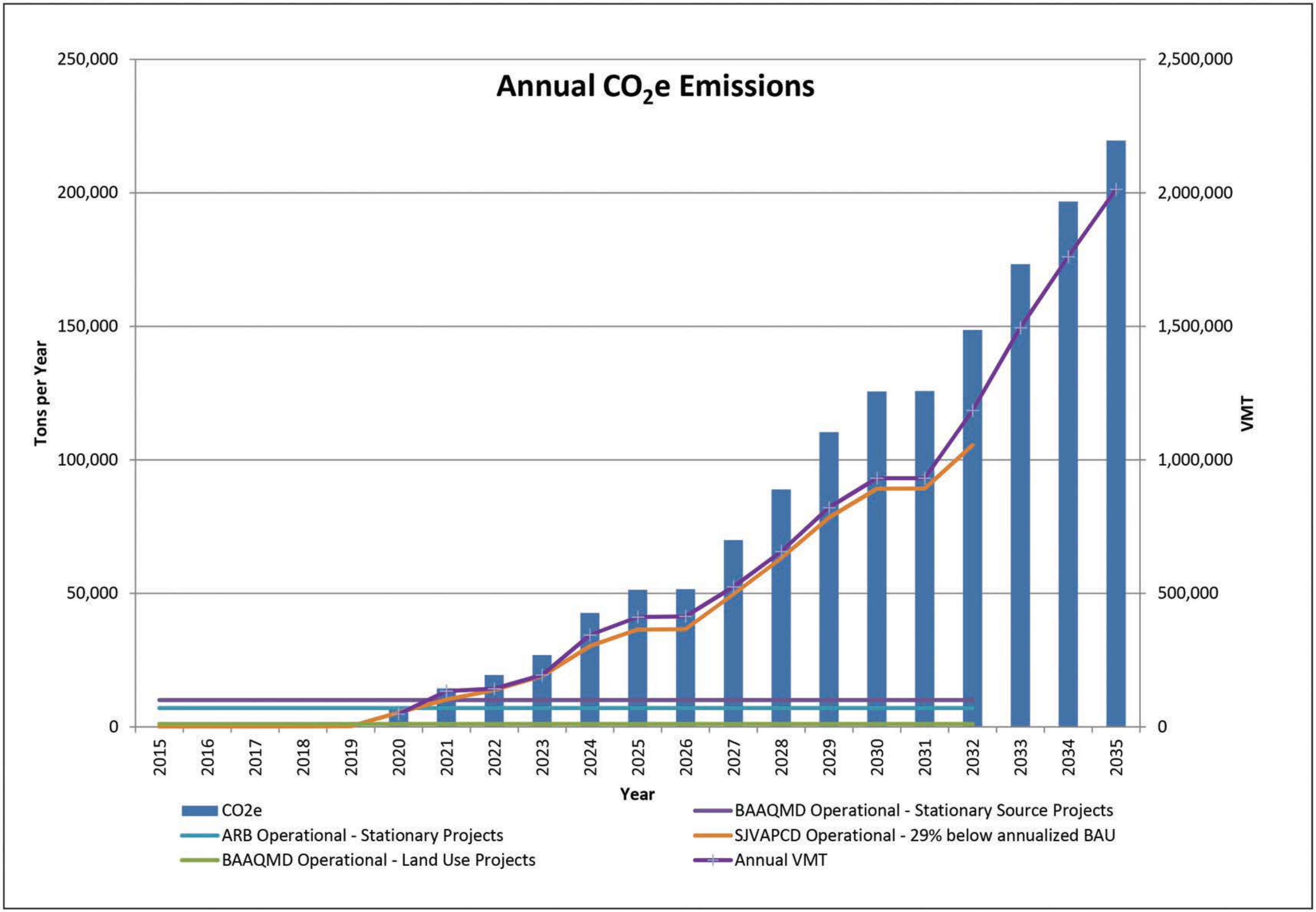

Figure 15-1
Annual CO_2e Emissions from Construction and Operation

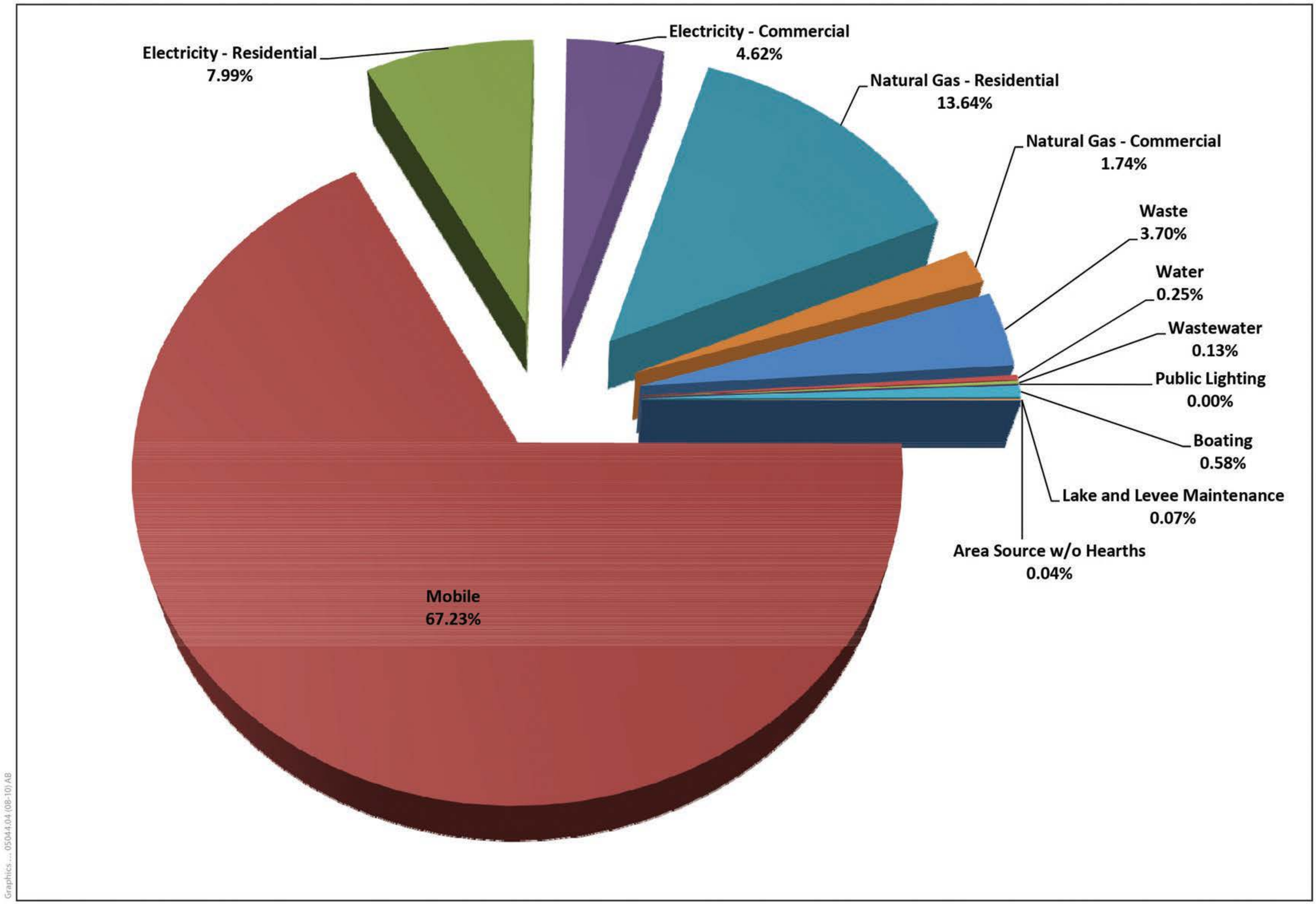

Figure 15-2
Annual GHG Emissions by Source at Full Buildout (2035)

emissions factors and usage rates. A more realistic scenario would be that emission factors would tend to decrease with time as new, more efficient technologies replace older, less efficient, and more polluting technology. This transition would likely result in lower energy consumption, energy emission factors, and vehicle trips and emissions.

Table 15-5. Total Estimated GHG Emissions from Construction and Operation of River Islands at Lathrop by Year (MT CO_2e)

Year	Construction	Operation	Total
2015	306	44	350
2016	303	89	392
2017	2,484	133	2,617
2018	950	177	1,127
2019	6,480	314	6,794
2020	13,968	7,600	21,568
2021	7,719	14,528	22,247
2022	7,957	19,726	27,683
2023	16,289	27,300	43,589
2024	8,143	43,253	51,396
2025	10,069	52,084	62,153
2026	4,449	52,330	56,779
2027	7,542	70,968	78,510
2028	6,810	90,347	97,157
2029	5,661	112,087	117,748
2030	6,925	127,676	134,601
2031	14,930	127,835	142,765
2032	11,354	151,031	162,385
2033	4,026	175,960	179,986
2034	1,618	199,707	201,325
2035		222,876	222,876
Total[b]	**137,981**	**1,496,065**	1,634,048

[a] Construction is complete in 2035.
[b] Total emissions over the 20-year period from 2015 to 2035.

Table 15-6. Annual (2035) Operational GHG Emissions Associated with River Islands at Lathrop (MT)

Source	Source Type	Emissions Type	CO_2	CH_4	N_2O	SF_6	Other (CO_2e)	CO_2e (MT/yr)
Construction	Equipment	–	133,876	–	–	–	4,039	137,981
	Total amortized[b]	–	3,347	–	–	–	101	3,448
Buildings	Residential	Electricity	17,1745	1.12	0.24	1.16E-02	–	17,549
		Natural gas	32,826	0.63	0.60	–	–	33,025
		Total	50,001	1.75	0.83	1.16E-02	–	50,571
	Commercial/ Municipal[c]	Electricity	9,932	0.65	0.14	6.68E-03	–	10,149
		Natural gas	3,788	0.07	0.07	–	–	3,811
		Total	13,720	0.72	0.21	6.68E-03	–	13,960
	All buildings	Area source[d]	82	0.08	0.00	–	–	84
	Buildings total	–	63,803	2.55	1.04	1.82E-02	–	64,615
Municipal	Waste generation[e]	–	50	385.04	0.00		–	8,136
	Wastewater	–	286	0.02	0.00		–	287
	Water-related[f]	–	548	0.04	0.01	–	–	552
	Public lighting	–	214	0.01	0.00		–	214
	Lake and levee maintenance	–	157	0.00	0.01	–	–	159
	Municipal total	–	1,263	385.11	0.02	-	–	9,349
Mobile	On-road	–	147,566	3.55	0.00		–	147,641
	Boating	–	1,185	0.44	0.24	1.96E-05	–	1,270
	Mobile total	–	148,752	3.99	0.24	0.00	–	148,911
Total Operational Emissions		–	213,810	391.66	1.31	0.02	9109	222,876
Grand Total[g, h]		–	217,157	–	–	–	9212	232,088

[a] Other GHGs include CH_4, N_2O, and HFCs from on-road passenger vehicles (construction worker trips).

[b] Amortized over the projected 40-year lifetime of the project (likely conservative). One-time amortized emissions are 0.5% of total annual emissions.

[c] Includes hotel rooms, fire stations, schools, and golf courses.

[d] Area source landscaping emissions. Emissions from natural gas hearths are included under natural gas consumption.

[e] CalEEMod waste estimate include both solid waste and wastewater treatment emissions.

[f] Includes emissions from electricity consumption for water supply, treatment, and distribution.

[g] Operational emissions plus amortized construction emissions.

[h] Totals may not equal sum due to rounding.

Components and associated emissions of the proposed action and alternatives do not differ significantly from one another, primarily because GHG emissions are dominated by mobile source emissions, and total VMT for the alternatives are the same as those projected for the proposed action. Total dwelling units and square footage of commercial space also differ by less than 3% among the proposed action and all alternatives. The changes in total emissions for each alternative in comparison to the proposed action are listed in Table 15-7.

Table 15-7. Comparison of Changes in Construction and Operational Emissions for the Alternatives Relative to the Proposed Action

Alternative	% Change in Total Construction Emissions	% Change in Total Operational Emissions
Alternative 2	up to 1% less	up to 3% less
Alternative 3	up to 10% more	>0% (amount unknown)
Alternative 4	up to 10% more	>0% (amount unknown)
No Action	up to 10% more	Unknown

Compared to the proposed action, operational differences are expected to be 3% less for Alternative 2 and negligible for the other alternatives, while construction emissions would vary by up to 10% for each alternative relative to the proposed action. Consequently, because impacts associated with the proposed action and alternatives are similar, a detailed discussion of impacts is provided for the proposed action, while discussion of the action alternatives primarily identifies differences in emissions relative to the proposed action.

15.2.3.1 Alternative 1—Proposed Action

Effects of GHG emissions (significant)

As previously discussed, Table 15-5 and Figure 15-1 indicate that 2035 would be the worst-case emissions year (222,876 MT CO_2e) and that these emissions would result solely from operational activities. The GHG emissions for 2035 represent 4.61% of San Joaquin County's current (2007) GHG inventory. When amortized construction emissions are included in the analysis, the project would result in 232,088 MT CO_2e (Table 15-6 and Figure 15-2), or 4.80% of San Joaquin County's current inventory.

As previously indicated, current SJVAPCD CEQA guidance was used as the basis for determining a project's indirect cumulative contribution to climate change. According to SJVAPCD guidance, the proposed action is not exempt from CEQA or NEPA and neither the City nor County have adopted GHG reduction plans or established GHG reduction targets for 2020. In addition, SJVAPCD has not yet adopted a list of approved BPSs for development projects. Consequently, River Islands must ensure that appropriate reduction measures from SJVAPCD's interim GHG emissions reduction calculator (Appendix F-6) are implemented into the design, construction, and/or operation of the proposed action to achieve a 29% reduction (64,634 MT CO_2es) in emissions compared to BAU projections. Implementation of Mitigation Measure CC-1 would satisfy SJVAPCD's reduction requirements. Failure to implement appropriate measures from Mitigation Measure CC-1 sufficient to achieve the 29% emission reductions required by SJVAPCD would result in the proposed action indirectly contributing to climate change through the generation of GHG emissions. If River Islands can demonstrate quantitatively that a 29% reduction is achieved, then the project would not result in a significant indirect effect related to climate change.

Mitigation Measure CC-1. Reduce emissions by 29% (64,634 MT CO_2e) compared to BAU

River Islands will implement all applicable and appropriate reduction and minimization measures available from SJVAPCD's interim GHG emissions reduction calculator sufficient to reduce GHG emissions by 29% (64,634 MT CO_2e) compared to BAU. River Islands will demonstrate that mitigation measures achieve a 29% reduction at the time of the ISR permit or other applicable permit application submittal. If additional measures not listed in the calculator are proposed and implemented, River Islands will contact SJVAPCD to ensure and verify the reductions associated with these measures. Measures from SJVAPCD's interim GHG emissions reduction calculator that may be incorporated into the design, construction, and/or operation of the project include but are not limited to those identified in Appendix F-6.

BAU emissions are defined as the emissions that would result from the proposed action in 2032 if built as described in Chapter 2 and without incorporation of design or other measures specifically aimed at reducing energy consumption and GHG emissions. BAU emissions for the proposed action are 222,876 MT CO_2e. Reducing emissions by 29% would require that 64,634 MT CO_2e emissions be avoided through implementation of reduction measures found in SJVAPCD's interim GHG emissions reduction calculator (Appendix F-6). Additionally, reductions can be achieved through state-level measures (e.g., Pavley I and II, Low Carbon Fuel Standard, Renewable Portfolio Standard) implemented irrespective of county, air district, or proposed action.

Effects of climate change (less than significant)

Sea Level Rise

In 2007, a focused flood risk reduction study, *Evaluation of Potential Effects of Global Climate Change on the River Islands Project* (EDAW 2007), was prepared to examine the vulnerability of proposed flood risk reduction elements of the River Islands at Lathrop project. This study modeled conditions in the Lower San Joaquin, Old, and Middle Rivers under sea level rise scenarios of 24 inches and 36 inches in 2100, as provided by the IPCC 2001 report (Intergovernmental Panel on Climate Change 2001). Subsequent research has strongly indicated that sea level rise projections in both the 2001 and 2007 IPCC reports (Intergovernmental Panel on Climate Change 2001, 2007) are likely gross underestimates (Rahmstorf 2007). Consequently, when BCDC examined sea level rise in San Francisco Bay, BCDC assumed a sea level rise of 16 inches by 2050 and 55 inches by 2100. State-level adaptation planning also utilizes the higher values (Cayan et al. 2008; California Natural Resources Agency 2009). While the flood risk reduction study reflected the best available data at the time, it does not capture the full range of future sea level rise in the Bay.

The 2007 EDAW study found that "reasonably foreseeable effects from climate change, including sea level rise, would not result in new significant impacts or substantial increases in the severity of any previously identified adverse environmental effects from the River Islands project related to flood risk reduction. Climate change also would not affect the feasibility of the River Islands flood risk management system, nor would it alter that flood risk management system's effects on downstream properties" (EDAW 2007). It should also be noted that, in 2007, conservation and fishing groups settled with the CVFPB and River Islands to investigate a bypass plan to reduce flood threat and restore habitat near Stewart Tract in the south Delta. The proposed bypass could reduce flood stage by nearly 2 feet along urbanized areas of the lower San Joaquin River, reducing pressure on vulnerable levees beyond what was analyzed as part of the EDAW study in 2007. If constructed, the proposed bypass would provide a potential ameliorating effect against sea level rise and increased flooding related to climate change.

Because proposed levees were found to provide adequate flood risk reduction to the River Islands at Lathrop site under several sea level rise scenarios, direct or indirect effects associated with sea level rise are anticipated to be less than significant, and no mitigation beyond levee construction is proposed. In addition, the state adaptation plan has identified strategies to address increased flooding that may result from climate change, including the establishment of floodplain corridors, setback levees, and bypasses, and the use of tidal wetlands as buffers (California Natural Resources Agency 2009).

Extreme Rainfall and Precipitation

The 2007 EDAW study concluded that the feasibility and effectiveness of the River Islands flood risk management system would not be compromised by climate change, nor would climate change alter that flood risk management system's effects on downstream properties. The study also found that levee modifications included in the proposed action would provide the 0.5% (200-year) level of performance, even accounting for a higher mean sea level in the Bay (EDAW 2007). Consequently, no direct or indirect effect on the proposed action is anticipated to result from extreme rainfall and precipitation resulting from climate change.

Energy Demand and Water Scarcity

Energy demand challenges will be experienced statewide and are not specific to River Islands at Lathrop; however, because of its inland location and regional projections for heat wave days, this area will have a higher future cooling demand than will coastal or higher elevation areas. As noted in Chapter 23, *Energy Resources and Environmental Sustainability*, the proposed action would increase electricity and natural gas demand in the City by approximately 1,310,000 kWh per day and 32,576 CF per day, respectively, at full buildout. While increased cooling demand may occur in the future as a consequence of climate change, this was not considered to be a substantial increase in energy use relative to the total amount of energy supplied by PG&E in its northern and central California service area, as PG&E confirmed it had adequate supply to provide electricity to the entire River Islands at Lathrop development without affecting service to current users (see Chapter 17, *Public Services and Utilities*). Consequently, this effect is anticipated to be less than significant.

Seventy-nine percent of the City's water demand was met by groundwater supplies in 2005 (City of Lathrop 2005). By 2030, only 51% of the demand will be met by groundwater, with the remaining 49% of water being supplied from surface water imports from SCWP, which receives its water from storage on the Stanislaus River. Hydrologic modeling under varying warming and drying scenarios suggest that surface water storage in California will be less reliable in the future (Medellín-Azuara et al. 2007; Vicuna 2007). Areas that cannot meet their current or future demand with locally sourced water may be particularly susceptible to water shortages.

River Islands at Lathrop will rely on water supplies and infrastructure supported by the City, described in detail in Chapter 17, *Public Services and Utilities*. Groundwater pumping currently accounts for roughly 80% of the City's water supplies (City of Lathrop 2009), with the balance coming from surface water deliveries as part of the SCSWCP. Although water demand is expected to increase, according to the 2009 *Water Supply Study*, there is a positive net difference between water supply and demand (City of Lathrop 2009).

Precipitation changes might affect groundwater recharge ability. Consequently, the decreases in surface water storage associated with climate change that could result from varying warming and drying scenarios could lead to decreased water supply for the proposed action. While increased demand could result from the proposed action, River Islands has entered into a development agreement with the City that will allocate only this agreed-upon, fixed amount of potable water for River Islands at Lathrop (City of Lathrop 2009). If water demands exceed the contractual agreement, the City will withhold building permits from the applicant. In addition, mitigation has been identified to minimize effects on the potable water supply (see Mitigation Measure PS-7 in Chapter 17). Consequently, direct and indirect effects are anticipated to be less than significant.

15.2.3.2 Alternative 2—No Alteration of Paradise Cut

Effects of GHG emissions (significant)

As indicated in Table 15-7, construction emissions under Alternative 2 are anticipated to be up to 1% less than those under the proposed action, while operational emissions are anticipated to be up to 3% less. BAU emissions for Alternative 2 are estimated to be 229,562 MT CO_2e. Reducing emissions by 29% would require that 66,573 MT CO_2e emissions be avoided through implementation of SJVAPCD-recommended GHG reduction measures (Appendix F-6). Additionally, reductions can be achieved through state-level measures (e.g., Pavley I and II, Low Carbon Fuel Standard, Renewable Portfolio Standard) implemented irrespective of county, air district, or proposed action.

Consequently, Alternative 2 would have a slightly lesser effect than the proposed action. In order to achieve the 29% reduction in emissions compared to BAU required by the SJVAPCD, River Islands must implement appropriate reduction measures from SJVAPCD's interim GHG emissions reduction calculator (Appendix F-6) into the design, construction, and/or operation of the proposed action. Implementation of Mitigation Measure CC-1 would satisfy the SJVAPCD's reduction requirements. River Islands will quantitatively demonstrate that mitigation measures achieve a 29% reduction at the time of the ISR permit or other applicable permit application submittal. Failure to implement appropriate measures from Mitigation Measure CC-1 sufficient to achieve the 29% emission reductions required by SJVAPCD would result in Alternative 2 indirectly contributing to climate change through the generation of GHG emissions. If River Islands can demonstrate quantitatively that a 29% reduction is achieved, then the project would not result in a significant indirect effect related to climate change.

Effects of climate change (less than significant)

Direct and indirect effects associated with Alternative 2 are similar to those identified under the proposed action. The direct and indirect effects would be less than significant.

15.2.3.3 Alternative 3—Avoidance of Central Drainage Ditch

Effects of GHG emissions (significant)

As indicated in Table 15-7, construction emissions under Alternative 3 are anticipated to be up to 10% more than those associated with the proposed action, while operational emissions are currently unknown but are not anticipated to vary substantially. BAU emissions for Alternative 3 are estimated to be 245,164 MT CO_2e. Reducing emissions by 29% would require that 71,097 MT CO_2e emissions be avoided through implementation of SJVAPCD-recommended GHG reduction measures (Appendix F-6). Additionally, reductions can be achieved through state-level measures (e.g., Pavley I and II, Low Carbon Fuel Standard, and the Renewable Portfolio Standard) implemented irrespective of county, air district, or proposed action.

Consequently, Alternative 3 would have a slightly greater effect than the proposed action. In order to achieve the 29% reduction in emissions compared to BAU required by SJVAPCD, River Islands must implement appropriate reduction measures from SJVAPCD's interim GHG emissions reduction calculator (Appendix F-6) into the design, construction, and/or operation of the proposed action. Implementation of Mitigation Measure CC-1 would satisfy the SJVAPCD's reduction requirements. River Islands will quantitatively demonstrate that mitigation measures achieve a 29% reduction at the time of the ISR permit or other applicable permit application submittal. Failure to implement appropriate measures from Mitigation Measure CC-1 sufficient to achieve the 29% emission reductions required by SJVAPCD would result in Alternative 3 indirectly contributing to climate change through the generation of GHG emissions. If River Islands can demonstrate quantitatively that a 29% reduction is achieved, then the project would not result in a significant indirect effect related to climate change.

Effects of climate change (less than significant)

Direct and indirect effects associated with Alternative 3 are similar to those identified under the proposed action. The direct and indirect effects would be less than significant.

15.2.3.4 Alternative 4—Proposed Action with Expanded Flood Risk Reduction

Effects of GHG emissions (significant)

Indirect effects associated with Alternative 4 are similar to those identified under the proposed action. Construction emissions associated with components of the expanded flood risk reduction would be greater; however, because these components have not been designed, these effects are not quantified. Accordingly, BAU emissions are estimated to be 222,876 MT CO_2e. A 29% reduction in emissions would require a decrease of 64,634 MT CO_2e through implementation of mitigation measures.

Effects of climate change (less than significant)

Direct and indirect effects associated with Alternative 4 are similar to those identified under the proposed action. The direct and indirect effects would be less than significant.

15.2.3.5 Alternative 5—No Action

Effects of GHG Emissions (significant)

The No Action Alternative would result in construction of River Islands at Lathrop but without alteration of federal project levees; an interior ring levee would be constructed instead. As indicated in Table 15-7, construction emissions are anticipated to be up to 10% more than those associated with the proposed action, while operational emissions are not anticipated to differ substantially from those under the proposed action. BAU emissions for the No Action Alternative are estimated to be 245,164 MT CO_2e. Reducing emissions by 29% would require that 71,097 MT CO_2e emissions be avoided through implementation of SJVAPCD-recommended GHG reduction measures (Appendix F-6). Additionally, reductions can be achieved through state-level measures (e.g., Pavley I and II, Low Carbon Fuel Standard, and the Renewable Portfolio Standard) implemented irrespective of county, air district, or proposed action.

Consequently, the No Action Alternative would have a slightly greater indirect effect than the proposed action. In order to achieve the 29% reduction in emissions compared to BAU required by

SJVAPCD, River Islands must implement appropriate reduction measures from SJVAPCD's interim GHG emissions reduction calculator (Appendix F-6) into the design, construction, and/or operation of the proposed action. Implementation of Mitigation Measure CC-1 would satisfy SJVAPCD's reduction requirements. River Islands will quantitatively demonstrate that mitigation measures achieve a 29% reduction at the time of the ISR permit or other applicable permit application submittal. Failure to implement appropriate measures from Mitigation Measure CC-1 sufficient to achieve the 29% emission reductions required by SJVAPCD would result in the No Action Alternative indirectly contributing to climate change through the generation of GHG emissions. If River Islands can demonstrate quantitatively that a 29% reduction is achieved, then significant indirect effects would be avoided.

Effect of climate change (less than significant)

Direct and indirect effects associated with the No Action Alternative are similar to those identified under the proposed action. The direct and indirect effects would be less than significant.

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Chapter 16
Public Health and Environmental Hazards

This chapter examines the proposed action's and alternatives' potential effects related to public health and safety and environmental hazards. It includes discussions of the issues listed below.

- Hazardous materials.
- Breeding and harborage of disease vector organisms.
- Health effects related to recycled water use.
- Wildland fire hazards.

Information on risks to health and safety from flooding is presented in Chapter 6, *Hydrology and Water Quality*.

The key sources of data listed below were used in the preparation of this chapter.

- *Phase I Environmental Site Assessments for Stewart Tract* (GeoResearch 1994; The Denali Group 2001, 2003).
- *West Lathrop Specific Plan* (City of Lathrop 2003).
- Various online regulatory databases (California Department of Toxic Substances Control 2009; State Water Resources Control Board 2009; U.S. Environmental Protection Agency 2009).
- Wildfire Hazard Real Estate Disclosure for San Joaquin County (California Department of Forestry 2011).
- Information on mosquito biology, control methods, and disease epidemiology from the California Department of Public Health, San Joaquin Mosquito and Vector Control District, and other sources.

Specific reference information is provided in the text.

16.1 Affected Environment

16.1.1 Regulatory Framework

16.1.1.1 Hazardous Materials

The California Department of Toxic Substances Control (DTSC) defines *hazardous materials* as materials that pose a significant present or potential hazard to human health and safety or the environment if released because of quantity, concentration, or physical or chemical characteristics (26 CCR 25501). Common hazardous materials include petroleum hydrocarbons, pesticides, VOCs, and certain metals.

Various federal and state agencies exercise regulatory authority over the use, generation, transport, and disposal of hazardous substances. EPA is the primary federal regulatory agency. The primary state agency is CalEPA, which may delegate enforcement authority to local agencies with which it has agreements.

Federal regulations applicable to hazardous substances are contained primarily in the CFR, Titles 29 (*Labor*), 40 (*Protection of Environment*), and 49 (*Transportation*). State regulations are contained in CCR Title 13 (*Motor Vehicles*), Title 19 (*Public Safety*), Title 22 (*Social Security*), and Title 26 (*Toxics*). Additional laws and regulations pertain specifically to hazardous materials management and are discussed here in further detail.

Federal Regulations

Comprehensive Environmental Response, Compensation, and Liability Act

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), also called the Superfund Act (42 USC Section 9601 et seq.), is intended to protect the public and the environment from the effects of prior hazardous waste disposal and new hazardous material spills. Under CERCLA, EPA has the authority to seek the parties responsible for hazardous materials releases and to ensure their cooperation in site remediation. CERCLA also provides federal funding (the Superfund) for the remediation of hazardous materials contamination. The Superfund Amendments and Reauthorization Act (SARA) of 1986 (Public Law 99-499) amends some CERCLA provisions and provides for a Community Right-to-Know program.

EPA has the authority to implement CERCLA in all 50 states and all United States territories, using enforcement tools such as orders, consent decrees, and other small-party settlements. The identification, monitoring, and remediation of Superfund sites are usually coordinated by state environmental protection agencies or waste management agencies. When potentially responsible parties cannot be identified or located, or when responsible parties fail to act, EPA has the authority to remediate abandoned or historical sites where hazardous materials contamination is known to exist and to pose a human health hazard.

Pursuant to CERCLA, EPA maintains a National Priority List (NPL) of uncontrolled or abandoned hazardous waste sites identified for priority remediation under the Superfund program. Sites are identified for listing on the basis of EPA's hazard ranking system. Sites may also be placed on the NPL if they meet the requirements listed below.

- The Agency for Toxic Substances and Disease Registry (ATSDR) of the U.S. Public Health Service has issued a health advisory that recommends removing people from the site.
- EPA has determined that the site poses a significant threat to public health.
- It will be more cost effective for EPA to use its remedial authority than its emergency removal authority to respond to the hazard posed by the site.

Resource Conservation and Recovery Act

The Resource Conservation and Recovery Act (RCRA) (42 USC Section 6901 et seq.) was enacted in 1976 as an amendment to the Solid Waste Disposal Act to address the nationwide generation of municipal and industrial solid waste. RCRA gives EPA the authority to control the generation, transportation, treatment, storage, and disposal of hazardous waste, including underground storage tanks storing hazardous substances. RCRA also establishes a framework for the management of nonhazardous wastes. RCRA addresses only active and future facilities. Abandoned or historical sites are covered by CERCLA.

RCRA was updated in 1984 by the passage of the federal Hazardous and Solid Waste Amendments (HSWA), which require that land disposal of wastes be gradually phased out. HSWA also increased EPA's enforcement authority and established more stringent hazardous waste management standards, including a comprehensive underground storage tank program.

State Regulations

EPA has granted the individual states primary oversight responsibility to administer and enforce hazardous waste management programs. In addition, California state regulations, which are equivalent to or more stringent than federal regulations, require planning and management to ensure that hazardous wastes are handled, stored, and disposed of properly to reduce risks to human health and the environment.

Hazardous Waste Control Act

The Hazardous Waste Control Act created the state hazardous waste management program, which is similar to, but more stringent than, the Federal program under RCRA. The Hazardous Waste Control Act is implemented by regulations contained in 26 CCR, which describes the key aspects of hazardous waste management, including identification and classification; sources; transport; design and permitting of recycling, treatment, storage, and disposal facilities; treatment standards; operation of facilities, including staff training; closure of facilities; and liability issues.

Regulations in 26 CCR list more than 800 materials that may be hazardous and establish criteria for their identification, packaging, and disposal. Under the Hazardous Waste Control Act and 26 CCR, hazardous waste generators must complete a manifest that accompanies the waste from the generator to the transporter to the ultimate disposal location. Copies of the manifest must be filed with DTSC.

Hazardous Materials Release Response Plans and Inventory Act of 1985

The Hazardous Materials Release Response Plans and Inventory Act, also known as the Business Plan Act, requires businesses using hazardous materials to prepare a hazardous materials business plan that describes their facilities, inventories, emergency response plans, and training programs. Under the Business Plan Act, *hazardous materials* are defined as raw or unused materials that are part of a process or manufacturing step. They are not considered hazardous waste, although the health concerns pertaining to the release or inappropriate disposal of these materials are similar to those for hazardous waste. The Business Plan Act also defines *acutely hazardous materials* as referring to certain chemicals specifically listed in 40 CFR. About 400 chemicals of special concern to emergency response planners are included in this inventory.

Aboveground Petroleum Storage Act

California's Aboveground Petroleum Storage Act (APSA) requires owners or operators of aboveground petroleum storage tank facilities with aggregate storage capacity of 1,320 gallons or more to prepare a spill prevention, control, and countermeasure plan (SPCCP) consistent with 40 CFR 112. As of January 1, 2008, pursuant to AB 1130, responsibility for APSA implementation, enforcement, and administration was transferred from the State Water Board to the Certified Unified Program Agencies (CUPAs). Owners/operators are required to file an annual tank facility statement with the CUPA. This requirement can be satisfied by filing a business plan in accordance with the Business Plan Act. Owner/operators are also required to immediately report petroleum spills of 42 gallons or more to the Governor's Office of Emergency Services and the CUPA with jurisdiction. The CUPAs are required to conduct regular inspections of all tank facilities with an aggregate storage capacity of 10,000 gallons or more to verify compliance with APSA's SPCC plan requirements. AB 1130 also established civil penalties for APSA violations.

Emergency Services Act

Under the Emergency Services Act, California developed an emergency response plan to coordinate emergency services provided by federal, state, and local agencies. Rapid response to incidents involving hazardous materials or hazardous waste is an important part of the plan, which is administered by the California Office of Emergency Services (OES). The OES coordinates the responses of other agencies, including EPA, the California Highway Patrol, the nine RWQCBs, the various air quality management districts, and county disaster response offices.

Occupational Safety and Health Administration Standards

Worker exposure to contaminated soils, inhalable vapors, and groundwater containing hazardous constituents is subject to monitoring and personal safety equipment requirements established in Title 8 of the California Occupational Safety and Health Administration (Cal-OSHA) regulations. The primary intent of the Title 8 requirements is to protect workers, but compliance with some of these regulations also reduces potential hazards to persons on neighboring properties because of the controls that must be implemented.

California Education Code Requirements for School Sites

As a condition for receiving state funding, Section 17213.1 of the California Education Code requires school districts to conduct a Phase I environmental assessment for any proposed new school site. If the district owns the site, the assessment must be completed prior to construction. If the district is proposing to purchase the site, the assessment must be completed prior to the purchase.

The assessment must conclude either that no further investigation is required or that a preliminary endangerment assessment (PEA) is needed to determine (1) whether a release of hazardous materials has occurred and the extent of the release, (2) whether there is a threat of a hazardous materials release, or (3) whether naturally occurring hazardous materials are present. If site conditions warrant, the district may elect to proceed immediately to the preparation of a PEA, which is a key step in the site assessment process prior to remediation of identified contamination. The Phase I environmental assessment and PEA are subject to review by DTSC.

If the PEA determines that there has been a hazardous materials release, that there is the threat of such a release, or that a naturally occurring hazardous material is present, the district may elect not to pursue the site. If the district decides to proceed with school development at the site, additional stringent requirements apply, including an evaluation of the financial implications of proceeding with hazardous materials response, consideration of alternative sites, and all applicable remediation/cleanup actions.

Other State Laws and Regulations

Additional state regulations that affect hazardous waste management are listed below.

- The Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65), which requires labeling of substances known or suspected by the state to cause cancer.

- California Government Code Section 65962.5, which requires CalEPA to develop, at least annually, an updated known hazardous waste and substance spill and leak locations (known as the Cortese List). DTSC, the State Water Board, the California Integrated Waste Management Board (CIWMB), and other state and local government agencies are required to provide additional material release information for the Cortese List.

Local Regulations

The regulation of hazardous materials at the local level is limited to standards, procedures, and policies that relate to siting, construction, and use or operation of businesses, farms, and residences within the jurisdiction. Establishment of standards and transport of hazardous materials and wastes from one location to another are regulated by the federal and state governments. However, counties are commonly responsible for implementing state standards authorized under Section 6.11 of the California Health and Safety Code. Implementing Section 6.11 standards may be accomplished by a combination of general plan policies and local ordinances and regulations. In addition, each county's Office of Emergency Services is responsible for planning emergency response actions to hazardous material incidents. Area response plans incorporate hazardous materials inventory data, training for emergency responses, and evacuation planning information.

16.1.1.2 Vector-Borne Hazards

Under the authority of the California Health and Safety Code, vector control agencies have the obligation and authority to require "the person or agency claiming ownership or title, or right to property or who controls the diversion, delivery, conveyance, or flow of water" to remove conditions that contribute to vector production (California Health and Safety Code Section 2060[b]). In California, local vector control agencies have the authority to conduct surveillance for vectors, prevent the occurrence of vectors, and abate production of vectors (California Health and Safety Code Section 2040). Vector control agencies also have authority to participate in review and comment and to make recommendations for projects with respect to their potential vector production (California Health and Safety Code Section 2041).

16.1.1.3 Recycled Water

22 CCR regulates the production of reclaimed water in California for three main types of recycled water uses: landscape irrigation, recreational impoundments, and industrial uses. The California Department of Public Health (DPH) is responsible for reviewing proposed water recycling projects and for providing comments and recommendations to the Central Valley Water Board, which issues water recycling requirements through the waste discharge permit process (CWC Section 13523). 22 CCR Division 4, Chapter 3 establishes water recycling criteria, which include criteria for water quality, treatment process requirements, and treatment reliability criteria for reclamation operations. Title 22 also defines requirements for sampling and analysis of reclaimed water and specifies design requirements for facilities. In July 2009, the State Water Board issued a statewide General Permit for Landscape Irrigation Uses of Recycled Water (State Water Resources Control Board 2009a). The General Permit is consistent with the State Water Board's Recycled Water Policy and with state and federal water quality laws, including the statewide water quality standards established by the California Department of Public Health. The General Permit facilitates the streamlining of the permitting process to reduce the overall costs normally incurred by producer, distributors, and users of recycled water.

The proposed use of recycled water for landscape irrigation at River Islands at Lathrop would fall under 22 CCR's guidelines for "landscape irrigation with high public contact," which includes irrigation of parks and playgrounds, school yards, residential landscaping, and golf courses. To be used as a supply source for this designation, recycled water must meet the process requirements for "disinfected tertiary recycled water," which is defined in 22 CCR, Division 4, Chapter 3, Section 60301.230, as recycled water that has been oxidized, coagulated, clarified, filtered, and disinfected. Although water meeting these criteria is not treated to drinking water standards, this constitutes the most stringent treatment process practicable for recycled water.

16.1.1.4 Wildfire Hazards

California Public Resources Code Section 4125 et seq. requires the designation of state responsibility areas (SRAs), which are identified on the basis of cover, beneficial water uses, probable erosion damage, fire risks, and hazards. The primary financial responsibility for wildland fire prevention and suppression in SRAs lies with the state. Fire protection in areas outside the SRA is the responsibility of local or federal jurisdictions. Areas not within SRAs are designated local responsibility areas and federal responsibility areas, respectively. Generally, when development density within a given SRA exceeds one dwelling unit per acre on a regional basis, the land is no longer classified as an SRA and becomes the responsibility of the local jurisdiction.

16.1.2 Existing Conditions

16.1.2.1 Methods Used to Identify Existing Conditions

The discussion of potential soil and groundwater contamination hazards in the project area is based primarily on information from the Phase I Environmental Site Assessment (Phase I Assessment) prepared by The Denali Group in April 2003. The 2003 Phase I Assessment was intended to update a previous Phase I Assessment prepared by The Denali Group in February 2001. The 2001 Denali Group report was an update of an earlier Phase I Assessment prepared by GeoResearch in August 1994. All the reports used state and federal database sources and the land use history of the project area to assess the likelihood for hazardous materials contamination. The reports covered the entire Stewart Tract: the RID Area, the PCC Area, the PCIP Area, and remaining Stewart Tract.

During preparation of the respective Phase I reports, GeoResearch and The Denali Group obtained information on historical land uses from a review of historic topographic maps (dating from 1952 to 1994) and historical aerial photographs (dating from 1937 to 1999). No historic fire insurance maps ("Sanborn maps") were issued for the site or its vicinity (The Denali Group 2003:6). Additional information on potential sources of hazardous materials was obtained from a review of federal and state environmental databases and local agency records and reconnaissance of Stewart Tract and adjacent areas.

To confirm and update information presented in The Denali Group's 2003 Phase I Assessment, EIS preparation included searches of EPA's Enviromapper Database (U.S. Environmental Protection Agency 2009), which lists generators appearing on hazardous waste manifests, and includes hazardous waste disposal activities or other releases reported through EPA's Toxic Release Inventory; DTSC's EnviroStor database (California Department of Toxic Substances Control 2009), which provides information on investigation, cleanup, permitting, and/or corrective actions that are planned, being conducted, or have been completed under DTSC's oversight; and the State Water

Board's GeoTracker database (State Water Resources Control Board 2009b), which includes a list of sites that are contaminated as a result of leaking underground storage tanks (USTs).

16.1.2.2 Public Health and Environmental Hazards Setting

Hazardous Materials

Groundwater and surface water in the RID Area have been affected by past activities associated with farming operations at the former RILCO farm headquarters and the Souza property agricultural chemical storage area. The RILCO site is located in the eastern portion of the RID Area, immediately north of Stewart Road. The Souza property is in the western portion of the RID Area, south of Stewart Road. Potential soil or groundwater contamination in these two areas is associated with the location of former USTs, existing aboveground storage tanks (ASTs), agricultural/chemical handling and storage areas, and waste disposal areas. Common chemical constituents associated with these uses include petroleum hydrocarbons, fertilizers, herbicides, and pesticides. While groundwater within the RID Area could potentially be contaminated as a result of current or past uses, The Denali Group's 2003 Phase I report concurred with the conclusion stated in its previous report that no pesticides or chlorinated herbicides were present in groundwater in the RID Area. This conclusion was based on groundwater monitoring data collected from 12 wells on Stewart Tract in 1999 (The Denali Group 2003:11).

Other potential onsite sources of contamination identified in The Denali Group's 2003 Phase I report are listed below.

- Two former USTs—one in the northern portion of the proposed RID Area near the Old River levee, the other in an agrochemical storage area near the intersection of Stewart Road and the UPRR tracks.
- A former aircraft landing strip adjacent to the east end of Cohen Road near the San Joaquin River levee.
- Four existing aboveground fertilizer tanks on concrete pads near the east end of the airstrip.
- Seven existing agricultural chemical storage/handling areas.
- Seven gasoline and/or diesel ASTs.
- A waste disposal area on the RILCO property, approximately 1 mile southwest of the terminus of Stewart Road.
- Approximately 25 existing and abandoned buildings constructed prior to 1973 with the potential to contain asbestos- or lead-containing materials.

In addition to the potential contaminant sources identified in the RID Area, The Denali Group identified several potential offsite sources of contamination, including the former Windeler Ranch glass landfill, the former Chevron service station on the Dell'Osso farm property, the Mossdale Marine boat launch facility, and the Brown Sand, Inc. sand quarry facility. However, the Denali Group concluded that these facilities did not present an environmental issue with respect to the RID, PCC, and PCIP Areas (The Denali Group 2003:11). Accordingly, these offsite facilities will not be discussed further in this chapter.

Based on information obtained from an Environmental Data Resources (EDR) regulatory database search, The Denali Group concluded that no portion of the proposed action area is included on a federal, state, or local list of known hazardous materials sites (The Denali Group 2003). ICF's search of EPA's Enviromapper database, DTSC's EnviroStor database, and the State Valley Board's GeoTracker databases did not identify any new change in governmental records regarding the site or the properties adjacent to the site.

Vector-Borne Hazards

Regional Threats of Mosquito-Borne Disease

Although 12 mosquito-borne viruses are known to occur in California, only west Nile virus (WNV), western equine encephalomyelitis virus (WEE), and St. Louis encephalitis virus (SLE) are significant causes of human disease.

WNV in particular has had a serious impact on the health of humans, horses, and wild birds throughout the state. WNV was first detected in California in 2003, then in San Joaquin County in 2004 (San Joaquin Mosquito & Vector Control District 2011). In 2010, 111 WNV human cases were identified in the state—6 in San Joaquin County (California Department of Public Health 2011).

Outbreaks of equine and human cases of WEE have been reported in the San Joaquin Valley since the early 1930s, occurring in association with the distribution and abundance of the primary vector, the western encephalitis mosquito (*Culex tarsalis*) (Calisher 1994:90). The largest recorded epidemic of WEE in California occurred in Kern County in 1952, with 100 laboratory-confirmed cases (Barker et al. 2003:509). Human cases of WEE in San Joaquin County were also reported between 1952 and 1957. WEE was again detected in adult mosquitoes and sentinel chickens in San Joaquin County between 1993 and 1996, but no human infections were reported (San Joaquin Mosquito & Vector Control District 2011). Although WEE enzootic (animal-to-animal transmission) activity has continued to occur in the San Joaquin Valley, no recent human cases of WEE have been reported in San Joaquin County (Barker et al. 2003:509; San Joaquin Mosquito & Vector Control District 2011).

Since 1945, 597 human cases of SLE have been reported in California, with the most recent outbreaks occurring between 1984 and 1989 in the Los Angeles Basin (26 cases) and the southern San Joaquin Valley (29 cases), respectively. The last human case reported, from Los Angeles County, was in 1997. Since 2003, no SLE activity has been detected in the state based on ongoing epidemiological surveillance and monitoring (California Vectorborne Disease Surveillance System 2011).

Mosquito Breeding

Many mosquitoes lay eggs on the surface of fresh or stagnant water. Any body of standing water represents potential breeding habitat for mosquitoes, including water in cans, barrels, livestock water troughs, ornamental ponds, swimming pools, puddles, creeks, ditches, or marshy areas (American Mosquito Control Association 2011). In cities and developed areas, runoff from landscape watering, car washing, and storms often collects in retention ponds or catch basins long enough to produce mosquitoes. Mosquito larvae can develop anywhere water stands for at least 5 days (California Department of Public Health 2005:7).

Mosquito Control

Regular site inspection and maintenance is recommended to reduce or eliminate potential mosquito harborage areas and control breeding (California Department of Public Health 2005:7). To reduce mosquito populations, vector control agencies utilize a combination of abatement procedures tailored to specific periods in the mosquito life cycle and specific habitat conditions. Mosquito control methods may include the use of biological agents (such as mosquitofish), microbial control agents (such as *Bacillus thuringiensis israelensis* and *Bacillus sphaericus*), pesticides, and source reductions (such as draining water bodies that produce mosquitoes) (California Department of Public Health 2005:6).

Stewart Tract is within the jurisdiction of the San Joaquin Mosquito & Vector Control District (SJMVCD). SJMVCD is currently conducting several types of mosquito control activities on Stewart Tract. These activities include inspection and trapping to monitor adult mosquito populations, surveillance of “seep” areas that provide potential breeding habitat, and, as necessary, spraying to reduce populations.

Recycled Water

Treated effluent (recycled water) from the City’s Water Recycling Plant (WRP) No. 1 currently meets 22 CCR reuse standards as disinfected secondary-2.2 recycled water, and is utilized for a variety of purposes, including landscape irrigation and farming activities. The recent expansion of WRP No. 1 increased the plant’s capacity to process recycled water and also involved an upgrade in technology to produce even higher quality recycled water (disinfected tertiary water) using a new Membrane Bio-Reactor (MBR) (see Chapter 17, *Public Services and Utilities*). The higher quality recycled water may be used for landscape irrigation in designated land application areas in addition to schools and parks (City of Lathrop 2009).

Wildland Fire Hazards

No portion of the development area is indicated as being within a high fire hazard zone or a wildland area that may pose substantial forest fire risks and hazards, as identified on the California Department of Forestry and Fire Protection’s (CAL FIRE’s) wildfire hazard real estate disclosure map for San Joaquin County (California Department of Forestry and Fire Protection 2011).

Much of the development area currently supports irrigated field and row crops as well as relatively confined, mainly linear bands of ruderal vegetation along agricultural field boundaries, at roadsides, and on levees banks along the San Joaquin River, Old River, and Paradise Cut. In addition to the frequent rotation and irrigation of crops in farmed areas, current vegetation management practices in other parts of the development area help to reduce excess fuel loads. Vegetation along levees is regularly disked, burned, or sprayed with herbicides to improve visibility and discourage burrowing rodent activity. Riparian vegetation in drainage canals is routinely cleared to improve water flow (City of Lathrop 2003).

16.2 Environmental Consequences

16.2.1 Methods for Analysis of Effects

The approach and methods used to evaluate effects related to hazardous materials and waste posed by construction, operation, and maintenance of the proposed action and alternatives consisted of reviewing available reports and databases regarding potential contaminants present at the site and considering them in light of regulatory parameters and guidance. Additionally, methods used to evaluate the project’s potential for mosquito-borne disease hazards consisted of reviewing design drawings of the proposed water features. For recycled water, the primary method for analysis consisted of determining the project's proposed reuse applications in light of current regulatory standards, and methods for analysis of wildfire hazards entailed a review of CAL FIRE's wildfire hazard real estate disclosure map for San Joaquin County and an informal assessment of onsite vegetative conditions.

16.2.2 Definition of Significant Effects

CEQ's NEPA regulations identify the outcomes listed below as constituting significant effects on public health.

- Transport, use, storage, and disposal of materials that pose a public health hazard.
- Accidental exposure to hazardous materials or wastes.
- Creation of conditions favoring the increased breeding or harborage of disease-carrying mosquitoes.
- Violation of water quality objectives and criteria intended to protect human health in regard to recycled water.
- Exposure of individuals or property to substantial wildland fire risks.

16.2.3 Effects and Mitigation Approaches

16.2.3.1 Alternative 1—Proposed Action

Potential hazard associated with transport, use, storage, and disposal of hazardous materials (significant)

Construction

The proposed action is not anticipated to create a substantial hazard to the public through the routine transport, use, storage, and disposal of hazardous materials during construction. Hazardous materials present in construction work areas would likely include fuel, oil, grease, lubricants, and other petroleum-based products contained in construction vehicles, as well as materials used during the construction process, such as solvents, adhesives, paints, and paving media. However, transport, storage, and handling of such materials is governed by numerous regulations and guidelines, including those recommended and enforced by the U.S. Department of Transportation (USDOT), the San Joaquin County Environmental Health Department (SJCEHD), the Central Valley Water Board, and—under the Business Plan Act—the City of Lathrop. Because the proposed action would be constructed on a neighborhood-by-neighborhood or district-by-district basis, it is assumed that most or all areas under construction at any given time would be larger than 1 acre. Contractors would be required to develop and implement a SWPPP to ensure that water quality is protected during all phases of construction (see *Measures to Protect Water Quality* under *Environmental Commitments* in Chapter 2, *Proposed Action and Alternatives*).

SWPPPs typically include development and implementation of an SPCCP to minimize the potential for, and potential effects from, spills of hazardous substances during construction. Typical components of a SPCCP are listed below.

- A list of all hazardous substances to be used during construction.

- Measures to prevent, control, and minimize the spillage of hazardous substances.
- Transport, storage, and disposal procedures for these substances.
- Procedures to be followed in case of a spill of a hazardous material.

With this plan in place, and with all contractors adhering to the relevant regulations and guidelines for the transport, use, storage, and disposal of hazardous materials during construction, potential direct effects related to hazardous materials transport, use, storage, and disposal during construction of the proposed action are expected to be less than significant. No indirect effects were identified.

Operation

General commercial uses. According to Chapter 17.61 (*River Islands Zoning Districts*) of the City's Municipal Code, commercial uses in the proposed action could include such facilities as automobile dealerships and repair shops, garden supply centers, nurseries, hospitals, medical office buildings, gas stations, dry cleaners, and other uses that regularly use, store, transport, or dispose of substances that qualify as hazardous materials under California state law—e.g., fuels, lubricants, cleaners, pesticides, and fertilizers. These commercial uses are typical of suburban and urban areas throughout the United States, and, as in existing developed areas, the potential risks related to such businesses would be controlled through federal, state, and local regulations. Assuming that all hazardous materials transport, storage, and handling would be untaken in compliance with relevant federal, state, and local regulations and guidelines, direct effects related to these general commercial uses of hazardous materials are anticipated to be less than significant. No indirect effects were identified.

Marinas and related uses. The proposed action would include public marina facilities with associated gas facilities at Lathrop Landing, and numerous group docks situated along the banks of the San Joaquin and Old Rivers, Paradise Cut Canal, and the internal lake system. The marina use in particular would require the transport, storage, and transfer of substantial volumes of marine fuel on a regular basis. Under normal operating scenarios, risk of exposure to hazardous materials would be limited. However, in the event of an accidental release from a marina facility, the adverse effect on public health—either through direct exposure or indirectly through environmental contamination—could be significant. Individual boats and watercraft would use small volumes of fuel and could also release small amounts of contaminants. To minimize the potential for and the direct effects associated with spills occurring during operations of the marina and dock facilities, Mitigation Measures PH-1 and PH-2 would be implemented.

Mitigation Measure PH-1. Prepare and implement a long-term spill prevention, control, and countermeasures plan for marina operation

Pursuant to 40 CFR 1, Part 112.1(b), the owner/operator of any marina facility within the proposed action will develop an SPCCP that specifies employee training requirements; storage, handling, and safety procedures for all hazardous materials used at the facility, including but not limited to fuels; spill prevention measures, including equipment maintenance related to spill prevention; and spill response procedures. The SPCCP will be subject to review and approval by the Lathrop-Manteca Fire District. A copy of the SPCCP will be maintained at each marina facility and must be available to the Lathrop-Manteca Fire Protection District (LMFPD) and the regional EPA field representative, who will have authority to conduct onsite inspections to verify appropriate safeguards and protocols.

Mitigation Measure PH-2. Encourage and enforce clean boating practices

River Islands will distribute the California Department of Boating and Waterways pamphlet *Clean Boating Habits* to individuals who own or rent boat slips within the development. Boat slip owners and renters will be required to sign a disclosure statement stating that the signatory has read and understood the material and agrees to comply with the recommended habits and practices discussed therein. Enforcement of clean boating practices will be ensured by one or more full-time paid boating security personnel contracted by River Islands and funded through dues payable to the Homeowners Association (HOA). In the event of noncompliance, the River Islands at Lathrop HOA may choose to issue a warning, impose a fine, or suspend or revoke boat slip privileges. A statement describing the specific penalties for noncompliance will be distributed along with the boat slip rental or ownership agreement. Additionally, signage describing recommended clean boating practices and penalties for noncompliance will be displayed prominently in appropriate locations throughout the development.

Neighboring land uses. In addition to the commercial uses within the proposed action area, commercial development in earlier phases of the project would likely include businesses and agricultural activities similar to those identified for the proposed action. The potential exists for residents and workers to be indirectly exposed to various hazardous materials as a result of such activities in neighboring areas as well as those of the proposed action. The presence of such businesses, and the associated risk of exposure, is typical of developed areas. The potential for exposure of developed uses to agricultural chemicals is similarly typical of rural and expanding communities where developed areas interface closely with agricultural uses. Hazardous materials use by businesses in earlier phases of the project and neighboring agricultural uses would be regulated under federal, state, and local laws, and the indirect effects related to these uses are expected to be less than significant. No direct effects were identified.

Exposure of construction workers, residents, and others to existing hazardous materials contamination (significant)

The Denali Group's 2003 Phase I Assessment identified a number of potentially contaminated sites within the RID Area, many of which could potentially affect construction of components of the proposed action. The majority of the contamination is attributable to past agricultural uses, such as bulk diesel, gasoline, and chemical storage and chemical releases from vehicles, spray planes, and other commonly used farm equipment and machinery. Common chemical constituents associated with these uses include petroleum hydrocarbons, fertilizers, herbicides, and pesticides. Additionally, the 2003 Phase I Assessment identified as many as 25 existing and abandoned buildings constructed prior to 1973, which have the potential to contain asbestos- or lead-containing materials. Given the potential in the RID Area for soil or groundwater contamination as well as asbestos- and lead-containing materials in existing buildings, there is some level of risk that construction workers or the public could be directly exposed to contaminated materials through accidental disturbance during construction of some components of the proposed action, potentially constituting a significant directeffect. No indirect effects were identified. To address this and related concerns, Mitigation Measure PH-3 would be implemented.

Mitigation Measure PH-3. Require investigation and remediation of groundwater and onsite structures before construction

Before demolition of any structures associated with past and current farming operations (e.g., buildings, ASTs, and USTs), the project applicant will investigate the extent to which soil or groundwater has been contaminated by these operations. This investigation would include, as necessary, analysis of soil or groundwater samples taken at or near the potential contamination sites. If the results indicate that contamination exists at levels above regulatory action standards, SJCEHD will be notified and the site will be remediated in accordance with recommendations made by SJCEHD, the Central Valley Water Board, DTSC, or other appropriate federal, state, or local regulatory agencies. The agencies involved would depend on the type and extent of contamination.

- SJCEHD will be notified if evidence of previously undiscovered soil or groundwater contamination (e.g., stained soil, odorous groundwater) is encountered during excavation and dewatering activities. Contaminated areas will be remediated in accordance with recommendations made by SJCEHD, the Central Valley Water Board, DTSC, or other appropriate federal, state, or local regulatory agencies.
- Before demolition of onsite buildings, River Islands will have a qualified consultant investigate whether any of the buildings contain asbestos-containing materials and lead that could become friable or mobile during demolition activities. If found, the asbestos-containing materials and lead will be removed by an accredited inspector in accordance with EPA standards and Cal-OSHA standards. In addition, all activities (construction or demolition) in the vicinity of these materials will comply with Cal-OSHA asbestos and lead worker construction standards. The asbestos-containing materials and lead will be disposed of properly at an appropriate offsite disposal facility.

In addition to the areas of known concern, undocumented areas of contamination may also be present, given Stewart Tract's extensive agricultural history, which has included the use of agricultural chemicals and other hazardous substances routinely used for farming activities. This is the case in any area with a long history of agricultural use. If any such contaminated areas are involved in construction, construction workers or the public could be exposed to hazardous substances through accidental disturbance, potentially leading to adverse health effects. Such exposure would constitute a significant direct effect. No indirect effects were identified. To address the potential for adverse health effects related to exposure to previously undocumented environmental contamination, Mitigation Measure PH-4 would be implemented.

Mitigation Measure PH-4. Stop work and implement hazardous materials investigations and remediation in the event that hazardous materials are encountered during construction

In the event that hazardous materials are encountered during construction, all construction activities in the area of the discovery will stop and River Islands will conduct a Phase I Assessment and, if required, Phase II hazardous materials investigation to identify the nature and extent of contamination and evaluate potential effects on project construction and human health. If necessary, River Islands will also implement Phase III remediation measures consistent with all applicable local, state, and federal codes and regulations. Construction will not resume until remediation is complete. If waste disposal is necessary, River Islands will ensure that all hazardous materials removed during construction are handled and disposed of by a licensed waste-disposal contractor and transported by a licensed hauler to an appropriately licensed and permitted disposal or recycling facility, in accordance with local, state, and federal requirements.

Potential to support breeding or harborage of disease-carrying mosquitoes (significant)

For the purposes of this EIS, analysis of vector-borne hazards focuses on operational effects, and specifically on the potential for the proposed water features to increase breeding or provide harborage for disease-carrying mosquitoes. During construction, if water impoundments occur (e.g., for dewatering), SJMVCD would be notified and provided access to any impoundment for inspection and treatment, if treatment is needed (Lucchesi pers. comm.). Potential construction-related effects and effects related to vectors other than mosquitoes are considered minor and are not discussed further in this EIS.

Once constructed, the proposed action would include various internal waterways, including an internal lake system and canals, the Lathrop Landing back bay along the San Joaquin River, and the new Paradise Cut Canal. If these features support standing water that is not subject to current circulation, they could provide additional areas of mosquito breeding habitat, potentially increasing the presence of mosquitoes in the area. This increase in presence could indirectly translate to increased risk of spreading mosquito-borne diseases, such as WNV.

Of the various constructed water bodies associated with the proposed action, the internal lake system is considered the most likely to provide mosquito breeding habitat. Lathrop Landing back bay and Paradise Cut Canal would be connected to the surrounding waterways and would be agitated to varying degrees by currents and therefore would probably have less potential to support mosquito breeding. However, shallow areas in these water bodies could carry some risk. All such risks could be addressed by appropriate design and mosquito management activities as described in Mitigation Measures PH-5 and PH-6. With these measures in place, the potential for water features of the proposed action to increase mosquito breeding would be controlled. Indirect effects on public health as a result of increased mosquito breeding are anticipated to be less than significant. No direct effects were identified.

Mitigation Measure PH-5. Prepare and implement a mosquito control plan

Prior to construction, River Islands will retain a qualified professional to prepare a mosquito control plan for the proposed action. The plan will be developed in coordination with SJMVCD and will be subject to SJMVCD approval. The approved plan will be implemented by the River Islands at Lathrop HOA or an equivalent entity (e.g., GHAD) in cooperation with SJMVCD. The plan will identify areas where mosquito larvae are likely to be present onsite (e.g., in areas with standing water) and will specify appropriate management and maintenance methods consistent with current practices. The management and maintenance methods may include the use of chemicals (e.g., pesticides), biological controls (e.g., use of mosquitofish and/or *Bacillus thuringiensis*), removal of overabundant riverbank vegetation, and control of excess runoff and areas where water can accumulate. The plan will also provide for adaptive management in future years, based on past-year management outcomes and new scientific developments.

Mitigation Measure PH-6. Design the proposed water features to limit mosquito habitat

During the design phase, the applicant will coordinate with SJMVCD to ensure that the proposed water features will not cause mosquito control issues. Resulting water feature designs might include using slope specifications SJMVCD provides for the water features and incorporating aeration to ensure that dissolved oxygen levels are sufficient for the biological controls (mosquitofish in particular) to be effective. Water feature design will be subject to SJMVCD approval.

Potential for health effects associated with use of recycled water (less than significant)

The proposed action entails use of recycled water to irrigate public landscaped areas in the proposed action area. These include parks, golf courses, commercial developments, and school grounds. Although recycled water is not proposed for residential irrigation use, the proposed reuse applications nonetheless fall under the guidelines for "landscape irrigation with high public contact," which must meet the process requirements for "disinfected tertiary recycled water" as defined in 22 CCR. Title 22 of the CCR strictly regulates the production of reclaimed water in California in order to protect public health. It includes specific water quality thresholds, facility design requirements, and treatment process and reliability criteria. Recycled water treated at the City's WRP No. 1 currently meets these standards, and water supplied by any other facility in the future would also be required to comply. With 22 CCR standards in place, the indirect effects on public health associated with use of recycled water are expected to be less than significant. No direct effects were identified.

Potential exposure to wildland fire hazards (less than significant)

Given the current use and management of land within the proposed action area and based on the CAL FIRE real estate disclosure map for San Joaquin County (California Department of Forestry and Fire Protection 2011), the proposed action area is not considered likely to be directly subject to wildland fires, and the potential for the proposed action to indirectly expose persons or property to injury, damage, or loss as a result of wildland fires is considered low.

The proposed action's residential and commercial developments, recreational water features, paved surfaces, and irrigated private and public landscaping would reduce existing open-space vegetated areas in the RID Area. Additional vegetation would be added to some areas associated with the new and expanded levees in compliance with Corps levee vegetation guidelines, but the frequency and intensity of vegetation management activities associated with levee maintenance would be the same as or greater than what now occurs. Consequently, additional vegetation along the levees is not expected to indirectly increase substantial fire hazards. Furthermore, with the construction of one or more fire stations in the RID Area (see Chapter 17, *Public Services and Utilities*), fire service providers deployed from these stations could respond quickly to wildland fires in the PCC and PCIP Areas, should they occur.

Given these considerations, the direct and indirect effects related to wildland fire hazards would be less than significant.

16.2.3.2 Alternative 2—No Alteration of Paradise Cut

Potential hazard associated with transport, use, storage, and disposal of hazardous materials (significant)

Construction

Under Alternative 2, alterations to Paradise Cut would be avoided, but the back bay would be designed and constructed as described for the proposed action. Approximately 225 additional acres would be available for residential development, allowing a reduction in single-family development density in areas along Paradise Cut. Commercial development would occur as described for the proposed action.

Materials necessary for construction under this alternative would be transported, stored, and handled in a manner consistent with relevant regulations and guidelines. Contractors would be required to develop and implement a SWPPP to ensure that water quality is protected during all phases of construction (see *Measures to Protect Water Quality* under *Environmental Commitments* in Chapter 2, *Proposed Action and Alternatives*).

SWPPPs typically include development and implementation of an SPCCP to minimize the potential for, and potential effects from, spills of hazardous substances during construction. With this plan in place, and with all contractors adhering to the relevant regulations and guidelines for the transport, use, storage, and disposal of hazardous materials during project construction, potential direct effects related to hazardous materials transport, use, storage, and disposal during construction are expected to be less than significant. No indirect effects were identified.

Because there would be no increase in the number of residential units but the construction area would be larger in comparison to that of the proposed action, the distances required to transport materials to the residential area under Alternative 2 could be longer than under the proposed action. Development under this scenario could carry a slightly increased risk of direct hazardous materials exposure, compared to the proposed action. However, the overall risk of exposure would be low because materials necessary for construction of this alternative would be transported, stored, and handled in a manner consistent with relevant regulations and guidelines.

Operation

Commercial uses associated with the development of Alternative 2 could include any of the uses defined in Chapter 17.61 (River Islands Zoning Districts) of the City's Municipal Code, including those that regularly generate, store, transport, or dispose of hazardous materials. However, in all cases, the direct risks are considered low because it is assumed that operation-related hazardous materials would be transported, stored, and handled in a manner consistent with relevant federal, state, and local regulations and guidelines. Therefore, potential direct effects related to hazardous materials transport, use, storage, and disposal during operation of the residential and commercial developments under this alternative are expected to be less than significant. No indirect effects were identified.

Dock facilities along the San Joaquin and Old Rivers and in Lathrop Landing back bay would be the same under Alternative 2 as under the proposed action, but there would be no Paradise Cut Canal and, consequently, no Paradise Cut Canal docks. Because there would be a decrease in the total number of group docks, there would be a decreased risk of accidental spills related to routine handling and transport of marine fuels. Nevertheless, risks to the public from exposure to hazardous fuel spills, though decreased, would constitute a significant direct effect. No indirect effects were identified. To minimize the potential for and effects of spills occurring during operation of the proposed marina and dock facilities, Mitigation Measures PH-1 and PH-2 would be implemented.

Exposure of construction workers, residents, and others to existing hazardous materials contamination (significant)

Residential and commercial development under Alternative 2 would occur much as described for the proposed action, but this alternative would entail residential development on an additional 225 acres. Consequently, development under Alternative 2 could carry slightly greater direct risks, relative to the proposed action, with respect to disturbance of contaminated sites that contain hazardous materials. Implementation of Mitigation Measures PH-3 and PH-4 would address this significant direct effect. No indirect effects were identified.

Potential to support breeding or harborage of disease-carrying mosquitoes (significant)

Under Alternative 2, most of the water features described for the proposed action would be implemented with the exceptions of alterations to Paradise Cut. As under the proposed action, the internal lake system and, to a lesser extent, the Lathrop Landing back bay could potentially provide stagnant conditions suitable for the breeding and harborage of disease-carrying mosquitoes, but there would be no fundamental changes to typical flow conditions in Paradise Cut. Consequently, improved conditions in Paradise Cut associated with Mitigation Measure PH-6—such as adding aeration and modifying slopes in accordance with SJMVCD recommendations—would not be made in that portion of the proposed action area. As a result, indirect risks to public health under Alternative 2 may be slightly greater than those under the proposed action. Implementation of Mitigation Measures PH-5 and PH-6 would address this significant indirect effect in internal water features. No direct effects were identified.

Potential for health effects associated with use of recycled water (less than significant)

The use of recycled water under Alternative 2 would be the same as under the proposed action: all recycled water uses would fall under the guidelines for "landscape irrigation with high public contact," which must meet the process requirements for "disinfected tertiary recycled water" as defined in 22 CCR. Because recycled water treated at the City's WRP No. 1 and distributed to River Islands at Lathrop would comply with these requirements, potential indirect public health effects related to recycled water would be less than significant. No direct effects were identified.

Potential exposure to wildland fire hazards (less than significant)

Alternative 2 would include residential and commercial developments, recreational water features, irrigated private and public landscaping, paved surfaces, and other components in the RID Area that are similar to those of the proposed action. Consequently, it would have a low potential to directly or indirectly expose persons or property to injury, damage, or loss as a result of wildland fire. Additionally, because the habitat restoration and creation described for Paradise Cut under the proposed action would not take place, there would be no alteration of existing features or habitat in the PCC or PCIP Areas, and the amount of vegetation in these areas would not increase over existing conditions; however, there would be less vegetation than under the proposed action, because no habitat restoration or enhancement efforts would be undertaken. Accordingly, direct and indirect risks of wildland fire associated with this alternative would be less than significant.

16.2.3.3 Alternative 3—Avoidance of Central Drainage Ditch

Potential hazard associated with transport, use, storage, and disposal of hazardous materials (significant)

Construction

Under Alternative 3, the Lathrop Landing back bay and Paradise Cut Canal would be largely the same as under the proposed action. The footprint of Paradise Cut Canal would be slightly altered because the alignment of the new setback levee would be modified to avoid the central drainage ditch. Avoidance of the ditch and a 100-foot protective buffer on either side would decrease the available development footprint by about 150 acres, increasing the density of the adjacent residential districts.

Stormwater management under Alternative 3 would be conceptually similar to that described for the proposed action, although the configuration of the internal lake system would be substantially revised. While the area available for development would be slightly smaller under Alternative 3 than under the proposed action, the extent of the internal stormwater management features would not be substantially reduced.

Because the number of homes and commercial units under Alternative 3 would not differ from that under the proposed action, potential effects related to hazardous materials transport, use, storage, and disposal during construction would be the same as described for the proposed action. Overall, the risk of exposure would be low because materials necessary for construction of this alternative would be transported, stored, and handled in a manner consistent with relevant regulations and guidelines. Contractors would be required to develop and implement a SWPPP to ensure that water quality is protected during all phases of construction (see *Measures to Protect Water Quality* under *Environmental Commitments* in Chapter 2, *Proposed Action and Alternatives*).

SWPPPs typically include development and implementation of an SPCCP to minimize the potential for and potential effects from spills of hazardous substances during construction. With this plan in place, and with all contractors adhering to the relevant regulations and guidelines for the transport, use, storage, and disposal of hazardous materials during project construction, potential direct effects related to hazardous materials transport, use, storage, and disposal during construction are expected to be less than significant. No indirect effects were identified.

Operation

Although the development footprint would be reduced under Alternative 3 by a total of about 150 acres, the amount of developed uses would not change; rather, the density would be increased to compensate for the areal deficit. Developed uses could still include any of the uses defined in Chapter 17.61 (River Islands Zoning Districts) of the City's Municipal Code, including those that regularly generate, store, transport, and dispose of hazardous materials. However, the risk is considered low because it is assumed that operation-related hazardous materials would be transported, stored, and handled in a manner consistent with relevant federal, state, and local regulations and guidelines. Potential direct effects related to hazardous materials transport, use, storage, and disposal during operation of the residential and commercial developments under this alternative are expected to be less than significant. No indirect effects were identified.

Docks on waterways surrounding Stewart Tract would be the same under Alternative 3 as under the proposed action, and the risk for accidental spills related to routine handling and transport of marine fuels would be the same. Under normal operating scenarios, a limited threat of direct exposure to hazardous materials would exist. However, in the event of an accidental release, effects could be substantial. To minimize the potential for and effects of spills occurring during operations of the marina and dock facilities, Mitigation Measures PH-1 and PH-2 would be implemented.

Exposure of construction workers, residents, and others to existing hazardous materials contamination (significant)

The developable area under Alternative 3 would be reduced by about 150 acres compared to that under the proposed action, and potential direct effects related to existing hazardous materials contamination would be similarly reduced because less ground disturbance—would occur. Nevertheless, the potential for direct exposure to existing hazardous materials contamination would be similar to that under the proposed action. No indirect effects were identified. Implementation of Mitigation Measures PH-3 and PH-4 would address this significant effect.

Potential to support breeding or harborage of disease-carrying mosquitoes (significant)

Under Alternative 3, most of the water features described for the proposed action would be implemented, albeit in a modified configuration. However, retention and avoidance of the central drainage ditch provide stagnant conditions suitable for the breeding and harborage of disease-carrying mosquitoes that would exceed the conditions extant under the proposed action. Consequently, indirect risks to public health under Alternative 3 may be slightly greater than those under the proposed action. Implementation of Mitigation Measures PH-5 and PH-6 would address these significant indirect effects. No direct effects were identified.

Potential for health effects associated with use of recycled water (less than significant)

The use of recycled water under Alternative 3 would be the same as under the proposed action: all recycled water uses would fall under the guidelines for "landscape irrigation with high public contact," which must meet the process requirements for "disinfected tertiary recycled water" as defined in 22 CCR. Because recycled water treated at the City's WRP No. 1 and distributed to River Islands at Lathrop would comply with these requirements, potential indirect public health effects related to recycled water would be less than significant. No direct effects were identified.

Potential exposure to wildland fire hazards (less than significant)

Development patterns under Alternative 3, although adjusted to avoid the central drainage ditch, would be similar to those under the proposed action. The proposed action area is not considered likely to be subject to direct wildland fire exposure, and the potential for the proposed action to indirectly expose persons or property to injury, damage, or loss as a result of wildland fires is considered low. The construction of one or more fire stations in the RID Area (see Chapter 17, *Public Services and Utilities*) would occur under Alternative 3, allowing fire service providers deployed from these stations to respond quickly to wildland fires in the PCC and PCIP Areas, should they occur. Consequently, direct and indirect effects related to wildland fire hazard would be less than significant.

16.2.3.4 Alternative 4—Proposed Action with Expanded Flood Risk Reduction

Potential hazard associated with transport, use, storage, and disposal of hazardous materials (significant)

Construction

Under Alternative 4, residential and commercial development in the RID Area would be the same as that under the proposed action, but the flood risk reduction component would include the addition of one or more bypass channels west of the existing Paradise Cut flood bypass, more extensive widening in Paradise Cut, widening of Paradise Weir, the addition of a new weir upstream of the existing Paradise Weir, and creation of new flood storage areas.

Materials necessary for construction of this alternative would be transported, stored, and handled in a manner consistent with relevant regulations and guidelines. Contractors would be required to develop and implement a SWPPP ensure that water quality is protected during all phases of construction (see *Measures to Protect Water Quality* under *Environmental Commitments* in Chapter 2, *Proposed Action and Alternatives*).

SWPPPs typically include development and implementation of an SPCCP to minimize the potential for and potential effects of spills of hazardous substances during construction. With this plan in place, and with all contractors adhering to the relevant regulations and guidelines for the transport, use, storage, and disposal of hazardous materials during project construction, potential direct effects related to hazardous materials transport, use, storage, and disposal during construction of Alternative 4 are expected to be less than significant. No indirect effects were identified.

Operation

Commercial uses associated with the development of Alternative 4 could include any of the uses defined in Chapter 17.61 (River Islands Zoning Districts) of the City's Municipal Code, including those that regularly generate, store, transport, and dispose of hazardous materials. However, the risk is considered low because it is assumed that operation-related hazardous materials would be transported, stored, and handled in a manner consistent with relevant federal, state, and local regulations and guidelines. Therefore, potential direct effects related to hazardous materials transport, use, storage, and disposal during operation are expected to be less than significant. No indirect effects were identified.

The number of boat dock facilities would be the same under Alternative 4 as under the proposed action, and the risk for accidental spills related to routine handling and transport of marine fuels would be similar. Under normal operating scenarios, a limited threat of direct exposure to hazardous materials would exist. However, in the event of an accidental release, effects could be significant. To minimize the potential for and effects of spills occurring during operations of the marina and dock facilities, Mitigation Measures PH-1 and PH-2 would be implemented.

Exposure of construction workers, residents, and others to existing hazardous materials contamination (significant)

Residential and commercial development under Alternative 4 would be the same as under the proposed action. Consequently there exists a similar level of risk that construction workers or the public could be directly exposed to contaminated materials through accidental disturbance during construction of these components, potentially constituting a significant direct effect. However, development of the expanded flood risk management components would entail considerable—but as yet unquantified—ground disturbance in areas that have not yet been investigated. The potential exists for increased levels of exposure to existing hazardous materials associated with work in historically agricultural areas. No indirect effects were identified. In addition to implementation of Mitigation Measures PH-3 and PH-4, a Phase I Assessment would likely be required before work on these components could proceed.

Potential to support breeding or harborage of disease-carrying mosquitoes (significant)

Residential and commercial development under Alternative 4 would the same as under the proposed action, but the flood risk reduction component would include the addition of one or more bypass channels west of the existing Paradise Cut flood bypass, more extensive widening in Paradise Cut, widening of Paradise Weir, the addition of a new weir upstream of the existing Paradise Weir, and the creation of new flood storage areas. Accordingly, some of the new features could potentially provide stagnant conditions suitable for the breeding and harborage of disease-carrying mosquitoes, exposing the public to potential increased health risks. Such exposure would constitute a significant indirect effect. No direct effects were identified. In the event this alternative is selected, specific mitigation measures would have to be developed in consultation with SJMVCD.

Potential for health effects associated with use of recycled water (less than significant)

The use of recycled water under Alternative 4 would be the same as under the proposed action: all recycled water uses would fall under the guidelines for "landscape irrigation with high public contact," which must meet the process requirements for "disinfected tertiary recycled water" as defined in 22 CCR. Because recycled water treated at the City's WRP No. 1 and distributed to River Islands at Lathrop would comply with these requirements, potential indirect public health effects related to recycled water would be less than significant. No direct effects were identified.

Potential exposure to wildland fire hazards (less than significant)

Alternative 4 would include residential and commercial developments, recreational water features, irrigated private and public landscaping, paved surfaces, and other components in the RID Area that are similar to those of the proposed action. Consequently, it would have a low potential to directly or indirectly expose persons or property to injury, damage, or loss. Details of the proposed riparian habitat restoration and creation activities in PCC and PCIP Areas are not known at this time; it is possible that this alternative would eventually lead to establishment of a greater extent of riparian vegetation associated with some of the flood risk reduction components. However, regardless of the final design of Alternative 4, these areas would not support new residential or commercial development and would remain largely isolated from the RID Area by Paradise Cut, and the risk associated with wildland fires would remain low. Furthermore, with the construction of one or more fire stations in the RID Area (see Chapter 17, *Public Services and Utilities*), fire service providers deployed from these stations could respond quickly to wildland fires in the PCC and PCIP Areas. Direct and indirect effects related to wildland fires under this alternative would be less than significant.

16.2.3.5 Alternative 5—No Action

Potential hazard associated with transport, use, storage, and disposal of hazardous materials (less than significant)

Construction

The No Action Alternative would entail construction of an interior levee system rather than extended levees for flood risk reduction. The No Action Alternative would not include waterside vegetation on benches associated with federal project levees along the San Joaquin and Old Rivers, nor would it involve habitat restoration and enhancement activities associated with the Paradise Cut Improvement Program.

Residential and commercial development would be similar to that under the proposed action, but development density in the RID Area would be increased because of the interior levee system and avoidance of the central drainage ditch. Lathrop Landing back bay and boat dock facilities would not be constructed. Potential effects related to hazardous materials transport, use, storage, and disposal during construction would occur to a slightly lesser degree than under the proposed action; in addition, risks from direct exposure would be low because materials necessary for construction of this alternative would be transported, stored, and handled in a manner consistent with relevant regulations and guidelines. Contractors would be required to develop and implement a SWPPP to ensure that water quality is protected during all phases of construction (see *Measures to Protect Water Quality* under *Environmental Commitments* in Chapter 2, *Proposed Action and Alternatives*).

SWPPPs typically include development and implementation of an SPCCP to minimize the potential for and potential effects of spills of hazardous substances during construction. With this plan in place, and with all contractors adhering to the relevant regulations and guidelines for the transport, use, storage, and disposal of hazardous materials during project construction, potential direct effects related to hazardous materials transport, use, storage, and disposal during construction activities associated with the No Action Alternative are expected to be less than significant. No indirect effects were identified.

Operation

Although the development footprint under the No Action Alternative would be reduced by a total of about 170 acres, the amount of developed uses would not change; rather, the density would be increased to compensate for the areal deficit. Developed uses could still include any of the uses defined in Chapter 17.61 (River Islands Zoning Districts) of the City's Municipal Code, including those that regularly generate, store, transport, and dispose of hazardous materials. However, the risk is considered low because it is assumed that operation-related hazardous materials would be transported, stored, and handled in a manner consistent with relevant federal, state, and local regulations and guidelines. Potential direct effects related to hazardous materials transport, use, storage, and disposal during operation of the residential and commercial developments under this alternative are expected to be less than significant. No indirect effects were identified.

Because no docks would be constructed either on the perimeter waterways or in constructed marinas under the No Action Alternative, there would be no risk of accidental spills related to routine handling and transport of marine fuels, nor would there be potential hazards associated marina, dock, or boat operations associated with River Islands at Lathrop.

Exposure of construction workers, residents, and others to existing hazardous materials contamination (significant)

Residential and commercial development under the No Action Alternative would be similar to that under the proposed action, but the development density in the RID Area would be greater because of the decrease in developable area attributed to the interior levee system and avoidance of the central drainage ditch. Potential direct effects related to existing hazardous materials contamination would be slightly less than under the proposed action because less ground disturbance would occur. Mitigation Measures PH-3 and PH-4 would address this significant direct effect. No indirect effects were identified.

Potential to support breeding or harborage of disease-carrying mosquitoes (significant)

Residential and commercial development under the No Action Alternative would be similar to that under the proposed action. All alterations to Paradise Cut would be avoided, the central drainage ditch would be retained, and the Lathrop Landing back bay would not be created. The central drainage ditch could potentially provide stagnant conditions suitable for the breeding and harborage of disease-carrying mosquitoes beyond those of the proposed action. Moreover, there would be no fundamental changes to typical flow conditions in Paradise Cut. Consequently, improved conditions in Paradise Cut associated with Mitigation Measure PH-6—such as adding aeration and modifying slopes in accordance with SJMVCD recommendations—would not be made in that portion of the proposed action area. As a result, indirect risks to public health under the No Action Alternative could be slightly greater than those under the proposed action. Implementation of Mitigation Measures PH-5 and PH-6 would address this significant indirect effect. No direct effects were identified.

Potential for health effects associated with use of recycled water (less than significant)

The use of recycled water under the No Action Alternative would be the same as under the proposed action: all recycled water uses would fall under the guidelines for "landscape irrigation with high public contact," which must meet the process requirements for "disinfected tertiary recycled water" as defined in 22 CCR. Because recycled water treated at the City's WRP No. 1 and distributed to River Islands at Lathrop would comply with these requirements, potential indirect public health effects related to recycled water would be less than significant. No direct effects were identified.

Wildland fire hazards (less than significant)

Under the No Action Alternative, the development density in the RID Area would be increased because of the interior levee system and avoidance of the central drainage ditch. The potential exists for more areas of ruderal vegetation surrounding the development to be at risk for fires during the dry season but, overall, the potential for exposure of persons or property to injury, damage, or loss as a result of wildland fire would be low. Additionally, because there would be no alteration of existing features or habitat in the PCC and PCIP Areas, the amount of vegetation in these areas would not increase over existing conditions. Accordingly, direct and indirect fire risks associated with the uses in these areas would be less than significant.

16.3 References

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16.3.2 Personal Communication

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Chapter 17
Public Services and Utilities

This chapter analyzes the proposed action's and alternatives' potential effects related to public services and utilities. Related discussions are found in Chapter 6, *Water Resources and Flood Risk Management;* Chapter 11, *Recreation;* Chapter 16, *Public Health and Environmental Hazards;* Chapter 19, *Socioeconomics;* Chapter 20, *Environmental Justice;* and Chapter 21, *Cumulative Effects*. Growth- and sustainability-related issues are addressed in Chapter 22, *Growth Inducement and Related Effects*, and Chapter 23, *Energy Use and Environmental Sustainability*.

The key sources of data listed below were used in the preparation of this chapter.

- *Comprehensive General Plan for the City of Lathrop, California* (City of Lathrop 2004).
- *West Lathrop Specific Plan* (City of Lathrop 2003a).
- City of Lathrop Municipal Code.
- *City of Lathrop Water Supply Study* (City of Lathrop 2009a).
- *City of Lathrop's Water, Wastewater, and Recycled Water Master Plan* (City of Lathrop 2001a).
- *Draft Environmental Impact Report for the City of Lathrop's Water, Wastewater, and Recycled Water Master Plan* (City of Lathrop 2001b).
- *Draft Subsequent Environmental Impact Report for River Islands at Lathrop Project* (City of Lathrop 2002) and addenda (City of Lathrop 2003, 2005, 2007, 2012).

Specific reference information is provided in the text.

17.1 Affected Environment

17.1.1 Regulatory Framework

17.1.1.1 State

California Integrated Waste Management Board

CIWMB oversees, manages, and tracks both hazardous and nonhazardous waste generation in California. The principal state regulations governing waste disposal are CCR Title 14 and Title 27. Title 14 establishes minimum standards for the handling and disposal of solid wastes (Chapter 3) and hazardous wastes (Chapters 7 and 8) and the planning/enforcement of these standards (Chapters 5 and 9). Title 27 establishes criteria for all waste management units, facilities, and disposal sites (Chapter 3); minimum requirements for information submitted by operators of solid waste disposal sites (Chapter 4); requirements for special treatment, storage, and disposal units (Chapter 7); and the enforcement of these standards (Chapter 5). Under CIWMB's authority, municipal solid waste landfills are categorized as Class I, Class II, or Class III. Class I landfills accept hazardous and nonhazardous waste, Class II landfills accept specific designated waste and nonhazardous waste, and Class III landfills accept only nonhazardous waste. Individual landfills may have additional specific requirements or limitations.

In 1989, AB 939, known as the Integrated Waste Management Act, was passed into law. Enactment of AB 939 established CIWMB and set forth aggressive solid waste diversion requirements. Under AB 939, every city and county in California was required to reduce the volume of waste sent to landfills by 50% through recycling, reuse, composting, and other means by 2000. AB 939 requires counties to prepare a Countywide Integrated Waste Management Plan (CIWMP). Since the passage of AB 939, California has achieved its landfill diversion rate of 50%. In 2011, AB 341 was enacted, setting a new landfill diversion rate goal of 75% by 2020.

California Department of Health Services

DHS establishes criteria under 22 CCR Division 4, Environmental Health, for wastewater recycling. Under Division 4, Chapter 3 designates water recycling criteria, Chapter 4 establishes water treatment devices, and Chapter 15 defines domestic water quality and monitoring regulations. DHS enforces Title 22 regulations and has jurisdiction over the distribution of recycled wastewater. RWQCBs also establish reuse requirements for recycled wastewater.

California Public Utilities Commission

CPUC regulates privately owned telecommunications, electric, natural gas, water, railroad, rail transit, and passenger transportation companies. CPUC establishes service standards and safety rules, and authorizes utility rate changes as well as enforcing CEQA for utility construction and operation. CPUC also regulates the relocation of power lines by public utilities under its jurisdiction, such as PG&E. CPUC works with other state and federal agencies in promoting water quality, environmental protection, and safety. CPUC establishes rules for all utilities or a class of utilities under its General Orders (as opposed to decisions regarding a particular case for a particular utility). CPUC's General Orders include a variety of provisions for public utilities. For example, the General Orders provide standards for gas service and water service, procedures for construction of underground electric supply and communication systems, planning and construction standards for electric transmission and electricity facilities, and other public utilities standards.

Senate Bills 610 and 221 of 2001

In 2001, SB 610 and SB 221 were passed, instituting a requirement that adequate water supply must be ensured prior to the approval of new, large developments. As part of this process, public water agencies, parties, or purveyors that may supply water for large development projects must prepare a Water Supply Assessment (WSA).

17.1.1.2 Local

City of Lathrop General Plan

Several elements of the City's General Plan, amended in 2004, establish goals, policies, and implementation programs that address the provision of public facilities and services necessary to meet the demand created by existing and future development in Lathrop. These goals and policies are summarized below.

Police and Fire Protection

Policies relating to police and fire protection are set forth in *Safety Goals and Policies* in the General Plan's *Hazard Management Element*. The City maintains a high priority to support police protection, as well as the fire suppression, fire prevention, and life safety functions of the LMFPD. The maximum adequate response time for fire services is 3–4 minutes to urban areas. The City's General Plan also outlines minimum fire flow standards: 3,000 gallons per minute (GPM) for commercial and industrial areas and 1,500 GPM for residential areas (City of Lathrop 2004). The City maintains four water storage tanks and booster pump stations to meet fire flow standards and emergency storage capacities (Gibson pers. comm.). The City also stipulates that street systems capable of providing access to urban fires will be maintained to evacuate residents in the event of an emergency. Although the General Plan does not require minimum staffing ratios for police or fire services, the General Plan does promote neighborhood watch programs and crime prevention, in addition to crime suppression (City of Lathrop 2004).

Water Supply

The General Plan's policy relating to water supply is to provide a secure, fresh source of water for existing and future residents (City of Lathrop 2004). The City has addressed water supply, wastewater, and recycled water in the *Water, Wastewater, and Recycled Water Master Plan* (City of Lathrop 2001a), the *Environmental Impact Report for the City of Lathrop's Water, Wastewater, and Recycled Water Master Plan* (City of Lathrop 2001b), *Water Supply Study* (City of Lathrop 2009a), and the *2005 Urban Water Management Plan* (2009). The *Water Supply Study* and the Urban Water Management Plan were last released in 2009 with a major update expected in early 2013.

Before 2005, the City was served entirely by existing groundwater supplies (well fields) for domestic water needs (City of Lathrop 2004). The City has expanded water supply sources through its involvement with the SSJID SCSWSP, which began providing surface water to Lathrop (under earlier phases of the project) in 2005 (City of Lathrop 2009a). The source of SCSWSP water is the Stanislaus River (City of Lathrop 2002).

Wastewater

Guidance for wastewater management is detailed in the General Plan's *Community Development Element*, under *Water, Sewerage, and Drainage*. The General Plan states that wastewater management will comply with the City's *Water, Wastewater, and Recycled Water Master Plan* (City of Lathrop 2004). Additional wastewater recycling facilities are proposed under this Master Plan. The General Plan also establishes a goal stating that wastewater and surface water should be reused so there is no net increase in water pollution, including point and nonpoint sources (City of Lathrop 2004). The General Plan encourages recycling of wastewater (City of Lathrop 2004).

Stormwater Drainage

Drainage policies for stormwater and floodwater conveyance are addressed in Section D, *Water Sewerage and Drainage*, of the General Plan's *Community Development Element*. The City requires that flood risk management and drainage construction meet the standards of the agencies with jurisdiction, including the Corps, FEMA, the California Reclamation Board, DWR, and RD 2062. The most conservative applicable requirements are to be implemented unless otherwise agreed upon by the agencies involved (City of Lathrop 2004).

Since the development of the current General Plan, the Lathrop City Council has implemented a *Storm Water Development Standards* plan (City of Lathrop 2008b). The plan provides consistent standards for future development in Lathrop to protect water quality and to aid in the development of a master plan that addresses overall management and infrastructure for flood conveyance and risk management.

Solid Waste Management

Solid waste management policies are outlined in the General Plan's *Resource Management Element*. Before site and building permits for solid waste management facilities are approved, the City must adopt standards that comply with state air and water quality standards. Periodic monitoring to ensure compliance with these standards will be maintained to lessen effects on water and air quality. A California-licensed engineer experienced with the processes involved will conduct environmental assessments of the facilities' industrial processes (City of Lathrop 2004).

Schools

The General Plan provides guidance for elementary and secondary education facilities within the City of Lathrop. A main premise for new schools outlined in the General Plan includes the incorporation of neighborhood and community parks to meet the recreation needs of the schools, as well as those of Lathrop residents. The City will retain existing school facilities and is planning to develop new schools as needed, under the direction of the California Board of Education. Under the General Plan, the City is authorized to obtain appropriate funding for additional school facilities through development fees (City of Lathrop 2004).

West Lathrop Specific Plan

The development of Stewart Tract as River Islands at Lathrop is included in the City's WLSP. The WLSP is the primary mechanism for implementing the City's goals for the West Lathrop area, as generally outlined in the General Plan. The WLSP outlines the City's vision for the western part of Lathrop and provides guidance for each development area within West Lathrop. Specific needs for land use, circulation, community design, and utilities are identified in the WLSP (City of Lathrop 2003a). Provisions for utilities that would be necessary for the development of Stewart Tract (Sub-Plan Area 3)—such as water, wastewater, recycled water, storm drainage, solid waste, electricity, natural gas, and telecommunications—are detailed in the WLSP.

Water Supply

General guidelines to satisfy current and future populations in Lathrop are identified in the General Plan, while more specific guidelines are detailed in the WLSP. Since development of the WLSP, the City has entered a contractual agreement (the Water Supply Development Agreement) with SSJID for treated surface water. As assumed in the WLSP, SSJID would deliver treated surface water to the City at two locations: the intersection of Manthey Road and Stewart Road, and the intersection of Lathrop Road and UPRR (City of Lathrop 2003a). From these locations, water would need to be delivered to Stewart Tract and throughout the RID Area. The WLSP suggests that water be piped to Stewart Tract through a connection at Louise Avenue/River Islands Parkway, then delivered by a looped series of 16- and 12-inch water mains following North and South River Islands Parkways (City of Lathrop 2003a). The City intends to construct, operate, and maintain a water storage tank and booster pump station (No. 4) on the eastern edge of Stewart Tract adjacent to the UPRR alignment (City of Lathrop 2003a). Moreover, the WLSP requires that facilities store 3.5 million gallons (MG) within Stewart Tract (City of Lathrop 2003a). The SCSWSP also identified the need for an additional 1 MG of water storage near Stewart Tract (City of Lathrop 2003a). The water distribution system would be consistent with the City's Water, Wastewater, and Recycled Water Master Plan.

Wastewater

The WLSP identifies potential areas for treatment and disposal of wastewater for Stewart Tract developments in accordance with the City's *Water, Wastewater, and Recycled Water Master Plan*. Since the development of the WLSP, the City has expanded its Water Recycling Plant No. 1 (WRP No. 1) and has constructed an additional facility (Crossroads) adjacent to WRP No. 1, both of which are located in the Crossroads Industrial Park (City of Lathrop 2003a, 2009a). The WLSP proposes a wastewater collection system for Stewart Tract that would direct wastewater to the newly expanded WRP No. 1, utilizing a series of lift stations and force mains situated at strategic areas in Stewart Tract (City of Lathrop 2003a). Under the WLSP, eight pump stations would be constructed in conjunction with looping sanitary sewer pipes (8–36 inches in diameter) and looping force mains (15–24 inches in diameter) throughout Stewart Tract (City of Lathrop 2003a).

Recycled Water

The WLSP encourages the recycling of wastewater (City of Lathrop 2003a). To maximize the use of recycled water, the WLSP proposes that recycled water be used for disposal in identified open space and public areas, for landscape irrigation in identified public and private locations, and for agricultural irrigation (City of Lathrop 2003a). As required by the Central Valley Water Board and DHS (Title 22, Division 4), recycled water can only be used in specific confined areas, and facilities must comply with regulations related to distances to domestic water lines (City of Lathrop 2003a). Assuming that Title 22 requirements are met, areas that could utilize recycled water for irrigation purposes include golf courses, cemeteries, freeway landscaping, parks, and playgrounds (City of Lathrop 2003a).

The WLSP estimates the average daily dry weather flow (ADWF) of wastewater for Stewart Tract at buildout to be approximately 3,920,000 gallons per day (GPD). The WLSP identifies a need for a separate recycled water main to convey recycled water. It is assumed that during irrigable seasons (April to mid-October), all the recycled water generated by Stewart Tract would be applied to selected land use areas under the WLSP. The WLSP also assumes that recycled water would be stored in storage ponds or discharged into the San Joaquin River, if the City obtains a permit (City of Lathrop 2003a).

Storm Drainage

The WLSP includes a preliminary conceptual plan for the storm drainage system for Stewart Tract. The WLSP assumes the incorporation of water features of the River Islands at Lathrop proposal, which includes several created wetlands, the internal lake system, connecting canals, golf course lakes, lake or river outfalls, pump stations, and storm drain pipes. The existing pump station between I-5 and the UPRR alignment west of I-5 is also identified in the WLSP for use in conjunction with three additional pump stations and storm drain pipes (27–72 inches) for storm drainage throughout the RID Area (City of Lathrop 2003a).

The conceptual storm drainage plan includes several BMPs—infiltration, biofiltration, and wetlands—that would comply with NPDES requirements. Infiltration BMPs would involve the routing of stormwater runoff to a greenbelt area before entering a drainpipe. Biofiltration BMPs—or grassy swales—are specified to be used along arterial roadways. Biofiltration mechanisms that would be used include longitudinal swales, parallel to roadways, that intercept stormwater runoff from adjacent streets for treatment. Additional BMPs for storm drainage involve the strategic placement of treatment wetlands at the downstream terminus of storm drain pipes. Commercial BMPs are also specified; these include biofiltration through swales or buffer strips, infiltration, media filtration, and oil/water separators, to be used for large commercial buildings and parking lots (City of Lathrop 2003a).

The WLSP also refers to the Storm Water Management Plan (Management Plan) for Lathrop, which describes specific drainage parameters that must be followed for adequate flood risk reduction and stormwater conveyance (City of Lathrop 2003a). The Management Plan states that new developments must be designed to accommodate a "100-year 48-hour" storm and the resulting excess runoff. The Management Plan also states that detention and retention basins must be at least 2 feet above the high groundwater elevation, as well as meeting Central Valley Water Board requirements (City of Lathrop 2003b).

Solid Waste

The WLSP identifies the need for expanded areas of the City, including the WLSP area. Current franchise agreements between the City, Lathrop Sunrise Sanitation Corporation, and Delta Container Corporation for the collection of solid waste, recyclables, and yard waste from residential, industrial, and commercial areas in Lathrop also include provisions for services for expanded areas of the City, including Stewart Tract. The WLSP assumes that these franchise agreements will be upheld and that these services would be provided to Stewart Tract. The WLSP also asserts that the City must comply with AB 939, which requires a 50% reduction of landfill waste by 2000 (City of Lathrop 2003a). Since the publication of the WLSP, California has achieved the goals of AB 939, and municipalities must now comply with AB 341, which sets a landfill diversion rate of 75% by 2020.

Electricity

According to the WLSP, additional electrical service would be necessary for future developments in the WLSP area. The WLSP assumes that electrical service would be provided to River Islands at Lathrop by LID through the existing 115-kV Manteca-Kasson line. The WLSP also states that the electrical service system must comply with all applicable regulations, and must be constructed as needed, as development is approved and progresses (City of Lathrop 2003a). Initial service to the development by LID is through an existing interconnection to the PG&E distribution system. A Wholesale Distribution Tariff Agreement is in place between LID and PG&E for this interconnection.

Natural Gas

Natural gas service and infrastructure would need to be constructed to serve the WLSP area. The WLSP assumes that natural gas would be provided to Sub-Plan Area 3 (the River Islands at Lathrop area) through an existing underground PG&E line in Lathrop (Louise Feeder), located at the intersection of Louise Avenue and South Harlan Road. The WLSP also stipulates that newly constructed pipelines and stations must be designed to meet all appropriate regulatory requirements (City of Lathrop 2003a).

Telecommunications

Telecommunication services would need to be constructed and designed to service the WLSP area, including River Islands at Lathrop. Additional services that would be required include networks for telephone, cable TV, cellular phone, and trunked radio services. Under the WLSP, the construction and design of telecommunication services must meet commercial and residential needs for Sub-Plan Area 3 (City of Lathrop 2003a).

City of Lathrop Municipal Code

The City's Municipal Code is currently being updated; the current working draft was updated in 2008 (City of Lathrop 2008a). For Public Services (Title 13), individual chapters address water service, water softening appliances, water conservation and rationing, recycled water service, cross-connection control, sewer service, utility rates and charges, underground utility districts, sewer use and industrial wastewater regulations, and stormwater management and discharge control.

Pollution prevention was identified by the City Council and state legislature as the first priority in pollution reduction and waste management. At the time these municipal codes were drafted, the City was not in compliance with the total dissolved solids (TDS) waste discharge requirements. Consequently, the installation of self-regenerating water softening appliances is prohibited to reduce saline discharge and meet the TDS standards (Code 13.05.020, 13.05.030). The municipal code also details discharge provisions into publicly owned treatment works, which comply with state and federal laws, including the CWA (Code 13.26.010).

17.1.2 Existing Conditions

17.1.2.1 Methods Used to Identify Existing Conditions

Information on public services and utilities for the proposed action was gathered from the City's website; the River Islands SEIR and addenda; school district websites (Manteca Unified, Banta Elementary, and Tracy Unified); the *Lathrop Water, Wastewater, and Recycled Water Master Plan*; the City of Lathrop's 2009 *Water Supply Study*, and communications with City staff. The area considered for existing conditions for this resource topic encompasses the City of Lathrop and the RID area.

17.1.2.2 Existing Services in City of Lathrop

Existing public services and utilities providers for the City and the proposed action area are summarized in Table 17-1. The City has developed a Municipal Service Review (MSR). Figure 17-1 illustrates the locations of existing infrastructure.

Table 17-1. Public Services and Utilities Providers in the Proposed Action Area

Public Services and Utilities	Provider
Communication services	Comcast, Verizon of California, AT&T, LID or affiliate
Electricity and natural gas	Lathrop Irrigation District, Pacific Gas & Electric Company
Education/schools	Banta Elementary School District, Tracy Unified School District, Manteca Unified School District
Fire protection	Lathrop-Manteca Fire Protection District
Police services	City of Lathrop, under contract with the San Joaquin County Sheriff's Department
Solid waste	City of Lathrop, through several independent contractors
Water supply	City of Lathrop, South San Joaquin Irrigation District
Wastewater, sewer system, and recycled water	City of Lathrop (WRP No. 1), Lathrop-Manteca Water Quality Control Facility, Crossroads Water Treatment Facility
Storm drainage	City of Lathrop

The number of residents served throughout Lathrop, including West Lathrop, was estimated from U.S. Census data, the City's website, and personal communications. The most recent U.S. Census data for Lathrop show a population of 18,023 for the City as a whole as of 2010, representing some 4,782 households (U.S. Census Bureau 2011a). As of 2010, the population of Stewart Tract was approximately 17 residents in some 5 households (U.S. Census Bureau 2011b).

Communication Services

AT&T provides telecommunications, including cellular and Internet service, in Lathrop and Stewart Tract. Cable television and Internet services are provided by Comcast (City of Lathrop 2009b). Additional cellular service in the area is provided by Verizon Wireless. LID may also provide telecommunications services through an affiliated agency or entity.

Electricity and Natural Gas

Electricity and natural gas infrastructure are provided by PG&E in the City of Lathrop, including West Lathrop (City of Lathrop 2009b). Stewart Tract (including the proposed action area) currently receives electricity via two 12-kV lines on Stewart Tract (City of Lathrop 2002). In 2006, an 8-inch gas line was extended across the San Joaquin Pedestrian and Bicycle Bridge, adjacent to Stewart Tract; this line carries gas at the appropriate pressure for distribution to residences (Batista pers. comm.). LID, formed in 2002, is also authorized to deliver electrical service, potable water, and wastewater service to areas in Lathrop, including Stewart Tract (City of Lathrop 2002).

Education/Schools

Manteca Unified School District (MUSD) serves the majority of the City of Lathrop, except for Stewart Tract (Manteca Unified School District 2009). Lathrop Elementary School and Joseph Widmer Elementary School are both located in Lathrop, serving grades K–8 (City of Lathrop 2002). Sierra High School in Manteca serves high school students bussed from Lathrop (City of Lathrop 2002).

The River Islands at Lathrop site is within the boundaries of both the Banta Elementary School District (BESD) and the Tracy Unified School District (TUSD) (City of Lathrop 2002).

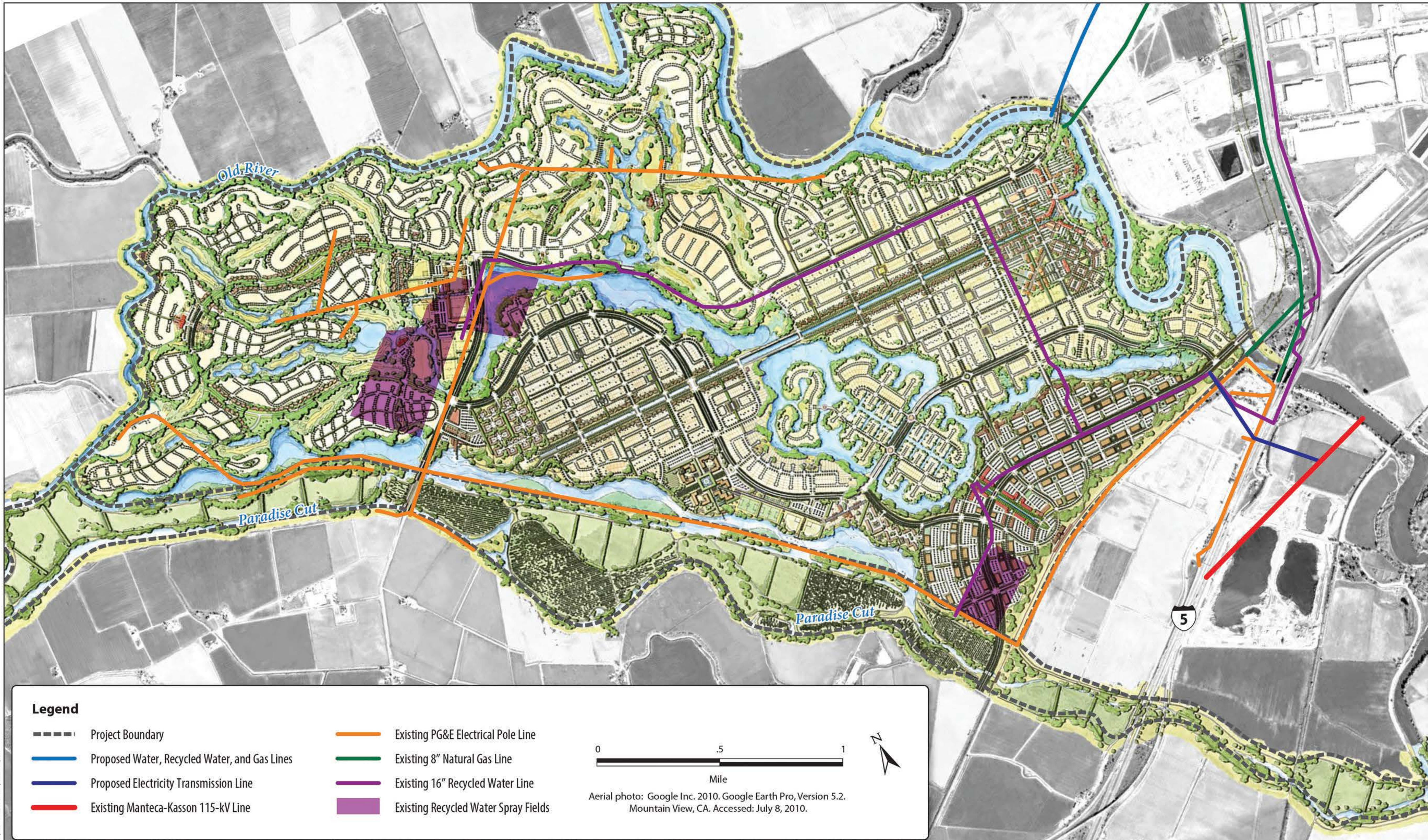

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Figure 17-1
Existing and Proposed Utility Routes

BESD provides education for K–8 students, with graduates attending Tracy High School (Banta Elementary School District 2009). BESD currently operates only one school. At present, approximately 300 students attend the single school in the BESD (Banta Elementary School District 2009). The school has the capacity to serve an additional 300 students, for a total capacity of 600 (Draa pers. comm.). Construction of another K–5 school and a 6–8 middle school is planned; these would be designed to serve 600 students (750 maximum) and 750 students (900 maximum), respectively (Draa pers. comm.).

TUSD comprises five high schools (three comprehensive schools and two alternative schools), a community school, two middle schools, four K–8 schools, and nine K–5 elementary schools (Tracy Unified School District 2011). During the 2010–2011 school year, TUSD served more than 17,000 students (Tracy Unified School District 2011). Tracy High School, whose service area encompasses Stewart Tract, currently serves 2,747 students, exceeding the designed enrollment capacity of 1,800–2,000 (Tracy Unified School District 2010). Construction work and renovations recently added another 40 classrooms and two additional buildings to Tracy High School. A third high school, John C. Kimball High School, opened in August 2009 and served grades 9–10 (Tracy Unified School District 2010). In 2010, 11th grade students were enrolled, followed by 12th grade students in 2011. Kimball High School has the capacity to serve approximately 2,000–2,400 students, helping to alleviate enrollment pressure on Tracy High School (Knowlan pers. comm.). The enrollment, capacity, and future capacity of the surrounding schools are shown in Table 17-2.

Table 17-2. Existing and Future Student Enrollment and Design Capacity for Surrounding Schools

School	Current Enrollment	Current Capacity	Future Capacity
BESD[a]	300	600	1,950–2,350[a]
Tracy High School[b]	2,747	2,747	1,800–2,000
Kimball High School[c]	908[d]	908[d]	1,900–2,400

Sources: Draa pers. comm., Carter pers. comm., Knowlan pers. comm. (Updates of all pers. comms. pending at time of publication.)

[a] Combining the capacities of the proposed K–5 school and 6–8 grade school with existing Banta Elementary School.

[b] Tracy High School is currently above the designed capacity of 1,800–2,000 students.

[c] Full buildout of Kimball High School completed in 2011.

[d] Based on statistics for the 2009–2010 school year.

Fire Protection

The City of Lathrop, including Stewart Tract, is served by the LMFPD. The district operates four fire stations that cover approximately 100 square miles. Two stations are in Lathrop and two are in nearby Manteca. The newest station, Station 34, is one of two stations in Lathrop, and was recently opened on May 20, 2006. It is the closest station to Stewart Tract (Lathrop-Manteca Fire Protection District 2009a).

Overall, LMFPD serves more than 8,105 single-family dwellings totaling 16.5 million square feet, and more than 779,000 square feet of commercial space. Industrial areas under protection total approximately 11.1 million square feet. LMFPD also protects several acres of agricultural uses, including dairy farms, poultry farms, and croplands (Lathrop-Manteca Fire Protection District 2009a).

LMFPD currently staffs 37 career firefighters, 18 reserve firefighters, and three administrative employees. Firefighters are divided into three shifts that work in 24-hour rotations, with 11 staff per shift. Station 34, the closest station to the project site, has a captain and two firefighters assigned daily (Lathrop-Manteca Fire Protection District 2009a). The City's current minimum staffing ratio is 1.2 officers for every 1,000 residents (City of Lathrop 2002).

In addition to responding to fires, LMFPD also responds to medical emergencies, traffic accidents, and river rescue calls. LMFPD is also actively involved in the San Joaquin County hazardous materials response team (Lathrop-Manteca Fire Protection District 2009b).

Police and Animal Control Services

The City contracts police services through the San Joaquin County Sheriff's Department (City of Lathrop 2009c). The San Joaquin County Sheriff's Department assigns deputy sheriffs to the City of Lathrop for a minimum of 3 years (City of Lathrop 2009c). The City of Lathrop has a police staffing goal of 1.5 officers per 1,000 population. Based on the current population of 18,908, a staffing level of 28 officers is desired (Mullen pers. comm.).

The San Joaquin County Sheriff's Department has eight divisions: Administration, Custody, Investigations, Patrol, Support Services, Lathrop Police Services, Mountain House Police Services, and Unified Court Services (San Joaquin County 2009a). The Sheriff for San Joaquin County is elected to a 4-year term by County citizens (San Joaquin County 2009b).

Currently, the City employs 22 sworn officers and 3 (non-sworn) civilians. The sworn officers comprise the captain (Police Chief), one lieutenant (Administrative and Operations), two shift patrol sergeants, one detective, one community resources officer, one school resource officer, one traffic officer, and 14 deputy patrol officers (including two K-9 units). The civilian officers comprise one police services manager, one criminal and intelligence analyst, and one administrative assistant. Currently, no watercraft police services are provided for the City. The department is continuously staffed, with a minimum staffing level of six officers per 24-hour period, divided into shifts. Patrol cars are staffed by a single officer, and some shifts may overlap during high peak times (Mullen pers. comm.).

Currently, Lathrop's Police Services leases office space in a renovated property at 15597 7th Street in Lathrop. This station is approximately 5.6 miles from the current access route to Stewart Tract via Stewart Road. This space has recently expanded from approximately 1,500 square feet to approximately 2,900 square feet. However, the space is already at maximum capacity, resources are extremely limited, and San Joaquin County facilities (e.g., interview/interrogation rooms) must be used to meet some of the needs of the police department (Delgado pers. comm.).

Since the City's police services are under contract with the County, response times for the City of Lathrop vary depending on the service required. The overall policy of the City's police force is to respond to service calls as soon as needed, ranging from Level 1 (minor emergency) to Level 3 (Severe Emergency). Certain high-impact/low-frequency services (i.e., S.W.A.T.) are provided by the County on an as-needed basis; this arrangement can affect response times.

The City also operates several active programs—Neighborhood Watch, Citizen's Police Academy, Junior Police Academy, Drug Abuse Resistance Education (D.A.R.E.), and Animal Control Services (City of Lathrop 2009d). The City of Lathrop Animal Control Division monitors the number of calls received for service; in 2001, the Division received 2,147 total calls for services (City of Lathrop

2002). In 2008, the Division received more than four times as many calls—a total of 8,891 (Enneking pers. comm.).

Solid Waste

The City provides solid waste, recycling, and green waste services in the City, including Stewart Tract, through several independent contractors. Lathrop Sunrise Sanitation, owned by Allied Waste, provides garbage and pickup services to residential areas of Lathrop through contracts with the City (Litchfield pers. comm.). Stockton Scavengers, owned by Waste Management Inc., provides garbage and pickup services for industrial waste (Rodriguez pers. comm.). Green waste is collected by Allied Waste. Fourteen recycling centers, including Stockton Recycling and North County Recycling Center, are located in and around Lathrop for residents to drop off recyclables (Rodriguez pers. comm.). Curbside service is also available for recyclable materials (City of Lathrop 2003a).

Residential and business refuse collected by Lathrop Sunrise Sanitation is hauled directly to Allied Waste's landfill, Forward Landfill Inc., located at 9999 South Austin Road in Manteca (Rodriguez pers. comm.). Lathrop Sunrise Sanitation operates this facility. The contract between Lathrop Sunrise Sanitation and the City expired in 2009, but the contract has been extended for another 5 years (Litchfield pers. comm.). The landfill's maximum permitted capacity is approximately 51 million cubic yards (approximately 12 million tons) (California Integrated Waste Management Board 2009a). In 2008, Forward Landfill received 3,696.8 tons (14,311 cubic yards) of municipal solid waste (Litchfield pers. comm.). As of May 19, 2008, this landfill was 23.7 million cubic yards under capacity (California Integrated Waste Management Board 2009a). Allied Waste is proposing to expand the landfill, adding an additional 30 years to the anticipated capacity date; this expansion would add an additional 177 acres to the facility boundary and 197.3 acres to the refuse footprint (Allied Waste Industries 2008). Forward Landfill submitted a Use Permit Application Package to the County of San Joaquin Development Department on February 15, 2008 (Allied Waste Industries 2008). Due to the downturn of the economy at the time of preparation of this Draft EIS, the expansion is currently being re-scoped (Litchfield pers. comm.).

Industrial waste is hauled to the San Joaquin County Lovelace Transfer Station, approximately 1 mile northeast of the City. From the transfer facility, waste is then hauled to the Foothill Sanitary Landfill, approximately 35 miles northeast of the City (City of Lathrop 2002). The landfill was reconstructed in 2003 and encompasses 34 acres (Foothill 2009). The new landfill can receive as much as 1,500 tons of waste daily and averages about 791 tons; it is expected to remain open until 2054 (Foothill 2009). As of June 1, 2005, this landfill had 97.9 million cubic yards (approximately 25 million tons) of remaining capacity; this capacity is expected to accommodate demand until 2054 (California Integrated Waste Management Board 2009b).

Green waste is delivered to Forward Landfill for composting (Litchfield pers. comm.). In 2008, Forward Landfill received 1,755.11 tons (6,500 cubic yards) of compost from the City of Lathrop (Litchfield pers. comm.).

Water Supply

[Note that the information contained within this section is subject to change pending major changes expected in the revised Water Management Plan (WMP and the 2010 Urban Water Management Plan, to be released in early 2013 (Gibson pers. comm.). Other than the revision of the groundwater well discussion for the purposes of addressing River Island comments, existing conditions identified here

reflect 2009 conditions. The entire section will be updated prior to public draft release pending the release of the new WMP.]

The City currently provides potable water to 3,164 single-family homes (City of Lathrop 2009a). Average daily water use for applicable dwelling units is shown in Table 17-3, based on water-billing record data from fiscal years 2005–2006 and 2006–2007 (City of Lathrop 2009a). The City currently uses approximately 10,056 GPD to serve commercial, residential, and government customers.

Table 17-3. Public Average Daily Water Use from Billing Data Review

Customer Category	Average Daily Water Use (GPD/connection)
Commercial	2,095
Government	6,771
Multifamily Residential	724
Single-Family Residential	466
Total	10,056

Source: City of Lathrop 2009a.

The City relies on groundwater wells and imported surface water for potable water supply. The City has six active wells (wells 6, 7, 8, 9, 10, and 21) from which groundwater is pumped through approximately 73 miles of underground pipes to approximately 5,170 water connections. At 50% of their peak capacity, wells 7 and 9 provide approximately 1.0 million gallons per day (MGD) per well; well 8 has a capacity of 0.8 MGD ; wells 6 and 10 have a slightly higher capacity of 1.2 MGD; and well 21 has the highest capacity of 1.5 MGD, for a total combined operational capacity of 6.7 MGD. Well capacities are rated at 50% of their peak capacity to allow for operational constraints during low demand as wells shut off and to address the need to recharge the aquifer.

Addressing several concerns regarding naturally occurring arsenic in the groundwater used to supply water to the City, the City completed construction in 2012 of a treatment system that removes arsenic from five City Wells (wells 6, 7, 8, 9, and 10) to provide potable water to Lathrop residents. As of December 2012, well 21 was not under compliance for arsenic and uranium, and the City has received a Compliance Order from the California Department of Public Health on October 24, 2012 (Gibson pers. comm.).

There were also concerns with aquifer overdraft, which has occurred throughout the Eastern San Joaquin County Groundwater Basin (City of Lathrop 2009a). DWR has indicated that this basin is in critical condition due to high extraction rates that exceed safe yields (City of Lathrop 2009a). In addition, groundwater west of Lathrop contains high concentrations of TDS, and the likelihood that the City's wells could be similarly affected is a major concern. The City is evaluating and developing several options for treatment.

Until 2005, the City was served entirely by existing groundwater supplies (well fields) for domestic water needs (City of Lathrop 2004). To expand its potable water supply source, the City joined SSJID's SCSWSP. The SCSWSP—a joint effort between SSJID and the Cities of Lathrop, Escalon, Manteca, and Tracy—was established to increase water supply to these areas. The first phase of the SCSWSP was completed in 2005, and it now supplies water to participating cities by pipeline from Woodward Reservoir in Stanislaus County (City of Lathrop 2009a).

The initial phase of the SCSWSP, completed in 2005, currently provides 8,007 AFY to the City. The second phase of the project is expected to begin water delivery in 2025. After final buildout of the SCSWSP in 2030, the City will be able to request up to 11,791 AFY of water. In dry years, the SCSWSP will be able to supply 6,574 AFY with the current infrastructure (i.e., Phase 1) completed, and 9,610 AFY after full buildout (City of Lathrop 2009a). Of the 8,007 AFY of SCSWSP water allocated to the City, approximately 3,500 AFY are allocated to River Islands.

Recently, water supplies and demands for the City of Lathrop were evaluated for normal years and dry years. Estimated surface water supplies, groundwater supplies, and water demand (excluding agricultural water demands) for 2005 are shown in Table 17-4. Estimations were modeled from normal hydrologic years and multiple (three consecutive) dry hydrologic years.

Table 17-4. Water Supply and Demand for Normal Years and Dry Years (AFY)

Year	Surface Water[a]	Groundwater	Water Demand	Difference
Normal year	8,007	6,048	8,026	(+) 6,029
Dry year	6,574	6,048	8,026	(+) 4,596

Source: City of Lathrop 2009a.

[a] The City's contract with SSJID expires in 2029.

Under guidance from the adopted *Lathrop Water, Wastewater, and Recycled Water Master Plan*, several new facilities are proposed for the City (including Stewart Tract): additional water recycling plants; pipelines (for water, wastewater, and recycled water); lift stations; pump stations; emergency wells; and storage tanks (City of Lathrop 2001a, 2001b).

Currently within Stewart Tract, a 36-inch SSJID line has been constructed along with a 16-inch potable water line that is connected separately to the City's existing water grid. A "hot tap" at the intersection of Manthey and Stewart Roads near River Islands at Lathrop is connected to a 30-inch pipeline that extends through a portion of Stewart Road (Batista pers. comm.).

Wastewater and Sewer System

Generation and Capacity

The City currently generates approximately 1.2 MGD of wastewater (Gibson pers. comm.). Wastewater generated by the City is processed at three facilities: the Manteca-Lathrop Water Quality Control Facility (WQCF), the Lathrop Water Recycling Plant MBR Expansion Facility (WRP No. 1), and the Crossroads Wastewater Treatment Facility (Crossroads) (City of Lathrop 2009a). The WRP No. 1 facility has also been referred to as the WRP No. 1 MBR facility in previous documents, due to the recent addition of the Membrane Biological Reactor, and to distinguish it from the adjacent Crossroads plant (also referred to as WRP No. 1 in other documents).

Wastewater from areas west of I-5 and south of Louise Avenue is conveyed to WRP No. 1, while wastewater from areas east of I-5 and north of Louise Avenue is conveyed to the WQCF (City of Lathrop 2009e), which processes the vast majority (approximately 95%) of wastewater from Lathrop (City of Lathrop 2001a, 2001b; Gibson pers. comm.). Commercial and industrial wastewater from areas south of Louise Avenue and east of I-5 is processed at the Crossroads plant (Batista pers. comm.).

The WQCF has a total capacity of 9.87 MGD (Gibson pers. comm.) The City of Lathrop owns 14.7% (1.45 MGD) of this capacity through a contract with the City of Manteca (City of Lathrop 2003a). In January 2009, daily average flows from Lathrop to the WCQF were 760,677 GPD, or 52% of Lathrop's capacity (City of Lathrop 2009f). Future expansion of the facility, including additional allocations for Lathrop, is currently being planned (City of Lathrop 2003a; Batista pers. comm.).

WRP No. 1 has a total capacity of 750,000 GPD (0.75 MGD), of which River Islands at Lathrop is entitled to 100,000 GPD, or 0.1 MGD (Batista pers. comm.). WRP No. 1 treats wastewater to the tertiary level (City of Lathrop 2009a). River Islands also has agreements in place with the City to fund the construction of the WRP-1 MBR Expansion Project to meet the buildout capacity requirements for the River Islands (City of Lathrop 2003c). In January 2009, the Mossdale Landing Lift Station pumped 241,951 GPD from Lathrop to WRP No. 1 (City of Lathrop 2009f).

The Crossroads facility, directly adjacent to WRP No. 1, has a capacity of 200,000 GPD, and treats wastewater to the secondary level (Batista pers. comm.; Gibson pers. comm.). In January 2009, Crossroads received an average of 194,000 GPD, or 97% of the plant's capacity (City of Lathrop 2009g). Table 17-5 illustrates current capacities and flows for each water treatment facility.

Table 17-5. Current Wastewater Treatment Facilities, Capacity, and Usage

Facility Name	Capacity (MGD)	Current Usage[a] (MGD)
Manteca-Lathrop WQCF	1.45[b]	0.761
WRP No. 1	0.75	0.242
Crossroads	0.20	0.194

Source: City of Lathrop 2009a, 2009f, 2009g; Gibson pers. comm.

[a] Indicates flows from the City of Lathrop.

[b] Total capacity at WQCF is 9.87 MGD; Lathrop's portion is 14.7% (1.45 MGD).

The City has proposed several expansions and improvements to facilities to accommodate future planned growth. Proposed improvements include staged expansion of WRP No. 1 to an eventual treatment capacity of approximately 10 MGD (City of Lathrop 2009h). The first stage of this expansion will increase the capacity of WRP No. 1 to 1.56 MGD. An additional facility (WRP No. 2) is planned for construction to treat additional wastewater, and would service up to 3.1 MGD at full buildout (California Regional Water Quality Control Board 2006). WRP No. 2 would serve the Central Lathrop Specific Plan Area (Batista pers. comm.). The City of Manteca, in cooperation with the City of Lathrop, is also planning to expand the Manteca-Lathrop WQCF, which would increase Lathrop's capacity (City of Lathrop 2001a, 2001b). Current capacities, proposed capacities after facility improvements/expansions, and net increase in facilities' capacities are shown in Table 17-6.

Table 17-6. Capacities of Existing and New Facilities with Proposed Improvements

Facility Name	Capacity (MGD)	Proposed Capacity[a] (MGD)	Difference/Increase (MGD)
Manteca-Lathrop WQCF	1.45[b]	TBD[c]	TBD
WRP No. 1	0.75	10.0[d]	(+) 9.25
Crossroads	0.20	0.216	(+) 0.016
WRP No. 2	–	3.12	(+) 3.12
Total	2.40	14.79	(+) 12.39

Source: City of Lathrop 2001a, 2001b, 2009a, 2009f, 2009g, 2009h; Gibson pers. comm.

[a] Assuming proposed expansions and new facilities will be constructed.

[b] Total capacity at WQCF is 9.87 MGD; Lathrop's portion is 14.7% (1.45 MGD).

[c] Expansions for WQCF have not been formalized; proposed capacity is calculated here as an unchanged figure (i.e., 1.45 MGD).

[d] After full buildout of facility expansions.

Wastewater Infrastructure

The City of Lathrop maintains several thousand feet of wastewater lines, which are cleaned on a monthly, biannual, or annual basis (City of Lathrop 2009h). Additionally, a series of pump and lift stations are used to transport influent. Pump stations in Lathrop include the O Street Pump Station, which pumps to the WQCF, and the Mossdale Pump Station, which pumps to WRP No. 1. Currently, a 16-inch recycled water line and three recycled water sprayfield sites are present on Stewart Tract (Batista pers. comm.) (Figure 17-1).

Recycled Water

Recycled water (treated effluent) from WRP No. 1 satisfies Title 22 standards for reuse (City of Lathrop 2009h). The recycled water is used for landscape irrigation, farming activities for fodder crops, and a variety of other purposes (City of Lathrop 2009h). To date, the City has not obtained a permit for river discharge (City of Lathrop 2009a). The expansion of WRP No. 1 involved an upgrade in technology to produce even higher quality recycled water using a new Membrane Biological Reactor. The higher quality recycled water may be used for landscape irrigation in designated land application areas in addition to schools and parks (City of Lathrop 2009h).

Storm Drainage

Stormwater and surface runoff from most of the City of Lathrop is managed by a series of detention basins or conveyed to the San Joaquin River by means of pipes and pump stations (City of Lathrop 2009i). The City currently maintains 16 detention/retention basins and three outfall structures (City of Lathrop 2009i). Although stormwater drainage is lacking in older and partially developed parts of the City, newer developments utilize detention ponds or discharge flows to the San Joaquin River (City of Lathrop 2002).

Stewart Tract is currently bordered by 2% (50-year) levees (except for the recently accredited 1% [100-year] levee along the San Joaquin River) and is below the 1% (100-year) floodplain (City of Lathrop 2003b). The agricultural land use at the River Islands at Lathrop site allows surface runoff to percolate and to be collected in irrigation ditches and canals (City of Lathrop 2002). This stormwater is then pumped into Paradise Cut from the central drainage ditch (City of Lathrop 2002).

17.2 Environmental Consequences

17.2.1 Methods for Analysis of Effects

This section addresses the potential effects of construction, operation, and maintenance of the proposed action and its alternatives on communication services, electricity, natural gas, education services, fire protection, police protection, water supply (including potable supply and recycled water), wastewater services, solid waste, and stormwater conveyance. Chapter 23, *Energy Resources and Environmental Sustainability,* provides analysis of energy consumption and resource use resulting from the proposed action.

The City has adopted public services and utilities standards, which were used to determine whether the proposed action would be consistent with pertinent local and state regulations. Representatives of relevant agencies, including LMFPD, Lathrop Police Services, City of Lathrop Public Works Department, TUSD, BESD, and Lathrop Sunrise Sanitation Services, were consulted for information on forward planning and the ability of various services to support the proposed action. The documents listed at the beginning of this chapter were also reviewed during preparation of this analysis. A project-level analysis was conducted for the proposed action and the alternatives, except for Alternative 4, which would include the LSJB. A program-level analysis addresses the effects of this alternative, since details for this bypass have not been confirmed.

At the time of preparation of this Draft EIS, the City had not completed any studies that would modify the household generation rates used in the River Islands SEIR (Ponton pers. comm.). Accordingly, population estimates (3.2 residents generated from single-family dwellings; 2.5 residents generated from multiple-family dwellings) are based on household generation data developed through the CEQA process (City of Lathrop 2002, 2007).

17.2.2 Definition of Significant Effects

Evaluation of effects on public services and utilities (i.e., fire and police protection, school services, water supply, stormwater drainage, water and wastewater treatment, waste disposal, and electrical and gas services) is typically concerned with a proposed action's potential to limit access to existing services and utilities and its potential to increase demand beyond what the currently available infrastructure will support. Failure to meet applicable standards—such as wastewater treatment standards, waste disposal and recycling statutes, fire and police response time targets, and so on—also constitutes a significant effect.

17.2.3 Effects and Mitigation Approaches

17.2.3.1 Alternative 1—Proposed Action

The proposed action would entail the development of 6,716 housing units: 3,891 single-family dwellings and 2,825 multifamily dwellings. The development density of the proposed action would be approximately 5.5 dwelling units (du) per acre. The estimated resident population for the proposed action area would be 19,514 residents. At full buildout of River Islands at Lathrop (Phases 1 and 2), the resident population would be approximately 32,843. Existing and proposed utility infrastructure to support the RID Area is shown in Figure 17-1.

Effects on communication services (less than significant)

Telecommunication services would be accessible for the proposed action (City of Lathrop 2003a; Ponton pers. comm.). River Islands would provide communication infrastructure by connecting to existing AT&T and Comcast utility lines already serving the City. Actual service connection to individual units would be the responsibility of the residents, as is the case with most developments. Occupancy would be phased, and the demand for telecommunication services would be gradual. Because these services already exist in the City and would be available to residences when occupancy begins, and because individual connections would be dependent on residents' desired level of service (i.e., some units may not require or desire all types of communication services), the proposed action would have less-than-significant direct and indirect effects on communication services.

Effects on electrical services (less than significant)

The entire project at full buildout (all phases) would increase electricity consumption by approximately 1,310,000 kilowatt hours per day (kWh/day) (City of Lathrop 2002). Increases in electricity demand could directly affect electrical services through the need for capacity expansion, and indirectly affect electrical services through increased congestion and reduced system wide efficiency. Because occupancy would be phased as the various neighborhoods are constructed, this level of consumption would not be reached until the entire River Islands at Lathrop community is completed. Chapter 23, *Energy Resources and Environmental Sustainability,* provides analysis of energy consumption and resource use resulting from the proposed action.

In 2000, PG&E supplied an estimated 81,923 million kW/day of electricity to northern and central California (City of Lathrop 2002). Conversations with PG&E staff during the preparation of the 2002 SEIR confirmed that PG&E had adequate supply to provide electricity to the entire River Islands at Lathrop development without affecting service to current users (City of Lathrop 2002).

It is anticipated that electricity would be provided to the RID Area by LID. LID may also purchase electricity from suppliers other than PG&E, if necessary (City of Lathrop 2002), but in 2006, LID signed an Interconnection Agreement with PG&E, allowing LID to acquire electricity directly from PG&E's power grid (Pacific Gas and Electric Company 2006). The Interconnection Agreement is consistent with River Islands' preferred approach to provide electricity to the proposed action area, which would entail connecting to the existing PG&E Manteca-Kasson 115-kv line near 301 West Stewart Road on Stewart Tract. Roughly 4,500 feet of overhead lines would link the 115-kV line to 12-kV substations in the Employment Center (City of Lathrop 2002). Lines would be designed to meet or exceed existing codes. Within the RID Area, electrical distribution lines would be underground (City of Lathrop 2002).

The proposed approach is consistent with the WLSP (City of Lathrop 2003a) and would meet existing City, PG&E, and Building Code requirements. Consequently, the additional service required for the proposed action would have less-than-significant direct and indirect effects on electrical services.

Effects on natural gas services (less than significant)

At full buildout, River Islands at Lathrop would increase natural gas consumption by approximately 32,576 cubic feet (cf) per day (City of Lathrop 2002). Because occupancy would be phased as the various neighborhoods are constructed, this level of consumption would not be reached until the entire River Islands at Lathrop project is completed.

In 2000, PG&E supplied an estimated 887 million cf per day of natural gas to northern and central California (City of Lathrop 2002). It is anticipated that PG&E would provide natural gas service to the proposed action area as well (City of Lathrop 2007).

Through the CEQA process, conversations with PG&E staff confirmed that PG&E had an adequate supply of natural gas to serve River Islands at Lathrop without affecting service to current users (City of Lathrop 2002, 2007). Although River Islands has not yet formally requested natural gas service from PG&E, the preferred method for providing natural gas would be to connect to PG&E's Louise Avenue feeder, east of I-5 on Louise Avenue near South Harlan Road (City of Lathrop 2002). This line would cross the San Joaquin River on the Bradshaw's Crossing Bridge (Batista pers. comm.) (Figure 17-1). It would be an 8- or 10-inch gas main within a 12-inch welded steel full-length casing (Batista pers. comm.). On the western (River Islands) end of Bradshaw's Crossing, a gas regulating station would be constructed to decrease the pressure for distribution. An 8-inch gas line has already been constructed inside the cavity of the San Joaquin Pedestrian and Bicycle Bridge, and is currently at appropriate pressure levels for distribution (Batista pers. comm.). Both the existing and proposed gas lines would serve the entire RID Area; a third gas line from the City of Tracy could also be constructed in the future along Paradise Road exclusively to serve the proposed action area if additional supply is required as development approaches full buildout (Batista pers. comm.).

Natural gas service and infrastructure to serve the proposed action area would be completed before resident occupancy of the proposed action area. There would be no service interruptions to residents of the proposed action area, since occupancy would not be permitted until infrastructure is completed, utilities are connected, and service is standing by. The proposed connections would be designed and implemented by PG&E and would comply with existing City, PG&E, and applicable Building Code requirements for construction and implementation (City of Lathrop 2002). Consequently, it is anticipated that natural gas service would be sufficient to serve the proposed action without adversely affecting existing natural gas services.

PG&E has confirmed that there are adequate natural gas supplies to serve River Islands at Lathrop. To meet applicable Building Code requirements, River Islands also must seek approval for construction, implementation, and utilities service to the area. Existing infrastructure would be utilized, and service would be in place before residents occupy the proposed action area. In light of these considerations, direct and indirect effects related to natural gas services are expected to be less than significant.

Effects on educational services (significant)

The proposed action would entail construction of 6,716 housing units: 3,891 single-family dwellings and 2,825 multifamily dwellings. Based on the City's assumed occupancy rates of 3.2 persons per single-family dwelling and 2.5 persons per multifamily dwelling, the anticipated population for the proposed action would be approximately 19,514 at project completion in 2030. At full buildout of River Islands at Lathrop, the resident population would be approximately 32,843.

The proposed action area is within the TUSD and the BESD. Student generation rates for each type of dwelling were provided by TUSD in the River Islands SEIR (City of Lathrop 2002). Since then, River Islands has worked with a demographer (School House Facilities) to refine these assumptions to reflect more current generation rates (Dell'Osso pers. comm.). Based on these student generation rates and units proposed for the proposed action area, total students generated are detailed in Table 17-7.

Table 17-7. Students Generated from the Proposed Action

Residential Development	Number of Units	K–8 Students Generated	9–12 Students Generated
Single-family[a]	3,891	2,306	311
Multifamily[b]	2,825	737	226
Total	6,716	3,043	537
Total Students Generated		3,580	

Sources: City of Lathrop 2002, 2007; Batista pers. comm., Dell'Osso pers. comm.

[a] Based on generation rates of 0.5927 for K–8 and 0.08 for 9–12 in single-family units

[b] Based on generation rates of 0.2609 for K–8 and 0.08 for 9–12 in multifamily units

The total anticipated student population shown in Table 17-7 would not be fully generated until completion of the proposed action (approximately 2031). Table 17-8 (reproduced for convenience from Table 17-2 above) shows current enrollments and current and projected capacities for the schools (existing and planned) that would serve River Islands at Lathrop.

Table 17-8. Existing and Future Student Enrollment and Design Capacity for Surrounding Schools

School	Current Enrollment	Current Capacity	Future Capacity
BESD[a]	300	600	1,950–2,350[a]
Tracy High School[b]	2,747	2,747	1,800–2,000
Kimball High School[c]	908[d]	908[d]	1,900–2,400

Sources: Draa pers. comm., Carter pers. comm., Knowlan pers. comm. (Updates of all pers. comms. pending at time of publication.)

[a] Combining the capacities of the proposed K–5 school and 6–8 grade school with existing Banta Elementary School.

[b] Tracy High School is currently above the designed capacity of 1,800–2,000 students.

[c] Full buildout of Kimball High School completed in 2011.

[d] Based on statistics for the 2009–2010 school year.

Given current student enrollments, designed maximum student capacities, plans for expansions and/or new facility construction, and the projected students that would be generated by the proposed action, Banta Elementary and Tracy High would not be able to accommodate the entire student growth resulting from the proposed action. Therefore, unless additional schools are constructed, the proposed action could result in exacerbated overcrowding, resulting in a significant direct effect on educational services. No indirect effects were identified.

However, the proposed action would include the construction of several additional schools in the RID Area that would be built progressively as the population of the new development grows. More specifically, River Islands plans to construct a traditional model school system with multiple facilities occupying a total of approximately 140–150 acres within the RID Area. The internal school system would involve either seven to eight K–8 schools, each with an approximate capacity of 750 students, constructed on 13–14 acres; or six K–5 schools and two 6–8 schools, providing similar overall capacities (City of Lathrop 2002; Dell'Osso pers. comm.). The single high school would be built in the proposed action area, would occupy some 40–50 acres, and would serve all 9–12 grade students residing in all phases of River Islands at Lathrop (City of Lathrop 2002). Table 17-9 illustrates the proposed schools' capacities in comparison to the students generated by the proposed action.

Table 17-9. Proposed Schools, Capacities, and Students Generated by the Proposed Action

School	Proposed Capacity per School	Total Proposed Capacity	Students Generated
K–8 Grade School	750	5,250–6,000[a]	3,043 (K–8)
9–12 High School	TBD[b]	TBD[b]	537 (9–12)

Sources: City of Lathrop 2002; Dell'Osso pers. comm.; Batista pers. comm.

[a] After buildout of seven–eight proposed K-8 grade schools.

[b] The single high school in the RID area would be constructed to meet the expected high school students generated from the entire River Islands at Lathrop project.

The proposed school system would serve River Islands at Lathrop in its entirety, based on actual student populations and demographics of the RID Area as they develop over time. In the early phases of development, student generation would be small due to low levels of resident occupancy. Because it is difficult to anticipate the demographics of future RID Area populations, the timing of school construction is uncertain, but schools would be constructed as needed, based on occupancy and student populations generated as development proceeds. The K–8 schools (or K–5 and 6–8 schools) would be constructed one at a time, depending on student counts in the proposed action area and the overall RID Area. Temporary facilities to serve high school students in the area would likely be located in one or more of the initial K–8 schools during early phases of development (City of Lathrop 2002), but because the proposed action area also lies within the TUSD and BESD district, students could attend schools in these districts during the early stages of resident occupancy. As the high school student population increases to a level that would support a new high school, this facility would be constructed (City of Lathrop 2002).

At this time, based on currently anticipated buildout and occupancy patterns, the single high school is expected to be built in the Woodlands or West Village District of the proposed action area (Batista pers. comm.). However, the location of each new school would be in compliance with California Department of Education requirements (City of Lathrop 2002). River Islands would also coordinate with affected school districts (TUSD and BESD) to determine the most appropriate location for each school (City of Lathrop 2002).

As shown in Table 17-9, the proposed action has been planned to include facilities adequate to meet the educational needs of residents. At full buildout of all phases of River Islands at Lathrop, the expected number of students generated would be approximately 6,282 (5,402 K–8 students and 880 high school students), based on updated student generation rates (Dell'Osso pers. comm.). Although the capacity of the single high school would be determined by actual students generated, River Islands has committed to providing a sufficient number of schools to support the entire development. The River Islands at Lathrop project would be designed to accommodate up to 5,600 K–8 students and 1,350 9–12 students, for a total student capacity of 6,950 (City of Lathrop 2002).

To address the direct effects on educational services and to accommodate the increased demand for public school facilities and services that would result from construction of the proposed action, Mitigation Measure PS-1 will be implemented.

Mitigation Measure PS-1. Require mitigation agreement with local school districts

The City will not allow occupancy of any project residences until a mitigation agreement has been executed between River Islands and the BESD and TUSD regarding the provision of school services for River Islands at Lathrop or payment of the state-mandated school impact fee to the districts.

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

In summary, additional school facilities would be required to serve the proposed action. Surrounding schools do not have the capacity to meet the needs of the proposed development. However, River Islands has incorporated the construction of several new schools in the proposed action.

Effects on fire protection services (significant)

At buildout, the estimated population for the proposed action would be 19,514 residents. Utilizing the City's minimum staffing ratio of 1.2 fire personnel for every 1,000 residents, an additional 23.4 personnel would be needed to adequately serve the proposed action area (City of Lathrop 2002; Manding pers. comm.). Additionally, most of the structures in the proposed action area would require a minimum fire flow between 1,250 and 2,000 GPM (measured at 20 pounds per square inch) for a minimum of 2 hours (City of Lathrop 2002). Fire flow standards would be greater in the Employment Center because it would contain multiple-story buildings (City of Lathrop 2002). Although there is an existing fire station on River Islands Parkway (Station 34), the fire district is not currently staffed or equipped to serve the needs of the proposed action (Manding pers. comm.). Up to three fully equipped and staffed fire stations would be required to serve the entire River Islands at Lathrop project (Manding pers. comm.). Although occupancy would be gradual, development of the proposed action could have a significant direct effect on fire protection facilities and services without timely provision of additional resources. No indirect effects were identified.

However, River Islands is proposing the construction of one or more fire stations and water storage facilities in the proposed action area to adequately meet the response times and fire flow standards set forth in the City's General Plan (City of Lathrop 2002). Stations would be constructed as development proceeds, based on service demands calculated by LMFPD (City of Lathrop 2002). River Islands would meet the City's fire flow standards through restricting the number of structures, the height of structures, the distance of structures from proposed fire stations, and water infrastructure design. The design, location, and implementation of all structures in relation to proposed fire stations would comply with LMFPD standards, enforced by the City's building permit process, California Fire Code, and State Fire Marshal's regulations (Lathrop-Manteca Fire Protection District 2009b).

To minimize the effect on fire protection facilities and services and to accommodate for the increased population that would result from the proposed action, Mitigation Measures PS-2 and PS-3 will be implemented.

Mitigation Measure PS-2. Require operation of interim fire station facility and equipment prior to occupancy

The City will not authorize the occupancy of any structures in Phase 2B of River Islands at Lathrop until the proposed interim fire station is in service. As development proceeds, the City will authorize occupancy of new structures only if confirmation of 3- to 4-minute emergency response times to these structures can be provided using LMFPD methodologies. At some point during the earlier phases of the project, the new permanent fire station (tentatively planned in the Employment Center) would need to be constructed and brought into service to meet the response time requirement. Similarly, at some point during the proposed action, one or more additional fire stations would need to be constructed to meet the response time requirements. LMFPD would build and equip necessary interim and permanent fire stations, as needed, on land dedicated by River Islands. River Islands will pay to LMFPD all applicable fire service fees and assessments required to pay for its share of fire district facilities and services required to serve the River Islands at Lathrop project. Construction of structures taller than 50 feet or four stories will not be permitted by the City until LMFPD possesses appropriate equipment (e.g., aerial trucks) to provide fire suppression and emergency services to the upper stories of these buildings. The applicant will pay to LMFPD all applicable fire service fees and assessments required to pay for its fair share of this equipment.

Mitigation Measure PS-3. Require confirmation of adequate fire flows

The City will not authorize the occupancy of any structures until River Islands has confirmed provision of adequate minimum fire flows as required by LMFPD and the California Fire Code.

Mitigation Measures PS-2 and PS-3 provide stipulations for response times, fire station locations, structure heights, minimum fire flows, and funding mechanisms before the City will authorize the occupancy of any structures (City of Lathrop 2002). The City would also only authorize the occupancy of new structures if LMFPD could confirm that the emergency response time would be within the 3- to 4-minute range, as outlined in the City's General Plan (City of Lathrop 2002). River Islands would also construct an onsite water storage tank, most likely in the Employment Center, to provide adequate pressure for fire flow requirements (Batista pers. comm.).

Funding to meet the increased demand for fire services would be provided by River Islands to LMFPD in a variety of ways. Initial costs would be provided by River Islands to supply additional stations, personnel, vehicles, a fire/rescue boat, an aerial device, and other fire equipment required to serve the proposed action area (Manding pers. comm.). Using these funds, LMFPD would build and equip the interim and permanent fire stations, as needed, in the RID Area (City of Lathrop 2002). River Islands would provide long-term funding through a variety of mechanisms, including property tax, sales tax, transient occupancy tax, assessments, or other special taxes, which would be determined prior to residents' move-in (Batista pers. comm.; Dell'Osso pers. comm.). A Facility Fee would also be implemented by the City, requiring River Islands to pay for its share of the continuing costs of maintaining and equipping the necessary facilities, personnel, and equipment (Manding pers. comm.). To minimize the direct effect on water-related emergency services and facilities, Mitigation Measure PS-4 will be implemented.

Mitigation Measure PS-4. Require development of an agreement with the Lathrop-Manteca Fire Protection District for water-related emergency services

River Islands and LMFPD have developed a tentative agreement regarding the type, cost, schedule, and purchase conditions for a fire/rescue boat to be operated by LMFPD to address water-related emergency services. The City will not authorize the occupancy of any project structures adjacent to the San Joaquin River, Old River, Paradise Cut, or the internal lake system until this agreement has been finalized.

This agreement solidifies the condition of providing a fire/rescue boat that would serve the proposed action area (City of Lathrop 2002). The finalized agreement would authorize the City to allow occupancy of structures adjacent to the San Joaquin River, Old River, Paradise Cut, and/or the internal lake system (City of Lathrop 2002).

In summary, although the proposed action would increase the demand on fire services, facilities, and resources, River Islands would be required to adequately address these deficiencies before the City would authorize occupancy of any development within the proposed action area.

Effects on police services (significant)

The estimated population for the proposed action area would be 19,514 residents. Utilizing the minimum staffing ratio of 1.5 officers for every 1,000 residents (Batista pers. comm.), an additional 29.3 police officers would be needed to adequately serve the proposed action area at buildout. Administrative staff would also be required to support the additional patrol officers. As mentioned in *Existing Conditions* above, response times to the proposed action area are currently deficient, and Lathrop's Police Services resources are already strained. Any need for additional staff would further strain current resources as well as the limited available space. Thus, development of the proposed action area would have a significant direct effect on police protection facilities and services if additional resources are not provided. No indirect effects were identified.

Additional or expanded police stations would be necessary to adequately serve the residents of the proposed action area. Although the need for a new facility is described in the WLSP and the River Islands SEIR, the location, design, and implementation of a new police facility has not yet been formalized (City of Lathrop 2002, 2003a). A new police station could be located in the proposed Employment Center at River Islands (City of Lathrop 2002); alternatively, the existing police station on 7th Street could be substantially expanded. If a new facility is constructed in River Islands at Lathrop, River Islands would also be responsible for developing an emergency response and evacuation plan in accordance with requirements of Lathrop's Police Services (City of Lathrop 2002). To minimize the direct effect on the increased demand for police protection facilities and services, Mitigation Measure PS-5 will be implemented.

Mitigation Measure PS-5. Implement payment to the City of Lathrop for police protection services

The project applicant will pay to the City the startup costs incurred in the hiring and training for each of the new police officer positions needed to serve the project (29 officers for the proposed action). This fee will be incurred once per position (i.e., it will not be used to train turnover staff). In addition, the following equipment costs will be paid for by the applicant.

- Standard safety equipment for each officer (e.g., sidearm, belt, holster, body armor, mobile radio).

- A fully equipped patrol vehicle for every two officers, including radio, siren, roof lighting, Opticom mobile strobe, mobile computer terminal, and vehicle video recorder.

The payment of the above startup fees and equipment costs will be phased to coincide with the need for new officers generated by project development. Each time sufficient dwelling units are developed to generate 667 residents, the fee equivalent for one officer will be paid to the City (based on a 1.5-officer-to-1,000-resident ratio). The resident threshold may be adjusted if City policy results in a different officer-to-resident ratio. The resident generation rates listed below are to be used for this calculation.

- Single-family—3.2 persons per dwelling unit.
- Multifamily—2.5 persons per dwelling unit.
- Active adult—1.5 persons per dwelling unit.

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

Since completion of the River Islands SEIR, a funding agreement for police services between the River Islands and an adjacent existing development, Mossdale Landing, was formalized. As part of the Master Lease Agreement, the Mossdale Landing development is responsible for funding 0.5 police officer per 1,000 residents, while River Islands is responsible for funding the remaining 1.0 police officer per 1,000 residents (Batista pers. comm.), to meet the 1.5 police officers to every 1,000 residents ratio. Additionally, River Islands would provide startup and equipment costs for police facilities; these are included in the development agreements as a standard City requirement (City of Lathrop 2002). A Capital Facility Fee, also paid by River Islands, would be determined by the City, if applicable (Batista pers. comm.).

The need for water-related emergency services and facilities would increase as a result of the proposed action. Currently, no emergency response watercraft serves the RID Area. Since River Islands would be a community surrounded by water, water-based emergency services would be needed—boating accidents and search and rescue efforts are typical services required in areas where residents are in close contact with bodies of water. Water-based emergency services would be funded by River Islands and provided by LMFPD, in coordination with Lathrop Police Services, as detailed in *Effects on Fire Protection Services* above.

In summary, although the proposed action would increase the demand on police services, facilities, and resources, the project applicant would be required to adequately address these deficiencies before the City would authorize occupancy of any development in the proposed action area.

Effects on animal control services (significant)

The proposed action would result in additional needs for animal control services as a consequence of both increased population and the need to patrol the riparian brush rabbit habitat identified in Chapter 3, *Terrestrial Biological Resources*. In 2008, the Lathrop Animal Control Division received more than 8,000 calls (Enneking pers. comm.). This need would increase gradually as the various neighborhoods in the proposed action area are constructed and become occupied; such an increase could have a significant direct effect on animal control services. No indirect effects were identified. To accommodate the expanded level of service that would be required as a result of the proposed action, an Animal Campus is proposed to be included in the RID Area. The campus would encompass 15–20 acres in the proposed action portion of the Employment Center (City of Lathrop 2002). To minimize the direct effect on demand for animal control facilities and services, Mitigation Measure PS-6 will be implemented.

Mitigation Measure PS-6. Require development of an animal control services agreement

River Islands and the City of Lathrop will negotiate an animal control services agreement element. The agreement will be designed to ensure that resources are available for animal control facilities and staff to expand to meet demand associated with the proposed action. Credit may be given to River Islands if a portion of the River Islands Animal Campus is dedicated to use by the City's Animal Control Division.

Effects on solid waste services (less than significant)

Added residents and businesses would translate to an increased level of solid waste generation. The estimated population for the proposed action at buildout is 19,514 residents. The anticipated employee population for the entire River Islands at Lathrop is expected to be approximately 15,000 workers (City of Lathrop 2003d) in addition to those already employed in the City. Although River Islands' expectation is that some (perhaps over time the majority) of these new workers would also reside within River Islands, this analysis assumed that worker and resident populations would be separate, in order to evaluate the maximum level of proposed action–related solid waste generation.

The average per capita solid waste disposal rate for San Joaquin County is 0.36 ton per resident per year (California Integrated Waste Management Board 2009c). The average per capita solid waste disposal rate for businesses varies depending on the type of business. In order to estimate a waste disposal rate for businesses in the proposed action area, the waste disposal rates in Table 17-10 were used.

Table 17-10. Estimated Waste Disposal Rates by Business Type

Business Type	Waste Generated (tons per employee per year)
General merchandise stores	0.3
Finance/insurance/real estate/legal	0.3
Manufacturing electronic equipment	0.5
Communications	1.5
Business services	1.7
Other professional services	1.2

Source: California Integrated Waste Management Board 2009d.

Because the types of businesses that would occupy commercial space in the proposed action area have not been formalized, a 'worst-case' scenario of 1.7 tons per employee per year was used. Using the waste generation rates above for businesses and the waste disposal rates for residents, the maximum estimated waste that would be generated as a result of the proposed action would be

32,525 tons per year (25,500 tons from employees and 7,025 tons from residents). This rate would not be reached until completion and occupancy of the entire River Islands at Lathrop.

The proposed action would not be fully built out until approximately 2031, and resident occupancy would increase gradually. As discussed in *Existing Conditions*, Foothill Sanitary Landfill has adequate capacity for 40 years, and the proposed action would be required to comply with federal, state, and local regulations and statutes relevant to solid waste reduction and recycling. In addition, Forward Landfill is planning to substantially expand its current capacity. With the existing available disposal capacity at Foothill Sanitary Landfill and the additional disposal capacity at Forward Landfill expected to come on line in parallel with project construction, solid waste generated by the proposed action is not expected to exceed available disposal capacity. The direct effects on waste disposal services would be less than significant. No indirect effects were identified.

Effects on water supply (significant)

Because of existing concerns about the quality of groundwater supplies, potable water supply for River Islands at Lathrop, including the proposed action area, would be provided solely by using imported surface water from the SSJID SCSWSP. The SCSWSP is being constructed in phases, and the first phase (completed in July 2005) currently provides approximately 8,007 AFY to the City (City of Lathrop 2009a). The second phase, once completed, will provide approximately 11,791 AFY to the City (City of Lathrop 2009a).

In 2009, water supplies and demands for the City, including several proposed developments, were estimated on the basis of normal years and multiple (three consecutive) dry years. Future surface water supplies, groundwater supplies, and water demand (excluding agricultural water demands) are shown in Table 17-11. Although water demand is expected to increase, according to the 2009 *Water Supply Study* there is a positive net difference between water supply and demand (City of Lathrop 2009a). The City will continue to depend on the SCSWP for reliable surface water and local well sources for groundwater.

Table 17-11. Future Water Supply and Demand for Normal Years (AFY)

Water Source	2010	2015	2020	2025	2030	Buildout[b]
Surface water[a]	8,007	8,007	8,007	11,791	11,791	11,791
Groundwater	6,048	8,064	12,096	12,096	12,096	12,096
Water demand	9,884	14,112	18,043	20,511	20,867	20,980
Difference	4,171	1,959	2,060	3,376	3,020	2,907

Source: City of Lathrop 2009a.

[a] The City's contract with SSJID expires in 2029. Allocations after this date are based on the current contract.

[b] Buildout of SSJID SCSWSP.

Based on the 2002 Nolte Water Supply Assessment (City of Lathrop 2002) and the 2009 *Water Supply Study* (City of Lathrop 2009a), the City estimated projected water usage for the River Islands at Lathrop development; at full buildout, water demand is estimated to be 5,114 AFY (City of Lathrop 2009a). The increased demand for potable water resulting from the proposed action could result in a significant direct effect on water supply. However, River Islands has entered into a development agreement with the City that will allocate only this agreed-upon, fixed amount of potable water for River Islands at Lathrop (City of Lathrop 2009a). If water demands exceed the contractual agreement, the City will withhold building permits. No indirect effects were identified. To minimize the direct effect on potable water supply, Mitigation Measure PS-7 will be implemented.

Mitigation Measure PS-7. Require multi–drought year water supply prior to occupancy

Once sufficient multi–drought year water supply is available to serve that portion of the project site being developed and water infrastructure (e.g., pipelines) to serve the areas is complete, certificates of occupancy may be issued.[1]

As disclosed in Chapter 2, *Environmental Commitments*, River Islands will also require implementation of water conservation measures such as the use of 'smart' water meters and irrigation controllers, as well as using recycled water for irrigation to reduce the demand for potable supply.

To summarize, River Islands has negotiated potable water supply adequate to meet the anticipated demand generated by River Islands at Lathrop in its entirety, and will implement water conservation measures, including the use of recycled water for irrigation. The City has committed to exercise responsibility for limiting growth in the event that the negotiated water supply proves inadequate (i.e., if demand has been underestimated).

Effects on wastewater and sewer system (significant)

Wastewater Treatment

At buildout, the entire River Islands at Lathrop development is expected to generate approximately 3,920,000 GPD of wastewater (City of Lathrop 2003a). Because occupancy would be phased as the various neighborhoods are constructed and occupied, the increase in wastewater generation would be gradual over the next 20 years.

The River Islands SEIR estimated that the second phase of River Islands at Lathrop would generate 1,789,208 GPD of wastewater (City of Lathrop 2002). Although the unit breakdown and phasing have changed slightly since the 2002 SEIR, the overall unit numbers in the proposed action area as analyzed in this EIS are comparable to those analyzed in the 2002 SEIR and represent a worst-case scenario (i.e., 6,940 total units were allocated for the second phase of the project as evaluated in the SEIR; 6,716 units are allocated for this EIS). Because the full buildout unit numbers have not changed, the 2002 SEIR assumptions for buildout are also still valid.

Total capacities for the WRP No. 1, WQCF, and Crossroads facilities are currently 750,000 GPD, 1.45 MGD (Lathrop's share), and 200,000 GPD, respectively. Currently, the City uses 32% of the capacity at WRP No. 1, 52% of the City's allotted portion at WCQF (City of Lathrop 2009f), and 97% of the Crossroads capacity (City of Lathrop 2009g). Remaining capacities at each facility are 508,049 GPD at WRP No. 1, 689,323 GPD at WQCF, and 6,000 GPD at the Crossroads facility, for a

[1] In October 2012, River Islands suggested that the South County Surface Water Supply Project (SCSWSP) and well 21 already provide the necessary buildout capacity to meet the conditions of Mitigation Measure PS-7. Pending confirmation with the reports from the 2010 UWMP, to be released in early 2013, fulfillment of MM PS-7 may result in a revision of this effect from adverse to not adverse and the removal of MM PS-7. However, if such water supply expansions were made with River Islands at Lathrop in mind, the effect will remain adverse and MM PS-7 will remain valid.

total of 1,203,372 GPD. Based on these data, existing wastewater treatment facilities (WRP No. 1, WQCF, and Crossroads) do not have sufficient capacity to fully accommodate the proposed action or full buildout wastewater generation. Thus, the proposed action could have a significant direct effect on future wastewater treatment facilities as buildout is approached. The CEQA process reached a similar conclusion: that the necessary treatment capacity to serve the second phase of the project would require expansion of WRP No. 1 and/or the construction of an additional wastewater recycling plant (City of Lathrop 2002).

As detailed in Table 17-6 above, the City is proposing the construction of several wastewater treatment facilities and the expansion of existing treatment facilities. The planned expansion of WRP No. 1, currently underway, would increase the capacity to 3.12 MGD (City of Lathrop 2009a). The Cities of Lathrop and Manteca are also planning to expand the WQCF, which would increase Lathrop's capacity (City of Lathrop 2001b). Although these expansions have not been formalized, Lathrop is currently invested in infrastructure upgrades at the Manteca WQCF and would be entitled to 14.7% of any additional capacity (City of Lathrop 2009a).

The City is also planning to construct additional wastewater recycling plants (City of Lathrop 2001a, 2001b). WRP No. 2, a future facility planned for construction, would have a 3.12 MGD capacity (City of Lathrop 2009a). There is a possibility that a third wastewater treatment plant (WRP No. 3) would be constructed within Stewart Tract, along with associated storage tanks, pipelines, lift stations, and pump stations, with a capacity of up to 4.5 MGD (City of Lathrop 2001a, 2001b). Expansion of WRP No. 1 and construction of WRP No. 2 or WRP No. 3 would provide sufficient capacity for the proposed action area and the final buildout of River Islands at Lathrop (see Table 17-5 for future capacities).

In addition to facility expansions and new facility constructions, Mitigation Measure PS-8 will be implemented to reduce effects on wastewater treatment capacity for the proposed action.

Mitigation Measure PS-8. Require adequate wastewater treatment capacity and treatment prior to occupancy

Once both adequate wastewater treatment capacity and tertiary treatment to Title 22 standards for unrestricted use are available to serve elements of the proposed action that would generate demand for these services, certificates of occupancy may be issued. It is expected that the necessary treatment capacity would require additional expansion of WRP No. 1 and/or construction of WRP No. 2 or WRP No. 3 in accordance with the City's adopted *Water, Wastewater, and Recycled Water Master Plan*.

Wastewater Infrastructure

Additional infrastructure for wastewater collection would be required as a result of the proposed action. Stewart Tract has little elevation change, necessitating sewage lift stations and force mains at appropriate locations to convey wastewater (City of Lathrop 2003b). However, River Islands has included infrastructure design and implementation as part of the proposed action.

A separate wastewater collection system would be developed for Stewart Tract. This system would include eight pump stations, a sanitary sewer pipe, and a force main pipe (City of Lathrop 2003b). Wastewater would be treated at the facilities mentioned in *Wastewater Treatment* above, remaining consistent with the City's *Water, Wastewater, and Recycled Water Master Plan* (City of Lathrop 2001a) and the *Environmental Impact Report for the Lathrop Water, Wastewater, and Recycled Water*

Master Plan (City of Lathrop 2001b). Assuming the project applicant complies with the *Water, Wastewater, and Recycled Water Master Plan* and the City's *Water Supply Study* (City of Lathrop 2009a) and constructs the facilities mentioned above, the direct effect on the sewer system would be less than significant. No indirect effects were identified.

Effects related to recycled water storage and disposal capacity (significant)

The proposed action would result in increased wastewater generation and increased demand for recycled water storage, which could result in a significant direct effect on recycled water storage and disposal capacity. However, River Islands has incorporated the use of recycled water (treated wastewater) for landscape applications, and River Islands proposes to reuse 100% of the treated wastewater generated by the proposed action as recycled water.

At buildout, the entire River Islands at Lathrop development would generate approximately 3.92 MGD of wastewater that would be reused as recycled water (City of Lathrop 2003a). However, full occupancy would not be immediate, as residential development would be gradual and market-driven. River Islands has already constructed three sprayfields onsite (within the RID Area) for recycled water reuse (Figure 17-1). In addition, up to approximately 450 acres of Paradise Cut agricultural lands could be used as irrigable areas (City of Lathrop 2002). Infrastructure is already in place to convey recycled water to these sites; this infrastructure includes a 16-inch recycled water line. Recycled water would also be used to irrigate public landscaped areas, such as parks, road medians, golf courses, and other appropriate vegetated locations in the RID Area (City of Lathrop 2002). During the non-irrigation season (November–February), recycled water would be stored in storage ponds at WRP No. 1 or onsite in the golf course lakes (City of Lathrop 2002). To minimize the direct effects on recycled water storage and disposal, Mitigation Measure PS-9 will be implemented. No indirect effects were identified.

Mitigation Measure PS-9. Require adequate storage and disposal capacity for recycled water prior to occupancy

Elements of the proposed action that would generate recycled water will not commence until storage and disposal capacity is provided to address the incremental increase in recycled water generation associated with the proposed action development. The additional disposal capacity may be provided through either land disposal or discharge to the San Joaquin River. If land disposal is selected, buildout will not commence until the following conditions are achieved.

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

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

In summary, although recycled water storage and demand would increase as a result of the proposed action, the project applicant must remain in compliance with the mitigation measures set forth in the River Islands SEIR. Assuming that these measures are applied and that development of the proposed action is not permitted until these measures are implemented, the direct effect on recycled water storage and disposal capacity would be less than significant. For a discussion of health effects related to recycled water usage (expected to be less than significant), see Chapter 16, *Public Health and Environmental Hazards*.

Effects on storm drainage (less than significant)

At full buildout, River Islands at Lathrop would create approximately 2,900 acres of impervious surfaces, which would generate substantial amounts of stormwater and surface water runoff (City of Lathrop 2002). However, because development of River Islands at Lathrop would be phased and occupancy would be gradual, the entire extent would not be in place immediately.

The proposed action would include additional stormwater management facilities and infrastructure. The storm drainage system includes the internal lake system, connecting canals, golf course lakes, created wetlands, lake or river outfalls, and a pump station within the RID Area (City of Lathrop 2003b). All stormwater would be managed through the onsite drainage system; excess would be discharged from the internal lake system to waterways surrounding Stewart Tract. Thus, the City's storm drains would not be required to handle the additional stormwater generated by the proposed action.

The recently adopted *Storm Water Development Standards* (City of Lathrop 2008b) specifies several BMPs that must be implemented for new developments. In addition, the internal lake system would be in contact with groundwater, necessitating the implementation of BMPs for treatment measures outlined in the NPDES permit (City of Lathrop 2003b). These BMPs address infiltration, biofiltration (grassy swales), wetlands, and design features of lakes and canals (City of Lathrop 2002). BMPs for commercial uses have also been developed in the *Stewart Tract Storm Drainage Plan* of the WLSP (City of Lathrop 2003b).

Assuming that River Islands constructs the proposed storm drainage system, which is consistent with the *Storm Water Development Standards*, and implements the above-mentioned BMPs, the direct and indirect effects of the proposed action on storm drainage would be less than significant. Additional direct effects resulting from the proposed project relating to stormwater and floodwater conveyance are addressed in Chapter 6, *Water Resources and Flood Risk Management*.

17.2.3.2 Alternative 2—No Alteration of Paradise Cut

Under Alternative 2, the development area would be expanded by approximately 225 acres. Development density would be reduced from 5.5 dwelling unit per acre to 4.94 dwelling unit per acre. Proposed utility line connections would remain as described for the proposed action. To accommodate the reduction in density while developing the same number of units, there would be an approximate 10% increase in utility line infrastructure for electricity, natural gas, water supply, recycled water, and wastewater/sewer services. Additional stormwater system components would also need to be constructed to reach the more distal development areas. Recycled water usage would increase due to the addition of landscaped areas. Police and fire services could also be affected, because a larger area would need to be reached in keeping with the City's response time standards.

Effects on communication services (less than significant)

Effects on communication services would be the same under Alternative 2 as under the proposed action. The direct and indirect effects would be less than significant.

Effects on electrical services (less than significant)

Although Alternative 2 would likely entail a 10% increase in utility line infrastructure, the effects on electrical services would otherwise be the same as under the proposed action. The direct and indirect effects would be less than significant.

Effects on natural gas services (less than significant)

Although Alternative 2 would likely entail a 10% increase in natural gas line infrastructure, the effects on natural gas services would otherwise be the same as under the proposed action. The direct and indirect effects would be less than significant.

Effects on educational services (significant)

The effects on educational services would be the same under Alternative 2 as under the proposed action. Mitigation Measure PS-1 would address this significant direct effect. No indirect effects were identified.

Effects on fire protection services (significant)

The effects on fire protection services would be similar under Alternative 2 to those under the proposed action; however, the slightly increased overall development footprint could slightly increase response times. Mitigation Measures PS-2, PS-3, and PS-4 would address this significant direct effect. No indirect effects were identified.

Effects on police services (significant)

The effects on police services would be similar under Alternative 2 to those under the proposed action; however, the slightly increased overall development footprint could slightly increase response times. Mitigation Measure PS-5 would address this significant direct effect. No indirect effects were identified.

Effects on animal control services (significant)

The effects on animal control services would be the same under Alternative 2 as under the proposed action. Mitigation Measure PS-6 would address this significant direct effect. No indirect effects were identified.

Effects on solid waste services (less than significant)

The effects on solid waste services would be the same under Alternative 2 as under the proposed action. The direct and indirect effects would be less than significant.

Effects on water supply (significant)

The effects on water supply would be similar under Alternative 2 to those under the proposed action; however, recycled water usage would increase due to the addition of landscaped areas.

Mitigation Measure PS-7 would address this significant direct effect. No indirect effects were identified.

Effects on wastewater and sewer system (significant)

The effects on wastewater and sewer systems would be similar under Alternative 2 to those under the proposed action; however, the increased development footprint could entail a 10% increase in related infrastructure. Mitigation Measure PS-8 would address this significant direct effect. No indirect effects were identified.

Effects related to recycled water storage and disposal capacity (significant)

The effects related to recycled water storage and disposal capacity would be similar under Alternative 2 to those under the proposed action. Mitigation Measure PS-9 would address this significant direct effect. No indirect effects were identified.

Effects on storm drainage (less than significant)

The effects on storm drainage would be similar under Alternative 2 to those under the proposed action; however, the increased development footprint would entail a 10% spatial increase in stormwater drainage infrastructure. Nevertheless, this direct effect would be less than significant. No indirect effects were identified.

17.2.3.3 Alternative 3—Avoidance of Central Drainage Ditch

Under Alternative 3, activities described above under the proposed action would be built as proposed, except for modifications to avoid and protect the central drainage ditch that divides the proposed RID Area (Figure 2-8). The ditch would be protected by avoiding the water body and a 100-foot buffer around it. Avoiding the ditch would effectively divide the RID Area into northern and southern development areas, reducing the available development area by approximately 150 acres.

Utilities would have to cross the waterway, presumably on additional clear span bridges. Routing of utility lines for electricity, natural gas, water supply, recycled water, and wastewater/sewer services would thus be more complex and less direct. Longer pipelines and additional infrastructure would be required, as well as additional pump stations to convey potable water, recycled water, and wastewater from one side of the ditch to the other.

Police and fire services would also be affected; emergency access and evacuation routes would have to cross the protected ditch, increasing response and evacuation times. The locations of clear span bridges under this alternative have not been determined, but proposed fire and police stations would need to be strategically located to effectively serve residents and meet the response time standards outlined in the City's General Plan.

Because the number of units would remain the same while available development area would decrease, Alternative 3 would result in increased development density. Alternative 3 would therefore likely result in fewer open/landscaped areas, potentially decreasing the demand on recycled water use for irrigation.

Effects on communication services (less than significant)

Effects on communication services would be the same under Alternative 3 as under the proposed action. The direct and indirect effects would be less than significant.

Effects on electrical services (less than significant)

Although Alternative 3 would likely entail additional utility line infrastructure associated with crossing the central drainage ditch on clear-span bridges, the effects on electrical services would otherwise be the same as under the proposed action. The direct and indirect effects would be less than significant.

Effects on natural gas services (less than significant)

Although Alternative 3 would likely entail additional infrastructure associated with crossing the central drainage ditch on clear-span bridges, the effects on natural gas services would otherwise be the same as under the proposed action. The direct and indirect effects would be less than significant.

Effects on educational services (significant)

The effects on educational services would be the same under Alternative 3 as under the proposed action. Mitigation Measure PS-1 would address this significant direct effect. No indirect effects were identified.

Effects on fire protection services (significant)

The effects on fire protection services would be similar under Alternative 3 to those under the proposed action; however, the necessity of routing emergency access across additional clear span bridges over the central drainage ditch could extend emergency response times, possibly necessitating relocation of proposed fire station sites. Mitigation Measures PS-2, PS-3, and PS-4 would address this significant direct effect. No indirect effects were identified.

Effects on police services (significant)

The effects on police services would be similar under Alternative 3 to those under the proposed action; however, the necessity of routing emergency access across additional clear span bridges over the central drainage ditch could extend emergency response times, possibly necessitating relocation of proposed police station sites. Mitigation Measure PS-5 would address this significant direct effect. No indirect effects were identified.

Effects on animal control services (significant)

The effects on animal control services would be the same under Alternative 3 as under the proposed action. Mitigation Measure PS-6 would address this significant direct effect. No indirect effects were identified.

Effects on solid waste services (less than significant)

The effects on solid waste services would be the same under Alternative 3 as under the proposed action. The direct and indirect effects would be less than significant.

Effects on water supply (significant)

The effects on water supply would be similar under Alternative 3 to those under the proposed action; however, recycled water usage would likely decrease due to the reduction of landscaped areas. Mitigation Measure PS-7 would address this significant direct effect. No indirect effects were identified.

Effects on wastewater and sewer system (significant)

The effects on wastewater and sewer systems would be similar under Alternative 3 to those under the proposed action; however, avoidance of the central drainage ditch would necessitate more complex conveyance of wastewater and sewer system facilities across the ditch, entailing additional pump stations. Mitigation Measure PS-8 would address this significant direct effect. No indirect effects were identified.

Effects related to recycled water storage and disposal capacity (significant)

The effects related to recycled water storage and disposal capacity would be similar under Alternative 3 to those under the proposed action. Mitigation Measure PS-9 would address this significant direct effect. No indirect effects were identified.

Effects on storm drainage (less than significant)

The effects on storm drainage would be similar under Alternative 3 to those under the proposed action; however, the stormwater management system would be redesigned to accommodate avoidance of the central drainage ditch. This direct effect would be less than significant. No indirect effects were identified.

17.2.3.4 Alternative 4—Proposed Action with Expanded Flood Risk Reduction

Alternative 4 would comprise the same residential and commercial development as the proposed action with the addition of expanded flood risk reduction. Because there would be no change in development of the proposed action area, and the activities described for the proposed action would not change, effects on public services and utilities would be the same those described for the proposed action. Construction and operation of the additional flood risk reduction measures included in Alternative 4 could entail additional effects related to public services and utilities, but these cannot be foreseen in detail at this time because the specifics of the additional measures have not been developed.

Effects on communication services (less than significant)

The effects on communication services would be the same under Alternative 4 as under the proposed action. The direct and indirect effects would be less than significant.

Effects on electrical services (less than significant)

The effects on electrical services would be the same under Alternative 4 as under the proposed action. The direct and indirect effects would be less than significant.

Effects on natural gas services (less than significant)

The effects on natural gas services under Alternative 4 would be the same as under the proposed action. The direct and indirect effects would be less than significant.

Effects on educational services (significant)

The effects on educational services would be the same under Alternative 4 as under the proposed action. Mitigation Measure PS-1 would address this significant direct effect. No indirect effects were identified.

Effects on fire protection services (significant)

The effects on fire protection services would be similar under Alternative 4 to those under the proposed action; however, it is possible that development of expanded flood risk reduction—particularly if it includes an increase in the extent of woody vegetation—could increase the spatial potential for wildfire. Mitigation Measures PS-2, PS-3, and PS-4 would address this significant direct effect. No indirect effects were identified.

Effects on police services (significant)

The effects on police services under Alternative 4 would be the same as those under the proposed action. Mitigation Measure PS-5 would address this significant direct effect. No indirect effects were identified.

Effects on animal control services (significant)

The effects on animal control services would be the same under Alternative 4 as under the proposed action. Mitigation Measure PS-6 would address this significant direct effect. No indirect effects were identified.

Effects on solid waste services (less than significant)

The effects on solid waste services would be the same under Alternative 4 as under the proposed action. The direct and indirect effects would be less than significant.

Effects on water supply (significant)

The effects on water supply would be the same under Alternative 2 as under the proposed action. Mitigation Measure PS-7 would address this significant direct effect. No indirect effects were identified.

Effects on wastewater and sewer system (significant)

The effects on wastewater and sewer systems would be the same under Alternative 2 as under the proposed action. Mitigation Measure PS-8 would address this significant direct effect. No indirect effects were identified.

Effects related to recycled water storage and disposal capacity (significant)

The effects related to recycled water storage and disposal capacity under Alternative 4 would be the same as under the proposed action. Mitigation Measure PS-9 would address this significant direct effect. No indirect effects were identified.

Effects on storm drainage (less than significant)

The effects on storm drainage under Alternative 4 would be the same as under the proposed action. This direct effect would be less than significant. No indirect effects were identified.

17.2.3.5 Alternative 5—No Action

The No Action Alternative would entail construction of an interior levee system rather than extended levees for flood risk reduction. The No Action Alternative would not include habitat restoration and enhancement activities associated with the PCC Area or the PCIP Area.

The No Action Alternative would result in identical buildout capacity and population as described above for the proposed action. However, all alterations to Paradise Cut, Old River, and San Joaquin River would be eliminated and the central drainage ditch would be avoided. The developable extent of the RID Area would be reduced by about 150 acres. Because the No Action Alternative would not entail construction of any marina or docking facilities and would not include boat access to the perimeter waterways, it is likely that water-related emergency services necessary under the proposed action would not be necessary under the No Action Alternative.

Effects on communication services (less than significant)

Effects on communication services would be the same under Alternative 5 as under the proposed action. The direct and indirect effects would be less than significant.

Effects on electrical services (significant)

Although Alternative 5 would likely entail additional utility line infrastructure associated with crossing the central drainage ditch on clear-span bridges, the effects on electrical services would otherwise be the same as under the proposed action. This direct effect would be less than significant. No indirect effects were identified.

Effects on natural gas services (less than significant)

Although Alternative 5 would likely entail additional infrastructure associated with crossing the central drainage ditch on clear-span bridges, the effects on natural gas services would otherwise be the same as under the proposed action. The direct and indirect effects would be less than significant.

Effects on educational services (significant)

The effects on educational services would be the same under Alternative 5 as under the proposed action. Mitigation Measure PS-1 would address this significant direct effect. No indirect effects were identified.

Effects on fire protection services (significant)

The effects on fire protection services would be similar under Alternative 5 to those under the proposed action; however, the necessity of routing emergency access across additional clear-span bridges over the central drainage ditch could extend emergency response times, possibly necessitating relocation of proposed fire station sites. Mitigation Measures PS-2, PS-3, and PS-4 would address this significant direct effect. No indirect effects were identified.

Effects on police services (significant)

Because the No Action Alternative would not entail construction of any marina or docking facilities and would not include boat access to the perimeter waterways, it is likely that water-related emergency services necessary under the proposed action would not be necessary under the No Action Alternative. The remaining effects on police services would be similar under Alternative 5 to those under the proposed action; however, the necessity of routing emergency access across additional clear-span bridges over the central drainage ditch could extend emergency response times, possibly necessitating relocation of proposed police station sites. Mitigation Measure PS-5 would address this significant direct effect. No indirect effects were identified.

Effects on animal control services (significant)

The effects on animal control services would be the same under Alternative 5 as under the proposed action. Mitigation Measure PS-6 would address this significant direct effect. No indirect effects were identified.

Effects on solid waste services (less than significant)

The effects on solid waste services would be the same under Alternative 5 as under the proposed action. The direct and indirect effects would be less than significant.

Effects on water supply (significant)

The effects on water supply would be similar under Alternative 5 to those under the proposed action; however, recycled water usage would likely decrease due to the reduction of landscaped areas. Mitigation Measure PS-7 would address this significant direct effect. No indirect effects were identified.

Effects on wastewater and sewer system (significant)

The effects on wastewater and sewer systems would be similar under Alternative 5 to those under the proposed action; however, avoidance of the central drainage ditch would necessitate more complex conveyance of wastewater and sewer system facilities across the ditch, entailing additional pump stations. Mitigation Measure PS-8 would address this significant direct effect. No indirect effects were identified.

Effects related to recycled water storage and disposal capacity (significant)

The effects related to recycled water storage and disposal capacity would be similar under Alternative 5 to those under the proposed action. Mitigation Measure PS-9 would address this significant direct effect. No indirect effects were identified.

Effects on storm drainage (less than significant)

The effects on storm drainage would be similar under Alternative 5 to those under the proposed action; however, the stormwater management system would be redesigned to accommodate avoidance of the central drainage ditch. This direct effect would be less than significant. No indirect effects were identified.

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Draa, William. Superintendent. Banta Elementary School District, Tracy, CA. March 20, 2009—email communication with Kristin Hageseth.

Enneking, Becky. Unit Supervisor. City of Lathrop Animal Control Division, Lathrop, CA. March 23, 2009—phone conversation with Kristin Hageseth.

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Litchfield, Don. Environmental Manager. Allied Waste Services, Manteca, CA. March 17 and 20, 2009 and July 13, 2010—phone conversation and email communications with Kristin Hageseth.

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Chapter 18
Aesthetics

This chapter analyzes the proposed action's and alternatives' potential effects related to visual resources and aesthetic values. Related discussions are found in Chapter 7, *Cultural Resources*; Chapters 9 and 10, *Land Use and Planning* and *Agricultural Resources*, respectively; Chapter 11, *Recreation*; and Chapter 21, *Cumulative Effects*.

The key sources of data listed below were used in the preparation of this chapter.

- *Draft Subsequent Environmental Impact Report for the River Islands at Lathrop Project* (City of Lathrop 2002).
- Site visits (February 26 and March 27, 2009).
- *Comprehensive General Plan for the City of Lathrop, California* (City of Lathrop 2004).
- *West Lathrop Specific Plan* (City of Lathrop 2003).
- *River Islands at Lathrop Urban Design Concept* (The SWA Group 2002).

Specific reference information is provided in the text.

18.1 Affected Environment

18.1.1 Regulatory Framework

Aesthetics and visual resources are regulated indirectly through a variety of federal, state, and local laws and programs. For example, the federal government does not explicitly regulate visual resources, but recognizes their value and preserves them under the aegis of the National Park, National Wildlife Refuge, National Monument, and National Scenic Byway Systems, and through protections afforded under the National Historic Preservation Act (see related discussion in Chapter 7, *Cultural Resources*). Similarly, aesthetic values are preserved at the state level through the establishment of state parks and preserves and through the California Scenic Highway Program. In addition, although local jurisdictions are not required to address visual resources as a separate topic in their general plans, most do consider aesthetic values in developing their planning framework. Various local jurisdiction goals and policies relevant to River Islands at Lathrop are discussed below.

18.1.1.1 City of Lathrop General Plan

The City's General Plan Goal No. 4 (*Quality in the Form, Design and Functions of the Urban Area*) focuses on aesthetic values and the relationship between aesthetic design and urban functionality.

Under Goal No. 4, Residential Areas Policy 1 requires architectural design review for all planned developments (City zoning designation PD), as well as multifamily, office, commercial, institutional, and industrial projects (City of Lathrop 2004:1-9). Under Commercial and Industrial Areas, Policy 2 stipulates that visual interfaces between commercial/industrial areas and residential areas shall be designed to prevent commercial and industrial activities from creating "obtrusive" visual impacts on nearby residential areas (City of Lathrop 2004:1-10). In addition, under Policy 3, outdoor commercial/industrial areas must be visually screened with a combination of ornamental fencing or walls and landscaping.

Urban Open Space System Policy 3 identifies the importance of landscaped open space corridors bordering expressways and arterial streets as a means of buffering residential areas from traffic and glare disturbance. The corridors are intended to vary in width and design such that they may accommodate a variety of recreational pursuits including walking, biking, golf, and nature study (City of Lathrop 2004:1-10).

18.1.1.2 West Lathrop Specific Plan

The WLSP is a planning document establishing the guidelines and principles for developing the southwestern portion of the City's planning area. Broadly, the WLSP envisions a sustainable, interconnected community utilizing the integrative themes of Delta waterways and agricultural heritage, and following clearly articulated principles regarding community identity, development objectives, design standards, and land use patterns. The WLSP includes extensive provisions to ensure creation of a high-quality visual environment.

Consistent with general plan goals and policies, the WLSP mandates development of a River Islands Urban Design Concept (UDC), a much more detailed document than the WLSP, establishing parameters for all aspects of River Islands at Lathrop development. The WLSP also requires creation of the Stewart Tract Design Review Board (DRB), intended to serve as the primary design advisor to the Planning Commission and the City Council regarding development of Stewart Tract. The DRB is responsible for review and approval of specific design components as the project moves forward, ensuring consistency with the general plan, the WLSP, and the UDC.

18.1.1.3 River Islands Urban Design Concept

The UDC contains an array of design guidelines and specifications intended to create a harmonious, interconnected, and vibrant community. Throughout, the UDC addresses aesthetic concerns. For example:

> The largest component of River Islands open space is the San Joaquin River system that surrounds the community. This open space anchors River Islands to the San Joaquin River Delta region, and provides space for flood storage, wildlife habitat and passive recreation opportunities, as well as a natural, aesthetically attractive edge.
>
> The lakes and waterways of River Islands interior are the second largest component of River Islands' open space system. They help create an aesthetic focus for the community, while providing storage for storm water, wetland areas to clean and polish runoff and lake water, and water-edge trails for walking, bicycling, and passive recreational use (The SWA Group 2002:I-3.)

The UDC establishes standards for gateways, roadways, landscaping, trails and bikeways, soundwalls, parks, lakes and waterways, natural areas, street furnishings, and boat docks; architectural guidelines for residential, public, and commercial areas; and lighting requirements—all of which address aesthetic as well as functional considerations. For example, visual unity associated with use of materials, adherence to neighborhood theme, and connection to other community elements is stressed throughout the document. Similarly, lighting is prescribed to be warm, of low brightness, and directed to preserve the darkness of the night sky and avoid adverse effects on residential uses; natural areas will generally be unlighted (The SWA Group 2002:I-176–I-180).

18.1.2 Existing Conditions

18.1.2.1 Methods Used to Identify Existing Conditions

Existing conditions for visual resources were identified using the FHWA methodology (Federal Highway Administration 1988), which provides a systematic, standardized approach to meet the challenge of objectively addressing issues—aesthetic judgment and values—that by their nature are subjective and may be deeply personal. This approach identifies a view's aesthetic value based on its inherent visual character, its visual quality, and viewers' response to it.

Visual character refers to the nature of a view—put simply, what does it look like, or what is there to see? Visual character may depend on a combination of natural and artificial (urban or built) elements.

A view's **visual quality** is described in terms of its vividness, intactness, and unity. *Vividness* describes the power or "memorable-ness" of landscape components as they combine in visual patterns. *Intactness* refers to the visual integrity of the natural or built landscape and its freedom from encroaching elements; this factor can be present in well-kept urban and rural landscapes, as well as in natural settings. *Unity* is the visual coherence and compositional harmony of the landscape considered as a whole. Typically, high-quality views are highly vivid, are relatively intact, and exhibit a high degree of visual unity. Low-quality views lack vividness, are not visually intact, and possess a low degree of visual unity (Jones et al. 1975; Dunne and Leopold 1978; Federal Highway Administration 1983, 1988).

Viewer response to a view—and to potential changes in that view—depends on viewer exposure and viewer sensitivity. This analysis emphasizes the sensitivity of individual viewers rather than overall viewer exposure. *Viewer exposure* reflects the number of viewers, the distance from which they view the resource, and the duration of viewing. *Viewer sensitivity* describes the public's level of concern for particular views. It depends in part on viewer exposure, but is also affected by viewer activity, awareness, and expectations. For example, visual sensitivity is higher for views seen by people who are driving for pleasure; people engaging in recreational activities such as hiking, biking, or camping; and homeowners. Visual sensitivity tends to be lower for views seen by people driving to and from work or as part of their work (U.S. Soil Conservation Service 1978; Federal Highway Administration 1983; USDA Forest Service 1995). This is because commuters and non-recreational travelers generally have fleeting views and tend to focus more on traffic than on surrounding scenery. By contrast, residential viewers typically experience extended viewing periods; furthermore, visual quality can become a quality of life issue and may carry additional emotional weight because of its potential to affect real estate values. Views from recreation trails and areas, scenic highways, and scenic overlooks are generally assessed as having high visual sensitivity because visual quality is an important aspect of the recreational experience.

The importance of a view to its viewers also relates to the position of the viewer relative to the resource, because the visibility and visual dominance of landscape elements depend on their placement within the viewshed.[1]Federal Highway Administration 1988 Generally, the closer a feature is to the viewer, the more dominant—and therefore the more important—it is from the viewer's perspective. To describe position within the viewshed, viewsheds are usually broken into

[1] A *viewshed* is defined as the surface area visible from a particular location (e.g., an overlook) or sequence of locations (e.g., a roadway or trail) (Federal Highway Administration 1988).

three distance zones: foreground, middleground, and background. The extent of the three zones varies depending on terrain and other factors, but in general, the foreground is considered to include all elements within 0.25–0.5 mile from the viewer, the middleground extends from the far edge of the foreground to a distance of 3–5 miles from the viewer, and the background extends from the far edge of the middleground to infinity (USDA Forest Service 1995).

18.1.2.2 Regional Aesthetic Setting

Stewart Tract, including the proposed action area, is located in the western portion of Lathrop. Lathrop is situated in the California's San Joaquin Valley, at the junction of I-5, I-205, and SR 120, approximately 30 miles east of the Tri-Valley region of the East Bay and 55 miles south of Sacramento. Tracy is about 5 miles southwest, Manteca about 5 miles east, and Stockton about 10 miles north-northeast.

Stewart Tract lies at the extreme southeastern end of the San Joaquin–Sacramento Delta, at the Delta's interface with the characteristic flat, agricultural San Joaquin Valley landscape. The Delta, lying north and west, is a network of natural and artificial channels lined by artificial levees of varying heights. Some of the channels support narrow areas of riparian vegetation. The San Joaquin Valley, to the east of the site, extends to the Sierra Nevada foothills in the east; the Coast Ranges, defining the western edge of the valley, begin approximately 10 miles southwest of Stewart Tract.

A patchwork of agricultural fields—predominantly supporting irrigated field and row crops—separates cities within the region from one another. These fields afford expansive views over the valley floor to the east and the Coast Ranges to the west and south. The agricultural land is dotted with rural development that becomes increasingly urbanized near the city limits of Lathrop, Stockton, Tracy, and Manteca.

Much of the development in the project region—including town centers, expanding suburban development, commercial centers, and light industrial facilities—occurs along major transportation corridors, such as I-5 and SR 99 to the east and I-205 to the south and southwest. Development radiating out from the urban cores in the region is encroaching on agricultural lands and closing the gap between larger and smaller outlying cities. This change is beginning to modify the visual character from rural to suburban and urban. The smaller cities, such as Tracy and Lathrop, are typified by a growing core of residential, commercial, and some industrial land uses with agricultural fields surrounding the city outskirts. Some of the cities in the region began with historic town center grids that still remain active and vibrant; in others, including Lathrop, town center functions are being relocated to more recently developed areas.

18.1.2.3 Local Aesthetic Setting

This section presents a more detailed discussion of the visual character, visual quality, and viewer groups in and near the proposed action area, including a series of photographs depicting representative views of the action area and vicinity. The locations and view directions of the photographs are shown in Figure 18-1. The photographs are presented in Figures 18-2, 18-3, and 18-4.

Currently, the proposed action area is characterized by generally flat agricultural fields (Figure 18-4, Viewpoints 16 through 19) and slightly undulating annual grassland associated with the levees that have been constructed during earlier phases of the project. Because the levee system provides high ground in an otherwise fairly flat landscape, the most expansive views are from the perimeter of

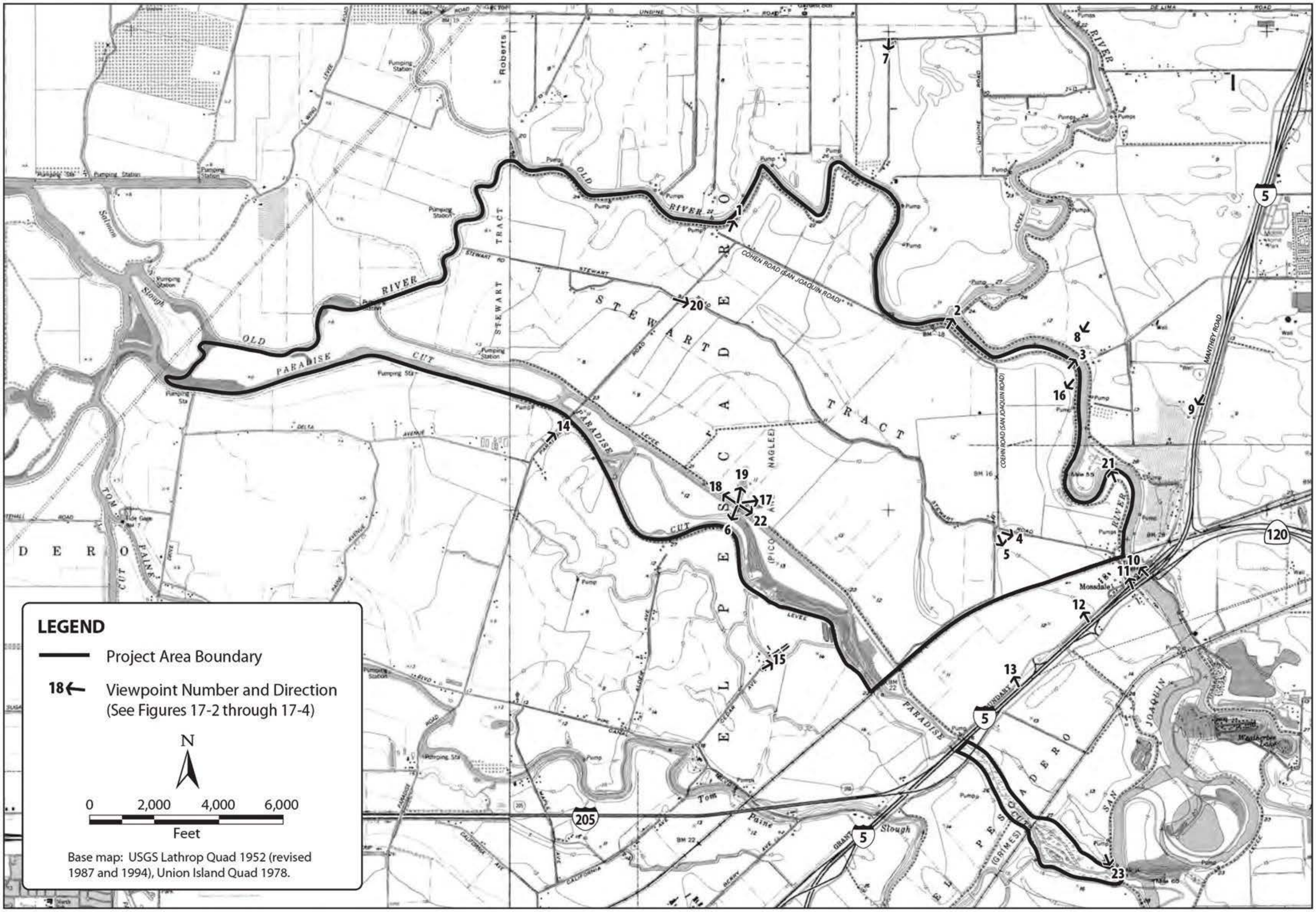

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Figure 18-1
Locations of Viewpoints

Viewpoint 1. Looking north at the Old River from the Old River levee.

Viewpoint 2. Looking northeast at confluence of the Old River and San Joaquin River.

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Figure 18-2
Views of the Surrounding Area from the Action Area

Viewpoint 3. Looking northeast across the San Joaquin River toward the Mossdale Village Development.

Viewpoint 4. Looking southeast toward UPRR from the action area.

Figure 18-2
Views of the Surrounding Area from the Action Area
(continued)

Viewpoint 5. Looking south toward grain silos from the action area.

Viewpoint 6. Looking southwest toward the Paradise Cut levee from the action area.

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Figure 18-2
Views of the Surrounding Area from the Action Area (continued)

Viewpoint 7. Looking south at the action area from Undine Road.

Viewpoint 8. Looking southwest at the action area.

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Figure 18-3
Views toward the Action Area from the Surrounding Area

Viewpoint 9. Looking southwest from I-5 south of the Louise Avenue Interchange.

Viewpoint 10. Looking north from the I-5 bridge over the San Joaquin River.

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Figure 18-3
Views toward the Action Area from the Surrounding Area (continued)

Viewpoint 11. Looking north from the I-5 bridge over the San Joaquin River, from just west of Viewpoint 10.

Viewpoint 12. Looking north from the I-5/I-205/SR-120 merge segment.

Figure 18-3
Views toward the Action Area from the Surrounding Area (continued)

Viewpoint 13. Looking north from the I-5/I-205/SR-120 merge segment.

Viewpoint 14. Paradise Road facing northeast toward bridge over Paradise Cut.

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Figure 18-3
Views toward the Action Area from the Surrounding Area
(continued)

Viewpoint 15. Looking northeast near terminus of Cedar Avenue.

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Figure 18-3
Views toward the Action Area from the Surrounding Area
(continued)

Viewpoint 16. Looking southwest over the action area from the levee adjacent to the San Joaquin River.

Viewpoint 17. Looking southeast over the action area from Paradise Cut Levee.

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Figure 18-4
Views of the Action Area

Viewpoint 18. Looking northwest along the Paradise Cut levee (action area at right).

Viewpoint 19. Looking north over the action area from the Paradise Cut levee.

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Figure 18-4
Views of the Action Area
(continued)

Viewpoint 20. Looking east from the intersection of Stewart Road and Paradise Road, toward existing uses within the action area.

Viewpoint 21. Looking north at the San Joaquin River.

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Figure 18-4
Views of the Action Area
(continued)

Viewpoint 22. Looking southeast along the Paradise Cut levee (action area at left).

Viewpoint 23. Looking southeast at the Paradise Weir.

Figure 18-4
Views of the Action Area
(continued)

Stewart Tract (Figure 18-4, Viewpoint 16); the levees present a substantial visual obstruction from some perspectives.

Because of the spatial extent of the proposed action area, the description of existing conditions for visual resources focuses separately on views inside and outside the RID Area. Note that in the following descriptions of existing conditions, earlier phases of the project are considered in conjunction with the proposed action development area because the areas are contiguous and the visual conditions are similar since construction of earlier phases have not yet begun. In the discussion of environmental consequences that follows, analysis focuses on effects associated with development of the proposed action in the proposed action area.

Views from Inside the RID Area

The northern edge of the RID Area is bounded by Old River from its confluence with Paradise Cut in the west to its confluence with the San Joaquin River in the east. Views toward the north from the Old River levee are expansive and vivid, dominated by Old River and its northern levee in the foreground, and by agricultural fields with scattered farmhouses and associated outbuildings in the middleground and background (Figure 18-2, Viewpoint 1). Because of the expanse, intactness, and unity of views in this direction, they are considered to be of high visual quality.

The eastern edge of the RID Area is bounded by the San Joaquin River upstream of its confluence with Old River to its intersection with the UPRR tracks. In this direction, views from the levee are expansive but, unlike the northern vista, they include the Mossdale Village development as well as agricultural lands, decreasing the intactness and unity of the views (Figure 18-2, Viewpoints 2 and 3). Accordingly, in this direction, the views are considered to be of moderate visual quality. On very clear days, the peaks of the Sierra Nevada are visible in the far distance to the east, intermittently adding visual interest.

The southeastern boundary of the RID Area is defined by the UPRR tracks. Because the rail line is slightly elevated above the surrounding terrain, it constitutes the foreground of views from nearby portions of the RID Area (largely within earlier phases of the project). The UPRR bridge over the San Joaquin River, the Manthey Road pedestrian bridge, an elevated portion of I-5, and historic grain silos are visible in the foreground and middleground; the background is obstructed by the rail line. The distinctive visual landmarks—the bridges and silos—contribute to a vivid and fairly expansive view of high visual quality (Figure 18-2, Viewpoints 4 and 5).

The southwestern boundary of the RID Area is defined by Paradise Cut from the UPRR tracks to the confluence with Old River. In this direction, the foreground is dominated by the Paradise Cut channel and riparian vegetation, the middleground is mostly agricultural land, and the Coast Ranges—including Mount Diablo—are conspicuous in the background. The high vividness, high intactness, and unified character of views in this direction contribute to overall high visual quality.

In views from interior portions of the RID Area—that is, the landside of the perimeter levees—features in the foreground described above (e.g., Old River, San Joaquin River, and Paradise Cut) are obstructed by the crowns of the levees. Views to the southeast are generally similar to those described above, because the foreground (the rail line) is at the high point and remains in line of sight from many vantage points. To the south and southwest, the tops of the Coast Ranges and Mount Diablo are still visible from some vantage points, but their lower elevations are obstructed by the levees and rail line. Nonetheless, because of the size of Stewart Tract, the general absence of structures, and the open, flat nature of the landscape, views within the RID Area are expansive and largely free of structures. Views of the RID Area itself are dominated by agricultural uses and are highly intact and unified but lack vividness; overall visual quality is considered moderate.

Views from Outside the RID Area

Views of the RID Area from the agricultural lands to the north are characterized by expansive agricultural views, a general lack of structures, and the Coast Ranges and Mount Diablo in the background. Because the rural residences are at elevations below the surrounding levees, the levees obstruct views of the interior portions of the RID Area; consequently, while the views are expansive, they consist primarily of foreground (e.g., levees) and background (e.g., Coast Ranges), but lack the middleground (Figure 18-3, Viewpoint 8). However, because of the expanse, intactness, and unity of views in this direction, they are considered to be of high visual quality.

Similarly, views toward the RID Area from the Mossdale Village development are primarily available only from residential vantage points closest to and higher than the eastern San Joaquin River levee; those views of the San Joaquin River, the Stewart Tract levee, and the mountains in the background are also considered to be of high visual quality.

Views of the RID Area from the section of I-5 immediately east of Stewart Tract are partially obstructed by the UPRR bridge, the Manthey Road pedestrian bridge, and commercial and residential development in Mossdale Village (Figure 18-3, Viewpoints 9 through 11). Views northward from the I-5/I-205/SR 120 merge segment have the historic grain silos in the foreground; however, the raised UPRR line partially obstructs middleground and background detail. Because of the intrusion of built elements into the agricultural setting, intactness and unity are both reduced; although these views from I-5 are fairly vivid, their overall visual quality is considered low to moderate.

Views of the RID Area from the southwest, like those from the north, are constrained by the elevations of levees; accordingly, only the levee and the tops of trees beyond the levee are visible (Figure 18-3, Viewpoint 14 and 15). These expansive views exhibit considerable unity and intactness, but without the interest of the Coast Ranges in the background, their visual quality is moderate.

The views from the waterways surrounding the RID Area are, due to line of sight, generally confined to the levee faces and crowns. Where views include natural vegetation and are characterized primarily by views of the water itself, riparian vegetation, and sky, views are vivid, intact, and unified, comprising elements that combine to create views of high visual quality. Less natural channel segments, such as heavily riprapped and largely unvegetated levee reaches along Old River, are less vivid, and while intact and unified, provide substantially less visual interest, resulting in low to moderate visual quality.

Viewer Groups

The four categories of viewer groups considered in this analysis are discussed below.

Residents

Typically, residents are considered to have a high level of visual sensitivity, because they experience extended viewing periods and because most people are expected to place a high value on the aesthetics of their home environment. Residences currently present within the RID Area comprise a 28-acre horse ranch and approximately five trailers/mobile homes that house agricultural workers on a seasonal basis. Because the seasonal residents are present as a function of their employment, they are both workers and residents. However, to address the situation conservatively, this analysis treats them as residents; the visual sensitivity of workers is typically considered lower, as discussed below.

Current residents outside the RID Area who have views of the proposed River Islands at Lathrop project comprise scattered rural residents to the north, northeast, and southwest, and suburban residents in the closest portions of Mossdale Village to the east.

Recreationists

Recreational users are also considered to have a high level of visual sensitivity, because the aesthetic quality of their surroundings is often a key component of their experience. People who currently recreate in the Stewart Tract vicinity (and who constitute a relevant viewer group) primarily comprise participants in water-based activities on the San Joaquin and Old Rivers; such activities include boating, fishing, and waterskiing, and are discussed in greater detail in Chapter 11, *Recreation*. Some individuals may engage in walking, jogging, birdwatching, and bank fishing from levees along the San Joaquin River in the Mossdale Village development, across the river from Stewart Tract.

Agricultural Workers

Visual sensitivity of agricultural workers, like that of most workers within the work setting, is considered to be moderate to low because these individuals tend to focus more on their work than on their surroundings. Agricultural workers who constitute potentially affected viewer groups comprise agricultural workers on Stewart Tract (discussed as residents; see above) as well as agricultural workers to the north across Old River and southwest across Paradise Cut.

Motorists

Drivers are considered to have moderate to low visual sensitivity because their views are typically fleeting and they are primarily focused on driving.

18.2 Environmental Consequences

18.2.1 Methods for Analysis of Effects

Effects on aesthetic resources were assessed qualitatively by comparing the visual changes expected to result from construction and occupancy of the proposed action and alternatives with existing conditions. Operations and maintenance of the proposed action and alternatives would have no effect on aesthetic resources are and not discussed further in this section. Effects were evaluated in accordance with FHWA methods (Federal Highway Administration 1988) with consideration of buildout in approximately 2031.

18.2.2 Definition of Significant Effects

Any change that degrades the visual quality of a site or its surroundings may constitute a significant aesthetic effect. Such changes may include introduction of built elements into a natural landscape, introduction of architecturally incompatible buildings into a developed area, removal of vegetation, recontouring of topography, and introduction of new sources of light or glare.

18.2.3 Effects and Mitigation Approaches

18.2.3.1 Alternative 1—Proposed Action

Temporary visual effects caused by construction activities (less than significant)

Construction of the proposed action would entail extensive earthmoving activities, as well as residential and commercial construction. Subject to permit approval, construction activities on Stewart Tract are anticipated to begin in 2014 and continue intermittently and in various locations as development progresses, with completion of the proposed action anticipated in approximately 2031.[2]

Direct visual changes associated with construction include vegetation removal, grading, excavation, the presence and movement of heavy equipment, and the introduction of equipment storage and materials stockpiles as well as new and in-progress structures into the viewshed. Moreover, equipment, vehicles, and materials commonly have reflective surfaces that can create added daytime glare. If construction activities extend into evening hours or if security lighting is warranted, construction can also result in the introduction of new nighttime light sources. Direct effects would vary between viewer groups and over time, as discussed below. No indirect effects associated with construction activities were identified.

Residents

During the initial phases of construction, residential viewers would be limited to the small number of seasonal and permanent residents living in existing seasonal agricultural housing and at the horse ranch. These viewers could experience changes in their views as grading and initial construction proceeds, and—based on the typical sensitivity of residential viewers—some may experience these changes as adverse. However, the number of potentially affected residents would be comparatively small—fewer than about 50 at any given time, and far fewer than 50 for a large part of each year, since many residents are seasonal workers—and the duration of effect would be comparatively short, in a setting where residents are expected and planning to relocate shortly after project inception, if not before. In view of these factors, overall effects on Stewart Tract's existing residential viewers are considered less than significant. In addition, standard construction practices to minimize visual effects on existing residences—such as maintaining an orderly construction site, storage of building materials in areas not occupied by existing residents, prompt removal of construction debris, and the potential to create visual barriers between construction sites and nearby sensitive receptors—would ensure that overall direct aesthetic effects on existing residences are less than significant.

Over time, with progressive construction and occupancy of the neighborhoods within the proposed action area, new residential viewers would arrive, and construction-related visual effects would shift from a viewer group accustomed to agricultural surroundings to one made up largely of

[2] The first few years of proposed action construction would overlap with construction of earlier phases of the project, which have already received approval. The cumulative effects of construction of the proposed action in combination with construction of prior phases and other reasonably foreseeable projects are discussed in Chapter 21 of this EIS.

homeowners and renters who have made a choice to live in a newly developing community with active residential and commercial construction. As these residents move into each neighborhood, nearby construction activities would continue to result in ongoing visual changes, although directs effects in any one area would be temporary and comparatively short term, depending on the pattern of development. This ongoing visual disturbance could be experienced as adverse by some new residential viewers but, like the effect on existing residences discussed above, it could be addressed by standard construction practices to reduce the visual effect of construction on new homeowners.

Direct visual effects on viewer groups outside the proposed action area would also vary between groups and over time. From many of the surrounding areas—agricultural lands to the north, northeast, and southwest—residents would have limited views of construction-related activities because their line of sight would be obstructed by intervening levees, with the exception of construction occurring on the tops of the levees along Paradise Cut, Old River, and the San Joaquin River, where some views from adjacent areas could occur. Residents along the southwestern edge of Mossdale Village could have greater exposure to direct visual effects of construction activities depending on the orientation of homes and the line of sight to the west across the San Joaquin River.

Future residents in earlier phases of the project, because it is contiguous with the proposed action area, would be expected to notice nearby construction activity. Although some of the residences adjacent to the proposed action area could perceive construction as a significant direct aesthetic effect, most views would likely be buffered by surrounding levees or obscured by intervening homes. Overall, this direct effect would be less than significant, especially considering the temporary nature of construction effects and the standard construction practices identified above.

Recreationists

Many recreationists in the area engage in water-based activities, as discussed in Chapter 11, *Recreation*; due to lines of sight from area waterways, this viewer group would be exposed primarily to activities on levee crowns and to the limited activities on the waterside of the levees. Although recreationists accustomed to the rural character of the waterways could be expected to experience the visual disturbance associated with construction activities as a direct adverse effect, the overall magnitude of the effect would be less than significant because of the distance to construction activities, limited views from rivers to the development area, and the standard construction practices identified above.

The other principal group of recreationists potentially affected by construction-related visual disturbance would be users of land-based facilities (e.g., neighborhood and community parks, trails) internal to River Islands at Lathrop. These users are also likely to experience the visual changes associated with construction as adverse; however, because most views would likely be buffered by surrounding levees or obscured by intervening homes, this direct effect would be less than significant.

For both groups of recreationists (those continuing existing recreational uses on area waterways and those taking advantage of new land-based recreational opportunities within the River Islands community), direct effects would be less than significant because of the standard construction practices (e.g., maintaining an orderly construction site, prompt removal of construction debris) employed in the proposed action area and the temporary nature of construction activities.

Agricultural Workers

Agricultural workers within Stewart Tract are not expected to experience substantial, if any, direct aesthetic effects resulting from construction of the proposed action, because agricultural activities would terminate to allow groundbreaking and earthwork associated with the proposed action.

Agricultural workers outside Stewart Tract (to the north and southwest) would be exposed to a limited amount of visual disturbance associated with construction because their line of sight would be largely obstructed by intervening levees. Moreover, workers are generally considered to have a lower visual sensitivity than residents. Although workers would experience visual changes as a result of construction, the temporary nature of construction and standard construction measures employed at the site would constitute a less-than-significant direct effect.

Motorists

Motorists on the area's primary existing commute routes (I-5, I-205, and SR 120) are expected to experience moderate to low sensitivity to visual changes, and views of work in the proposed action area from these routes would typically be fleeting and obstructed. The sensitivity of drivers on new roadways within Stewart Tract (those constructed under earlier phases of the project as well as those included in the proposed action) might be somewhat higher because many of these drivers would also be residents. In both motorist groups, some viewers might experience construction-related visual changes as a direct adverse effect, particularly for non-resident viewers opposed to development in the South Delta; however, because of the temporary nature of construction and the standard construction measures identified above, this direct effect would be less than significant.

Long-term changes in visual character (less than significant)

Over the long term, with buildout of River Islands at Lathrop (including the proposed action), the visual character of Stewart Tract would change dramatically from its existing rural/agricultural character to an area dominated by suburban and town center developed uses, with abundant landscaping and parklands. Viewers' experience of the change would vary between user groups and over time.

Residents

Early River Islands at Lathrop residents (all phases) would experience the change from agricultural to developed views incrementally as development proceeds. At first, residential views would either be dominated by remaining undeveloped lands and/or active construction (looking outward from new neighborhoods) or by the built features of the new neighborhood itself (looking inward into the neighborhood). Over time, views from all perspectives would become increasingly developed in character, with the principal difference being between older, more established neighborhoods (visually "softened" by more mature landscaping) and newer construction. Expansive existing vistas to the west and south, which include striking views of Mount Diablo and the Coast Ranges, would become increasingly blocked, remaining visible primarily from upper stories and high ground. Some viewers would likely experience this as an adverse aesthetic effect.

However, at the same time, views within Stewart Tract would become increasingly unified in character, which many viewers are likely to experience as a positive change—in part, but not entirely, because of potential benefits to residential property values as project amenities are progressively developed. The UDC incorporates numerous design features focused on aesthetic quality. For example, it provides for extensive water features intended to serve as community focal points, along with detailed architectural, landscaping, and lighting guidelines to contribute to a visually unified and attractive community. Similarly, the WLSP requires undergrounding of electrical distribution lines to avoid the visual clutter and obstruction associated with overhead lines (City of Lathrop 2002:IV-63–64). In addition, as discussed above, residents of both earlier phases of the project and the proposed action area would presumably understand that they are entering a large-scale development with a long-term development schedule. Thus, although the long-term change in visual character would be significant, most residents of River Islands at Lathrop are expected to experience it as beneficial.

Views of residential viewers outside Stewart Tract to the southwest would be constrained by line of sight obstructions created by intervening levees. However, some of these residents would be able to see the tops of buildings constructed on the high ground at the perimeter of the proposed action area, as well as new vegetation associated with planned landscaping. The new bridges accessing the proposed action area across Paradise Cut would introduce other new and modified structural elements into the viewshed of residents in the area southwest of the proposed action—the Paradise Road bridge would be expanded and upgraded with aesthetic treatments (landscaping, architectural treatments), and the new South Golden Parkway Bridge would be visible from some distance, with towers incorporating special lighting and other design features to contribute to the desired community identity. However, other bridges and vertical structures are already present in the vicinity (grain silos, UPRR bridge), and whether this would be perceived as a neutral, beneficial, or adverse effect is highly subjective. The number of affected residential viewers to the southwest would be comparatively small; thus, even if some viewers do experience these long-distance, long-range changes as negative, direct effects are generally expected to be less than significant.

The small number of residential viewers in neighboring Mossdale to the north who are able to see the proposed action area from their upper stories could have similarly mixed reactions; some may experience the visual manifestation of continued successful development as a positive change, while others may be neutral, and still others may consider it a negative by comparison with currently existing rural/agricultural views. However, as with viewers to the southwest, the total number of persons affected would be small, and overall direct effects are expected to be less than significant.

Recreationists

As discussed above, recreational viewer groups fall into two broad categories: those engaging in water-based activities and those engaging in land-based activities. At buildout, recreationists using the waterways surrounding River Islands would be directly exposed to visual changes associated with residential development atop the perimeter levees as well as the planned restoration/landscaping that may be conducted on benches along portions of the waterside faces of some levees. New facilities, such as boat docks and fishing piers, would add a developed component to the existing character of the waterways, which, however, are currently dominated by levees (and therefore are already heavily modified from natural conditions); at the same time, the planting/restoration plan would enhance the natural characteristics of the riparian environment, adding SRA habitat in selected areas and improving the aesthetic experience.

Recreationists engaged in land-based activities constitute a group that is not currently extant on Stewart Tract; rather, this group would come into existence as a function of the overall River Islands at Lathrop development. Early users would likely use some facilities (e.g., trails, pathways) while some of the agricultural land remains, although the pattern of development of such facilities is not yet defined. Because the recreational facilities would be designed with a strong emphasis on creating a pleasing aesthetic setting as stipulated in the UDC, it is expected that most users would experience a beneficial effect; some users could experience the loss of agricultural views as negative, but in light of the UDC's provisions for aesthetic value, direct effects are expected to be less than significant.

Agricultural Workers

Agricultural workers (all of whom would be presumed to view the site from outside Stewart Tract since no agricultural uses would remain on Stewart Tract at buildout) would see the same long-term change as residents in those areas. However, because workers are typically less sensitive to visual changes than residents, and because the extent of views from areas beyond Old and San Joaquin River levees would largely be obstructed by the levees themselves, agricultural workers are expected to experience long-term changes in visual character as a less-than-significant direct effect.

Motorists

As discussed above, motorists on the area's primary existing commute routes (I-5, I-205, and SR 120) are expected to have moderate to low sensitivity to visual changes, and views of the proposed action area from these routes would typically be fleeting and obstructed, although the new bridges would be conspicuous visual elements from some vantage points. In addition, the UDC incorporates numerous provisions to ensure a visually harmonious and pleasing new community. As a result, motorists' views from I-5, I-205, and SR 120, while limited and intermittent, are expected to be generally pleasant.

The sensitivity of drivers on new roadways within Stewart Tract (those constructed under all phases) might be somewhat higher because many of these drivers would also be residents; however, as residents, these viewers are also expected to be particularly appreciative of the visual amenities required by the UDC.

As a result, long-term direct effects for all motorist populations are expected to be positive and could be considered beneficial visual effects.

Increased light and glare (significant)

The proposed action area comprises primarily residential, recreational, and open space uses, although approximately 40% of the commercial uses included in River Islands at Lathrop would also be part of the proposed action. Because the proposed action would entail conversion from agricultural to residential and commercial uses, some level of increase in daytime glare (reflectivity) and nighttime light would be unavoidable.

As set forth in the UDC (The SWA Group 2002:I-176–I-191), the lighting plan for River Islands at Lathrop emphasizes aesthetically pleasing treatments, a balance of safety and utility, avoidance of unnecessary light scatter, and preservation of darkness ("dark sky values") consistent with safety and security. In general, lighting would be designed with an emphasis on limiting glare, directing most light sources downward, and using light sources characterized by soft brightness and warm color temperatures. Moreover, open space and natural areas would have either no lighting or very limited security lighting. Also, as set forth in the WLSP (City of Lathrop 2002:V-10), walls along arterial roadways would be designed to minimize glare from vehicle headlights into residential areas. The UDC stipulates that reflective glass curtain walls would not be permitted in River Islands at Lathrop (e.g., in the Employment Center). Moreover, the dominant building materials would be wood, masonry, brick, and stucco (The SWA Group 2002:I-132). Such prescriptions would contribute to minimizing daytime glare. However, some features, such as towers at the proposed new bridges into River Islands, may feature brushed aluminum surfaces precisely to increase visibility from distant viewpoints, and may therefore directly contribute to increased light and glare (The SWA Group 2002:I-139). To ensure that the specific design of fencing and walls are consistent with the WLSP, the proposed action would be required to comply with Mitigation Measure AES-1.

Mitigation Measure AES-1. Evaluate the design and function of walls and fences prior to approval

Before approval of any residential development that would be located adjacent to an existing or planned future arterial road, proposed walls and fences will be included in the architectural and design review by the City and the DRB. Any proposed gaps or openings in walls along the arterial road will be evaluated as part of the design review for their potential to permit light and glare from the roadway to enter the residential development. Gaps or other openings will not be permitted where light or glare may pass through the gap and adversely affect homes or other residences.

Visual changes associated with Corps levee vegetation guidelines (significant)

Implementing Corps levee vegetation management requirements for federal project levees during levee alterations associated with the proposed action would require all vegetation on existing levees and within 15 feet of the levee toe to be removed. Along San Joaquin River and Old River, approximately 2.01 acres and 9.98 acres of vegetation, respectively, would need to be removed as described in Chapter 3, *Terrestrial Biological Resources*. This aesthetic change along the San Joaquin River and Old River has the potential to reduce visual experience for all viewer groups (i.e., residents, recreationists, agricultural workers, and motorists), and changes to the visual quality of the landscape could have a significant direct effect. It should be noted that, because such vegetation management is required even in the absence of the proposed action, it should not be considered as a significant effect of the proposed action *per se*, but is included here for purposes of full disclosure.

18.2.3.2 Alternative 2—No Alteration of Paradise Cut

Temporary visual effects caused by construction activities (less than significant)

Under Alternative 2, there would be no all alterations to Paradise Cut; instead, the Paradise Cut levee would be altered and augmented on the landside, providing an additional 225 acres of developable area. The same number of residential units (i.e., 6,716) would be constructed as under the proposed action, with a slight reduction in single-family density. Construction activities (e.g., vegetation removal, grading, excavation, presence and movement of heavy equipment) under this alternative would have the same temporary visual effects on viewer groups as those under the proposed action. Some of the viewer groups could perceive construction as an adverse aesthetic effect; however, most views would likely be buffered by surrounding levees or obscured by intervening homes. Water-based recreationists would be exposed primarily to activities on levee crowns and to the limited activities on the waterside of the levees. Furthermore, standard construction practices would be employed to minimize direct visual effects on viewer groups. This temporary direct effect would be less than significant. No indirect effects were identified.

Long-term changes in visual character (less than significant)

Under Alternative 2, long-term changes in visual character for each viewer group would be similar to those under the proposed action. The existing agricultural character would be replaced with mixed-use residential and commercial development and land- and water-based recreational features that would alter viewers' experience and the area's visual character. However, viewers' experience of the change would vary between user groups and over time. Initially, views would be dominated by either undeveloped lands, already developed lands (i.e., Mossdale Landing), or active construction sites, depending on the viewer's location; however, over time views would become increasingly unified in character. Some viewers may experience this as a positive change, while others, whose views are blocked to the west and south (of Mount Diablo and the Coast Ranges), would experience this as a negative change. The UDC incorporates numerous design features focused on aesthetic quality, including detailed architectural, landscaping, and lighting guidelines to enhance visual character. Like the proposed action, this alternative would generate support for the aesthetic treatments (i.e., landscaping and lighting) among some viewers, while other viewers (e.g., those opposed to development in the Delta) would consider this an adverse effect. Overall, long-term changes in visual character are anticipated to result in a less-than-significant effect. No indirect effects were identified.

Increased light and glare (significant)

Alternative 2 would entail construction of the same number of residential units and commercial and recreational features as the proposed action, with a slight decrease in density of single-family dwellings. The UDC also prohibits reflective glass curtain walls as part of the River Islands development. The dominant building materials would be wood, masonry, brick, and stucco, which would minimize glare. However, the proposed development would still generate some level of increase in daytime glare and nighttime light. Mitigation Measure AES-1 would address this significant direct effect. No indirect effects were identified.

Visual changes assuming compliance with Corps levee vegetation guideline (significant)

Under Alternative 2, River Islands would be required to comply with the levee vegetation guidelines, removing all vegetation on existing levees and within 15 feet of the levee toe. Under this policy, removal of vegetation and changes to the visual quality of the landscape could have an adverse effect. Along San Joaquin River and Old River, approximately 2.01 acres and 9.98 acres of vegetation, respectively, would need to be removed as described in Chapter 3, *Terrestrial Biological Resources*). This aesthetic change along the San Joaquin and Old Rivers has the potential to reduce visual experience for all viewer groups (residents, recreationists, agricultural workers, and motorists), and changes to the visual quality of the landscape could have a significant direct effect. It should be noted that, because such vegetation management is required even in the absence of the proposed action, it should not be considered as a significant effect of the proposed action *per se*, but is included here for purposes of full disclosure.

18.2.3.3 Alternative 3—Avoidance of Central Drainage Ditch

Temporary visual effects caused by construction activities (less than significant)

Under Alternative 3, the central drainage ditch would be avoided and protected by a 100-foot no-development buffer zone. The same number of residential units would be constructed as under the proposed action; however, the density of housing would be slightly greater. Construction activities (e.g., vegetation removal, grading, excavation, presence and movement of heavy equipment) under this alternative would have the same temporary visual effects on viewer groups as would the proposed action. Some of the viewer groups could perceive construction as an adverse aesthetic effect; however, most views would likely be buffered by surrounding levees or obscured by intervening homes. Water-based recreationists would be exposed primarily to activities on levee crowns and to the limited activities on the waterside of the levees. Furthermore, standard construction practices—such as maintaining an orderly construction site, storage of building materials in areas not occupied by existing residents, prompt removal of construction debris, and the potential to created visual barriers between construction sites and nearby sensitive receptors—employed to minimize direct visual effects on viewer groups would ensure that overall aesthetic effects on viewer groups are less than significant. No indirect effects were identified.

Long-term changes in visual character (less than significant)

Under Alternative 3, long-term changes in visual character for each viewer group would be similar to those under the proposed action; however, because of the 100-foot setback, the proposed action area would be bifurcated so that the northern portion of Stewart Tract would be separate from the southern portion. Moreover, presence of the central drainage ditch could interfere with the visual unity that would be established by proceeding in accordance with the concepts in the UDC. The existing rural/agricultural character over time would change to an area dominated by suburban and town center developed uses, with abundant landscaping and parklands. The UDC incorporates design features focused on aesthetic quality, including detailed architectural, landscaping, and lighting guidelines to enhance visual character. Direct aesthetic effects under this alternative, like those under the proposed action, would be dependent on viewer group sensitivity and response, and changes in character could be adverse for some viewers and beneficial for others. Overall, long-term changes in visual character are anticipated to result in a less-than-significant effect. No indirect effects were identified.

Increased light and glare (significant)

Alternative 3 would entail construction of the same number of residential units and commercial and recreational features as the proposed action, with a slight decrease in density of single-family dwellings. The UDC prohibits reflective glass curtain walls as part of the River Islands development. The dominant building materials would be wood, masonry, brick, and stucco, which would minimize glare. However, the proposed development would still generate some level of increase in daytime glare and nighttime light. Mitigation Measure AES-1 would reduce this significant direct effect. No indirect effects were identified.

Visual changes from compliance with Corps levee vegetation guidelines (significant)

Under Alternative 3, River Islands would be required to comply with the Corps levee vegetation guidelines, removing all vegetation on existing levees and within 15 feet of the levee toe. Under this policy, removal of vegetation and changes to the visual quality of the landscape could have an adverse effect. Along the San Joaquin and Old Rivers, approximately 2.01 acres and 9.98 acres of vegetation, respectively, would need to be removed as described in Chapter 3, *Terrestrial Biological Resources*. This aesthetic change along the San Joaquin and Old Rivers has the potential to reduce visual experience for all viewer groups (residents, recreationists, agricultural workers, and motorists), and changes to the visual quality of the landscape could have an adverse effect. It should be noted that, because such vegetation management is required even in the absence of the proposed action, it should not be considered as a significant direct effect of the proposed action *per se*, but is included here for purposes of full disclosure.

18.2.3.4 Alternative 4—Proposed Action with Expanded Flood Risk Reduction

Temporary visual effects caused by construction activities (less than significant)

Alternative 4 would include additional flood risk reduction components (i.e., a new bypass channel, widening of Paradise Cut and Paradise Weir, an additional weir upstream of the existing weir, and creation of new flood storage areas); however, the other components would be the same as those under the proposed action. Alternative 4 would involve substantial acreage outside Stewart Tract, which may entail greater visual changes than the proposed action; viewer groups could perceive these activities as an adverse aesthetic effect. Because most views would likely be buffered by surrounding levees or obscured by intervening homes, and only those recreationists engaging in activities along the Paradise Cut levee would be exposed to these activities, effects are not considered adverse. Furthermore, standard construction practices employed to minimize visual effects on viewer groups would ensure that overall direct aesthetic effects on viewer groups are less than significant. No indirect effects were identified.

Long-term changes in visual character (less than significant)

Under Alternative 4, long-term changes in visual character for each viewer group would be similar to those under the proposed action. The current agricultural character would be replaced with mixed-use residential and commercial development and land- and water-based recreational features that would alter viewers' experience and the visual character of the area. Aesthetic effects under this alternative, like those under the proposed action, would be dependent on viewer group sensitivity and response, and changes in character could be adverse for some viewers and beneficial for others. Although the area southwest of the proposed action area could experience visual modification under this alternative, the new features—low levees, additional waterways, and possibly additional areas of riparian vegetation—would remain consistent with the existing character. Overall, long-term changes in visual character are anticipated to result in a less-than-significant effect.

Increased light and glare (significant)

Alternative 4 would entail the same development scenario as the proposed action. The UDC prohibits reflective glass curtain walls as part of the River Islands development. The dominant building materials would be wood, masonry, brick, and stucco, which would minimize glare. However, the proposed development would still generate some level of increase in daytime glare and nighttime light. Mitigation Measure AES-1 would address this significant direct effect. No indirect effects were identified.

Visual changes from compliance with Corps levee vegetation guidelines (significant)

Under Alternative 4, River Islands would be required to comply with the Corps' levee vegetation guidelines, removing all vegetation on existing levees and within 15 feet of the levee toe. Under this policy, removal of vegetation and changes to the visual quality of the landscape could have an adverse effect. Along the San Joaquin and Old Rivers, approximately 2.01 acres and 9.98 acres of vegetation, respectively, would need to be removed as described in Chapter 3, *Terrestrial Biological Resources*. This aesthetic change along the San Joaquin and Old Rivers has the potential to reduce visual experience for all viewer groups (residents, recreationists, agricultural workers, and motorists), and changes to the visual quality of the landscape could have an adverse effect. It should be noted that, because such vegetation management is required even in the absence of the proposed action, it should not be considered as a significant direct effect of the proposed action *per se*, but is included here for purposes of full disclosure.

18.2.3.5 Alternative 5—No Action

Under the No Action Alternative, an interior levee system rather than extended levees would be constructed for flood risk reduction. The No Action alternative would not include any habitat enhancement or restoration on benches outside federal project levees along the San Joaquin and Old Rivers nor would it include habitat restoration and enhancement activities associated with the PCC Area or the Paradise Cut Improvement Program. Similarly,

Temporary visual effects caused by construction activities (less than significant)

Temporary visual effects associated with construction activities would be similar to those under the action alternatives, with the exception of activities conducted outside the RID Area under Alternative 4. Direct effects would be less than significant, and No indirect effects were identified.

Long-term changes in visual character (less than significant)

The long-term changes in visual character associated with the No Action Alternative would be generally similar to those under Alternative 2; however, because of the construction of the interior levee system, the incorporation of the high-ground perimeter into urban design and community parks and trails would not be realized, potentially decreasing the beneficial aesthetic effects associated with buildout of River Islands at Lathrop under the action alternatives.

Increased light and glare (significant)

Because the extent of development would be the similar under the No Action Alternative to that under the action alternatives, and because the same design guidelines would be followed, the potential effects associated with light and glare would also be the same. Mitigation Measure AES-1 would address this significant direct effect. No indirect effects were identified.

Visual changes from compliance with Corps levee vegetation guidelines (significant)

Because existing federal project levees would not be altered in any way, no benches would be constructed on the waterside of levees. Pursuant to the Corps' levee vegetation guidelines, removal of vegetation and changes to the visual quality of the landscape could have an adverse effect. It should be noted that, because such vegetation management is required even in the absence of the proposed action, it should not be considered as a significant direct effect of the proposed action *per se*, but is included here for purposes of full disclosure.

18.3 References

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Chapter 19
Socioeconomics

This chapter provides a brief discussion of socioeconomic factors as they relate to the proposed action. Related discussions are found in Chapter 20, *Environmental Justice*; Chapter 9, *Land Use and Planning*; Chapter 10, *Agricultural Resources*; Chapter 11, *Recreation*; Chapter 22, *Growth Inducement and Related Effects*; and Chapter 21, *Cumulative Effects*.

The key sources listed below were used in preparation of this chapter.

- *Comprehensive General Plan for the City of Lathrop, California* (City of Lathrop 2004).
- *West Lathrop Specific Plan* (City of Lathrop 2003).
- Housing and employment reports from local and regional government councils and associations.
- Population and employment statistics from local jurisdiction general plans.
- Development plans for the proposed action.

Specific reference information is provided in the text.

19.1 Affected Environment

19.1.1 Regulatory Framework

NEPA requires that an EIS consider social and economic effects if they are related to effects on the natural or physical environment. The NEPA definition of *effects* includes social and economic factors (40 CFR 1508.8, 1508.14). However, the intent of NEPA is that social and economic effects alone should not trigger preparation of an EIS (40 CFR 1508.14). Socioeconomic issues relevant to the evaluation of environmental effects associated with the proposed action are labor force, employment, population, and housing.

19.1.1.1 City of Lathrop General Plan

Goals 3 and 5 of the housing element of the City's General Plan, reproduced below, are relevant to the analysis.

> **Goal #3** To develop a balanced residential environment with access to employment opportunities, community facilities and adequate services.
>
> **Goal #5** To promote efficient use of land available for housing.

19.1.1.2 West Lathrop Specific Plan

Objectives 1A, 2A, 2B, and 3I of the WLSP, reproduced below, pertain to population, employment, and housing.

> **Objective 1A:** Add to the economic vitality of Lathrop by providing more local jobs, homes and revenue-generating land uses.

Objective 2A: Provide diverse types of housing in West Lathrop that respond to the needs generated by increased employment as well as regional housing needs.

Objective 2B: Enhance the diversity of subregional labor market opportunities and job training capabilities.

Objective 3I: Ensure that new development in West Lathrop expands the housing, employment and recreation resources of the City of Lathrop.

19.1.2 Existing Conditions

19.1.2.1 Methods Used to Identify Existing Conditions

The examination of population, employment, and housing conditions in this section is based on information obtained from review of the plans for the proposed action and alternatives, as well as review of available population, employment, and housing projections from the City's General Plan, the WLSP, SJCOG, and other sources.

19.1.2.2 Existing Economic and Housing Climate in the Lathrop Area

Population

San Joaquin County comprises seven incorporated cities: Escalon, Lathrop, Lodi, Manteca, Ripon, Stockton, and Tracy. San Joaquin County's population grew at an average annual rate of 1.6% during the 1990s, reaching a total of 566,600 in 2000 (Inter-Regional Partnership 2003:22). In 2010, the County population was estimated to be 685,306, up 21.6% from 2000 (U.S. Census Bureau 2011a). The rapid growth in the County can be attributed in large part to the willingness of Bay Area jobholders to move farther from their places of employment and reside in San Joaquin County, where land and homes have historically been less expensive. The County's growth is expected to continue, though at a lesser rate. Current projections indicate a total population of 935,709 by 2030 and approximately 1.3 million by 2050 (California Department of Finance 2012).

The City of Lathrop, in northern San Joaquin County, is considered part of the Stockton-Lodi metropolitan area. Census data for the past two decades show Lathrop as the second fastest growing city in the area, behind Tracy and ahead of Manteca, Stockton, and Ripon. Between 1990 and 2000, the population increased by 52.7%. According to the U.S. Census Bureau, Lathrop grew another 60%—from 10,445 residents in 2000 to 18,023 in 2010 (U.S. Census Bureau 2011b). Estimates for future population in the City vary widely depending on the assumptions used in the projections. The City's General Plan anticipated substantial growth, with a population of about 30,000 projected for 2012 (City of Lathrop 2004:34); however, the economic downturn beginning in 2007 rendered this projection inaccurate. A more recent projection from SJCOG estimates the City's population at 20,896 in 2015 (San Joaquin Council of Governments 2011). Commuters from the Bay Area, Silicon Valley, Pleasanton–Dublin–San Ramon–Livermore–Danville (the "Tri-Valley" region), and Sacramento employment centers are expected primarily to fuel this modest growth.

Employment

As of July 2012, the labor force in the County was 300,300 and the number of employed individuals totaled 254,800. The unemployment rate was reported at 15.1% (California Employment Development Department 2012). A significant characteristic of employment in San Joaquin County is the seasonal fluctuation in the availability of job opportunities. As is typical of California's rural agricultural regions, seasonal, agriculturally oriented jobs result in high unemployment rates during the winter months and comparatively low unemployment rates during the summer and fall harvest seasons. It is likely that the recent economic downturn has also had an impact on real estate, lending, and other financially related occupations. The City had an unemployment rate of 12.3% in July 2012, with 5,000 out of 5,700 individuals in the labor force employed. At that time, California's unemployment rate was somewhat lower at 10.7%. Table 19-1 highlights the July 2012 labor force numbers and unemployment rates for cities in the region, San Joaquin County, and the state.

Table 19-1. Employment[a] as of July 2012

Area	Labor Force	Employment	Unemployment	Unemployment Rate
City of Stockton	126,700	103,600	23,100	18.2%
City of Lodi	32,000	28,300	3,700	11.5%
City of Manteca	27,700	24,00	3,700	13.2%
City of Tracy	32,900	29,800	3,100	9.5%
City of Ripon	6,000	5,400	600	10.6%
City of Lathrop	5,700	5,000	700	12.3%
City of Escalon	3,500	3,000	500	13.9%
San Joaquin County	300,300	254,800	45,500	15.1%
California State Total	18,458,100	16,483,900	1,974,100	10.7%

Source: California Employment Development Department 2012.

[a] Data not seasonally adjusted.

Based on the latest *Projections of Employment by Industry and Occupation* prepared by the California Employment Development Department, total employment in San Joaquin County is projected to reach 262,100 by 2018 (California Employment Development Department 2010). This increase represents a gain of 19,200 jobs from 2011—a growth rate of about 1.1% annually. The rate is less than half of the growth rate of California as a whole, which is estimated at about 2.5% annually for the same forecast period.

The educational services, health care, and social assistance sector is expected to generate the largest number of new jobs (6,900) during the outlook period, largely due to an increase of health care employment opportunities. Another 12,700 new jobs are estimated to occur in the government; retail trade; professional and business services; and transportation, warehousing, and utilities sectors.

In the City of Lathrop, 6,629 persons over the age of 16 were listed by the 2009 American Community Survey as employed. Based on estimates between 2005 and 2009, occupations in the civilian labor force were 1,785 in management, professional, and related occupations; 943 in service occupations; 1,933 in sales and office occupations; 52 in farming, fishing, and forestry occupations; 757 in construction, extraction, maintenance and repair occupations; and 757 in production, transportation, and material moving occupations (U.S. Census Bureau 2010a).

Housing

Despite recent dramatic shifts in the real estate market, the overall trend in San Joaquin County and the City of Lathrop in recent years has been one of rapid growth and booming construction. Although it may moderate, this general trend is expected to continue.

Land costs have historically been lower in San Joaquin County than in the more densely developed Bay Area to the west. In recent decades, workers employed in the Bay Area have sought less expensive housing in San Joaquin County, resulting in increased construction activity in the northern part of the County, particularly in the cities closest to the Bay Area, such as Lathrop and Tracy (Inter-Regional Partnership 2003:24). This trend was projected to continue into the foreseeable future—as of 2003, the Inter-Regional Partnership forecast a countywide 57% increase in households between 2000 and 2025 (Inter-Regional Partnership 2003:27).

Like many parts of California, however, the Lathrop housing market has experienced a dramatic shift in the last 4–5 years. Prices in Lathrop have declined markedly, and numerous foreclosures have occurred (California Association of Realtors 2008; Recordnet.com 2008a, 2008b). A number of indicators suggest that the state and local markets are beginning to stabilize, however (California Association of Realtors 2012 and Recordnet.com 2011), and even with changes in the market, City outreach materials anticipate substantial population growth in the Stockton-Lathrop area over the next decade (City of Lathrop 2012).

The California Department of Housing and Community Development (DHCD) considers the desired vacancy rates necessary to provide a stable housing environment to be approximately 2% for owner-occupied housing and 5% for rental housing (Department of Housing and Community Development 2000; San Joaquin County 2010a). According to the 2009 American Community Survey, the City had a vacancy rate of 3.4% for owner-occupied units and 6.7% for rental units between 2005 and 2009. San Joaquin County had a vacancy rate of 3.9% for owner-occupied units and 6.4% for rental units in 2009 (U.S. Census Bureau 2010a and 2010b). These suggest a relative surplus of housing.

According to the most recent *San Joaquin County Housing Element* (San Joaquin County 2010a), the occupancy and vacancy rates for housing units in San Joaquin County have generally followed statewide trends: from 2000 to 2008 the vacancy rate in incorporated San Joaquin County decreased, and the correlated occupancy rate increased (San Joaquin County 2010a). However, the City of Lathrop was the fastest growing in terms of total and occupied units. Lathrop was the only city where the vacancy rate increased during this period (San Joaquin County 2010a).

Regional Housing Needs Allocation

A regional housing needs plan (RHNP) is mandated by the State of California (Government Code Section 65584) for regions to address housing issues and needs based on future growth projections for the area. The RHNP for San Joaquin County is developed by SJCOG and allocates to cities and the County their “fair share” of the region’s projected housing needs based on household income groupings over the 5-year planning period for each specific jurisdiction’s housing element. The RHNP also identifies and quantifies the existing housing needs for each jurisdiction.[1]

SJCOG anticipates that a total of 1,326 new housing units would be required for the City during the current planning period (2007-2014) to meet regional housing needs. Estimates cited in the City’s

[1] The State of California requires local government organizations to prepare periodic RHNAs. SJCOG uses a demography-based formula to allocate the identified need for new housing construction among its member jurisdictions, with the need broken down by income groups to ensure that each jurisdiction meets its responsibility without disproportion between income groups. Income groups are defined relative to Housing and Urban Development’s Median Family Income (MFI) figure, as follows: very low (less than 50% of MFI), low (50–80% of MFI), moderate (80–120% of MFI), and above moderate (more than 120% of MFI) (City of Lathrop 2004).

General Plan suggested a greater need than that identified by the regional housing needs allocation (RHNA). However, it is important to note that the General Plan was written at a time of intensive growth in the region and does not reflect the severe downturn in the housing market that began in 2007. Utilizing a study of housing between 1970 and 1990 in nearby mid-sized cities (Ceres, Folsom, Lodi, Manteca, and Turlock)—all of which experienced "aggressive growth" and averaged construction of 400–600 housing units per year over the study period—the General Plan estimated that with an aggressive economic growth program in place, the City could develop an average of 500 units per year over the next 20 years (City of Lathrop 2004:252). Therefore, the General Plan and zoning map allowed for as many as 12,900 housing units over the Plan's 20-year lifespan. While the housing market is currently stabilizing, it is reasonable to assume that, in view of the slowing of growth trends in the area (California Department of Finance 2012), the General Plan allows for more developmental capacity than will be necessary over its lifespan.

19.2 Environmental Consequences

19.2.1 Methods for Analysis of Effects

The analysis of effects construction and operation of the proposed action and its alternatives on housing and employment entailed consideration of existing or proposed plans and policies in the vicinity of the proposed action area. These were reviewed to help determine potential socioeconomic effects.

Indirect effects associated with increased population, housing, and employment—such as traffic congestion, air quality degradation, and noise generation—are addressed in each technical section of this EIS, as appropriate. These technical sections provide a detailed analysis of other relevant environmental effects that could result from development of the proposed action. Indirect effects are not discussed further in this chapter.

19.2.2 Definition of Significant Effects

NEPA requires that an EIS consider social and economic effects if they are related to effects on the natural or physical environment. The NEPA definition of effects includes social and economic factors (40 CFR 1508.8, 1508.14). Accordingly, a proposed action is typically considered to have the potential for significant socioeconomic effects if it would directly or indirectly lead to any of the conditions listed below.

- Substantial changes in the availability of employment, housing, or services.
- Substantial effects on the economic base of the region or state.
- Displacement of a substantial number of people or existing housing units, such that replacement housing in another location would be needed.

19.2.3 Effects and Mitigation Approaches

19.2.3.1 Alternative 1—Proposed Action

Potential effects on population growth, employment, and housing demand during construction (less than significant)

If constructed, the proposed action would result in the development of 6,716 mixed-density dwelling units, 2 million square feet of commercial and retail space, and flood risk reduction and conservation measures. Development of the proposed action would comprise the balance of the total River Islands at Lathrop project—11,000 homes and 5 million square feet of commercial space—not developed under earlier phases of the project. Accordingly, the proposed action would entail development of 40% of the total River Islands at Lathrop commercial space. Approximately 5,500 jobs would be associated with the proposed action (Batista pers. comm.), and 17,000 with the entire River Islands at Lathrop project (City of Lathrop 2003).

According to information provided by River Islands for the air quality analysis, the proposed action is estimated to generate a maximum of 700 construction jobs at any given time during the peak of project construction—anticipated during the final year of the construction period. Fewer workers (a maximum of 300–400 at any given time) would be onsite during nonpeak times. According to the 2009 American Community Survey, an estimated 566 Lathrop residents and 19,925 residents of San Joaquin County were employed in the construction field. This number is considered sufficient to meet temporary construction demands associated with the proposed action.

Because residents of the City or County are expected to fill the majority of these construction jobs, substantial population growth and corresponding increases in housing demand in the region during the construction period for the proposed action are not anticipated. The projected timeline for construction of the entire River Islands at Lathrop project is 20 years. While construction jobs are typically considered temporary, the River Islands at Lathrop project is expected to provide ongoing opportunities for the duration of the construction period. For these reasons, direct effects related to population growth and housing demands associated with project construction would be less than significant, and the additional job opportunities could be beneficial. There would be no indirect effects.

Potential effects on the region's economic base (no effect)

Overall, the proposed action is expected to increase and diversify economic activity in the region during construction and also as a result of the new business and residential development. With an expected maximum of 700 construction jobs needed to develop the proposed action, a corresponding and temporary indirect increase in the purchasing of goods and services in the area is anticipated. A permanent increase to the region's economic base is expected to occur once the project is developed and jobs and dwellings become occupied.

The conversion of farmland to other uses will result in a decline in agriculture-related economic activity in the area. Agriculture is an important aspect of the San Joaquin County economy, accounting for a gross production value of nearly $2.2 billion in 2010 (San Joaquin County 2010b). However, as noted in Chapter 10, *Agricultural Resources*, the production and associated income garnered from the project area accounts for only a small fraction (0.39%) of the County's agricultural value. New economic activities associated with the proposed action are expected to overshadow this loss, generating local spending along with tax revenue to support public expenditures associated with development.

As discussed in Chapter 2, *Proposed Action and Alternatives*, River Islands at Lathrop is specifically intended to help to diminish the County's identified jobs deficit and provide a hub for professional employment opportunities, allowing more residents to work locally and avoid commuting out of the City or the region. Measure D (2000) and the amended 2003 WLSP specifically prohibit warehouses and industrial land uses that support few employees; this prohibition would necessarily result in a denser Employment Center, as described in Chapter 2. A $5,000 economic development fee per residential unit construction is also imposed on developers until major revenue and employment generators, such as the Employment Center and a mixed use town center, are in place in River Islands. Revenue from these fees, potentially reaching $55 million[2], is earmarked to assist economic development projects in Lathrop. No potentially adverse direct or indirect effects on the economic base of the region are expected (City of Lathrop 2003: ii, III–15, V-75).

Potential effects on population growth and housing demand from project development (less than significant)

The proposed action would entail the development of 6,716 single- and multifamily homes and accommodate an estimated population of 19,514 by buildout in 2031 (Table 19-2).

Table 19-2. Proposed Action Estimated Population

Dwelling Unit (DU)	Total DUs	Persons per DU	Residents
Single-family	3,891	3.2	12,451.2
Multifamily	2,825	2.5	7,062.5
Total	6,716		19,514

In earlier phases of the project, 4,284 single and multifamily housing units would be developed, generating an estimated 13,329 additional residents in the City. Combining resident totals for earlier phases of the project with the estimated population resulting from the proposed action (19,514), River Islands at Lathrop would generate approximately 32,843 residents. This number is slightly higher than but generally consistent with projections in the WLSP, which anticipates 30,000 residents at full buildout (City of Lathrop 2003:VI-7). Population growth (discussed in Chapter 22, *Growth Inducement and Related Effects*) is not considered a significant direct environmental effect. It may, however, have corollary indirect effects on other elements of the community, such as infrastructure, utilities, facilities, and services. These changes are analyzed in the respective resource chapters of this EIS (*Air Quality, Public Services and Utilities, Transportation and Circulation, Growth Inducement and Related Effects*).

The proposed action would offer many new employment opportunities. In view of the high unemployment rates in the city (12.3%) and county (15.1%) it is expected that a large proportion of the jobs generated by the project would be filled by residents of the local region (California Employment Development Department 2012). This would moderate the demand for new housing associated with the proposed action.

[2] This estimate is based on the maximum number of residential units called for in the River Islands at Lathrop development plan.

In addition, the proposed action is consistent with the City's General Plan. The General Plan and zoning map allowed for as many as 12,900 housing units over the Plan's 20-year lifespan; the proposed action would allow the development of 11,000 new housing units.

In recent years, the City has not been able to achieve its state-mandated RHNA affordable housing target through conventional means, such as redevelopment efforts. The City views large mixed-use projects that include a broad spectrum of housing types as a more promising approach to meeting its fair-share obligation. The WLSP specifies a range of zoning designed to encourage development of various types of housing (single- and multifamily, at varying densities), as well as commercial areas that will provide jobs for residents.

To ensure that actual construction—and particularly construction of multifamily units—is sufficient to meet market demand, the City intends to continue its dialogue with the development community, monitor market demand and requests for zoning changes, and initiate zoning changes and annexations as needed to meet the identified demand (City of Lathrop 2002). The 20-year construction timeline would also accommodate longer term forecasting of demand and would potentially moderate the cyclical nature of economic trends.

In conclusion, because the proposed action is consistent with the City's planning documents, would create economic opportunities for existing residents under the requirements of Measure D, and would not create a significant demand for new housing, direct effects related to housing availability or demand are expected to be less than significant. Moreover, over the long term, the River Islands at Lathrop project (including the proposed action) would provide local residents with housing diversity not currently available in the City. There would be no indirect effects.

Potential housing displacement effects (less than significant)

Stewart Tract is currently used for agricultural production and supports a small number of dwelling units related to agricultural uses. The majority of these units are used seasonally to house farm workers (up to 50, according to a County estimate) and do not provide year-round housing (Batista pers. comm.). The remaining units are owned by River Islands. All the seasonal workers would be displaced at full buildout, some of which would occur under the proposed action. However, because the number of residents affected would be small and the residency is seasonal, this direct effect would be less than significant. There would be no indirect effects.

Potential effects on employment from project development (no effect)

As described in Chapter 2, *Proposed Action and Alternatives*, River Islands at Lathrop would include an Employment Center and Town Center offering a mix of offices, retail uses, personal services, restaurants, and entertainment venues. These two centers are expected to employ approximately 17,000 people at project buildout (City of Lathrop 2003). The proposed action would include the construction of 2 million square feet of commercial and retail space, or 40% of the overall project commercial space. The construction of the other 60% of commercial space would occur under earlier phases of the River Islands at Lathrop project.

The conversion of approximately 3,500 acres of farmland to accommodate development of the proposed action would result in direct job losses for approximately 50 seasonal farm workers (Batista pers. comm.). Employment associated with agricultural production in the area (e.g., food processing) would also be affected. As detailed in the report *Employment Impacts of Reduced Water Supplies to San Joaquin Valley Agriculture*, it can be assumed that every on-farm job in California's

Central Valley produces additional associated jobs, and that a multiplier of 1.577 can be used to provide a reasonable estimate of the specific amount of associated jobs per on-farm job. Using the estimate of 50 seasonal farm workers displaced due to the proposed action, along with a multiplier of 1.577 to determine total agricultural sector employment (i.e., including indirect and induced employment from food processing and other activities) (Michael 2009), it can be assumed that the proposed action would result in the loss of nearly 79 total jobs[3]. This figure is conservative because it treats seasonal jobs as full-time equivalent jobs. In the context of the region, these losses are relatively minor. As of July 2012, 300,300 people were employed in the County; in 2009, 13,071 individuals claimed farming, fishing, and forestry occupations (California Employment Development Department 2012 and U.S. Census Bureau 2010b). With the estimate of total lost jobs detailed above, agricultural employment impacts caused by the proposed action would result in declines of 0.03% and 0.60%, respectively. Additionally, the proposed action is expected to create roughly 5,500 new jobs in addition to the temporary construction jobs noted above. The conversion from agriculture to diverse commercial uses is also consistent with the City's General Plan and the WLSP, which seeks to develop a more diversified economic base. No potentially adverse direct or indirect effects are expected.

19.2.3.2 Alternative 2—No Alteration of Paradise Cut

Under Alternative 2, all alterations to Paradise Cut would be avoided. Because this alternative would entail the same quantity of residential units and commercial development as the proposed action, the potential socioeconomic effects would be the same as those under the proposed action.

Potential effects on population growth, employment, and housing demand during construction (less than significant)

The effects on population growth, employment, and housing demand associated with construction would be the same under Alternative 2 as under the proposed action. This direct effect would be less than significant. There would be no indirect effects.

Potential effects on the region's economic base (no effect)

The effects on the region's economic base would be the same under Alternative 2 as under the proposed action. This would result in no direct or indirect adverse effects.

Potential effects on population growth and housing demand from project development (less than significant)

The effects on population growth and housing demand from project development would be the same under Alternative 2 as under the proposed action. This direct effect would be less than significant. There would be no indirect effects.

Potential housing displacement effects (less than significant)

The potential housing displacement effects under Alternative 2 would be the same as under the proposed action. This direct effect would be less than significant. There would be no indirect effects.

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[3] 1.577 (total agricultural-related jobs per farm worker job) * 50 (farm worker jobs)= 78.85 total jobs. 78.85 / 13,071 * 100% = 0.6%. 78.85 / 2,424 * 100% = 3.2%

Potential effects on employment from project development (no effect)

The effects on employment under Alternative 2 would be the same as under the proposed action. This would result in no direct or indirect adverse effects.

19.2.3.3 Alternative 3—Avoidance of Central Drainage Ditch

Residential and commercial development under Alternative 3 would be the same as that under the proposed action, although the development footprint would differ to avoid the central drainage ditch and a 100-foot buffer around it.

Potential effects on population growth, employment, and housing demand during construction (less than significant)

The effects on population growth, employment, and housing demand associated with construction would be the same under Alternative 3 as under the proposed action. This direct effect would be less than significant. There would be no indirect effects.

Potential effects on the region's economic base (no effect)

The effects on the region's economic base would be the same under Alternative 3 as under the proposed action. This would result in no direct or indirect adverse effects.

Potential effects on population growth and housing demand from project development (less than significant)

The effects on population growth and housing demand from project development would be the same under Alternative 3 as under the proposed action. This direct effect would be less than significant. There would be no indirect effects.

Potential housing displacement effects (less than significant)

The potential housing displacement effects under Alternative 3 would be the same as under the proposed action. This direct effect would be less than significant. There would be no indirect effects.

Potential effects on employment from project development (no effect)

The effects on employment under Alternative 3 would be the same as under the proposed action. This would result in no direct or indirect adverse effects.

19.2.3.4 Alternative 4—Proposed Action with Expanded Flood Risk Reduction

Alternative 4 would entail additional construction work related to flood risk management beyond the confines of Stewart Tract, but the residential and commercial development would be the same as under the proposed action. Because this alternative has only been developed at a broad conceptual scale, it is not possible to quantify the additional employment losses or opportunities that would be associated with it. However, it is likely that the socioeconomic effects would not substantially differ from those described under the proposed action. Effects on agricultural productivity and their economic implications are discussed separately in Chapter 10, *Agriculture*.

Potential effects on population growth, employment, and housing demand during construction (less than significant)

The effects on population growth, employment, and housing demand associated with construction would be the same under Alternative 4 as under the proposed action, with the exception of an unquantified additional number of jobs associated with construction of flood risk reduction measures. This direct effect would be less than significant. There would be no indirect effects.

Potential effects on the region's economic base (no effect)

The effects on the region's economic base would be the same under Alternative 4 as under the proposed action. This would result in no direct or indirect adverse effects.

Potential effects on population growth and housing demand from project development (less than significant)

The effects on population growth and housing demand from project development would be the same under Alternative 4 as under the proposed action. This direct effect would be less than significant. There would be no indirect effects.

Potential housing displacement effects (less than significant)

The potential housing displacement effects under Alternative 4 would be the same as under the proposed action. This direct effect would be less than significant. There would be no indirect effects.

Potential effects on employment from project development (no effect)

The effects on employment under Alternative 4 would be the same as under the proposed action. This would result in no direct or indirect adverse effects.

19.2.3.5 Alternative 5—No Action

The No Action Alternative would generate the same population growth and provide the same employment and housing opportunities as the proposed action. Accordingly, the No Action Alternative would be consistent with the City's General Plan and the WLSP, and would not create a significant demand for new housing.

Potential effects on population growth, employment, and housing demand during construction (less than significant)

The effects on population growth, employment, and housing demand associated with construction would be the same under Alternative 5 as under the proposed action. This direct effect would be less than significant. There would be no indirect effects.

Potential effects on the region's economic base (no effect)

The direct and indirect effects on the region's economic base would be the same under Alternative 5 as under the proposed action. This would result in no direct or indirect adverse effects.

Potential effects on population growth and housing demand from project development (less than significant)

The effects on population growth and housing demand from project development would be the same under Alternative 5 as under the proposed action. This direct effect would be less than significant. There would be no indirect effects.

Potential housing displacement effects (less than significant)

The potential housing displacement effects under Alternative 5 would be the same as under the proposed action. This direct effect would be less than significant. There would be no indirect effects.

Potential effects on employment from project development (no effect)

The direct and indirect effects on employment under Alternative 5 would be the same as under the proposed action. This would result in no direct or indirect adverse effects.

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Chapter 20
Environmental Justice

This chapter analyzes the proposed action's and alternatives' potential effects related to environmental justice. *Environmental justice* embodies the concept that disadvantaged populations must not experience disproportionate adverse effects as a result of any federal action. Disproportionate adverse effects on minority or low-income populations are generally referred to as *environmental justice effects*. Related discussions are found in Chapter 19, *Socioeconomics,* and Chapter 21, *Cumulative Effects*.

The key sources of data listed below were used in the preparation of this chapter.

- Development plans for the proposed action.
- Census Bureau 2009 and 2010 documents for county, city, and related census tracts.

Specific reference information is provided in the text.

20.1 Affected Environment

20.1.1 Regulatory Framework

The concept of environmental justice is rooted in the Civil Rights Act of 1964, which prohibits discrimination in federally assisted programs, and in Executive Order 12898 (Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations), issued February 11, 1994. Executive Order 12898 was intended to ensure that federal actions and policies do not result in disproportionately adverse effects on minority or low-income populations. It requires each federal agency to take "appropriate and necessary" steps to identify and address any such disproportionate effects resulting from its programs, policies, or activities, including those it implements directly and those for which it provides permitting or funding.

Additional guidance from CEQ clarifies that environmental justice concerns may arise from effects on the natural or physical environment that produce human health or ecological outcomes, or from adverse social or economic changes (Council on Environmental Quality 1997). Environmental justice issues are mandated and regulated at the federal level, and NEPA compliance requires analysis of environmental justice effects.

20.1.2 Existing Conditions

20.1.2.1 Methods Used to Identify Existing Conditions

For purposes of this analysis, minority and low-income populations are defined according to CEQ's 1997 guidance.

- **Minorities—**Persons of American Indian or Alaska Native; Asian or Pacific Islander; Black, not of Hispanic origin; Hispanic; or persons of two or more races (without double-counting persons of Hispanic or Latino origin who are also counted in any of the other groups).

- **Minority populations—**Minority populations are identified where the minority population of the affected area exceeds 50% of the total population.
- **Low-income populations—**Low-income populations are identified where more than 50% of households are below the poverty line or where a population exhibits a meaningfully higher proportion of persons in poverty when compared with the general population.

As of 2010, the most recent available definition applicable to census tracts in the proposed action area, the poverty line is defined as $21,756 for a family of four in 2009 (U.S. Census Bureau 2010a). Low-income populations were estimated using 2009 American Community Survey data that estimate poverty status (U.S. Census Bureau 2010b). The population for whom poverty status is determined is generally slightly less than the total population because the Census Bureau excludes certain groups from consideration. Excluded groups are those whose poverty status cannot be determined, such as people in institutional group quarters such as prisons or nursing homes; college dormitories; military barracks; living situations without conventional housing (and who are not in shelters); and unrelated individuals under age 15 in households (such as foster children) (U.S. Census Bureau 2010c). Minority populations were estimated using 2010 Census data that report Hispanic or Latino populations by race and, separately, populations not Hispanic or Latino by race (U.S. Census Bureau 2011).

Consistent with EPA's *Final Guidance for Incorporating Environmental Justice Concerns* (U.S. Environmental Protection Agency 1998), for the purposes of an environmental justice screening, the study area encompasses an area approximately 6 miles around Stewart Tract. Data from the U.S. Census Bureau's 2009 American Community Survey and 2010 Census for poverty status, race, and ethnic origin for all census tracts touching the study area were obtained and incorporated into the analysis.

20.1.2.2 Demography and Incomes in the Lathrop Area

The affected areas for environmental justice analysis are San Joaquin County, the City of Lathrop, and the census tracts within 6 miles of the River Islands at Lathrop footprint. In 2010, the population in San Joaquin County was 685,306 persons, of whom 439,387 (64.1%) were minorities. In 2009, 102,669 were living below the poverty level (15.7% of those for whom poverty level was determined) (U.S. Census Bureau 2010b and 2010d). The City's population in 2010 was 18,023 persons, of whom 13,593 (75.4%) were minorities. In 2009, 1,710 were living below the poverty level (10.8% of those for whom poverty level was determined). The proposed action would be located entirely within census tract 005202, which in 2010 had a population of 6,765 persons, of whom 3,422 (50.6%) were minorities. In 2009, 385 were living below the poverty level (6.0% of those for whom poverty level was determined).

Twenty-eight other 2000 Census tracts, on which the 2009 poverty data are based, fall within a 6-mile radius of the action area, while 37 other 2010 Census tracts, the geographical units on which race and ethnicity data are based, fall within the study area. Table 20-1 presents data on race and ethnicity for census tracts within 6 miles of Stewart Tract. As noted in Chapter 19, Stewart Tract houses up to 50 agricultural workers on a seasonal basis. Demographic data may not reflect the characteristics of transient populations.

According to the 2009 American Community Survey, none of the 29 census tracts within 6 miles of Stewart Tract has a low-income population greater than 50%. Sixteen neighboring tracts have a poverty rate higher than 10%. One tract is between 20% and 30%. The proposed action would be located entirely within tract 005202, which has a low-income population of 6.0%, less than the County-wide poverty rate of 15.7%. Tracts 003900 and 005119, both of which are adjacent to tract 005202, have poverty rates of 18.3% and 6.3%, respectively.

Table 20-1. Race and Ethnicity Statistics within 6 Miles of Stewart Tract

Census Tract Code	Caucasian	Black	American Indian or Alaskan Native	Asian	Hawaiian or Pacific Islander	Hispanic Origin	Other Race Alone	Two or More Races	Census Tract Total
003801	1,582	2,659	42	2,741	144	4,882	27	475	12,552
003802	927	1,174	16	1,483	69	2,557	13	280	6,519
003803	1,391	613	30	514	15	2,572	29	117	5,281
003900	450	5	6	10	0	1,269	0	9	1,749
005106	2,929	287	30	532	24	1,962	10	243	6,017
005108	1,763	151	25	179	16	2,207	20	102	4,463
005109	1,808	81	40	94	5	1,858	23	107	4,016
005110	3,481	143	44	174	20	2,409	39	178	6,488
005114	3,161	484	15	1,059	43	2,654	15	290	7,721
005119	1,349	607	16	1,950	36	1,789	17	242	6,006
005122	2,086	158	26	633	48	1,717	16	145	4,829
005123	2,056	243	18	391	13	1,599	5	168	4,493
005124	1,672	151	16	168	3	1,312	5	111	3,438
005125	990	60	5	50	14	696	2	42	1,859
005126	1,891	141	34	208	15	1,682	8	152	4,131
005127	1,207	415	29	1,249	61	2,352	11	186	5,510
005129	1,011	103	31	429	11	1,905	6	86	3,582
005130	997	89	26	256	22	1,733	3	60	3,186
005132	1,380	89	31	63	4	1,607	1	82	3,257
005133	1,927	96	31	107	8	1,953	7	120	4,249
005134	2,680	155	34	178	10	1,518	5	163	4,743
005135	2,910	121	22	350	56	1,478	13	189	5,139
005202	3,343	416	22	845	52	1,742	24	321	6,765
005206	5,788	1,197	54	4,662	104	4,073	54	855	16,787
005207	3,917	1,063	28	4,016	181	3,801	32	861	13,899
005208	2,684	385	32	644	41	1,732	17	249	5,784
005209	2,918	533	13	901	43	2,087	13	350	6,858
005210	4,345	839	34	2,229	84	3,294	37	571	11,433
005302	2,379	301	30	245	23	3,344	16	169	6,507
005303	1,529	201	23	128	15	2,677	8	113	4,694
005305	2,421	415	19	570	49	2,773	24	224	6,495
005307	1,110	202	17	256	20	1,461	6	142	3,214
005308	1,569	290	24	488	44	1,592	10	172	4,189
005403	2,652	405	20	428	41	2,097	8	224	5,875
005405	928	279	10	265	14	1,759	8	154	3,417
005406	745	235	17	291	20	1,812	5	137	3,262
005501	2,486	983	56	58	8	1,484	154	39	5,268
005502	916	60	6	129	2	635	0	58	1,806
Total	79,378	15,829	972	28,973	1,378	80,074	691	8,186	215,481
	36.8%	7.3%	0.5%	13.4%	0.6%	37.2%	0.3%	3.8%	N/A

Source: U.S. Census Bureau 2011.

Across the census tracts in aggregate, the minority population in the proposed action area is greater than 50%. The Caucasian population is 36.8%. Minority (non-Caucasian) populations comprised 63.2% of the combined populations of the 2010 Census tract data. Table 20-1 shows demographic data for these tracts. Census tract 005202, which encompasses the proposed action area, has a Caucasian population of 49.4% and a minority population of 50.6%. Therefore, implementation of the proposed action must consider any potential disproportionate effect on minority populations.

20.2 Environmental Consequences

20.2.1 Methods for Analysis of Effects

Assessing whether effects on resources of construction, operations, and maintenance of the proposed action and its alternatives would be disproportionately high and adverse for minority or low-income populations entails the exercises listed below.

1. Evaluating populations in the affected area to identify geographic concentrations of minority and/or low-income populations.
2. Determining whether the project would affect minority and/or low-income populations to a greater degree than neighboring regions.

Consistent with EPA guidance (U.S. Environmental Protection Agency 1998), this analysis addressed only adverse effects.

20.2.2 Definition of Significant Effects

Environmental justice is concerned with inequitable distributions of human health and environmental burdens, including effects on socioeconomic conditions (see Chapter 19, *Socioeconomics*). Disproportionately high and adverse effects on minority and low-income populations are expressly prohibited by Executive Order 12898. Accordingly, any outcome that would significantly and adversely affect a minority or low-income population to an extent that exceeds the impact on the general population is considered a significant effect on environmental justice. Based on the aggregate proportion of minorities in the region along with demographic trends, minority populations exist in the study area.

In the context of this project, health impacts in the study area include the potential for human exposure to existing or introduced hazardous materials. As noted in Chapter 16, *Public Health and Environmental Hazards*, hazardous materials introduced by construction, commercial, or recreational activities could affect human health. Hazards stemming from neighboring land uses and those materials that could be exposed during construction activities represent another concern, particularly for construction workers and residents whose exposure to such materials would be heightened. The proposed action's potential to support breeding or harborage of disease-carrying mosquitoes is another issue related to health, and must be considered in analyzing environmental justice impacts.

Environmental impacts in the study area relate primarily to impacts on natural resources upon which low-income and minority groups potentially depend for subsistence purposes. Based on the fish, vegetation, and wildlife resources in the area, analysis must consider the degree to which populations depend on "indigenous fish, vegetation and/or wildlife, as the principal portion of their diet" (Council on Environmental Quality 1997).

Socioeconomic issues include the potential for direct effect in terms of a disproportionate amount of job loss among low-income or minority employees or indirect local economic effects on minority or low-income populations. Where local economies are heavily dependent on a certain industry, there is potential for indirect effects from fluctuations in activity in this industry. The agricultural sector in San Joaquin County employs a significant number of workers, and much of the County's unemployment is due to seasonal variation in the sector (San Joaquin Partnership 2009). As noted in Chapter 10, *Agricultural Resources*, adoption of the proposed action would result in the conversion of agricultural land to other uses. Thus, there is a potential for a socioeconomic impact on minority or low-income populations through job loss in this sector. Another issue is the incidence of housing displacement in the study area. The analysis must identify and consider any significant impacts on housing for the identified environmental justice communities.

The proposed action and its alternatives would be considered to have a significant effect on environmental justice if the effects described above would result in a disproportionately high and adverse effect on the minority population identified in the analysis.

20.2.3 Effects and Mitigation Approaches

20.2.3.1 Alternative 1—Proposed Action

Potential health effects on minority populations (less than significant)

Because existing regulations guide the treatment and control of hazardous materials associated with construction activities, general commercial facilities, and existing neighboring land uses, effects related to these uses would be less than significant. The proposed action is not expected to create direct or indirect public health issues with respect to use of recycled water or wildland fire risks. However, marine fuel associated with the development of a marina presents a greater concern; as Chapter 16, *Public Health and Environmental Hazards*, notes, in the event of an accidental release from a marina facility, the direct adverse effect on public health could be significant. However, the chapter introduces two mitigation measures (PH-1 and PH-2) to counteract such potential effects. Additionally, it is unlikely that minority populations would be disproportionately affected by such an occurrence.

Direct exposure of construction workers, residents, and others to existing hazardous materials is another potential issue. Contamination from previous uses—primarily agricultural chemicals—exists in the area. Additionally, accidental disturbance of asbestos- or lead-containing materials could present a risk for construction workers or the public, particularly if groundwater or soil is contaminated. This is a particular concern for minority populations in San Joaquin County, where more than half of those claiming construction occupations in 2009 were of Hispanic or Latino origin (U.S. Census Bureau 2010b). To counteract this potential health risk, Mitigation Measure PH-3 requires investigation and remediation of groundwater and onsite structures prior to construction. Mitigation Measure PH-4 requires construction to stop in the event that hazardous materials are encountered during construction. Additionally, the measure requires hazardous materials investigations and remediation, where applicable.

A final health impact of concern relates to the potential of the proposed action to support breeding or harborage of disease-carrying mosquitoes, which could indirectly expose the public to increase health risks. Two additional mitigation measures address this concern, requiring that River Islands develop and implement a mosquito control plan and design water features to limit mosquito habitat.

Potential environmental effects on minority populations (less than significant)

Because no subsistence-dependent populations have been identified in the study area, direct and indirect environmental justice effects related to subsistence resources would be less than significant. Additionally, the proposed action would have a beneficial effect on fishing resources by increasing access through the construction of piers and adopting mitigation measures to protect fish from harmful effects associated with construction activities.

Potential socioeconomic effects on minority populations (less than significant)

The proposed action would convert 3,491 acres of agricultural land to other uses. Conversion of farmland is a particular economic concern to minority populations in the study area. In 2009, 2,424 individuals in the study area claimed farming, fishing, and forestry occupations, while 13,071 individuals claimed farming, fishing, and forestry occupations in San Joaquin County. (U.S. Census Bureau 2010b.) Of these, 11,886 individuals (over 90%) were of Hispanic or Latino origin. Thus, any substantial effect on the County's agricultural sector would include a disproportionate direct impact on this minority community. Chapter 10, *Agricultural Resources*, mentions, however, that the proposed action area represents only a tiny fraction of the total farmland in the County, translating into minor job losses in the context of the area.

Estimated workers (mostly seasonal) on the land in question number fewer than 50 (Batista pers. comm.). Applying a multiplier of 1.577 for direct farm employment to total agricultural sector employment (i.e., including indirect and induced employment from food processing and other activities) would result in losses of nearly 79 jobs (Michael 2009)[1]. This figure is also conservative because it treats seasonal jobs as full-time equivalent jobs; even so, the conversion still results in a loss of only 0.6% of agricultural employment in the County and 3.2% of agricultural employment in the study area (U.S. Census Bureau 2010b). These effects are not great enough to be considered "high and adverse" in the context of the area; accordingly, this direct effect would be less than significant.

Additionally, any disproportionate effects on seasonal agricultural workers would be mitigated by the fact that such workers are not dependent upon specific land areas and because Mitigation Measure AG-1 would purchase conservation easements on other farmland, ensuring the continued protection of farmland in the project vicinity and partially counterbalancing the effect of conversion.

In terms of housing, Stewart Tract supports a small number of dwelling units related to agricultural uses. River Islands owns some units, but most are used seasonally to house up to 50 farm workers (according to a County estimate). These workers would be displaced at full buildout (Batista pers. comm.). However, because of the seasonal nature of the dwellings and the small number of individuals affected, this direct effect is considered less than significant.

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[1] 1.577 (total agricultural-related jobs per farm worker job) * 50 (farm worker jobs)= 78.85 total jobs. 78.85 / 13,071 * 100% = 0.6%. 78.85 / 2,424 * 100% = 3.2%.

Furthermore, the proposed action would provide employment and housing opportunities that do not currently exist in the area. In total, approximately 17,500 new permanent jobs would be created by the River Islands at Lathrop project (City of Lathrop 2003), with approximately 5,500 jobs coming from the proposed action alone (Batista pers. comm.). Because the proposed action would include commercial and retail space, it is assumed that most of the created jobs would be permanent (year-round) rather than seasonal, thus providing more stability and more opportunity for local residents, including minorities. According to information provided by River Islands for the air quality analysis, the proposed action is estimated to generate a maximum of 700 construction jobs at any given time during the peak of project construction—anticipated during the final year of the construction period. Fewer workers (a maximum of 300–400 at any given time) would be onsite during nonpeak times. Because minorities compose a plurality of construction workers in San Joaquin County, these workers would be well-positioned to benefit from the proposed action. Additionally, the River Islands at Lathrop community would provide 11,000 new residential units, with 6,716 single- and multifamily homes coming as part of the proposed action.

In light of these factors—existing demographics, the context of the overall environment, and the project's potential to provide new employment and housing opportunities—construction of the proposed action would result in less-than-significant effects on housing or employment opportunities for minority populations in the project vicinity.

20.2.3.2 Alternative 2—No Alteration of Paradise Cut

The area of effect under Alternative 2 would vary only slightly from that of the proposed action and the potential effects on surrounding communities would be similar to those of the proposed action.

Potential health effects on minority populations (less than significant)

The potential health effects on minority populations would be the same under Alternative 2 as under the proposed action. The direct and indirect effects would be less than significant.

Potential environmental effects on minority populations (less than significant)

The potential environment effects on minority populations would be the same under Alternative 2 as under the proposed action. The direct and indirect effects would be less than significant.

Potential socioeconomic effects on minority populations (less than significant)

The potential socioeconomic effects on minority populations under Alternative 2 would be the same as under the proposed action. The direct and indirect effects would be less than significant.

20.2.3.3 Alternative 3—Avoidance of Central Drainage Ditch

The area of effect under Alternative 3 would vary only slightly from that of the proposed action, and the potential effects on surrounding communities would be identical to those of the proposed action.

Potential health effects on minority populations (less than significant)

The potential health effects on minority populations would be the same under Alternative 3 as under the proposed action. The direct and indirect effects would be less than significant.

Potential environmental effects on minority populations (less than significant)

The potential environment effects on minority populations would be the same under Alternative 3 as under the proposed action. The direct and indirect effects would be less than significant.

Potential socioeconomic effects on minority populations (less than significant)

The potential socioeconomic effects on minority populations under Alternative 3 would be the same as under the proposed action. The direct and indirect effects would be less than significant.

20.2.3.4 Alternative 4—Proposed Action with Expanded Flood Risk Reduction

Alternative 4 would result in more extensive conversion of agricultural lands than would the proposed action, although the extent of the increase cannot be quantified at this time due to the programmatic nature of Alternative 4. However, the residential and commercial development components would be the same as those of the proposed action. Alternative 4 would have greater effects on agricultural lands and could consequently have different effects relative to environmental justice, but the current concept for this alternative envisions continued use of floodway areas for seasonal agriculture and consequently would not substantially affect seasonal agricultural employment.

Potential health effects on minority populations (less than significant)

The potential health effects on minority populations would be the same under Alternative 4 as under the proposed action. The direct and indirect effects would be less than significant.

Potential environmental effects on minority populations (less than significant)

The potential environment effects on minority populations would be the same under Alternative 4 as under the proposed action. The direct and indirect effects would be less than significant.

Potential socioeconomic effects on minority populations (less than significant)

The potential socioeconomic effects on minority populations under Alternative 4 would be the same as under the proposed action. The direct and indirect effects would be less than significant.

20.2.3.5 Alternative 5—No Action

Residential and commercial development under the No Action Alternative would proceed as described under the proposed action, and the health, environmental, and socioeconomic effects would be the same.

Potential health effects on minority populations (less than significant)

The potential health effects on minority populations would be the same under Alternative 52 as under the proposed action. The direct and indirect effects would be less than significant.

Potential environmental effects on minority populations (less than significant)

The potential environment effects on minority populations would be the same under Alternative 5 as under the proposed action. The direct and indirect effects would be less than significant.

Potential socioeconomic effects on minority populations (less than significant)

The potential socioeconomic effects on minority populations under Alternative 5 would be the same as under the proposed action. The direct and indirect effects would be less than significant.

20.3 References

20.3.1 Printed References

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20.3.2 Personal Communication

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Chapter 21
Cumulative Effects

NEPA requires lead agencies to evaluate a proposed action's potential to contribute to cumulative effects in the project or program area. NEPA implementing regulations (40 CFR Section 1508.7) define a *cumulative effect* as:

> the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions.

Cumulative effects fall into two categories: those that represent the additive effect of repeated activities taking place over time as part of a single proposed undertaking, and those that represent the combined effect of activities taking place under more than one proposed undertaking. Lead agencies are cautioned that cumulative effects may result from outcomes that are individually minor but cumulatively significant over time (40 CFR 1508.7). Analysis of cumulative effects is needed to ensure that each federal action's effects are considered thoroughly in the context of effects resulting from other similar, related, and/or neighboring projects.

21.1 Overall Approach and Scope

Cumulative effects are addressed by evaluating the potential for other past, present, and reasonably foreseeable future actions in the vicinity of the proposed action to create additive environmental effects when considered in combination with construction, operation, and maintenance of the proposed action. CEQ guides lead agencies to restrict analysis of cumulative effects to those that are meaningful. For those effects for which adverse cumulative effects are identified, the contribution of the proposed action is evaluated to consider whether mitigation measures are available to reduce the potential effect. In cases where no adverse cumulative effects are identified or when the proposed action would have no or only limited contribution to the cumulative effect, the potential effect is addressed briefly to the extent needed to support the effects conclusion. The cumulative effects analysis is based on analyses presented in the River Islands SEIR (City of Lathrop 2002), with information updated to reflect changes in the environment and to take into consideration the differences between the CEQA proposed project and the NEPA proposed action.

Cumulative projects in the vicinity of Stewart Tract were identified using project records from the City and recent environmental documentation for projects in the Delta (i.e., DWR, South Delta Improvement Program). To address those effects that are inherently regional, the City's and County's general plans and the *San Joaquin County Multi-Species Habitat and Open Space Plan* were also referenced.

21.1.1 Cumulative Projects in the Vicinity of the Proposed Action

NEPA does not provide specific guidance as to how to conduct a cumulative effects assessment; however, the list approach has been effective at disclosing cumulative effects under NEPA.

A list of past, present, and reasonably foreseeable future projects for the City and other projects in the vicinity that could potentially affect similar resources as the proposed action was compiled for the cumulative setting. These projects (cumulative projects) include other development projects, restoration and water-related projects in and near the San Joaquin and Old Rivers, and other flood risk reduction projects and management programs that could result in effects and benefits similar to those of the proposed action.

21.1.1.1 City of Lathrop Projects

The list of past, present, and reasonably anticipated projects in the City used for this cumulative assessment are identified in Table 21-1 and Figure 21-1 and are described below.

These projects either have recently resulted in or are proposed to result in development of 9,108 acres in Lathrop, 4,905 acres of which would be River Islands at Lathrop. Related projects are proposed to add 21,405 new residences (11,000 of which are part of River Islands at Lathrop). A total of 788,363 square feet of new industrial development would be added to the City, and a total of 5,243,942 square feet of commercial/office/employment uses (plus a 196-room hotel) are proposed.

Crossroads Commerce Center and Industrial Park

Located south of Louise Avenue between Howland and Harlan Roads in East Lathrop, Crossroads is an industrial/commercial area comprising 450 acres of Industrial- and 48 acres of Freeway Commercial–designated land. The industrial area includes an existing 750,000-square-foot Nestle distribution warehouse, three existing 250,000-square-foot warehouses, and a 435,000-square-foot CVS Pharmacy warehouse. The Freeway Commercial area contains the existing 138,000-square-foot Lathrop Business Park, four fast-food restaurants, a sit-down restaurant, a 430,770-square-foot Daimler Chrysler facility, and a 31,886-square-foot hotel (City of Lathrop 2002).

Field Storage Corporation

Field Storage Corporation has been completed. It consists of an 82,000-square-foot mini-storage facility with 1,025 square feet of office space on the east side of Harlan Road, south of J Street. The adjacent parcel to the north contains a 3,024-square-foot car wash (City of Lathrop 2002).

Lathrop Industrial Park

Lathrop Industrial Park was completed to contain four industrial warehouses totaling 961,740 square feet of warehouse space and offices. The project is at 2725 Yosemite Avenue in East Lathrop.

Panattoni Distribution Center

This project entails 700,000 square feet of warehouse space at 11190 Harlan Road in East Lathrop.

Mossdale Landing

The site is between 1-5 and the San Joaquin River and south of Lathrop Road. The Mossdale Landing project is a 477-acre residential and mixed-use commercial development consisting of 2,600 dwelling units (of which approximately 1,500 single-family units have been constructed to date) and approximately 100 acres of commercial development. Mossdale Landing includes

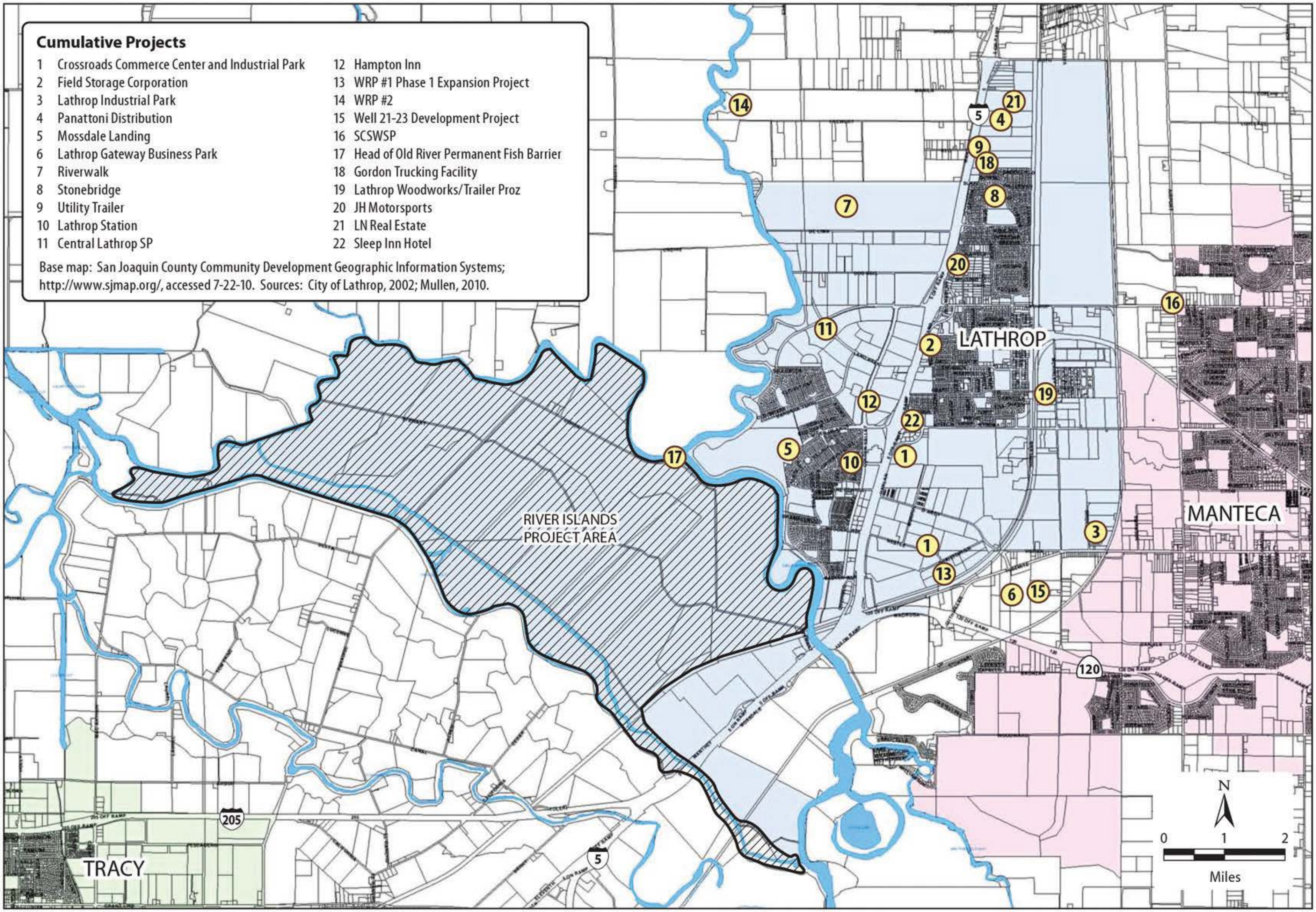

Figure 21-1
Cumulative Projects in the Vicinity of River Islands at Lathrop

segments of North River Islands Parkway and Golden Valley Parkway, which would also serve River Islands at Lathrop. The project is in the area identified as Mossdale Village in the WLSP and is consistent with that plan (Mullen pers. comm.).

Lathrop Gateway Business Park

The project consists of a request for City approval of the Lathrop Gateway Business Park Specific Plan, associated applications, and the annexation of the 384-acre specific plan area into the City. The Land Use Plan proposes approximately 57 acres of commercial office uses, 168 acres of limited industrial uses, 83 acres of service commercial uses, and 77 acres in roads and public facility sites. The site is south of the existing Lathrop city limits—south of Vierra Road and Yosemite Avenue, between two UPRR tracks that pass through southern Lathrop, east of 1-5, and north of SR 120. The Draft EIR 45-day review period ended July 26, 2010 (Mullen pers. comm.).

RiverWalk

The project is located west of I-5, east of the San Joaquin River, and north of De Lima Road. The RiverWalk Specific Plan consisted of a subdivision proposed on a 523-acre site to include approximately 1,800 single-family homes and various supporting facilities. Although the application for RiverWalk has been withdrawn by the applicant, it is included here as a likely future development scenario for the site because it was proposed at the time the notice of preparation (NOP) for River Islands at Lathrop was released, and there is continued interest in the site from the development community. Other elements of the RiverWalk project include an elementary school, two neighborhood parks, a community park, an open space corridor and detention basin, a landscaped pedestrian bicycle corridor, a portion of Golden Valley Parkway, and a location for WRP No. 2 as described in the *Water, Wastewater, and Recycled Water Master Plan* (Master Plan) (City of Lathrop 2001).

Stonebridge

On Harlan Road north of Warren Avenue in East Lathrop, Stonebridge is an approved 211-acre, 885-unit single-family residential subdivision that includes a 7.6-acre park facility and an elementary school (City of Lathrop 2002).

Utility Trailer Sales

Utility Trailer Sales is located at 12608 Harlan Road in East Lathrop and sells new and used truck trailers. The facility encompasses 54,056 square feet of sales area with a shop and office, and 19,572 square feet of parts storage area. This project employs 150 persons (75 per shift) (City of Lathrop 2002; Mullen pers. comm.).

Lathrop Station

This proposed residential/commercial mixed-use development is in the Mossdale Village area, west of the proposed Golden Valley Parkway alignment and south of Louise Avenue. A UDC and two Vesting Tentative Maps have been filed for approximately 147 acres. The proposal includes 20 acres of Freeway Commercial, 16.5 acres of Service Commercial, 13.5 acres of Village Commercial, 34.3 acres of Low-Density Residential, 15.5 acres of Medium-Density Residential, and 4 acres of Neighborhood Park. A total of 440 dwelling units is proposed. The City is currently processing entitlements for this project (City of Lathrop 2002).

Central Lathrop Specific Plan

The Central Lathrop Specific Plan area covers 1,044 acres west of 1-5, east of the San Joaquin River, and north of Louise Avenue. Proposed land uses include residential, commercial, office, community and neighborhood parks, cultural center, elementary school, and high school (City of Lathrop 2002). The project would include 6,800 housing units, 1,040 single-family lots, and a maximum 5 million square feet of office and commercial development on 270 acres (Mullen 2010).

Hampton Inn

This approved development consists of a three-story, 45,000-square-foot motel on 1.9 acres east of 1-5 and north of Louise Avenue (City of Lathrop 2002; Mullen pers. comm.).

Wastewater Recycling Plant No. 1 Phase 1 Expansion Project

The existing WRP No. 1 on Howland Road near Yosemite Avenue was expanded to a design capacity of 6.1 mgd. The plant was upgraded from secondary to tertiary treatment and will serve future growth in the City (Mullen pers. comm.).

Wastewater Recycling Plant No. 2

Under the *City of Lathrop Water, Wastewater, and Recycled Water Master Plan* (Master Plan), a new treatment plant would be developed in the northeastern portion of Mossdale Village with a capacity of up to 3.2 mgd. This plant would serve RiverWalk and other development in the Central Lathrop Specific Plan area (City of Lathrop 2002).

Wells 21–23 Development Project

The City is proposing to construct three water wells (wells 21, 22, and 23) and approximately 3,000 feet of water transmission pipeline to convey groundwater from the wells to the City's water distribution system. The project also includes proposals to construct associated well and pump houses, telemetry facilities, and pipelines. Each well would produce between 1,200 and 1,500 gpm from the Sacramento–San Joaquin River Delta groundwater subbasin. The project is consistent with the facilities planned for in the Master Plan and would help meet the City's water demand from future planned growth as projected in the Master Plan. Consistent with the Master Plan, this project would provide water to future planned growth until such time as surface water deliveries to the City commence associated with SSJID’s SCSWSP. Once SCSWSP water deliveries commence, the wells would be used to supplement City water supplies during peak demand and to provide required fire flow (City of Lathrop 2002).

South San Joaquin Irrigation District’s South County Surface Water Supply Project

The SCSWSP is a joint project of SSJID and the Cities of Manteca, Escalon, Lathrop, and Tracy to supply treated potable water to these participating cities. The primary objective of the SCSWSP is to provide a safe, reliable drinking water supply to these south County cities. The project involves construction and operation of a new water treatment plant at Woodward Reservoir in Stanislaus County, and a 36.5-mile, 20- to 54-inch water transmission pipeline with pumping facilities to deliver treated water to turnouts for each city. SSJID’s source of water is the Stanislaus River, based on the agency’s rights for direct diversion and diversion to storage. SSJID proposes to develop the project in two phases: Phase I (2003–2011) would supply approximately 31,000 AFY; Phase II

(2011–2025) would increase the total supply to approximately 44,000 AFY. The City's requested capacity allocation from the SCSWSP is 14.6 MGD (maximum day demand) under Phase I and an additional 6.5 MGD under Phase II, for a total capacity allocation of 21.1 MGD supplied by the SCSWSP to the City. Two points of connection (POCs) to the City's municipal water system are proposed as part of the SCSWSP: one west of the UPRR tracks between the San Joaquin River and Paradise Cut, and the other along Lathrop Road east of the UPRR tracks. A third potential POC is proposed along Yosemite Avenue east of the UPRR tracks. The SCSWSP has been approved and adopted, and the EIR for the project has been certified (City of Lathrop 2002).

Gordon Trucking Facility

The Gordon Trucking Facility site is at 12550 and 12590 Harlan Road. The facility would consist of an approximately 21,243-square-foot office and maintenance building, a 5,145-square-foot truck wash building, and a 10,000-square-foot fuel station canopy on approximately 15.8 acres (Mullen 2010).

Lathrop Woodworks/Trailer Proz

The project would construct a 27,500-square-foot metal industrial building on a 4.87-acre vacant lot at 16091 McKinley Avenue. The building would include a 12,500-square-foot office and shop building for Trailer Proz semi-trailer leasing, sales, and maintenance and repair operations and a 15,000-square-foot warehouse and storage building for Lathrop Woodworks. The site would include 25 vehicle parking spaces and 26 trailer storage spaces (Mullen pers. comm.).

JH Motorsports

The project would convert an existing non-conforming residential property to a commercial use in an approximately 1,800-square-foot building at 14150 Harlan Road. The building would provide automobile service and repair and would sell used Audi automobile parts (Mullen pers. comm.).

LN Real Estate

The project site at 11800 Harlan Road would encompass 749,100 square feet of industrial space (Mullen pers. comm.).

Sleep Inn Hotel

The project is a three-story, 76-room hotel at 161 Louise Avenue between Hampton Inn and Louise Plaza (Mullen pers. comm.).

Table 21-1. Cumulative Projects in the Vicinity of River Islands at Lathrop

					Proposed (P) / Existing (E)		
ID[a]	Project Name	Status	Acreage	Undeveloped Land Use[b]	Residences	Industrial (sq ft)	Commercial/Office (sq ft)[c]
1	Crossroads Commerce Center and Industrial Park	Approved/partially developed	498	Ag/open space		2,323,137 (E)	178,000 (E)
2	Field Storage Corporation	Developed	5	Vacant		85,000 (E)	
3	Lathrop Industrial Park	Developed	59	Vacant		961,740 (E)	
4	Panattoni Distribution	Developed	33	Vacant		700,000 (E)	
5	Mossdale Landing[c]	Proposed	477	Ag/open space	1,100 (P); 1,500 (E)		4,350 (P)
6	Lathrop Gateway Business Park	Proposed	384	Ag/open space		7,318 (P)	6,098 (P)
7	Riverwalk[d]	Proposed (application withdrawn)	523	Ag/open space	1,800 (P)		
8	Stonebridge	Approved/partially developed	260	Ag/open space	~ 620 (E); 265 (P)		
9	Utility Trailer	Developed	24	Vacant		75,000 (E)	
10	Lathrop Station[d]	Proposed	147	Ag/open space	440 (P)		435,000 (P)[e]
11	Central Lathrop SP	Proposed	1,044	Ag/open space	6,800 (P)		11,761 (P)
12	Hampton Inn	Developed	2	Vacant			45,000 (E)
13	WRP No.1 Phase I Expansion Project	Developed	16	Vacant			
14	WRP No. 2	Proposed	16	Ag/open space			
15	Wells 21–23 development project	Proposed	5	Ag/open space			
16	SCSWSP	Approved	N/A	N/A			
17	Head of Old River permanent fish barrier	Approved/partially developed	N/A	N/A			
18	Gordon Trucking Facility	Proposed	688	Vacant		15,145 (P)	21,243 (P)
19	Lathrop Woodworks/Trailer Proz	Proposed	5	Vacant		15,000 (P)	12,500 (P)
20	JH Motorsports	Proposed				1,800 (P)	

					Proposed (P) / Existing (E)		
ID[a]	Project Name	Status	Acreage	Undeveloped Land Use[b]	Residences	Industrial (sq ft)	Commercial/Office (sq ft)[c]
21	LN Real Estate	Proposed	17	Vacant		749,100 (P)	
22	Sleep Inn Hotel	Proposed	N/A	Vacant			N/A
–	River Islands[d]	Proposed	4,905	Ag/open space	11,000 (P)		4,753,000 (P)
	Totals		9,108	8,259 ac Ag/open space 849 ac vacant	21,405 (P) 2,120 (E)	788,363 (P) 4,144,877 (E)	5,243,952 (P) 196-room hotel (P) 223,000 (E)

Source: Mullen pers. comm.

[a] Corresponds to identification numbers in Figure 21-1.

[b] This represents current land uses if undeveloped or prior (undeveloped) land uses if the site is partially/fully developed.

[c] Does not include school or park buildings.

[d] Projects within the approved West Lathrop Specific Plan area.

[e] Based on an FAR of 0.20.

21.1.1.2 Flood Risk Management Projects

Lower San Joaquin River Feasibility Study

The Corps's Lower San Joaquin River Feasibility Study is a cooperative effort between the Corps, the CVFPB, and the San Joaquin Area Flood Control Agency. The CVFPB is supported by DWR. The Lower San Joaquin River Feasibility Study is a multi-year, $10 million study that will extend from the southern part of San Joaquin County along the San Joaquin River downstream and through Stockton, including the Lodi wastewater treatment plant. In addition, the study addresses the watersheds east of Stockton and nearly 140 miles of levees. The results of this study will help determine needed measures for future flood risk reduction systems in an effort to reach or exceed the future 0.5% (200-year) level of performance.

River Islands at Lathrop is at the southern end of this study area. The feasibility study may evaluate changes in Paradise Weir to reduce the flows continuing down the San Joaquin River to the Lathrop and Stockton urban levees. Because future projects to alter the existing San Joaquin River flood risk management system would likely be limited to modifications in downstream urban levees or changes in Paradise Weir to reduce flood flows along these downstream urban levees, there are no expected cumulative effects on flood risk management from these possible future projects. This feasibility study does not yet have any recommended projects, so it is not considered a cumulative action at this time.

Upper San Joaquin Basin Storage Investigations

The Upper San Joaquin River Basin Storage Investigation is a feasibility study by the U.S. Bureau of Reclamation (Reclamation) and DWR. The purpose of the investigation was to determine the benefits of potential projects in the upper San Joaquin River watershed to expand water storage capacity, improving water supply reliability for agricultural, urban, and environmental uses. Opportunities have been identified during the investigation relative to flood risk management, hydropower, recreation, and water quality.

Because the upper San Joaquin River is already highly developed with several reservoirs for seasonal storage for hydropower and winter flood risk management storage space, the opportunity for incremental flood risk management benefits downstream of Friant Dam are limited. Because the potential projects would be upstream of Friant Dam, and the existing San Joaquin River flood risk management bypasses (i.e., Chowchilla, Eastside, and Mariposa) would not be altered, there would not be any cumulative effects on flood risk management from this future project. This feasibility study does not yet include any recommended projects, so it is not considered a cumulative action at this time.

South Delta Flood Bypass Investigations

A coalition of conservation and fishing groups announced the settlement of their lawsuit against the CVFPB and River Islands at Lathrop, LLC on April 4, 2008 (see Chapter 1, *Introduction*, for a more detailed discussion). The coalition sued the Reclamation Board in 2006, claiming the board had issued flood protection permits to River Islands without requiring sufficient protections or analysis of impacts on neighboring levees. The parties to the settlement agreed to work jointly on a south Delta flood bypass and habitat restoration area in the vicinity of Stewart Tract and Paradise Cut. The parties agree that prompt action is needed to take advantage of this opportunity. If action is delayed, ongoing urbanization in the Delta could permanently foreclose this opportunity to provide effective, affordable, environmentally beneficial flood risk reduction for Delta communities. Therefore, under the settlement agreement, River Islands has agreed to fund additional hydraulic modeling to refine the bypass route and to provide funds for potential land acquisition. The parties will work with the Corps, DWR, and local agencies to further evaluate and implement a regional solution. This project has been included as Alternative 4 in this EIS.

Flood Risk Management at the San Joaquin River National Wildlife Refuge

USFWS has conducted hydraulic modeling of floodplain habitat management at the San Joaquin National Wildlife Refuge (SJNWR) to evaluate the frequency and duration of floodplain inundation and to predict potential benefits for juvenile Chinook rearing. SJRNWR is working with the Corps to consider breaching existing San Joaquin River levees to flood up to 3,100 acres of newly acquired refuge land to protect and restore wetland and riparian habitat. The focus of the study has been to identify potential levee breech sites and evaluate potential flooding risk to adjacent landowners. The hydraulic analysis indicated that this flooding would provide good habitat benefits during moderate flood events, but would not likely reduce the peak flood flows.

Central Valley Flood Protection Plan

Legislation passed in 2007 directed DWR to develop the Central Valley Flood Protection Plan (CVFPP) as a sustainable, integrated flood management plan that reflects a system-wide approach for reducing flood risks for areas in the Central Valley.

The CVFPP, adopted by the CVFPB in 2012, describes the existing flood risk in the Central Valley and recommends actions to reduce the probability and consequences of flooding. Whatever actual flood risk reduction measures that may come from this planning process, it is assumed that these measures will have no adverse cumulative effects on flood risk reduction in the lower San Joaquin River basin.

21.1.1.3 Other Regional Projects

Head of Old River Permanent Fish Barrier

As part of the CALFED South Delta Improvements Program, a permanent operable barrier is proposed to replace the temporary rock barrier currently installed at the head of Old River. The existing temporary barrier is installed and removed twice each year—once in the spring and once in the fall—to improve water quality conditions and to prevent migrating salmon from entering Old River. The proposed permanent barrier would serve similar purposes but would be in place all year, with gates to control water and fish passage. Various design alternatives are being considered for the permanent barrier, including the use of locks to allow continued boat passage. DWR is leading this project effort in cooperation with several other public agencies (City of Lathrop 2002).

San Joaquin River Restoration Project

The San Joaquin River Restoration Project (SJRRP) is a direct result of a Stipulation of Settlement (Settlement) reached in September 2006 after more than 18 years of litigation of the lawsuit challenging the renewal of a long-term water service contract between the United States and CVP Friant Division contractors. The parties to the Settlement include the U.S. Departments of the Interior and Commerce, NRDC, and the Friant Water Users Authority. The Settlement received federal court approval in October 2006. The San Joaquin River Restoration Settlement Act, included in the Omnibus Public Land Management Act of 2009, was signed by the President on March 30, 2009, and became Public Law 111-11. The Act authorizes and directs the Secretary of the Interior to fully implement the Settlement. The Settlement is based on two goals: to restore and maintain fish populations in "good condition" in the mainstem San Joaquin River below Friant Dam to the confluence of the Merced River, including naturally reproducing and self-sustaining populations of salmon and other fish; and to reduce or avoid adverse water supply impacts on all of the Friant Division long-term contractors that may result from the interim flows and restoration flows provided for in the Settlement.

South Delta Improvements Program

The South Delta Improvements Program is divided into Stages 1 and 2. Stage 1 includes the construction and operation of permanent operable gates (to replace temporary barriers), dredging in portions of the south Delta, and extension of some agricultural diversion structures by 2012. The head of Old River gate would be operated between April 15 and May 15 and in the fall. The remaining three agricultural gates would be operated April 15 through the agricultural season. The gates would maintain south Delta water levels above 0.0 msl for channels upstream of the operable gates. Stage 2 involves increasing the permitting diversion amount at Clifton Court Forebay to 8,500 cfs.

The entirety of the South Delta Improvements Program was evaluated in an EIS/EIR, finalized in 2006. DWR and Reclamation are currently preparing a supplemental document for Stage 1. Neither agency intends to pursue Stage 2 in the near future, but it is included in the cumulative analysis because it could be foreseeable if Delta conditions improve and DWR and/or Reclamation decide to pursue it.

CALFED Ecosystem Restoration Program

The goals of the CALFED Ecosystem Restoration Program are listed below.

- Recover 19 at-risk native species and contribute to the recovery of 25 additional species.
- Rehabilitate natural processes related to hydrology, stream channels, sediment, floodplains, and ecosystem water quality.
- Maintain and enhance fish populations critical to commercial, sport, and recreational fisheries.
- Protect and restore functional habitats, including aquatic, upland, and riparian habitats, to allow species to thrive.
- Reduce the negative effects of invasive species and prevent additional introductions that compete with and destroy native species.
- Improve and maintain water and sediment quality to better support ecosystem health and allow species to flourish.

The Ecosystem Restoration Program, which is divided into the Sacramento, San Joaquin, and Delta and Eastside Tributary regions, includes the following kinds of actions.

- Develop and implement habitat management and restoration actions, including restoration of river corridors and floodplains, reconstruction of channel-floodplain interactions, and restoration of Delta aquatic habitats.

- Restore habitat that would specifically benefit one or more at-risk species.
- Implement fish passage programs and conduct fish passage studies.
- Continue major fish screen projects and conduct studies to improve knowledge of their effects.
- Restore geomorphic processes in stream and riparian corridors.
- Implement actions to improve understanding of at-risk species.
- Develop understanding and technologies to reduce the effects of irrigation drainage on the San Joaquin River and reduce transport of contaminant (selenium) loads carried by the river to the Delta and the Bay.
- Implement actions to prevent, control, and reduce effects from nonnative invasive species.

Ecosystem Restoration Program actions contribute to cumulative benefits on fish and wildlife species, habitats, and ecological processes.

Bay Delta Conservation Plan

The Bay Delta Conservation Plan provides for the recovery of endangered and sensitive species and their habitats in the Delta in a way that also provides for the protection and restoration of water supplies. The plan will identify and implement conservation strategies to improve the overall ecological health of the Delta; identify and implement more ecologically friendly ways to move fresh water through or around the Delta; address toxic pollutants, invasive species, and impairments to water quality; and provide a framework and funding to implement the plan over time.

Alternatives being evaluated include conveyance options using the through-Delta, peripheral aqueduct. The restoration options include various degrees of restoration in the Delta and Suisun Marsh. The final plan and the EIS/EIR are expected to be complete in 2014. The Bay Delta Conservation Plan could contribute to beneficial cumulative impacts by increasing suitable habitat for fish and wildlife species.

21.1.2 Regional Planning Environment

Relevant land use plans are included to assess past, present, or reasonably foreseeable development actions in the City and County that could affect the same resources as the proposed action, or provide for the restoration, preservation, or enhancement of those resources. Where applicable, the following regional planning documents were also considered.

- *San Joaquin County General Plan* (San Joaquin County 1992).
- *San Joaquin County Multi-Species Habitat and Open Space Plan* (San Joaquin County 2000).
- *Comprehensive General Plan for the City of Lathrop, California* (City of Lathrop 2004).

21.2 Cumulative Effects Analysis

This section describes the potential contribution to cumulative effects for each resource area.

21.2.1 Terrestrial Biological Resources

Cumulative projects evaluated in combination with the proposed action could result in significant effects on special-status plant and wildlife species (listed in Table 3-5, Chapter 3, *Terrestrial Biological Resources*). Cumulative projects could also affect waters of the United States, riparian habitat, and wildlife corridors. Potential effects on special-status species include direct removal or mortality of species through construction activities, loss of foraging habitat related to conversion of agricultural land, and modification or removal of riparian areas along the San Joaquin and Old Rivers.

The primary cumulative effect on vegetation and wildlife is related to removal of habitat associated with riparian areas adjacent to rivers and sloughs and loss of agricultural land used by raptors as foraging habitat. Direct loss of special-status wildlife species associated with cumulative projects would require avoidance of species habitat where possible, and mitigating losses through coordination with resource agencies. Because special-status species are protected under applicable state and federal laws, other cumulative projects would be required to minimize take and to compensate for loss of species and their habitats in a manner similar to that of the proposed action. The cumulative projects would also be required to mitigate the loss of riparian habitat on a no-net-loss basis in accordance with regulatory agencies' policies. Because of the substantial potential effect on wildlife and wildlife habitat associated with the cumulative projects, these effects are considered to be significant, and the relevant project proponents would be required to implement mitigation measures to avoid, minimize, and compensate for site-specific impacts.

The SJMSCP would permit conversion of 109,302 acres of open space in San Joaquin County over the permit term (i.e., 2001–2051). From 2001 through 2011, nearly 13,800 acres had been granted coverage under the plan (SJCOG 2012:7). The SJMSCP provides measures to offset not only incidental take pursuant to ESA and CESA, but also provides mitigation to offset cumulative impacts on nearly 100 species in 52 vegetation communities and to offset other impacts associated with other open space conversions in San Joaquin County (San Joaquin County 2000). Projects affecting any of these resources are required to include mitigation measures to avoid or lessen these effects and provide compensation through payment of fees (or in-lieu land dedication) for conversion of open space lands. Fees are to be used to fund the purchase of conservation easements on agricultural lands and the preservation and creation of natural habitats to be managed in perpetuity through the establishment of habitat preserves. Participation in the SJMSCP is voluntary. If a project applicant decides to participate in the SJMSCP, specific avoidance, minimization, and compensation requirements apply to the project; the project applicant in turn receives the benefit of more efficient permitting. Because the SJMSCP provides a streamlined mechanism for mitigating impacts on resources covered under the plan, it is assumed that a majority of qualifying projects within the County would use the SJMSCP for mitigation. Accordingly, cumulative impacts on terrestrial biological resources covered under the SJMSCP are considered less than significant.

21.2.2 Fish Resources

Cumulative projects (such as flood risk reduction or water supply projects) evaluated in combination with the proposed action could result in significant effects on fish, including special-status species, resulting from entrainment during dredging; injury or mortality to special-status fish species due to pile driving; disturbance and possible mortality of fish associated with boat and marina operations; modification of stream morphology and alteration of habitat associated with overwater structures; and loss of SRA cover resulting from construction. The majority of these effects would result from proposed construction activities (e.g., dredging, work on the waterside faces of levees) near the San Joaquin River, Old River, and Paradise Cut. Potential cumulative effects associated with flood risk reduction or water supply projects that involve alterations of conditions in the San Joaquin River or Old River are considered significant. Implementation of mitigation measures similar to those described for the proposed action (Mitigation Measures FISH-1 through FISH-8, dredging and pile driving during authorized environmental work windows [i.e., August 1–September 15], enforcement of a no-wake zone, and other environmental commitments) would be implemented to reduce significant effects on special-status fish species in the San Joaquin River system.

The proposed action in combination with other cumulative projects would result in beneficial water quality effects on fish in Paradise Cut, Old River, and the San Joaquin River related to changes in project operations from agricultural water diversion and discharges to use of a potable water supply in the proposed action area. No cumulative effects on fish associated with long-term changes in water quality are anticipated.

Other levee modification projects planned in the region would entail similar construction activities that could result in significant effects on fish resources in the San Joaquin River and Old River. Projects could also result in the removal of riparian and aquatic habitat in light of current Corps levee vegetation guidelines. Any future action would be required to undergo similar regulatory review and/or permitting in accordance with current CDFW, RWQCB, Corps, and NMFS requirements to protect sensitive fish species. Furthermore, cumulative projects would also require CEQA review, where construction and operational BMPs would likely be implemented to avoid or minimize effects on sensitive fish species. However, activities could still result in the take of listed fish species, releases of sediment or contaminants into waterways, and/or removal of riparian and aquatic habitat. Impacts associated with these activities are anticipated to be less than significant on a project-by-project basis given regulatory compliance and environmental review; however, the combined effect of increased sedimentation and turbidity and the release of contaminants would be considered a significant cumulative effect on fish resources. Further mitigation would need to be developed in conjunction with the related projects or through ongoing large-scale regional restoration efforts.

Cumulative projects in the City could also include the disposal of a portion of their treated wastewater through discharge to the San Joaquin River. As evaluated in the Master Plan EIR, the discharge of tertiary treated wastewater to the river by cumulative development in Lathrop could add a small increment (calculable but likely not measurable) of biochemical oxygen demand (BOD) and other pollutants of concern to the San Joaquin River and consequently the Stockton Ship Channel (where low dissolved oxygen levels occur) (City of Lathrop 2001, 2002). The San Joaquin River Dissolved Oxygen TMDL received final approval by EPA in February 2007 to reduce the amount of oxygen-demanding substances and their precursors in the San Joaquin River (California Regional Water Quality Control Board 2010). If any of the treated wastewater generated by the proposed action or cumulative projects is disposed of in the river, it could contribute to significant cumulative effects.

21.2.3 Geology, Soils, and Mineral Resources

The proposed action, in combination with other local and regional projects, has the potential for significant effects on structures and personal safety as a result of seismic ground shaking, liquefaction, and related types of ground failure (e.g., construction on expansive and/or corrosive soils, failure of cut and fill slopes). Other development projects or earth-moving activities in the City and surrounding region could change the stability of soils or expose structures to ground shaking and liquefaction, exposing additional structures and people to seismic hazards. Projects proposed near the San Joaquin and Old Rivers (e.g., Mossdale Landing) could be exposed to additional risks associated with seismically induced levee failures. However, the degree of damage would be due in part to the type of seismic hazard, type of structure, and the quality of building materials and craftsmanship used in construction. The potential seismic and soil hazards in the City of Lathrop could constitute a significant cumulative effect if projects are not in compliance with provisions of the CBC or do not incorporate recommendations from site-specific geotechnical reports and grading plans prepared for these projects. Although these combined effects could be significant, implementing the mitigation measures identified for the proposed action, including designing facilities to meet minimum safety standards during a seismic event; completion of design-level geotechnical studies assessing the potential for liquefaction, shrink-swell potential, and corrosive soils before a grading permit is issued; and an analysis of final levee designs for stability conditions, would reduce the proposed action's contribution to these cumulative effects, and if implemented for other projects would reduce the potential for a significant effect.

The proposed action would have no effect on mineral resources because the action area is not in a mineral zone containing mineral deposits; accordingly, no cumulative effects on mineral resources are expected.

21.2.4 Water Resources and Flood Risk Management

Because waterways (San Joaquin River, Old River, Paradise Cut) adjacent to the proposed action area are part of the San Joaquin River and are tidal channels in the Delta, local hydrology and water quality conditions are affected by other regional actions. The major cumulative actions pertaining to water resources (e.g., dams and reservoirs, mining operations, logging, urban development, and other flood risk management levees) have occurred in the upstream San Joaquin River basin. Some cumulative actions have occurred in the Delta, such as water supply diversions, agricultural diversions, reclamation and flood risk management levee projects, urban development, and dredging for channelization and maintenance. The water resources cumulative effects assessment focuses on how the proposed action would contribute to the cumulative effects of these actions on hydrology, water quality, and flood risk reduction.

Major cumulative effects on reduced San Joaquin River flows have been caused by the upstream reservoirs and agricultural diversions to the many irrigation districts. However, the proposed action would reduce the existing agricultural diversions and would therefore not contribute to the cumulative water quality effects on the river, but would potentially result in slightly reduced agricultural return flows discharging to the river. Because the proposed action area is surrounded by levees, all stormwater runoff would be naturally contained within the internal lake system and wetlands and would percolate to groundwater or be discharged into Paradise Cut. In addition, because the proposed action's water demand is less than that required for current irrigated agriculture, the over water balance associated with the proposed action is positive compared to existing conditions. Therefore, the proposed action would not contribute to cumulative effects on drainage or runoff to adjacent properties or to any significant cumulative effects on river flow regime.

The proposed action and other urban development projects (e.g., Mossdale Landing, Central Lathrop Specific Plan) would discharge stormwater runoff to the nearby Delta channels and may degrade water quality with sediment and associated contaminants during major storms. Because the stormwater discharges would be somewhat less than the existing agricultural drainage discharges, and because some treatment of the stormwater would occur in the internal lake system and wetlands system through natural filtration of sediment and nutrients, the cumulative effect on water quality is expected to be less than significant. In addition, wastewater would be treated in accordance with Title 22 and Central Valley Water Board standards and is not expected to have a cumulative effect on water quality.

The construction of boat docks for the proposed action could result in hundreds of additional boats in the Delta, contributing to cumulative water quality degradation through potential riverbank erosion, fuel spills, exhaust, and waste discharges. The proposed action, when combined with urban and industrial discharge sources of potential contaminants, may have significant cumulative water quality effects. Mitigation Measure HYD-5 would reduce the proposed action's contribution to these cumulative effects, reducing the potential for a significant cumulative effect.

As described in Chapter 6, *Water Resources and Flood Risk Management*, the Stewart Tract levees are part of the San Joaquin River Flood Control System. There are many miles of upstream levees and flood bypasses that protect agricultural and some urban areas between Friant Dam and Stockton. These were designed and constructed as part of a master plan for flood risk reduction frommoderate (i.e., 2% [50-year]) storms. The modifications to the Stewart Tract levees that are part of the proposed action would not interfere with or reduce the flood risk reduction benefits provided by these upstream levees and bypasses. The South Delta Flood Bypass investigations (listed above) are not completed, but would potentially provide additional cumulative benefits by providing additional floodplain habitat and flood risk reduction for downstream urban levees along the San Joaquin River (Lathrop and Stockton).

21.2.5 Cultural Resources

The cultural resources evaluation for the proposed action found that the action area contains several previously recorded prehistoric (CA-SJO-255 and CA-SJO-280) and historic cultural resource sites (26 historic built environment resources). The entire APE has the potential to contain buried archaeological resources, and ground disturbance could result in inadvertent damage to or destruction of buried archaeological sites or human remains not identified using standard archaeological survey methods. Cultural resources have been identified on other development projects in the vicinity of the proposed action (e.g., Mossdale Landing), and more may be found as surveys are conducted at the locations of cumulative projects. As discussed in Chapter 7, *Cultural Resources*, the proposed action would be carried out in compliance with Section 106 of the NHPA. Similar mitigation measures would be applied to related projects in the vicinity of the proposed action, as appropriate, and compliance with existing state and federal laws would reduce these effects by requiring that cumulative projects not adversely affect cultural resources. Farmsteads and various agriculture-related historic features in the region are relatively common, and continued removal of some of these features would not substantially reduce or eliminate the resource in the region. Therefore, implementation of mitigation measures and compliance with existing regulations would ensure that the proposed action and cumulative projects would not contribute to significant cumulative effects on cultural resources.

21.2.6 Paleontological Resources

Paleontological resources are relatively rare, and cumulative impacts from the loss of these resources in the region increase proportionately as the resource base diminishes. No fossils have been reported in the proposed action area; however, the Pleistocene Modesto Formation, which contains significant paleontological resources (per SVP Conformable Impact Mitigation Guidelines Committee 1995), could be present at certain depths (i.e., 15 feet below ground surface). The Modesto Formation is mapped immediately east of the proposed action area, and paleontologically sensitive vertebrate content could be present near the proposed action area or other areas in the City where development is proposed.

Because the area is underlain by highly sensitive surficial deposits (i.e., Pleistocene Modesto Formation) at certain depths, earth-moving activities (e.g., excavation, grading) associated with cumulative projects could potentially damage or disturb vertebrate and other fossil resources. Similar mitigation measures would be applied to related projects in the vicinity of the proposed action, as appropriate, and compliance with existing state and federal laws (e.g., relevant sections of the California Public Resources Code, the Federal Antiquities Act, as discussed in Chapter 8, *Paleontological Resources*) would reduce these effects. Therefore, implementation of mitigation measures and compliance with existing regulations would ensure that the proposed action and cumulative projects would not contribute to a significant cumulative effect on paleontological resources.

21.2.7 Land Use

The City's General Plan and the WLSP designate land uses and provide zoning classifications to accommodate the development proposed under the River Islands at Lathrop project, including the proposed action. Any indirect changes in land use due to additional growth would be planned for under relevant local jurisdiction planning documents, as described in Chapter 22, *Growth Inducement and Related Effects*. Other development projects in the City and surrounding jurisdictions would be required to undergo a similar environmental review process (either NEPA or CEQA) and land use consistency analysis before project approval; all City projects would be required to undergo evaluation of land use impacts on a project-specific basis, and presumably would be planned for under relevant City and/or County planning documents. Therefore, because the proposed action was found to have no significant land use effects, and given that any future development projects would be required to undergo a similar review process before project approval, the proposed action's contribution to cumulative effects is considered less than significant.

21.2.8 Agricultural Resources

The proposed action would result in an estimated loss of 2,938 acres of Prime Farmland and 204 acres of Farmland of Statewide Importance. This is considered a significant cumulative effect when considered along with past farmland conversions and planned future development proposed in the City of Lathrop, the surrounding cities, and the County as a whole.

In 2010, San Joaquin County was estimated to support 614,994 acres of Important Farmland: 385,337 acres of Prime Farmland, 83,307 acres of Farmland of Statewide Importance, 69,481 acres of Unique Farmland, and 76,869 of Farmland of Local Importance (California Department of Conservation 2012). According to the DOC land conversion tables for San Joaquin County, 696 acres of Important Farmland were converted to other uses between 2008 and 2010. Lands classified as Unique Farmland and Farmland of Local Importance actually increased during this period (likely due more to designation of existing farmland as unique or important than to new farmland being put into production). However, the overall loss of Important Farmland occurred due to conversions of Prime Farmland (11,647 acres) and Farmland of Statewide Importance (2,990 acres). San Joaquin County was one of three counties that converted the largest amount (3,562 acres) from irrigated uses to Other Lands (California Department of Conservation 2011). The County's population is expected to increase, and current projections indicate a total population of 935,709 by 2030 (California Department of Finance 2012).Additional conversions can also be expected from implementation of habitat restoration and water storage projects associated with CALFED, the SJMSCP, and other regional efforts.

The SJMSCP anticipates the conversion of open space and agricultural lands to urban development. River Islands would participate in the SJMSCP by contributing fees, on a per-acre basis, for agricultural lands that are developed (see Mitigation Measure AG-1 in Chapter 10, *Agricultural Resources*, for a discussion of River Islands' participation in the County easement program). The SJCOG would use these fees, in part, to purchase conservation easements on agricultural lands, providing greater protection to these farmlands in the County. However, participation in the SJMSCP cannot fully mitigate the project's cumulative contribution to the loss of agricultural land in the region; therefore, the effect would be significant.

21.2.9 Recreation

Planned residential development in the City and associated increases in population would result in a cumulative increase in the demand for parkland. The park system proposed under all evaluated alternatives would substantially exceed the standards established by the City's General Plan and would be accessible to residents of River Islands at Lathrop as well as those of the broader Lathrop community. Cumulative projects such as Stonebridge, Lathrop Station, Mossdale Landing, and Central Lathrop Specific Plan also include recreational amenities, which in combination with the proposed action would provide a net surplus of park facilities and result in a beneficial cumulative effect with regard to parkland.

The proposed action would include a network of trails and landscaped open space corridors that could be connected to a regional network of similar facilities via pedestrian and bicycle access across project bridges and connections to open space corridors along the San Joaquin River. Future development in and outside the City may extend trails and open space corridors beyond Stewart Tract and increase the regional recreation opportunities. Because the proposed action in combination with other cumulative projects facilitates the development of a regional network of trails and open space corridors, a beneficial cumulative effect with regard to regional recreational opportunities would result.

Currently, speed restrictions already exist in portions of the San Joaquin River in the vicinity of the proposed action (e.g., adjacent to Mossdale Marina, Dos Reis Community Park, and Mossdale Crossing County Park). The existing temporary fish barrier on Old River requires boats to stop and wait for boat portage during 2–4 months of the year. The proposed permanent fish barrier would extend the speed restrictions throughout the year. Construction of docks and waterfront development associated with cumulative projects would also impose speed restrictions on the San Joaquin and Old River segments, limiting opportunities for waterskiing, wake boarding, and similar water-based recreation. Because the proposed action in combination with other cumulative projects would limit speed restrictions in a relatively small area of the Delta, and because of the increased water-based recreational opportunities available under the proposed action, the proposed action would have a limited contribution to cumulative effects related to loss of non–speed restricted boating opportunities, and is considered less than significant.

Development of cumulative projects in the region would increase the demand for boating opportunities (launches, docks, and other water recreation facilities that provide access to the local waterways). A significant cumulative effect would result if the demand from planned projects would exceed the carrying capacity of Delta waterways (i.e., if access were limited by boat launch facilities) or if adequate access to the waterways is not provided (City of Lathrop 2002). The addition of boats in the Delta system associated with the proposed action and other planned projects in the City and County is not expected to degrade the recreational experience for existing boaters in the Delta; the proposed action includes a substantial number of these facilities and would increase public access to the waterways in the Delta. Consequently, no significant cumulative effects would result.

21.2.10 Transportation and Circulation

Because the traffic analysis by its nature is a cumulative analysis—i.e., the baseline and the proposed action scenarios consider expected background development growth as well as expected roadway improvements—the analysis in Chapter 12, *Transportation and Circulation*, provides a comprehensive assessment of cumulative effects. To summarize, the proposed action would result in significant effects on intersection, roadway, freeway mainline, and freeway ramp LOS from operational traffic. While many of these impacts would be ameliorated by proposed mitigation measures, and although many roadway segments and intersections would not be subject to adverse effects, there is a likelihood for significant cumulative effects to result from implementation of the proposed action. The reader is directed to Chapter 12 for a full analysis of these effects.

21.2.11 Noise

The proposed action, in combination with other local projects, could have significant effects from short-term construction-generated noise on sensitive receptors during evening and nighttime hours.

Noise is a localized occurrence that attenuates with distance. Therefore, only future development projects in the direct vicinity of the proposed action area and occurring at the same time as the proposed action could result in significant cumulative effects associated with construction noise. Several related projects are planned in the vicinity of the proposed action, including Mossdale Landing and Lathrop Station. Each of these projects would generate types of noise similar to that of the proposed action; like the proposed action, each would have the potential to affect nearby residences and other sensitive receptors.

The City's noise ordinance prohibits, unless a permit has been obtained, construction work in a residential zone, or within 500 feet of a residential zone, between 10 p.m. and 7 a.m. on Sunday through Thursday and between 11 p.m. and 9 a.m. on Friday, Saturday, and legal holidays. For the proposed action it was determined that adherence to these noise regulations alone would not be sufficient to avoid significant construction noise effects. It is similarly anticipated that these regulations alone would not avoid significant construction noise effects associated with the related projects. Therefore, significant cumulative noise effects associated with construction activities could occur.

Operational effects could result from noise generated by stationary sources (e.g., central air conditioning units; commercial equipment such as forklifts, hydraulic lifts, recreational facilities, and lawnmowers); commercial and public land uses; schools and neighborhood parks; golfing; and maintenance equipment. Significant effects could also result from compatibility of the proposed land uses with projected onsite noise levels. Stationary noise associated with the proposed action and related projects could potentially result in exceedance of the City's noise regulations at sensitive receptors. While the noise from any stationary noise sources associated with cumulative projects could be controlled at the source (using such measures as noise walls, enclosures, and site planning), there is no guarantee that all the related projects would include such noise controls as part of their proposals. Hence, significant cumulative noise effects associated with stationary noise sources could occur.

While construction and stationary source noise can be controlled onsite at the point of origin, traffic, boating, railroad, and agricultural noise may extend beyond a project site along existing and proposed offsite roadways, resulting in significant noise effects on sensitive uses in the vicinity of these sources. The proposed action alone would not contribute to a perceptible increase in noise levels that would exceed the City's land use compatibility standards; however, the combined cumulative increase in traffic on I-5, I-205, and the I-5/I-205/SR-120 interchange anticipated for 2025 (resulting from the related projects and regional growth as well as other development projects in the region) could result in significant effects on a substantial number of additional existing and proposed sensitive receptors. This is considered a significant cumulative noise effect, and because the proposed action would contribute traffic to the local roadway system, it would contribute to this cumulative effect. Construction of sound walls and other noise-attenuating features (e.g., berms, dualpane windows) throughout the region would require a regional program and may not be feasible to implement. Because it is considered infeasible to sufficiently reduce noise at every existing and proposed sensitive receptor that would be affected, this cumulative noise effect is considered significant.

21.2.12 Air Quality

The cumulative projects in the City of Lathrop listed above and in Table 21-1 would result in construction of 14,689 residential dwelling units in addition to the 6,716 units analyzed as part of this EIS. Completion of these projects would also result in roughly 3.2 million square feet of commercial space; 2 million square feet of commercial space would be constructed as part of the proposed action, the effects of which are analyzed in this EIS.

Construction of River Islands at Lathrop in combination with other local and regional cumulative projects (e.g., Mossdale Landing, Lathrop Gateway Business Park) would generate ozone precursor emissions (i.e., ROGs and NO_X), CO, and particulate matter emissions from sources such as mobile and stationary construction equipment exhaust, employee vehicle exhaust, dust from clearing the land, exposed soil eroded by wind, and ROGs from architectural coatings and asphalt paving. ROG emissions could also occur during each "finishing" phase of construction activity, during asphalt paving, and during the application of architectural coatings (i.e., paints). Fugitive PM10 emissions could occur during periods of site grading and excavation activities.

Operation of River Islands at Lathrop in combination with other local and regional cumulative projects would generate on-road vehicle travel and off-road boating operation, which would result in mobile source emissions that include ozone precursor pollutants (i.e., ROGs and NO_X), CO, PM10, and PM2.5. In addition, emissions would result from area sources such as onsite landscaping equipment emissions; natural gas combustion (for cooking and heating); fireplace use; operation of miscellaneous sources for the golf courses; lake/levee maintenance; and use of consumer products and lawn and garden equipment.

Ambient air quality is cumulative by nature and the SJVAB has some of the worst air quality in the nation—the combined result of meteorological conditions and emissions-producing activities throughout the region. The County is federally classified as an extreme nonattainment area for the 8-hour O_3 standard, a nonattainment area for the PM2.5 standard, a serious maintenance area for the PM10 standard, and a moderate maintenance area for the CO standard (urbanized areas are classified as maintenance, while the remainder of the County is classified as unclassified/ attainment). Due to these nonattainment classifications, SJVAPCD has numerous rules and regulations in place designed to limit emissions and help the region reach the air quality goals set forth in the SIP. Cumulative projects listed in Table 21-1 would be required to follow SJVAPCD rules and incorporate additional mitigation as part of the CEQA process, potentially reducing emissions to an acceptable level on a per-project basis. CEQA analysis performed for River Islands at Lathrop in 2003 assumed that all cumulative projects would be able to successfully mitigate below the threshold using SJVAPCD recommended measures, and thus determined no significant cumulative effects. However, because of the seriousness of air quality problems in the SJVAB, the possibility that not all projects would be able to mitigate emissions below the threshold, and because emissions that result from the proposed action exceed both federal and SJVAPCD thresholds, the cumulative contribution of the proposed action to cumulative air quality effects is considered significant.

21.2.13 Climate Change

Climate change is an inherently cumulative issue—that is, based on current scientific understanding, global climate is already changing as a result of many human activities over a long period of time, and no single proposed future action is likely to independently create or arrest climate change. The proposed action combined with other cumulative development projects would result in a cumulative increase in GHG emissions. Even with emission reduction mitigation that would be incorporated into the proposed action and other projects, this cumulative effect is considered significant.

21.2.14 Public Health and Environmental Hazards

The proposed action, in combination with other local and regional projects, could result in significant effects related to an accidental release of hazardous materials and public health risks associated with exposure to common chemical constituents (e.g., petroleum hydrocarbons, fertilizers, herbicides, pesticides) from past agricultural practices.

Cumulative projects in the City and County would involve the transport, handling, and storage of hazardous materials (e.g., fuels, soils, grease, fertilizers, petroleum hydrocarbons) to varying degrees during construction and operation. The transport, handling, and storage of such materials is regulated by USDOT, SJCEHD, the Central Valley Water Board and—under the Business Plan Act—the City of Lathrop. It is assumed that other development projects would implement and be required to comply with various federal, state, and local hazardous materials regulations. Although some of the projects listed in Table 21-1 (e.g., WRPs No. 1 and 2 and the Crossroads Industrial Park) would include industrial components that could result in the use and storage of larger quantities of hazardous materials, these larger users are subject to more stringent regulation and monitoring. Because these laws and regulations apply to the proposed action as well as to cumulative projects, no significant cumulative effects would result.

Furthermore, the proposed action includes the use of recycled water to irrigate public landscaping. If wastewater recycling facilities do not operate properly, the public could come into contact with contaminated water, resulting in a public health hazard. Some of the related projects would also irrigate public landscaping areas with recycled water (e.g., Mossdale Landing, Lathrop Station), increasing the overall risk of public exposure to contaminated water. However, recycled water treated in the City would comply with CCR Title 22 requirements for unrestricted use (i.e., disinfected tertiary treatment). Locations and methods of application for irrigation would also meet Title 22 requirements. Therefore, the risk of a public health hazard associated with the use of recycled water is not considered a significant cumulative effect.

21.2.15 Public Services and Utilities

Cumulative development would increase the demand for electrical and natural gas supply; refer to Chapter 23, *Energy Resources and Environmental Sustainability*, for an analysis of energy consumption and resource use resulting from the proposed action, and to the following discussion of cumulative effects on energy resources. Because future development would be required to comply with all existing City, PG&E, and applicable Building Code requirements, it is anticipated that electricity and natural gas supplies would be available. Therefore, cumulative effects on electricity and natural gas utilities are expected to be less than significant.

The proposed action, in combination with other local and regional projects, could result in a substantial increase in demand for school, fire protection, police, and animal control services by impeding access to existing services. All future development projects would be required to undergo a similar CEQA and/or NEPA environmental review process to determine the adequate level of public service facilities required to serve them, as well as to disclose the environmental effects associated with those actions. The City and related school districts are responsible for ensuring adequate provision of education services within their jurisdictional boundaries based on planning projections outlined in general planning documents. It is a City of Lathrop policy to ensure that balanced fiscal resources are available to fund public services for new development; although not all cumulative projects would require construction of new service facilities, it is presumed that sufficient police and fire stations, schools, and animal control facilities would need to be constructed to serve cumulative projects (City of Lathrop 2002). This could result in a significant cumulative effect.

The proposed action when combined with other projects would not result in significant effects related to increased generation of solid waste. The Foothill Sanitary Landfill has adequate capacity for 40 years, and the proposed action and cumulative projects would be required to comply with federal, state, and local regulations and statutes relevant to solid waste reduction and recycling. Furthermore, the Forward Landfill is planning to substantially expand its current capacity. Therefore, solid waste generated by the proposed action and cumulative projects is not expected to exceed available disposal capacity or otherwise adversely affect waste disposal services; no significant cumulative effects on solid waste disposal would result.

As discussed in Chapter 17, *Public Services and Utilities*, the City has committed to exercise responsibility for limiting growth in the event that the negotiated water supply proves inadequate (i.e., if demand has been underestimated). It is projected that future City water demand (i.e., proposed action plus existing/future cumulative development) would be 15,868 AFY in 2025 (City of Lathrop 2002, 2009). Future water supply for the City would consist of groundwater from the City's existing planned municipal wells and surface water deliveries from the SCSWSP. Future water supply available to the City during both normal years and multi–drought years would be adequate to meet future water demand during all horizon (2005, 2010, 2015, 2020, 2025) years (City of Lathrop 2002, 2009). Therefore, cumulative effects related to water supply would be less than significant.

The City is planning for the construction of several wastewater treatment facilities, expansion of existing treatment facilities (WRP No. 1 and Manteca WQCF), and construction of additional wastewater recycling plants (WRP No. 2). The City would be responsible for ensuring that all cumulative projects' water, wastewater, and recycled water services are adequately provided within the jurisdictional boundaries. The City's Master Plan provides for the provision of adequate water and wastewater treatment/disposal capacity to serve City growth and cumulative development through 2030. For the purpose of this cumulative analysis, it has been assumed that the construction of new facilities and expansion projects, including the SCSWSP and the City of Lathrop Well Field Expansion Project, would be implemented. 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 CEQA and/or NEPA review; therefore, no significant cumulative effects would result.

Future development projects would be required to comply with the City's drainage master plans, and stormwater conveyance would consist of surface runoff to detention ponds, with subsequent conveyance to the San Joaquin River. Cumulative effects of related projects would also undergo CEQA and/or NEPA environmental review to ensure that adequate conveyance facilities are included. Because the proposed action would have less-than-significant effects related to provision of stormwater conveyance and cumulative future development would comply with City provisions, no significant cumulative effects would occur.

21.2.16 Aesthetics

The visual character within the City and County has increasingly changed from agricultural and open space to urban uses, thus altering and limiting the views available to viewer groups (i.e., motorists along the I-5, I-205, and SR 120 corridors, residents, recreationists, and agricultural workers) in the project vicinity. This trend would continue as cumulative projects are implemented in the region, and the proposed action would therefore contribute to this cumulative change in views. Concurrent with the conversion from agricultural to urban uses is an increase in the level of nighttime light and glare, which obscure views of the night sky. Implementation of the proposed action and related projects would contribute to a significant visual effect in the City.

Because all federal levees are subject to Corps guidelines for vegetation management (ETL 1110-2-583 30 April 2014), all cumulative projects would also need to comply with vegetation-free zones, where appropriate; the proposed action would therefore contribute to this cumulative change in views.

As development proceeds in the region, there would continue to be substantial changes in visual conditions as agricultural lands and open space are replaced by urban development. The cumulative effect of these changes on aesthetic resources from past and planned cumulative projects, as well as the contribution from the proposed action, is considered significant. Although these cumulative effects can be minimized to a degree through mitigation measures (e.g., vegetative and topographic screening of structures, use of outdoor lighting that limits glare, appropriate building design, and other measures), the effects cannot be fully mitigated. Therefore, the cumulative effects associated with the conversion of agricultural and open space views in the region to urban land uses, the associated increase in nighttime light and glare, and compliance with the Corps' levee vegetation management guidelines are considered significant.

21.2.17 Socioeconomics

The proposed action in combination with other local and regional projects would not result in significant effects on population growth, employment, or housing demand. The number of residents in the City and County is considered sufficient to meet the need for construction jobs generated by the proposed action and cumulative projects, and a large proportion of the new employment opportunities generated by the proposed action would be filled by residents. A permanent increase to the region's economic base is expected to occur once cumulative projects are developed and jobs and dwellings become occupied; this change is considered a beneficial effect and may help to alleviate cumulative socioeconomic effects. Seasonal workers could be displaced as a result of other development projects; however, the permanent removal and loss of jobs would be minimal compared to the total seasonal workforce employed in the region, particularly given the new employment opportunities created by some of the larger planned development projects (e.g., Mossdale Landing, Gateway Business Park). Because the population generated by the proposed action and the development of new residential units are planned for in the City's General Plan and WLSP, the proposed action would not contribute to a significant cumulative effect.

21.2.18 Environmental Justice

The vicinity of the proposed action area is not characterized by the presence of any low-income populations; accordingly, the environmental justice analysis focuses on minority populations. Because the proposed action and other planned developments (e.g., Mossdale Landing, Central Lathrop Specific Plan) would not have significant health effects or environmental effects on any minority populations, it would not contribute to cumulative environmental justice effects in these areas. Moreover, because the proposed action would provide employment and housing opportunities that do not currently exist in the City, it is anticipated to have beneficial socioeconomic effects on minority populations. Therefore, the proposed action's contribution to cumulative environmental justice effects is expected to be less than significant.

21.2.19 Energy Resources and Environmental Sustainability

Construction activities associated with the cumulative projects would require the use of fuels and electricity to operate construction equipment and transport employees and materials. However, construction of other projects would not be expected to cause inefficient, wasteful, and unnecessary use of energy resources because these projects would be required to incorporate ARB's existing regulations and possibly some or all of the proposed Early Action Measures during construction. The cumulative projects would also be subject to local energy efficiency measures aimed at reducing GHGs, such as those that have been identified by an applicable air quality district. As a result, the proposed action's contribution to cumulative energy effects during construction is expected to be less than significant.

Operational activities associated with the cumulative projects would require the use of fuel, electricity, and natural gas to run water treatment operations, operate facilities, supply homes and commercial structures, and maintain and operate habitat and water-related improvements. Upon completion of construction, future projects would contribute to the cumulative increases in energy consumption. However, the use of fuels and electricity to operate and maintain the identified cumulative projects would not be an excessive use when considered in the context of the total energy demand within PG&E's northern and central California service territory. Furthermore, the identified residential and commercial projects would be required to meet California's Title 24 energy efficiency standards, ensuring that energy supplied to buildings is not used in an inefficient, wasteful, and unnecessary manner. As a result, the proposed action's contribution to cumulative energy effects during construction is expected to be less than significant.

21.2.20 Indian Trust Assets

The proposed action would not result in effects on Indian Trust Assets (ITAs) because there are no ITAs in or near the proposed action area; consequently, no there would be no cumulative effect.

21.3 References

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21.3.2 Personal Communication

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Chapter 22
Growth Inducement and Related Effects

NEPA requires that an EIS discuss how a proposed action and alternatives, if implemented, could induce growth. Under authority of NEPA, CEQ regulations require EISs to consider the potential indirect effects of a proposed action "that are later in time or farther removed in distance but are still foreseeable." Indirect effects "may include growth-inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate and related effects on air, water and other natural systems" (40 CFR 1508.8[b]).

This chapter provides an evaluation of potential growth inducement, considering the possibility that constructing and operating the proposed action or an alternative could create indirect effects outside Stewart Tract by generating demand for additional growth or by removing obstacles to additional growth in the City or County.

This chapter also provides an analysis for compliance with Executive Order 11988, *Floodplain Management*, requiring federal agencies to take action to reduce the risk of flood loss, restore the natural and beneficial values of floodplains, and minimize the effects of floods on human safety, health, and welfare.

22.1 Affected Environment

22.1.1 Regulatory Framework

22.1.1.1 City of Lathrop General Plan and West Lathrop Specific Plan

The General Plan and WLSP, as amended in 2004 and 2007, respectively, provide guidance for land use on Stewart Tract. The General Plan and WLSP both describe the long-range vision for development in the City. Since 1991, Stewart Tract has been identified as a primary sub-plan area to achieve long-term community and economic benefits for the City. In 2004, through the amended General Plan, the City adopted the River Islands at Lathrop project as evaluated in this EIS. The General Plan vision for Stewart Tract is a master-planned development integrating residential districts; schools, police, and fire services; parklands and recreational amenities; and a regional Employment Center developed around a newly planned Town Center and regional commercial area. Development is intended to take advantage of the site's proximity to the Delta by offering marina, boating, water skiing, canoeing, fishing, and other water-related activities.

The WLSP lays out a blueprint for development in the southwestern portion of the City's planning area. The WLSP describes the proposed pattern of land uses; their nature and intensity; and the circulation, transit, public services, and utilities needed to serve the plan area, along with the implementation measures that will ensure the plan's viability. The WLSP envisions a sustainable, comprehensively designed community, balancing nonresidential with residential uses. Principal land uses include a mixed-use Town Center, an Employment Center, and varied housing types. Other land uses include parks, recreation areas, schools, and open space incorporated within major land uses, with the exception of the PCC Area, which is designated as a conservation/open space area.

22.1.1.2 Executive Order 11988

Executive Order 11988 (May 24, 1977) requires federal agencies, when taking an action, to avoid short- and long-term adverse effects associated with the occupancy and alteration of floodplains, and they must avoid direct and indirect support of floodplain development whenever there is a reasonable and feasible alternative. If the only reasonable and feasible alternative involves siting in a floodplain, the agency must minimize potential adverse effects associated with occupancy and modification of floodplains and explain why the action is proposed in the floodplain.

In February 1978, the Water Resources Council issued *Floodplain Management Guidelines for Implementing Executive Order 11988*. These guidelines provide analysis of the executive order, definitions of key terms, and an eight-step decision-making process for carrying out the executive order's directives (Water Resources Council 1978). The eight-step process requires a determination of whether the proposed action is in the base floodplain; public review of floodplain analyses; evaluation of alternatives to developing in the floodplain; identification of effects and measures to minimize them; and public disclosure of the decisions regarding floodplain development prior to project implementation. Section 22.2.3 discusses compliance with this executive order.

22.1.2 Growth Projections

Population growth is discussed in Chapter 19, *Socioeconomics*. The County's population growth is expected to continue to increase. Current projections indicate a total population of 935,709 by 2030 (California Department of Finance 2012). Estimates for future population in the City vary widely depending on the assumptions used in the projections. The City's General Plan anticipated substantial growth, with a population of about 30,000 projected for 2012 (City of Lathrop 2004:34); however, the economic downturn beginning in 2007 rendered this projection inaccurate. A more recent projection from SJCOG estimates the City's population at 20,896 in 2015 (San Joaquin Council of Governments 2011). Commuters from the Bay Area, Silicon Valley, the Tri-Valley area, and Sacramento employment centers are expected to fuel this growth.

22.2 Environmental Consequences

Because all the alternatives (including the No Action Alternative) would entail the same number of housing units and the same amount of retail/commercial space (and hence job creation) as the proposed action, it is assumed that they would have the same growth-inducing effects as the proposed action. Consequently, the alternatives are not separately addressed in this discussion. Operations and maintenance of the alternatives were determined to have no growth-inducting effects and are not discussed further in this section.

22.2.1 Methods for Analysis of Growth-Inducing Effects

Implementing the proposed action could result in growth through three mechanisms. Growth could occur in the vicinity of the RID Area in Lathrop or San Joaquin County as a result of economic activity generated by constructing residential and commercial development associated with the proposed action. Growth could occur by economic activity resulting from employment created by commercial development and demand for services generated by the increased population associated with the proposed action. Finally, limitations on growth in surrounding areas could potentially be reduced by the extension of services and infrastructure to Stewart Tract.

This analysis qualitatively evaluates the potential for construction and permanent employment associated with the proposed action and alternatives to induce growth in the vicinity of the RID Area. More specifically, this analysis examines if the number of construction and commercial center jobs generated by the proposed action could create demand for additional housing or increase economic activity. The evaluation of the proposed action's potential growth-inducing effect related to eliminating a barrier or limitation on growth is described by evaluating the infrastructure components that could potentially be expanded to serve surrounding areas.

22.2.2 Growth-Inducing Effects

Construction effects (less than significant)

The proposed action entails the construction of 6,716 single- and multifamily homes, 2 million square feet of commercial and retail space, and recreational facilities (e.g., group docks, fishing piers). A total of approximately 11,000 homes and 5 million square feet of commercial space are planned for the overall River Islands at Lathrop project at buildout. Effects associated with these growth elements are incorporated into the effects analysis developed for each environmental issue area in the EIS.

According to information provided by River Islands for the air quality analysis, the proposed action is estimated to generate a maximum of 700 construction jobs at any given time during the peak of project construction—anticipated during the final year of the construction period. Fewer workers (a maximum of 300–400 at any given time) would be onsite during nonpeak times. As discussed in Chapter 19, *Socioeconomics*, because a substantial number of City and County residents are employed in the construction fields (566 and 19,925, respectively, as estimated in the 2009 American Community Survey), there appears to be a substantial labor force resident in the vicinity of the proposed action for these construction jobs (U.S. Census Bureau 2010). The presence of this labor force suggests that the increased demand for construction workers would not necessarily result in increased demand for housing in the area. If a smaller number of construction workers were needed from outside the region to augment the local labor force, it is reasonable to expect that only a portion of these additional workers would relocate for temporary construction employment. Accordingly, the increased number of construction jobs associated with the proposed action would result in less-than-significant growth-inducing effects that could substantially affect the environment.

An increased construction labor force working in and near the City for an extended period could be expected to increase short-term demand for goods and services. Because construction would occur over 20 years, this increased economic activity could create economic benefits for City and surrounding businesses (see Chapter 19, *Socioeconomics*), some of which could result in business expansions. Although it is difficult to estimate the precise economic effect—or the effect that such increased business activity would have on the environment—overall, this activity would not be expected to result in a less-than-significant growth-inducing effect. Because a substantial number of construction workers who already reside in Lathrop or surrounding cities would be expected to fill available construction jobs, the influx of new workers from outside the County would likely be relatively small. Even during the peak of construction, the population influx during working hours is expected to be moderate at best. In view of this local labor pool, the potential for substantial business expansion based on a temporary influx of construction workers during working hours is considered low. Consequently, growth-inducing effects associated with increases in the population of construction workers would be less than significant.

Commercial employment and population effects (significant)

Once the proposed action is constructed, the 2 million square feet of commercial space developed would be expected to generate approximately 5,500 jobs (Batista pers. comm.) that would be partially filled by local residents (approximately 17,000 jobs created at full buildout for the entire River Islands at Lathrop project). While the analysis in the City's SEIR (City of Lathrop 2002) determined that the jobs generated by River Islands at Lathrop would likely exceed employable residents by a substantial amount (approximately 5,000 jobs estimated for the entire RID Area), this analysis was undertaken when the economy was in a much stronger condition. Due to the current high unemployment rates in the City (12.3%) and the County (15.1%), it is now expected that a large proportion of the jobs generated by the project would be filled by residents of the local region (California Employment Development Department 2012). This would moderate the demand for new housing associated with the proposed action. In addition, the County has historically exhibited a disparity between the number of jobs and the available housing. An estimated 45,000 County residents commuted to jobs outside the County in 2002 (City of Lathrop 2002). It is estimated that by 2025, more than 130,000 residents could be commuting to jobs outside the County. In view of these housing rich/jobs poor conditions, as well as the substantial housing generated by the proposed action, it is not expected that employment in the proposed action area would generate substantial additional housing demand or development that could result in significant growth-inducing effects.

The proposed action would entail development of 6,716 residential units and an estimated population of 19,514 at full buildout. Although the proposed action includes the provision of commercial services in the Town Center and office/retail center and anticipates commercial services in the Employment Center, onsite services would likely meet only some of the needs of the projected population. This additional project-generated population would likely increase the demand for goods and services in the City and region, potentially stimulating growth to serve the expanded population (City of Lathrop 2002). This is considered a potential growth-inducing effect that could have indirect effects on the environment.

Infrastructure improvement effects (significant)

Although the City's General Plan and the WLSP designate development within the boundaries of Stewart Tract, there may be some pressure to expand outside the proposed action area in surrounding agricultural lands. The General Plan states that Lathrop's planning area boundaries are to be considered relatively "fixed" for very important reasons pertaining to the logical spheres of influence of neighboring cities and as a means to ensure the preservation of environmental qualities and amenities of the subregion (City of Lathrop 2004). Areas north and northwest of Stewart Tract are within the Primary Delta, and any development would be under the jurisdiction of the Delta Protection Commission with protection afforded under the *Land Use and Resource Management Plan for the Primary Zone of the Delta*. Lands west of Paradise Cut and north of I-205 were considered areas more likely for urban expansion (City of Lathrop 2004:6-2). The City of Tracy's general plan (2005, amended 2006) proposes to expand Tracy's sphere of influence and designates lands for urban uses that are currently designated by the County for agriculture. However, until Tracy annexes these areas, the County retains jurisdiction; once annexation occurs, the land will be within Tracy's jurisdiction and its land use designations will apply (City of Tracy 2006).

The proposed action is expected to reduce existing barriers to growth by upgrading transportation, drainage, water supply, and wastewater infrastructure on Stewart Tract. In view of the land use context presented in the preceding paragraph—limitations on development north of Stewart Tract in the Primary Delta (Upper Roberts Island, Union Island, and Fabian Tract) and existing urban development east of Stewart Tract in the City of Lathrop—the most likely area for additional urban growth to occur would be south and west of Paradise Cut in the direction of Tracy. Because the proposed action would include construction of the proposed Golden Valley Parkway Bridge (crossing Paradise Cut) and would substantially expand City of Lathrop infrastructure immediately adjacent to this developable area, the potential for growth-inducing effects associated with the proposed action is considered significant.

If urban development were to proceed southwest of Paradise Cut and north of SR 205—due in part to the reduction barriers to growth as a function of the proposed action—effects associated with this development would likely be similar to those of the proposed action. New growth could change scenic vistas, visual character and quality, and other visual resources. Local air quality could worsen as a result of growth because of elevated levels of vehicle emissions and increases in DPM generated by construction activities. Additional growth could also increase GHG emissions in the County. Regional development could reduce the area of wildlife and fish habitat remaining in the region and could affect historic structures and cultural resources. New growth could increase the number of persons and structures subject to earthquakes and other geophysical effects and could result in an increase of impervious surfaces, resulting in drainage and flooding effects, as well as an increase in point and nonpoint source pollution. New growth could also result in equipment- and vehicle-related noise effects, and regional and local traffic would likely increase as a result of development-generated trips and increased numbers of through commuters traveling to employment hubs.

These potential future effects have been addressed during local land use authority approval processes. San Joaquin County and the Cities of Lathrop and Tracy are responsible for implementing general plan policies and other measures intended to mitigate the adverse effects of future growth, including CEQA and NEPA review of future plans and projects.

22.2.3 Executive Order 11988 Analysis

The following eight-step decision-making process for carrying out the Executive Order 11988 directives provides information on the proposed action's compliance with guidance for developing within a floodplain. A detailed analysis of the proposed action's compliance with Executive Order 11988 is provided in Appendix G.

- **Step 1: Determine if a proposed action is in the base floodplain (100-year floodplain or 1% chance flood or 500-year or .2% if the action falls under the definition of critical, discussed separately below).** As described in Chapter 2, *Proposed Action and Alternatives*, the existing levees were designed to provide 2% (50-year) level of performance. Earlier phases of the River Islands at Lathrop project subsequently included placement of fill to raise a portion of the area above the 1% (100-year) flood elevation, as well as construction of new setback and interior levees to provide flood risk reduction for a portion of the River Islands at Lathrop project area (i.e., Phase 1). The new setback levee was designed to provide a 0.5% (200-year) level of performance. Later modifications (i.e., Phase 2B) are also designed to provide 0.5%

(200-year) level of performance. Because it is designed to provide a 0.5% (200-year) level of performance, the proposed action would also act to minimize the risk of failure at the 500-year, or 0.2%, event, in accordance with the State of California Urban Levee Design Criteria (ULDC) (California Department of Water Resources 2012) adopted as part of the CVFPP.

The Water Resources Council's Floodplain Management Guidelines presented the concept of a critical action. The guidelines (Part II, Decision-Making Process, Step 1C) outline the parameters of critical actions and include activities that create, maintain, or extend the life of structures or facilities that: produce or store highly volatile, toxic, or water reactive materials; house sensitive or relatively immobile populations including hospitals and schools; and hold irreplaceable records, utilities, and/or emergency services (Water Resources Council 1978). To summarize, as noted in the guidelines, a critical action is "any activity for which even a slight chance of flooding is too great." Under the proposed action, the levee modifications and Paradise Cut flood conveyance measures would reduce the chance of flooding rather than being sensitive to or compromised by flooding; i.e., the purpose of these measures is to reduce the potential flood risk on the proposed action. In addition, the proposed action does not create, maintain, or extend the life of facilities in the floodplain because such facilities can be built as part of the No Action alternative. Accordingly, the proposed action is not considered a critical action because levee modifications (described in Chapter 2, *Proposed Action and Alternatives*) are intended to withstand flood conditions and reduce flood risk.

- **Step 2: Provide public review.** The NEPA process provides for public disclosure; this EIS is one instrument for public review of the proposed action. As discussed in Chapter 1, *Introduction*, the Corps hosted two public scoping meetings following issuance of the NOI; these were advertised in local newspapers and direct mailings to potentially interested parties, including agencies with jurisdictional or advisory responsibilities, individuals and organizations who had commented on the River Islands SEIR, and local residents near the site. The scoping meetings included an informal presentation covering the proposed action, the Corps' permit and review responsibilities, and the NEPA process. Attendees were encouraged to ask questions and present oral input during and after the presentation. Both the presentation and the subsequent question and answer session were transcribed by a court reporter. Appendix A includes a complete transcript of the question and answer sessions at the two scoping meetings, along with additional comments received during the scoping period.

  Once the Draft EIS is complete, the Corps is required to notify agencies and the public that it is available for review. The official notification—referred to as a notice of availability (NOA)—is published in the Federal Register and is usually also printed in newspapers in the vicinity of the proposed action and mailed to individuals who have requested it. Issuance of the NOA initiates a review period during which the lead agency receives and collates public and agency comments on the proposed action and the document.

  In addition to public disclosure activities completed in compliance with NEPA guidelines, other processes have provided opportunities for the public to review the proposed action. Public review was a mandated element of the CEQA process guiding the City of Lathrop General Plan and the West Lathrop Specific Plan, both of which featured Stewart Tract development plans. Additionally, municipal permitting actions specific to the project have also incorporated elements of public involvement.

- **Step 3: Identify and evaluate reasonable and feasible alternatives to locating in the base floodplain.** The proposed action is specifically targeted to provide flood conveyance modification and to exceed the level of performance beyond the base flood to that of the 0.5% chance (200-year) flood event or better.

General engineering and environmental analyses have been performed for the proposed action and alternatives, following the identification and screening process discussed in Chapter 2, *Proposed Action and Alternatives*. The alternatives screening analysis evaluated potential offsite locations for the proposed action and concluded that no feasible sites that would meet the project purpose and need were available. Detailed analyses were performed for the offsite alternatives and have found the site of the proposed action to be the only practicable location that achieves the objectives of the project.

- **Step 4: Identify the effects of the proposed action.** This EIS analyzes the environmental effects potentially resulting from the proposed action pursuant to NEPA requirements. Environmental effects associated with the proposed action are discussed in Chapters 3 through 25.
- **Step 5: Minimize threats to life and property and to natural and beneficial floodplain values. Restore and preserve natural and beneficial floodplain values.** The proposed action includes elements to reduce the threat of harm from flooding to life and property in the proposed development. Earlier phases of the project were designed to provide 0.5% (200-year) level of performance. Under the proposed action, the existing federal project levees along Old River would be reconstructed and widened to extend the high-ground perimeter with a crest width of 65–75 feet and height adequate to provide 0.5% (200-year) level of performance. The proposed action would also alter the Paradise Cut Canal flood risk management bypass to increase its flood conveyance capacity and to allow for preservation and enhancement of riparian habitat and other natural and beneficial floodplain values.
- **Step 6: Reevaluate alternatives.** To ensure that the EIS contains an appropriate range of alternatives to support Section 404 compliance, the alternatives development and screening approach was designed to satisfy both the Restrictions on Discharge (40 CFR 230−233) and NEPA and its implementing regulations. Chapter 2, *Proposed Action and Alternatives*, provides an overview of the alternatives development and screening process.
- **Step 7: Issue findings and a public explanation.** To conclude the NEPA process, a record of decision (ROD) for the proposed action will be publically issued following the Final EIS.
- **Step 8: Implement the action.** The applicant, River Islands, intends to construct the proposed action as soon as possible following conclusion of the project approval processes; construction is targeted for initiation in the 2014 construction season.

22.3 References

22.3.1 Printed References

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Chapter 23
Energy Resources and Environmental Sustainability

This chapter analyzes the proposed action's and alternatives' potential effects on energy use and resources. Related information is presented in Chapter 14, *Air Quality;* Chapter 15, *Climate Change;* Chapter 17, *Public Services and Utilities;* and Chapter 21, *Cumulative Effects*.

The key sources of data listed below were used in the preparation of this chapter.

- *West Lathrop Specific Plan* (City of Lathrop 2003).
- *Draft Subsequent Environmental Impact Report for the River Islands at Lathrop Project* (City of Lathrop 2002).
- *River Islands at Lathrop Draft Architectural Guidelines* (Draft Architectural Guidelines) (Cambay Group 2008).

Specific reference information is provided in the text.

23.1 Energy Terminology

- **Watt.** The absolute meter-kilogram-second unit of power equal to the work done at the rate of one joule per second.
- **Watt-hour.** A unit of work or energy equivalent to the power of one watt operating for one hour.
- **Kilowatt.** 1,000 watts.
- **Gigawatt.** A unit of power equal to one billion watts.
- **Cubic foot.** A unit of measurement used to represent volume. It represents an area 1 foot long by 1 foot wide by 1 foot deep.
- **Nonassociated gas.** Natural gas produced from a reservoir that contains no crude oil or does not contain significant quantities of crude oil.
- **Hydroelectric.** Production of electricity by water power.
- **Geothermal.** Utilizing the heat of the earth's interior.
- **Biomass.** Plant materials and animal waste used as a source of fuel.
- **Solar energy.** Produced or operated by the action of the sun's light or heat.
- **Photovoltaic.** The generation of a voltage when radiant energy falls on the boundary between dissimilar substances (e.g., two different semiconductors).
- **Fuel cell.** A device that continuously changes the chemical energy of a fuel (e.g., hydrogen) and an oxidant directly into electrical energy.

- **Renewable energy.** Energy derived from sources capable of being replaced by natural ecological cycles (i.e., solar, wind, biomass, geothermal, tidal) or sound management practices.
- **Fossil fuel.** A fuel (coal, oil, or natural gas) formed in the earth from plant or animal remains.

23.2 Affected Environment

23.2.1 Regulatory Framework

23.2.1.1 Federal

National Energy Policy

The National Energy Policy, established in 2001 by the National Energy Policy Development Group, is designed to help the private sector and state and local governments promote dependable, affordable, and environmentally sound production and distribution of energy for the future (National Energy Policy Development Group 2001). Key issues addressed by the energy policy are energy conservation, repair and expansion of energy infrastructure, and ways of increasing energy supplies while protecting the environment.

23.2.1.2 State

California 2008 Energy Action Plan Update

The 2008 update to the 2005 Energy Action Plan II is California's principal energy planning and policy document (State of California 2008). The updated document examines the state's ongoing actions in the context of global climate change. The 2005 Energy Action Plan II continues the goals of the original 2003 Energy Action Plan, describes a coordinated implementation plan for state energy policies, and identifies specific action areas to ensure that California's energy resources are adequate, affordable, technologically advanced, and environmentally sound. In accordance with this plan, the first-priority actions to address California's increasing energy demands are energy efficiency and demand response (i.e., reduction of customer energy use during peak periods to address system reliability and support the best use of energy infrastructure). Additional priorities include the use of renewable sources of power and distributed generation (the use of relatively small power plants near or at centers of high demand). In the event that these actions are unable to satisfy the increasing energy demand and transmission capacity needs, clean and efficient fossil-fired generation is supported.

The California 2008 Energy Action Plan Update examines policy changes in the areas of energy efficiency, demand response, renewable energy, electricity infrastructure, electricity reliability, electricity market structure, natural gas supply and infrastructure, research and development, and climate change.

Renewable Portfolio Standard Program

In 2002, with the adoption of SB 1078, California established its RPS program. California's RPS obligates investor-owned utilities, energy service providers, and community choice aggregators to procure at least 20% of retail sales per year from eligible renewable sources by 2017. The adoption of SB 1078 subsequently accelerated that goal to 2010 for electrical corporations, and CEC further recommended that the state increase the target for all retail electricity sellers to 33% by 2020, a standard supported by Executive Orders S-14-08 and S-21-09, and eventually codified under SB X1-2 in 2011 (California Energy Commission 2011).

The RPS was developed to provide a flexible, market-driven policy to ensure that the public benefits of wind, solar, biomass, and geothermal energy continue to be realized as electricity markets become more competitive. The policy aims to ensure that a minimum amount of renewable energy is included in the portfolio of electricity resources serving the state or county, putting the energy industry on a path toward increasing sustainability.

CPUC and CEC are jointly responsible for implementing the RPS program. Legislation establishing the RPS created no obligation for local land authorities. However, in order to meet the requirements of this legislation, additional renewable energy projects and transmission line connections will be necessary, and local land use planning processes can facilitate or hinder the ability of energy providers to establish these additional facilities. Further, to meet GHG reduction goals of a particular jurisdiction, the ability of energy providers to increase their renewable energy portfolios is directly related to the ability of the jurisdiction to reduce GHGs associated with electricity consumption.

Building Energy Efficiency Standards

The Energy Efficiency Standards for Residential and Nonresidential Buildings, as specified in Title 24 CCR 6, were established in 1978 in response to a legislative mandate to reduce California's energy consumption. The standards are updated periodically to allow consideration and possible incorporation of new energy efficiency technologies and methods. The most recently updated version of the standards was adopted on April 23, 2008, and took effect August 1, 2009. CEC is currently in the process of updating the 2008 building energy codes. The new regulations will be adopted in 2014.

Compliance with these standards is mandatory at the time new building permits are issued by City and County governments.

In addition, amendments to Title 24 called the "Green Building" standards were adopted in August 2009. These voluntary standards encourage building techniques that would substantially reduce energy consumption and water use below Title 24 standards. Examples of Title 24 standards include requirements related to improving building energy efficiency through insulation, roofing products, lighting control devices, water-heating systems, space-conditions systems, natural gas furnaces, and exterior doors. These standards may become the basis for future mandatory requirements in updates to Title 24.

California Senate Bill 1037 and Assembly Bill 2021

In 2003, CPUC and CEC adopted an Energy Action Plan that prioritized resources for meeting California's future energy needs, with energy efficiency identified as the highest priority. Since then, this policy goal has been codified as SB 1037 and AB 2021 into statute through legislation that requires electric utilities to meet their resource needs first with energy efficiency. This policy also set new targets for statewide annual energy demand reductions of 32,000 gigawatt hours (GWh) and 800 million therms from BAU—enough to power more than 5 million homes or replace the need to build about 10 new large power plants (500 megawatts [MW] each). These targets represent a higher goal than existing efficiency targets established by CPUC for investor-owned utilities due to the inclusion of innovative strategies. Achieving the state's energy efficiency targets will require coordinated efforts from the state, the federal government, energy companies, and customers. ARB will work with CEC and CPUC to facilitate these partnerships. California's energy efficiency programs for buildings and appliances have generated more than $50 billion in savings over the past three decades (California Public Utilities Commission 2005).

California Assembly Bill 32—Global Warming Solutions Act of 2006

AB 32 requires California to reduce its total GHG emissions to 1990 levels by 2020—about a 30% decrease from current levels. In September 2007, ARB approved a list of nine Discrete Early Actions to reduce GHG emissions and developed regulations and programs based on these actions over the following 4 years (HSC §38560.5 [b]).

ARB's Discrete Early Actions include adoption of a low carbon fuel standard and new standards for heavy-duty trucks; requirements to properly inflate tires; programs to capture landfill methane and utilize shore power; and regulations reducing emissions of hydrofluorocarbons, semiconductor perfluorocarbons, sulfur hexafluoride (SF6), and other compounds with high global warming potential (California Air Resources Board 2011).

23.2.1.3 Local

City of Lathrop General Plan

As discussed in the City's General Plan, the State Housing Element law requires that an analysis of opportunities for energy conservation be discussed. The City of Lathrop adopted the 2001 Uniform Building Codes, which requires the City to review all project plans and ensure new development is in compliance with energy standards cited in the UBC (City of Lathrop 2004). Energy conservation standards are consistent with CEC standards. These standards, defined in Title 24 of the California Administrative Code, contain specifications relating to insulation, glazing, heating systems, cooling systems, water heaters, swimming pool heaters, and several other items. Solar energy and PG&E rebates for home improvements and appliances are discussed in the General Plan as a way to encourage efficient energy consumption.

One policy adopted by the City is to promote energy conservation activities in all residential neighborhoods. The city does so by supplying energy conservation awareness brochures in all public meeting places.

West Lathrop Specific Plan

The WLSP does not address energy conservation for Mossdale Village and River Islands at Lathrop.

River Islands at Lathrop Draft Architectural Guidelines

According to the *Draft Architectural Guidelines for River Islands at Lathrop* (Cambay Group 2008), all buildings within River Islands at Lathrop are required to consider incorporating energy conservation design, as described in Chapter 2, *Proposed Action and Alternatives*. Proposed methods from the Draft Architectural Guidelines include those listed below.

- Passive solar design, such as thermal masses to absorb winter sun energy and roof overhangs and carefully placed deciduous trees to provide summer shade.

- Active solar design, such as solar collectors to heat water, or photovoltaic cells to generate electricity.
- Energy-efficient mechanical heating and cooling equipment, such as heat pumps.
- Extra thermal insulation in roofs and walls to control heat gain and loss.
- Operable windows in commercial buildings.
- Home integrated systems: wireless PC-based systems that allow homeowners to program appliances to restrict use during peak energy periods.
- Load-shifting technologies such as thermal energy storage for residential and commercial use that moves the operation of air conditioning compressors from on-peak operation to off-peak hours.
- Thermal-rated glazing, including reflective coatings to reduce heat load in the summer.
- Utilization of Energy Star–rated appliances.
- District heating and cooling, where feasible and economical, to medium- and high-density residential areas, the town center and employment center areas.
- Distributed generation facilities, including fuel cells, wind technology, and photovoltaics, provided such facilities are consistent with other requirements of the Design Guidelines and Development Standards, WLSP, and other regulations.
- Geothermal heat pumps used to heat and cool multiple homes in an area where such facilities are feasible and economical. Use of the central lake for such facilities is permitted in River Islands at Lathrop. Use of water from the San Joaquin River system may be subject to additional environmental review, but is permitted in River Islands at Lathrop, subject to the Design Guidelines and Development Standards, WLSP, and other regulations.

23.2.2 Existing Conditions

23.2.2.1 State Overview

Statewide, California's electricity is supplied by a number of sources, including natural gas (45.7%), coal (18.2%), large hydroelectric plants (11.0%), and nuclear (14.4%). The remaining 10.6% is supplied from geothermal, biomass, small hydroelectric, wind, and solar sources. Sectors with the largest consumption of electricity are commercial (37%) and residential (32%) (California Energy Commission 2009a).

In 2008, Californians consumed 286,771 GWh of electricity. California's consumption of electricity steadily increased during 2002 to 2008, and is expected to increase at a rate of 1.2% between 2010 and 2018. However, energy consumption was expected to slightly decrease in 2010 from the 2008 consumption. The 2010 reduction was forecast due to lower-than-expected economic growth and increased energy efficiency (California Energy Commission 2009a).

Natural gas is the largest source of electricity in California. Natural gas, from in-state and out-of-state plants, provides approximately 46% of statewide electricity needs (California Energy Commission 2009b). In 2009, northern California (including San Joaquin County) produced 73.6 billion cubic feet of non-associated natural gas (i.e., reserves that do not contain oil)—more than any other region in the state (California Department of Conservation 2010).

In 2008, ARB adopted the Climate Change Scoping Plan to reduce GHG emissions pursuant to AB 32. Energy measures outlined in this plan would reduce electricity demand by 32,000 GWh in comparison to BAU demand projected for 2020 (California Air Resources Board 2008). Increasing efficiency in all energy sectors in California is a high priority for meeting energy demand.

23.2.2.2 Regional Overview

PG&E's natural gas and electricity distribution network extends through 47 of California's 58 counties, comprising most of northern and central California (Pacific Gas and Electric Company 2008). Its power generation portfolio includes two nuclear power reactor units at the Diablo Canyon power plant with a total capacity of approximately 2,240 MW of electricity; two conventional fossil fuel units at the Humboldt Bay power plant, which currently produce 105 MW of combined output; a hydroelectric system consisting of 110 generating units with a total generating capacity of 3,896 MW; 2,500 megawatts from cogeneration projects; 600 MW from wind projects; and 800 MW from projects with other fuel sources, which include biomass, waste-to-energy, geothermal, solar, and California-eligible hydroelectric facilities.[1] In 2000, PG&E supplied an estimated 887 million cubic feet per day of natural gas and an estimated 81,923 million kW per day of electricity to northern and central California (City of Lathrop 2002).

23.3 Environmental Consequences

23.3.1 Methods for Analysis of Effects

This analysis evaluates the proposed action and alternatives in terms of energy demand during construction and operation and assesses the potential for long-term increases in energy demand, with a particular focus on the potential for inefficient, wasteful, and unnecessary use of energy. For energy used during construction, the analysis discusses how construction operations would be conducted to minimize the use of fuels and ensure that they are not used in a wasteful manner. For energy used during operation, the analysis evaluates energy efficiency measures associated with project operations, consistent with state and local regulations and guidelines. Although long-term energy use would also be associated with the operation and maintenance of the proposed levees, lakes, wetlands, and golf courses within the proposed action area, these activities would have minor effects on energy in comparison to the proposed homes, commercial buildings, and water-oriented recreational features of the proposed action. Accordingly, the operational analysis focuses primarily on the long-term energy use associated with operation of the proposed residential, commercial, and recreational components.

This analysis also assumes that potentially inefficient, wasteful, and unnecessary energy consumption during project construction would be reduced through implementation of various GHG and criteria pollutant emissions reduction measures. Currently, measures discussed are ARB's existing and proposed Early Action Measures to reduce state-wide GHG emissions, and SJVAPD's recommended measures to reduce construction vehicle emissions. Ultimately, the energy efficiency/reduction measures discussed in this section will be consistent with the measures discussed in the air quality and climate change sections.

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[1] As defined in SB 1078, hydroelectric facilities qualify as eligible renewable resources if they have a capacity rating of 30 MW or less.

23.3.2 Definition of Significant Effects

CFR Section 1502.16 requires an EIS to include discussions of a proposed action's energy and natural resource requirements and the conservation potential afforded through the proposed action, alternatives, and mitigation measures. The Corps has not formally adopted a definition of significant effects for effects related to energy and natural resources, nor has the County or City adopted CEQA significance standards that would provide input at the project-specific level. For purposes of this analysis, consistent with prevailing practice, the encouragement of activities or practices or the construction of facilities that result in the inefficient, wasteful, and unnecessary consumption of energy would constitute a significant effect.

23.3.3 Effects and Mitigation Approaches

23.3.3.1 Alternative 1—Proposed Action

Construction-related energy and resource use (less than significant)

As described in Chapter 2, *Proposed Action and Alternatives*, construction of the proposed action would be phased over the period between approximately 2012 and 2031. Project construction would result in a significant increase in energy use through the use of petroleum-based fuels and lubricants for construction equipment, vehicle travel within the work site, and worker commute trips to access the site, all of which could potentially result in inefficient, wasteful, and unnecessary energy consumption and/or use of fuels. However, inefficient or wasteful use of fuels and other petroleum resources during construction would not be economical for River Islands at Lathrop or its contractors.

GHG reduction actions that achieve GHG emissions reductions through fuel efficiency, implemented as part of the proposed action, would help to limit wasteful and inefficient use of fuel associated with project-related construction vehicles (see Chapter 15, *Climate Change*). These reduction actions would include measures set forth in existing ARB regulations (13 CCR 2480 and 2485), which limit idling of diesel-fueled commercial motor vehicles (weighing over 10,000 pounds) to 5 minutes at any location. In addition, ARB's proposed Early Action Measures (pursuant to the California Global Warming Solutions Act of 2006) include other emission reduction measures for diesel trucks and diesel off-road equipment. ARB has reviewed and adopted many Early Action Measures, including Pavley fleet regulations (AB 1493), the Low Carbon Fuel Standard, and GHG reduction measures for heavy-duty on-road vehicles. Equipment used for construction of the project could be subject to these and additional requirements (pending adoption of additional measures). Once such measures go into effect, River Islands and its construction contractors would be subject to these requirements and would implement these measures as required.

Because this project's construction would occur in 2012 and after, the applicable Early Action Measures adopted in 2010 would apply to the project. Additionally, as described in Chapter 14, *Air Quality*, the project would implement SJVAPD's recommended measures to reduce emissions from heavy-duty construction equipment exhaust during construction (Mitigation Measure AQ-2). Several of these measures, although designed to reduce criteria pollutant emissions, achieve this goal through fuel conservation. Air Quality mitigation measures that also act to conserve fuel would further ensure that wasteful and inefficient fuel consumption would not occur. The AB 32–related measures and the SJVAPCD criteria pollutant emissions reductions measures represent the minimum level of fuel conservation that must occur for project implementation.

With implementation of the existing and proposed ARB measures, as well as SJVAPD's recommended emissions reductions measures for heavy-duty construction equipment, the proposed action is not expected to cause wasteful, inefficient, or unnecessary use of fuel or energy resources during construction. Therefore, fuel and energy use during project construction would result in a less-than-significant direct effect on nonrenewable energy resources. No indirect effects were identified.

Long-term energy use during occupancy and operation (less than significant)

The proposed action would entail construction of 6,716 single- and multifamily homes, commercial space, and public amenities such as boat docks and other recreational facilities. Operation of the proposed action would increase overall, long-term consumption of natural gas and electricity, potentially resulting in inefficient, wasteful, and unnecessary energy consumption. Based on the analysis provided in the River Islands SEIR, it is anticipated that River Islands at Lathrop at full buildout would increase electricity and natural gas demand in the City by approximately 1,310,000 kWh per day and 32,576 cubic feet per day, respectively (City of Lathrop 2002). This increase in energy use was not considered to be substantial relative to the total amount of energy supplied by PG&E in its northern and central California service area (estimated in 2000 to be 81,923 million kW per day of electricity and 887 million cubic feet per day of natural gas). Accordingly, the proposed action, constituting a portion of the River Islands at Lathrop demand, would similarly not be expected to require substantial amounts of energy during operation.

The proposed action would be required to meet Title 24 energy efficiency standards and consider implementing the energy-efficient design recommendations included in the Draft Architectural Guidelines. Where feasible, River Islands would also implement SJVPACD's recommended measures aimed at reducing operational emissions; these include incorporation of infrastructure enhanced for public transit and pedestrian use; energy-efficient design strategies for homes and buildings; and other measures (see Chapter 14, *Air Quality*, Mitigation Measure AQ-3). SJVAPCD also provides a list of BMPs for development projects to reduce associated GHG emissions (see Chapter 15, *Climate Change).* Many of these measures, if selected and implemented as part of River Islands at Lathrop, would act to conserve building energy use and reduce resident and worker VMT.

Increases in energy consumption associated with the proposed action would be small relative to the total demand on PG&E's resources; consequently, the proposed action would not require substantial amounts of energy during operation. The proposed action would also implement energy-efficient design features consistent with Title 24 standards, the Draft Architectural Guidelines, and SJVPACD's recommended measures for reducing operational emissions. In addition, the proposed action has been developed in coordination with the City of Lathrop to meet long-term housing demands and expected regional growth. The proposed action is not expected to cause wasteful, inefficient, or unnecessary use of energy during operation; consequently, the direct effects on nonrenewable energy resources would be less than significant. No indirect effects were identified.

23.3.3.2 Alternative 2—No Alteration of Paradise Cut

Alternative 1 would eliminate all alterations to Paradise Cut. To provide the needed flood risk reduction upgrades, the existing Paradise Cut levee would be altered and augmented on the landside.

Construction-related energy and resources use (less than significant)

Commercial and residential development under Alternative 2 would be the similar to that under the proposed action, although the development footprint would be about 225 acres greater, reducing development density from 5.5 dwelling units per acre to 4.94 dwelling units per acre. To accommodate the reduced density while developing the same number of units in an expanded footprint, a slight increase in energy consumption could occur during construction due to the need to cover more ground. However, extensive earthwork to the Paradise Cut levee system would not be required, because alterations to the PCC Area and the PCIP Area would be avoided. Overall, the construction-related effects on energy resources would be less under Alternative 2 than under the proposed action. Construction-related effects would be further reduced with implementation of the existing and proposed ARB measures, as well as SJVAPD's recommended emissions reductions measures for heavy-duty construction equipment. Consequently, Alternative 2 is not expected to cause wasteful, inefficient, or unnecessary use of fuel or energy resources during construction; consequently, the direct effects on nonrenewable energy resources would be less than significant. No indirect effects were identified.

Long-term energy use during occupancy and operation (less than significant)

Under Alternative 2, the development area would be expanded and development density would be reduced. To accommodate the reduced density and develop the same number of units, there would be a slight increase (approximately 10%) in energy infrastructure. However, because the quantity of residential and commercial development would be the same as that described under the proposed action, long-term energy consumption would be roughly the same as that under the proposed action.

The River Islands SEIR did not consider the operational energy requirements of the entire River Islands at Lathrop development to be substantial relative to the total demand on PG&E's resources (City of Lathrop 2002). The development components proposed under Alternative 2 would similarly not be expected to require substantial amounts of energy during operation. In addition, many of the components would be required to meet Title 24 energy efficiency standards and would incorporate the energy-efficient design recommendations included in the Draft Architectural Guidelines as well as SJVPACD's recommended measures aimed at reducing operational emissions. Alternative 2 is not expected to cause wasteful, inefficient, or unnecessary use of energy during operation; consequently, the direct effects on nonrenewable energy resources would be less than significant. No indirect effects were identified.

23.3.3.3 Alternative 3—Avoidance of Central Drainage Ditch

Residential and commercial development under Alternative 3 would entail the same components as the proposed action, but they would be configured to avoid the central drainage ditch (Figure 2-8).

Construction-related energy use (less than significant)

Avoidance of the central drainage ditch would reduce the development footprint of the RID Area by about 150 acres. It would also necessitate the construction of up to 10 clear-span bridges to convey traffic across the ditch. Additional energy infrastructure (e.g., electrical and gas lines) would need to be constructed on either side of the drainage ditch (or within the bridges crossing the ditch) to provide service to residents of the proposed action. This added construction would require fuel consumption in addition to that required under the proposed action. Overall, the effects related to energy resources would be generally similar to those under the proposed action. While inefficient, wasteful, and unnecessary energy consumption and/or use of fuels could potentially occur during construction, these construction-related effects would be reduced with implementation of the existing and proposed ARB measures, as well as SJVAPD's recommended emissions reductions measures for heavy-duty construction equipment. Alternative 3 is not expected to cause wasteful, inefficient, or unnecessary use of fuel or energy resources during construction; consequently, the direct effects on nonrenewable energy resources would be less than significant. No indirect effects were identified.

Long-term energy use during occupancy and operation (less than significant)

Under Alternative 3, the development footprint would be reduced by approximately 150 acres. Although additional energy infrastructure would be needed, the long-term energy use during occupancy and operation would not differ from the energy that would be required under the proposed action. Therefore, the potential for adverse effects on energy resources under Alternative 3 would the same as that under the proposed action.

The River Islands SEIR did not consider the operational energy requirements of the entire River Islands at Lathrop development to be substantial relative to the total demand on PG&E's resources (City of Lathrop 2002). The development components proposed under Alternative 3 would similarly not be expected to require substantial amounts of energy during operation. In addition, many of the components would be required to meet Title 24 energy efficiency standards and would incorporate the energy-efficient design recommendations included in the Draft Architectural Guidelines as well as SJVPACD's recommended measures aimed at reducing operational emissions. Alternative 2 is not expected to cause wasteful, inefficient, or unnecessary use of energy during operation; consequently, the direct effects on nonrenewable energy resources would be less than significant. No indirect effects were identified.

23.3.3.4 Alternative 4—Proposed Action with Expanded Flood Risk Reduction

Alternative 4 would comprise the proposed action along with expanded flood risk reduction. Additional components under Alternative 4 include constructing a new bypass channel or channels west of the existing Paradise Cut flood bypass, implementing more extensive widening in Paradise Cut, widening Paradise Weir and constructing an additional weir upstream of the existing Paradise Weir, and creating new flood storage areas. Salmon Slough and Doughty Cut could also be dredged to provide additional flood management capacity. The expanded flood risk reduction measures have been developed at only a conceptual level. Specific details related to the amount of earthwork required for these flood risk reduction measures have not been developed. This alternative is analyzed on a programmatic level in this EIS.

Construction-related energy use (less than significant)

To construct expanded flood risk reduction, increased energy resources would be required in addition to the energy required for the proposed action. Creation of a new flood bypass southwest of Stewart Tract would require substantial earthwork and construction. Alterations to area waterways, such as Paradise Cut, Salmon Slough, or Doughty Cut, would also require significant amounts of earthwork to increase flood conveyance capacity in these channels.

The additional flood risk reduction activities would increase fuel use for construction, although the extent of the increase is not known at this time. Consequently, the effects on energy resources during construction of Alternative 4 would be greater than under the proposed action. Construction-related effects would be reduced with implementation of existing and proposed ARB measures, as well as SJVAPD's recommended emissions reductions measures for heavy-duty construction equipment. Alternative 4 is not expected to cause wasteful, inefficient, or unnecessary use of fuel or energy resources during construction; consequently, the direct effects on nonrenewable energy resources would be less than significant. No indirect effects were identified.

Long-term energy use during occupancy and operation (less than significant)

The additional operation and maintenance activities needed for the new flood risk reduction measures under Alternative 4 would require minimal long-term energy use. Energy use during occupancy and operation of the RID Area would be the same as that under the proposed action. Consequently, the potential for adverse effects on energy resources related to occupancy and operation would be similar to that of the proposed action.

The River Islands SEIR did not consider the operational energy requirements of the entire River Islands at Lathrop development to be substantial relative to the total demand on PG&E's resources (City of Lathrop 2002). The development components proposed under Alternative 4 would similarly not be expected to require substantial amounts of energy during operation. In addition, many of the components would be required to meet Title 24 energy efficiency standards and would incorporate the energy-efficient design recommendations included in the Draft Architectural Guidelines as well as SJVPACD's recommended measures aimed at reducing operational emissions. Alternative 2 is not expected to cause wasteful, inefficient, or unnecessary use of energy during operation; consequently, the direct effects on nonrenewable energy resources would be less than significant. No indirect effects were identified.

23.3.3.5 Alternative 5—No Action

The No Action Alternative would entail construction of an interior levee system rather than extended levees for flood risk reduction. The No Action Alternative would not include waterside vegetation on project levees along the San Joaquin and Old Rivers, nor would it include habitat restoration and enhancement activities associated with the PCIP.

Construction-related energy use (less than significant)

Under the No Action Alternative, the overall development concept would be very similar to that of the proposed action, but the development density in the RID Area would be effectively increased. An interior ring levee would be constructed to the 0.5% (200-year) level in lieu of the extended levees along the San Joaquin and Old Rivers. A new component—the 500-foot UPRR trestle not proposed under the proposed action—would be constructed under the No Action Alternative. Construction of the Golden Valley Parkway bridges would take place under authority of the City of Lathrop.

The No Action Alternative would not include any alterations to Paradise Cut (PCC and PCIP Areas) and the central drainage ditch would be avoided. As described for Alternative 2, avoidance of the central drainage ditch would require additional construction to support public services and utilities (up to 10 clear-span bridges would need to be constructed to connect the bifurcated development area). The No Action Alternative would thus require additional construction fuel to construct the additional energy infrastructure, the bridges, and the 500-foot trestle. Because additional construction would be required for these components, effects on energy resources during construction are anticipated to be greater than under the proposed action. However, construction-related effects would be reduced with implementation of the existing and proposed ARB measures, as well as SJVAPD's recommended emissions reductions measures for heavy-duty construction equipment. Alternative 4 is not expected to cause wasteful, inefficient, or unnecessary use of fuel or energy resources during construction; consequently, the direct effects on nonrenewable energy resources would be less than significant. There would be no indirect effects.

Long-term energy use during occupancy and operation (less than significant)

Under the No Action Alternative, the overall development concept would be similar to that of the proposed action, but the interior levee system would effectively increase the development density in the RID Area. Potential effects related to long-term energy use during project operation would be less than under the proposed action. Because the River Islands SEIR did not consider the electricity and natural gas requirements of the entire River Island at Lathrop development to be substantial relative to total demand on PG&E's resources (City of Lathrop 2002), the development components proposed under the No Action Alternative would similarly not be expected to require substantial amounts of energy during operation. In addition, many of the components would be required to meet Title 24 energy efficiency standards and would incorporate the energy-efficient design recommendations included in the Draft Architectural Guidelines as well as SJVPACD's recommended measures aimed at reducing operational emissions. The No Action Alternative is not expected to cause wasteful, inefficient, or unnecessary use of energy during operation; consequently, the direct effects on nonrenewable energy resources would be less than significant. No indirect effects were identified.

23.4 Irreversible and Irretrievable Commitment of Resources

This section fulfills the requirement to address irreversible and irretrievable commitments of resources under NEPA. Irreversible effects are those that directly or indirectly cause use or consumption of resources in such a way that they cannot be restored or returned to their original condition despite mitigation. Potentially irreversible effects are documented in this EIS. An irretrievable effect or commitment of resources occurs when a resource is removed or consumed. These types of effects are evaluated to ensure that consumption is justified.

Irreversible commitments of resources would result from implementing the proposed action and each alternative. These resources are listed below.

- Construction materials.
- Labor.
- Energy needed for construction, operation, and maintenance.
- Conversion of open space, agricultural, and natural environments.

Construction of the River Islands at Lathrop project would use cement, aggregate, steel, and paving media, all of which are nonrenewable resources. Construction could also use various plastic components produced from petroleum, and some elements would likely require wood, a slowly renewable resource, to create falsework for cement pouring and to construct some landscaping elements. Site finishing would likely require additional concrete, steel, paving media, wood, and plastic products to construct recreational facilities. A small volume of dimension stone/natural rock would be used for landscaping at the park facilities or other elements of the project. Construction at all sites would also require a commitment of energy (petroleum) resources for haulage and equipment operation.

Project maintenance would require a small ongoing commitment of energy (petroleum or electricity) for vehicle operations. Over the long term, maintenance could also require nonrenewable mineral and petroleum resources to replace and repair components of the proposed action and alternatives.

Land uses that would be irreversibly committed include agricultural land and open space. The conversion of some agricultural lands to nonagricultural uses is considered an irreversible and irretrievable commitment of resources.

23.5 References

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Chapter 24
Comparison of Alternatives

NEPA requires lead agencies to identify the environmentally preferable alternative from the range of alternatives analyzed in an EIS. The *environmentally preferable alternative* refers to the alternative that would best accomplish NEPA's goals of minimizing significant effects on the environment and protecting natural and cultural resources. Identification of the environmentally preferable alternative is based on a comparison of the anticipated environmental outcomes of all alternatives analyzed. In many cases, this is necessarily a largely subjective evaluation. Moreover, for some proposed actions, the environmentally preferable alternative may be different for different environmental resources.

In accordance with NEPA requirements, the purpose of this chapter is to identify the environmentally preferable alternative. This analysis will also support the Corps' identification of the Least Environmentally Damaging Practicable Alternative (LEDPA), the only approach it may legally permit under CWA Section 404.

To facilitate comparison among alternatives, Table 24-1 (at the end of this chapter) summarizes the significant and beneficial environmental outcomes expected for the four action alternatives and the No Action Alternative as presented in Chapters 3 through 20, Chapter 23, and Chapter 25 of this EIS. The discussions in Table 24-1 provide comparisons between the alternatives for each potential effect.

24.1 Identification of Environmentally Preferable Alternative

24.1.1 Methods

As mentioned above, Table 24-1 presents a summary comparison of the proposed action, the action alternatives, and the No Action Alternative. This comparison provides the basic context for identifying the environmentally preferable alternative, but additional detail at a resource-specific level is needed. This level of detail was obtained by assessing each impact individually to identify the alternative that would offer the best outcome for that specific concern. An alternative was considered "preferred" in the context of a particular resource when outcomes for the majority of effects related to that resource would be the least damaging—or the most beneficial—under that alternative. If more than one alternative was "preferred" for a given resource (i.e., there was no clear majority), outcomes were weighed qualitatively to determine which alternative would offer the greatest environmental benefit with the least environmental detriment. Resource-specific results were then tallied to assess the "score" for each alternative. Where overall outcomes were unclear, effects on aquatic resources were used as the final deciding factor, because of the need to identify which alternative represents the LEDPA for CWA Section 404 permitting.

24.1.2 Outcome

24.1.2.1 Results by Impact and Resource

Table 24-1 (at the end of this chapter) summarizes results by resource and effect. Each summary discussion includes findings by alternative and a brief comment explaining the finding. For additional detail and analysis, please refer to the relevant resource chapter.

24.1.2.2 Environmentally Preferable Alternative

As discussed in *Methods* above, the environmentally preferable alternative is expected to be the alternative identified as preferable for the most resource areas—that is, the one that offers the best outcome overall for the most resources. In most cases, Alternative 3, which includes avoidance of the central drainage ditch, was the environmentally preferable alternative.

Alternative 2 involves no modifications to Paradise Cut. In order to provide the needed flood risk reduction, the Paradise Cut levee would be modified and expanded on the landside. Although this alternative would reduce effects on waters of the United States and aquatic resources in Paradise Cut, effects could likely be mitigated through implementing BMPs, environmental commitments, and mitigation measures in consultation with the resource agencies. The majority of adverse effects are expected to be of limited severity and duration during construction. However, this alternative would not allow for the creation of upland refugia for terrestrial species during high water, a habitat characteristic currently lacking in this area. Moreover, Alternative 2 would not allow for the levees to be constructed with a waterside bench to support planting of riparian vegetation, creating suitable habitat for riparian brush rabbit and other terrestrial species as well as riparian tree cover to benefit aquatic species. Accordingly, this alternative is not environmentally preferable.

Alternative 4 would comprise the proposed action plus additional flood conveyance modification outside the proposed action area. The flood risk reduction component presented under the proposed action would be modified to include the construction of a new bypass channel, more extensive widening in Paradise Cut, widening Paradise Weir and constructing an additional weir upstream of the existing weir, and creating new flood storage areas. Salmon Slough and Doughty Cut could also be dredged to provide additional flood storage capacity under this alternative. Although Alternative 4 would provide all the flood risk reduction components and habitat creation and restoration as the proposed action, and all measures would be designed to maximize their potential benefit to fish and wildlife, Alternative 4 would require obtaining significant acreage outside Stewart Tract and developing multiple landowner agreements. Consequently, the environmental consequences of implementing Alternative 4 are not yet known. Although this alternative does have the potential to provide significant environmental benefits and should be explored further if and when a more specific design is developed, it cannot be identified as the environmentally preferable alternative in this EIS on the basis of the existing level of information, which suggests that it would entail the same adverse effects as Alternative 1.

The No Action Alternative would entail a project that does not require federal review and permitting. Instead, the No Action Alternative proposes construction of an internal setback levee along Old River and Paradise Cut to provide flood risk reduction for the RID Area. All federal project levees and waters of the United States would be avoided under this alternative. Construction of all the residential and commercial elements under the proposed action would occur under the No Action alternative, with a slightly smaller (by approximately 170 acres) footprint. Although the No

Action Alternative would avoid effects on jurisdictional waters and federal project levees, this alternative would not allow for any PCIP modifications (e.g., setback levees, lowered bench, high-ground refugia) or the creation of waterside benches for vegetation and habitat restoration along the San Joaquin and Old Rivers. Neither regional flood risk reduction benefits nor ecosystem restoration and enhancement activities associated with the PCIP and SRA habitat plantings would be realized under the No Action alternative. Therefore, the No Action alternative is not the environmentally preferable alternative.

24.2 Comparison of Environmentally Preferable Alternative and Proposed Action

24.2.1 Proposed Action

As described in Chapter 2, *Proposed Action and Alternatives*, the proposed action would provide a total of approximately 6,716 homes and approximately 2 million square feet of commercial space, along with water-oriented recreational amenities and preserved open space, on Stewart Tract in the Secondary Delta. The proposed action comprises three areal components: the proposed action portion of the RID area, the PCC area, and the PCIP area (Figure 2-2).

The proposed action comprises all the development proposed under Phase 2B of the River Islands at Lathrop project—residential neighborhoods, commercial areas, and support infrastructure such as schools and fire and police facilities. It would also provide a central lake, canals, and other constructed internal waterways; several parks and a system of trails; a Town Center marina on a new back bay water feature along the San Joaquin River; and boat docks built outside the Stewart Tract levee system along the San Joaquin and Old Rivers and in the newly created internal lake system and Paradise Cut Canal.

The PCC Area is adjacent to the southwest margin of the RID Area. The PCC Area would be modified by creating new setback levees on the landside of the existing levee along Paradise Cut and breaching the existing levee to widen the floodway and provide upland refugia for special-status species on the remnants of the breached levee.

The PCIP Area is a portion of the Paradise Cut flood risk management bypass upstream of the PCC Area. Modifications to the PCIP Area include lowering the 40-acre bench near Paradise Weir and constructing a setback levee north of the weir to provide additional flood conveyance capacity; the existing levee would be breached, creating levee remnants in the PCIP Area that could be used as upland refugia as is proposed in the PCC Area.

Under the proposed action, the remnants of the existing levees in the PCC and PCIP Areas would be restored with riparian vegetation to provide fish and wildlife habitat—in particular, habitat for riparian brush rabbit. Portions of the setback levee in the PCIP Area could also include a waterside bench area to accommodate additional riparian plantings suitable for riparian brush rabbit and other terrestrial and aquatic species. Revegetation of the waterside bench areas would be in compliance with the Corps's levee vegetation policy (see *Vegetation Management* in Chapter 2).

24.2.2 Environmentally Preferable Alternative

The environmentally preferable alternative, Alternative 3, would involve all the features of the proposed action along with preservation of the central drainage ditch in the proposed action area. Two waters of the United States are present in the proposed action area: the central drainage ditch (approximately 4 miles long) and the pond (approximately 3 acres). However, all alternatives with the exception of Alternative 2 would avoid the pond; accordingly, it is not a factor in the comparison between the environmentally preferable alternative and the proposed action.

Under the environmentally preferable alternative, the improvements to upland habitat and creation of refugia for riparian terrestrial species, such as riparian brush rabbit, could be accomplished while avoiding the central drainage ditch in the proposed action area. Under this alternative, the flood conveyance capacity and levee modifications would also be realized, allowing for increased flood risk reduction in this area. Although vegetation in the PCIP Area would be affected during construction and lowering of the 40-acre bench, this area would be revegetated and permanent effects would be minimal. This alternative also allows for the potential to contour existing levees in the PCIP Area to include a waterside bench to create additional riparian habitat for terrestrial species and SRA cover for aquatic species.

As stated above, River Islands could implement the residential and commercial components of the proposed action under Alternative 3. Selecting Alternative 3 and avoiding the central drainage ditch would have maximum restoration and flood conveyance possibilities and minimum long-term effects on the environment. Thus, this alternative is the environmentally preferable alternative.

Table 24-1. Comparison of Alternatives by Resource Topic

Effect	Findings[a]	Comments
Chapter 3, Terrestrial Biological Resources		
Effects on common upland biological communities	Alternative 1 – LTS Alternative 2 – LTS Alternative 3 – LTS Alternative 4 – LTS Alternative 5 – LTS	The proposed action and alternatives do not differ in findings for common upland biological communities because these communities are abundant in this region and the overall development footprint of the alternatives differs only slightly between each alternative. Thus, the effects are expected to be less than significant under all alternatives.
Effects on special-status plant species	Alternative 1 – S Alternative 2 – S Alternative 3 – S Alternative 4 – S Alternative 5 – S	Effects on special-status plant species have the potential to be significant under each alternative, since the likelihood of encountering special-status plant species is possible with each alternative.
Effects on waters of the United States	Alternative 1 – S Alternative 2 – S Alternative 3 – S Alternative 4 – S Alternative 5 – NE	Effects on waters of the United States are potentially significant under the action alternatives. Alternative 3 would avoid effects on the central drainage ditch; however, this would result in minimal environmental benefit since this jurisdictional water is heavily managed and currently used for agricultural purposes. Avoiding the pond, however, would be environmentally beneficial, because this area supports emergent vegetation and suitable habitat for wildlife species. Alternative 2 would entail filling the pond. Alternatives 2 and 5 would avoid alterations to Paradise Cut; however, habitat restoration and creation of upland refugia for riparian brush rabbit and giant gartersnake would not be realized under these alternatives. The No Action Alternative would have no effect because it was designed to avoid the need for any federal permits. Habitat restoration and creation in Paradise Cut would not take place under the No Action Alternative.
Effects on riparian habitat	Alternative 1 – S Alternative 2 – S Alternative 3 – S Alternative 4 – S Alternative 5 – LTS	Effects on riparian habitat would be significant under all alternatives. It is anticipated that the only riparian habitat that would be removed during construction of the proposed action is the 40-acre bench in the PCIP Area and the vegetation along the San Joaquin and Old Rivers that would require removal to comply with the Corps' levee vegetation guidelines. Although Alternatives 2 and 5 would avoid effects on the 40-acre bench, the habitat restoration and creation of upland refugia for riparian brush rabbit and giant gartersnake would not occur under these alternatives. Alternative 3 would avoid the central drainage ditch; however, this feature does not support riparian habitat. Long-term effects under Alternatives 1, 3, and 4 could result in a net increase of riparian habitat to support special-status species. Alternative 5 would result in effects on riparian habitat solely through compliance with the Corps' levee vegetation guidelines.
Effects on valley elderberry longhorn beetle	Alternative 1 – S Alternative 2 – S Alternative 3 – S Alternative 4 – S Alternative 5 – LTS	Effects on valley elderberry longhorn beetle have the potential to be significant under the action alternatives because elderberry shrubs have been identified along Old River and in the PCC Area, and these could be disturbed or removed by construction activities. Because the No Action Alternative would avoid all such activities, the effect would be less than significant.

Effect	Findings[a]	Comments
Effects on western pond turtle	Alternative 1 – S Alternative 2 – S Alternative 3 – S Alternative 4 – S Alternative 5 – LTS	Alternative 2 would have a potentially significant effect on western pond turtle because it would fill the pond. Although Alternatives 1, 3, 4, and 5 would avoid the pond, the potential for a significant effect on upland nesting habitat in the PCIP and PCC Areas still exists under Alternatives 1, 3, and 4. Alternative 5 would not adversely affect western pond turtle because aquatic habitat (including the pond) and upland habitat in Paradise Cut would be avoided. However, habitat restoration and creation of upland refugia would not occur under Alternatives 2 or 5.
Effects on giant garter snake	Alternative 1 – S Alternative 2 – S Alternative 3 – S Alternative 4 – S Alternative 5 – S	Alternatives 1, 2, and 4 would potentially have a significant effect on giant garter snake because suitable aquatic habitat is present in drainage ditches and the pond in the RID Area and in aquatic areas in the PCIP and PCC Areas. All upland habitat (agricultural and nonagricultural) within 200 feet of aquatic habitat is also considered suitable for giant garter snake. Alternative 3 would avoid effects on the central drainage ditch. Alternative 5 would avoid effects on aquatic giant garter snake habitat; however, the habitat restoration and creation of upland refugia for riparian brush rabbit and giant garter snake during high water would not occur under Alternative 5. Long-term effects under Alternatives 1 and 4 could result in a net benefit of increasing riparian habitat to support giant garter snake.
Effects on riparian brush rabbit	Alternative 1 – S Alternative 2 – S Alternative 3 – S Alternative 4 – S Alternative 5 – S	Short-term effects on riparian brush rabbit during construction have the potential to be significant under all alternatives (Table 3-9 in Chapter 3, *Terrestrial Biology*). However, Alternatives 1, 3, and 4 would allow for extensive habitat restoration and creation along Paradise Cut. Long-term effects under these alternatives could result in a net benefit through increasing riparian habitat to support riparian brush rabbit. Alternatives 2 and 5 would not allow for any alterations to Paradise Cut, including riparian brush rabbit restoration efforts and creation of upland refugia on levee remnants.
Effects on bats	Alternative 1 – LTS Alternative 2 – LTS Alternative 3 – LTS Alternative 4 – LTS Alternative 5 – LTS	Effects on bat species are expected to be less than significant under all alternatives. No important roost sites are known to be present in the proposed action area. Some foraging habitat would potentially be lost due to construction, but foraging habitat is locally and regionally abundant.
Effects on tricolored blackbird	Alternative 1 – LTS Alternative 2 – LTS Alternative 3 – LTS Alternative 4 – LTS Alternative 5 – LTS	Effects on tricolored blackbird are expected to be less than significant under all alternatives. Suitable foraging habitat is present for tricolored blackbird, but no nesting colonies are known to occur in the immediate vicinity, and suitable foraging habitat is locally and regionally available.
Effects on western burrowing owl	Alternative 1 – S Alternative 2 – S Alternative 3 – S Alternative 4 – S Alternative 5 – S	Effects on western burrowing owl have the potential to be significant under all alternatives. Although burrowing owls are not known to nest within the project footprint, evidence of their presence has been observed in the RID Area, which would be affected under every alternative. Potential burrow habitat occurs along agricultural field edges and levees along the San Joaquin River, Old River, and Paradise Cut. Although suitable burrows are expected to be limited in number due to intensive agricultural activity and the low numbers of California ground squirrels, the effect on burrowing owls could be significant.

Effect	Findings[a]	Comments
Effects on Swainson's hawk	Alternative 1 – S Alternative 2 – S Alternative 3 – S Alternative 4 – S Alternative 5 – S	Effects on Swainson's hawk have the potential to be significant under all alternatives. Agricultural and fallow fields in the RID and PCC Areas provide suitable Swainson's hawk foraging habitat; these fields would be removed in the entire RID Area.
Effects on northern harrier	Alternative 1 – S Alternative 2 – S Alternative 3 – S Alternative 4 – S Alternative 5 – S	Effects on northern harrier have the potential to be significant under all alternatives. Suitable nesting habitat for northern harrier occurs in the PCIP Area near Paradise Weir, and suitable foraging habitat exists in the RID Area. Nesting or foraging habitat would be affected under the proposed action and alternatives. Removal of riparian vegetation to comply with the Corps' levee vegetation guidelines would also have the potential for significant effects on northern harrier.
Effects on white-tailed kite	Alternative 1 – S Alternative 2 – S Alternative 3 – S Alternative 4 – S Alternative 5 – S	Effects on white-tailed kite have the potential to be significant under all alternatives. Suitable nesting habitat is present in riparian habitat in all project component areas, and nests have been documented along the San Joaquin River and the UPPR tracks in the RID Area. Nesting and foraging habitat would be affected under all alternatives. Removal of riparian vegetation in compliance with the Corps' levee vegetation guidelines would also have the potential to adversely affect white-tailed kite.
Effects on greater sandhill crane	Alternative 1 – LTS Alternative 2 – LTS Alternative 3 – LTS Alternative 4 – LTS Alternative 5 – LTS	Effects on greater sandhill crane are expected to be less than significant under all alternatives. Suitable winter foraging habitat for greater sandhill crane would be lost, but suitable foraging habitat for this species is locally and regionally available. These birds are highly mobile while they forage and can easily relocate to nearby foraging sites in the event of disturbance to a foraging field.
Effects on loggerhead shrike	Alternative 1 – S Alternative 2 – S Alternative 3 – S Alternative 4 – S Alternative 5 – S	Effects on loggerhead shrike have the potential to be significant under all alternatives. Suitable nesting habitat for loggerhead shrike is present in isolated trees and shrubs outside riparian habitat, in vegetation around Paradise Weir, and in emergent wetland vegetation surrounding the pond in the RID Area and in Paradise Cut. Removal of riparian vegetation to comply with the Corps' levee vegetation guidelines would also have the potential to adversely affect loggerhead shrike.
Effects on American white pelican	Alternative 1 – LTS Alternative 2 – LTS Alternative 3 – LTS Alternative 4 – LTS Alternative 5 – LTS	Effects on American white pelican are expected to be less than significant under all alternatives. Although potentially suitable foraging habitat for American white pelican would be lost, such habitat is locally and regionally abundant. It is also unlikely that American white pelicans would be present due to the considerable distance between the proposed action area and large bodies of water.
Effects on yellow-breasted chat, yellow warbler, and other migratory bird species	Alternative 1 – S Alternative 2 – S Alternative 3 – S Alternative 4 – S Alternative 5 – S	Effects on yellow-breasted chat, yellow warbler, and other migratory bird species have the potential to be significant under all alternatives. Heavy equipment and human activity during construction would increase noise in the vicinity of the work area, potentially resulting in disturbance of migratory birds (e.g., yellow-breasted chat, yellow warbler) nesting and foraging in the proposed action area.

Effect	Findings[a]	Comments
Effects on wildlife corridors	Alternative 1 – S Alternative 2 – S Alternative 3 – S Alternative 4 – S Alternative 5 – NE	Effects on wildlife corridors have the potential to be significant under the action alternatives. Breaching of the existing federal project levee to create the Lathrop Landing back bay on the San Joaquin River would conflict with the SJMSCP prohibition against development in the San Joaquin River Wildlife Corridor. The effect on wildlife corridors would not be adverse under the No Action Alternative, because no federal project levees would be altered under this alternative.
Chapter 4, Fish Resources		
Temporary disturbance and possible mortality of fish, including special-status species, as a result of construction activities	Alternative 1 – LTS Alternative 2 – LTS Alternative 3 – LTS Alternative 4 – S Alternative 5 – NE	Construction activities and techniques under the action alternatives have the potential to increase sedimentation and turbidity in the surrounding waterways as a result of work on the waterside faces of levees, dredging activities, in-stream activities (bridge construction and modification), activities associated with Paradise Cut floodwater conveyance measures, and construction of the Lathrop Landing back bay. Turbidity resulting from construction and maintenance activities would be intense in the vicinity of the activity but would attenuate with time and distance from the activity, and the effect is expected to be less than significant. Under Alternative 4, additional construction work in and around watercourses in the vicinity of Paradise Cut would be conducted, so there would be an increased potential for construction-related disturbances; these could result in significant effects. Under the No Action Alternative, none of the construction activities affecting the San Joaquin River, Paradise Cut, or Old River would be conducted and there would be no effect.
Effects of entrainment on fish, including special-status species, and other biota from entrainment during dredging	Alternative 1 – S Alternative 2 – S Alternative 3 – S Alternative 4 – S Alternative 5 – NE	Dredging activities that would take place under the action alternatives may disturb, injure, or kill fish. In addition, fish that come within the "zone of influence" of the suction pipe of the hydraulic dredge may be drawn into the dredge along with water and dredged sediments. The effect of dredging activities would be significant under these alternatives, although Alternative 2 would only involve dredging activities associated with the Lathrop Landing back bay. Under the No Action Alternative, none of the water features along the San Joaquin River, Paradise Cut, or Old River would be built and there would be no effect from dredging.
Possible injury or mortality to special-status fish species due to pile driving	Alternative 1 – S Alternative 2 – S Alternative 3 – S Alternative 4 – S Alternative 5 – NE	Noise, vibrations, and other physical disturbances that could occur under the action alternatives could potentially harass fish, disrupt or delay normal activities, or cause injury or mortality from exposure to noise. This would be a significant effect. Although Alternative 2 would not involve earthwork along Paradise Cut, the bridge construction would still take place. Under the No Action Alternative, none of the water features affecting the San Joaquin River, Paradise Cut, or Old River would be built; moreover, the bridges would be constructed under authority of the City of Lathrop, and there would be no effect.

Effect	Findings[a]	Comments
Potential for increased mortality of native fish from predation or entrainment at SWP/CVP pumps associated with diversion into Paradise Cut	Alternative 1 – LTS Alternative 2 – NE Alternative 3 – LTS Alternative 4 – S Alternative 5 – NE	The modifications under Alternatives 1 and 3 would result in more flow (approximately 500 cfs) into Paradise Cut compared to existing conditions. However, because no changes to the height or width of the existing weir are proposed, these modifications would not affect the frequency or duration that San Joaquin River flows are diverted into Paradise Cut, and the effect would be less than significant. Alternative 2 would not result in modifications to Paradise Cut; consequently, there would be no change in the number of fish diverted into Paradise Cut at high flows. Because of the increased capacity of the Paradise Cut floodway bypass under Alternative 4, it is possible that larger numbers of fish could be diverted into Paradise Cut, constituting a significant effect. Under the No Action Alternative, none of the water-related features affecting the San Joaquin River, Paradise Cut, or Old River would be built, and there would be no effect.
Potential effects of entrainment on special-status fish species as a result of diversions into Stewart Tract	Alternative 1 – LTS Alternative 2 – LTS Alternative 3 – LTS Alternative 4 – LTS Alternative 5 – LTS	The amount of water required to maintain water levels in the internal lake system could vary slightly under Alternatives 3 and 5 because the configuration of the water bodies would differ from that under the proposed action. Nevertheless, because any intakes in surrounding waterways (San Joaquin and Old Rivers) would be screened under all alternatives, the effect would be less than significant.
Water quality effects on fish in Paradise Cut, Old River, and the San Joaquin River associated with increased urban runoff	Alternative 1 – LTS Alternative 2 – LTS Alternative 3 – LTS Alternative 4 – LTS Alternative 5 – LTS	Currently, most of Stewart Tract is used for agricultural production, and excess irrigation runoff and storm drainage is collected in a drainage ditch and pumped untreated into Paradise Cut. Under all alternatives, the interior lake system would be used to collect and store onsite drainage. The increase in new impervious surfaces combined with the runoff from urbanized areas would result in a change from agricultural runoff to urban runoff. Although the potential exists for degradation of water quality associated with urbanization, the naturally occurring treatment of urban runoff associated with internal water features would result in a beneficial effect. Because Alternatives 3 and 5 would entail a modified design of the internal lake complex and would retain the central drainage ditch, there would be less treatment of urban runoff (i.e., settling or sediment and adsorption contaminants) from the RID Area, and the discharged stormwater would be higher in turbidity and adsorbed contaminants under these alternatives.
Disturbance and possible mortality of fish, including special-status species, associated with boat and marina operation	Alternative 1 – S Alternative 2 – S Alternative 3 – S Alternative 4 – S Alternative 5 – NE	Year-round operation of the marina and storage of boats that would be implemented under the action alternatives would increase the chance of periodic or chronic discharges of gasoline, oil, and other contaminants into the river, potentially resulting in significant effects. Operation and maintenance of the new marina would also increase the amount of surface runoff from impervious surfaces (building roofs and parking areas), increasing the potential for discharges of contaminants into the river. Although Alternative 2 would avoid alterations to Paradise Cut, the disturbance and possible mortality of fish associated with boat and marina operation at the Lathrop Landing back bay would still be potentially significant. Under the No Action Alternative, none of the water features affecting the San Joaquin River, Paradise Cut, or Old River would be built and there would be no effect.

Effect	Findings[a]	Comments
Predation and altered habitat function associated with overwater structures and modification of stream morphology	Alternative 1 – S Alternative 2 – S Alternative 3 – S Alternative 4 – S Alternative 5 – NE	Shade resulting from piers and floating docks described under the action alternatives could create favorable conditions for predatory fish species, resulting in a significant effect. Although this effect would be reduced under Alternative 2 because of avoidance of alterations to Paradise Cut, it would still be adverse due to overwater structures and modification of stream morphology to create the Lathrop Landing back bay. Under the No Action Alternative, none of the water features affecting the San Joaquin River, Paradise Cut, or Old River would be built and there would be no effect.
Potential for stranding of fish, including special-status species, in Paradise Cut	Alternative 1 – S Alternative 2 – NE Alternative 3 – S Alternative 4 – S Alternative 5 – NE	Physical alterations to Paradise Cut resulting from modifications under the Alternative 1, 3, and 4 would create shallow-water habitat. Fluctuating water levels in this area could potentially lead to increased mortality of fish if these alterations lead to the formation of isolated pool habitats or if fish become stranded during receding flow events. This would constitute a significant effect. Because Alternatives 2 and 5 would avoid alterations to Paradise Cut, these effects would not occur.
Loss of shaded riverine aquatic cover as a result of construction	Alternative 1 – S Alternative 2 – S Alternative 3 – S Alternative 4 – S Alternative 5 – S	Corps levee vegetation guidelines prescribe that levees be unvegetated; this policy would require implementation under all alternatives. Riparian vegetation influences the stream ecosystem in numerous ways and the effects of altering riparian vegetation are highly variable, ranging from increased sedimentation and warmer localized stream temperatures to decreased food production and habitat complexity. Consequently, all alternatives would result in a significant effect associated with loss of SRA cover. The action alternatives would allow for onsite mitigation and habitat restoration of SRA cover, although Alternative 4 could result in additional riparian removal in offsite locations (yet to be determined).
Elimination of agricultural water diversion and discharges	Alternative 1 – B Alternative 2 – B Alternative 3 – B Alternative 4 – B Alternative 5 – B	Under the proposed action and alternatives, agricultural water diversion and discharges would be eliminated and fish screens would be installed to all intake diversions into the internal lake system. This would constitute a beneficial effect.
Chapter 5, Geology, Soils, and Mineral Resources		
Effects on structures and personal safety as a result of seismic ground shaking, seismically induced liquefaction, and related types of ground failure	Alternative 1 – S Alternative 2 – S Alternative 3 – S Alternative 4 – S Alternative 5 – S	Effects on structures and personal safety as a result of seismic groundshaking, seismically induced liquefaction, and related types of ground failure have the potential to be significant under all alternatives. The development footprint of the alternatives would be subject to seismic activity in the area resulting from motion along the San Andreas, Hayward, and Calaveras faults and the Great Valley Fault System. Effects from this activity would not differ between alternatives.
Effects on structures and infrastructure as a result of construction on expansive and/or corrosive soils	Alternative 1 – S Alternative 2 – S Alternative 3 – S Alternative 4 – S Alternative 5 – S	Effects on structures and infrastructure as a result of construction on expansive and/or corrosive soils have the potential to be significant under all alternatives. Previous studies indicate that the development footprint (which generally does not change substantially among alternatives) may have a moderate to low potential for expansive and corrosive characteristics.

Effect	Findings[a]	Comments
Effects due to failure of cut and fill slopes, including but not limited to levee slopes	Alternative 1 – S Alternative 2 – S Alternative 3 – S Alternative 4 – S Alternative 5 – S	Effects due to failure of cut and fill slopes, including but not limited to levee slopes, have the potential to be significant under all alternatives. The alternatives aim to create new levees; the action alternatives propose modifications to existing levees; all these activities could be adversely affected by earthquake-induced lateral spreading and landslides.
Potential for seepage and associated detrimental effects	Alternative 1 – LTS Alternative 2 – LTS Alternative 3 – LTS Alternative 4 – LTS Alternative 5 – LTS	Potential for seepage and associated detrimental effects are not expected to be significant under any alternative. The results of preliminary analysis indicate that a suitable levee section for retrofitting the existing levees and construction of new levees could be designed in accordance with current standards and conform to practical construction constraints. Design standards would be consistent for all alternatives.
Potential for construction related erosion	Alternative 1 – LTS Alternative 2 – LTS Alternative 3 – LTS Alternative 4 – LTS Alternative 5 – LTS	Potential for construction-related erosion is not expected to be significant under any alternative. Topography of the area (with the exception of the levees) is flat, minimizing the potential for water erosion. Levees surrounding the RID Area create a closed system and confine sediments within the levees. Construction contractors would be required to comply with the same the environmental commitments, including development of a SWPPP and implementation of BMPs, under all alternatives.
Chapter 6, Water Resources and Flood Risk Management		
Change in Delta flow as a result of modified diversions and drainage	Alternative 1 – LTS Alternative 2 – LTS Alternative 3 – LTS Alternative 4 – LTS Alternative 5 – LTS	Under all alternatives, there would be no diversions for agriculture. Similarly, drainage resulting from rainfall runoff would be greater than under existing (agricultural) conditions, although this runoff would occur during wet periods, when Delta flows would already be relatively high. The interior lake–canal complex would provide some storage capacity to retain peak runoff and allow for some infiltration to the groundwater and settling of particulates. Postproject peak biweekly rainfall runoff that would be discharged from the interior lake system would result in a relatively small increase compared to the flow in Old River. Thus, effects on Delta flows are not expected to be significant under any alternative.
Change in Delta water quality associated with runoff	Alternative 1 – LTS Alternative 2 – LTS Alternative 3 – LTS Alternative 4 – LTS Alternative 5 – LTS	Water quality contamination is expected to be reduced under all alternatives due to the conversion of agricultural land. Although some water quality constituents may have increased loading in Paradise Cut as a result of the change from agricultural to urban runoff, none of these constituents would be expected to be present in concentrations exceeding water quality standards. Because the largest postproject discharges would generally occur during storm events when flows in the Delta and Paradise Cut would be elevated and dilution rates would be high, the effects on Delta water quality are expected to be beneficial under all alternatives.

Effect	Findings[a]	Comments
Decrease in water quality resulting from construction activities	Alternative 1 – LTS Alternative 2 – LTS Alternative 3 – LTS Alternative 4 – LTS Alternative 5 – LTS	Activities under all alternatives would involve construction-related ground-disturbing activities that could potentially cause erosion and sedimentation discharge into adjacent water bodies. The environmental commitment to implement BMPs associated with the NPDES General Permit would reduce the likelihood that construction-related water quality effects would occur, or would reduce any effect that does occur. In addition, because there is no direct runoff from the site, all runoff would be stored prior to discharge from Stewart Tract. With adherence to the BMPs, impacts on water quality resulting from construction are expected to be less than significant.
Decrease in water quality resulting from construction adjacent to Delta waterways	Alternative 1 – S Alternative 2 – S Alternative 3 – S Alternative 4 – S Alternative 5 – LTS	An accidental spill or inadvertent discharge of construction materials adjacent to or in a water body could affect water quality in the San Joaquin River, Old River, or Paradise Cut. However, environmental commitments have been incorporated into the alternatives to avoid and minimize potential effects associated with potential accidental discharges of construction materials, and Mitigation Measures HYD-1 through HYD-3 would be implemented. Moreover, any increases in turbidity and other contaminants that may occur during construction and maintenance would be temporary and would be diluted quickly because of river currents and tidal flushing. The action alternatives could result in potential significant effects; however, because Alternative 2 would not entail modifications in Paradise Cut, the potential for effects in that area would not occur. Alternative 5 would not entail any construction adjacent to waterways, and the effect would consequently be less than significant.
Decrease in water quality resulting from periodic dredging	Alternative 1 – S Alternative 2 – S Alternative 3 – S Alternative 4 – S Alternative 5 – NE	Dredging may directly produce temporary water quality effects by stirring up contaminated bottom sediments and releasing them into the water column. However, as described in Mitigation Measure HYD-4, several measures would be implemented to reduce water quality impacts associated with dredging. In addition, dredging would require a Section 404 permit (with Section 401 certification). Alternative 2 would not entail dredging of the Paradise Cut Canal, but it would require dredging of the Lathrop Landing back bay. Alternative 5 would not involve any periodic dredging, and there would be no effect.
Effects on groundwater quality	Alternative 1 – LTS Alternative 2 – LTS Alternative 3 – LTS Alternative 4 – LTS Alternative 5 – LTS	There are no municipal water supply wells on Stewart Tract. Therefore, potential contamination of potable groundwater used for private or municipal wells would not occur under any alternative. All alternatives would include measures to prevent contaminants from reaching the groundwater, such as implementing BMPs to reduce potential contamination during construction and treatment of urban runoff in the wetlands prior to entering the internal lake system. Therefore, the effect on groundwater quality is expected to be less than significant under alternatives.
Decreased water quality as a result of increased boat traffic	Alternative 1 – S Alternative 2 – S Alternative 3 – S Alternative 4 – S Alternative 5 – S	The construction of boat docks under the action alternatives could result in hundreds of additional boats in the Delta, potentially causing deleterious water quality effects. This would be a significant effect. However, under the action alternatives, Mitigation Measure HYD-5 would include several measures to minimize these effects (e.g., speed restrictions, discharge requirements). Alternative 5 would not entail the construction of boat docks or an increase in boat traffic, so there would be no direct effect; however, the increased population could lead to an indirect effect by increasing demand for water-based recreation activities using regional facilities.

Effect	Findings[a]	Comments
Effects on federal project levees—Section 408 evaluation	Alternative 1 – LTS Alternative 2 – LTS Alternative 3 – LTS Alternative 4 – LTS Alternative 5 – NE	Because there was no simulated overtopping of the existing levees, and almost no changes in the simulated river profile elevations under any alternative, there are no hydraulic effects on the existing levee performance and no increase in flood risk caused by any alternatives. Because no alterations of any existing federal project levees would take place, there would be no effect.
Increased river elevations causing reduced flood risk reduction of surrounding and downstream urban levees	Alternative 1 – LTS Alternative 2 – LTS Alternative 3 – LTS Alternative 4 – LTS Alternative 5 – LTS	All alternatives would result in slight increases in San Joaquin River, Old River, and Paradise Cut elevations. These changes would be minor and would not increase the flood risk for any urban levee.
Chapter 7, Cultural Resources		
Effects on archaeological resources	Alternative 1 – S Alternative 2 – S Alternative 3 – S Alternative 4 – S Alternative 5 – S	Effects resulting from ground disturbance at undiscovered archaeological sites or at sites of human remains have the potential to be significant under all alternatives. The likelihood of encountering archaeological sites or human remains would not vary between any of the alternatives.
Effects on historical resources	Alternative 1 – LTS Alternative 2 – LTS Alternative 3 – LTS Alternative 4 – S Alternative 5 – LTS	Alternatives 1, 2, 3, and 5 all introduce new elements that would have the potential to adversely affect the historic setting of six nearby grain silos that are recommended as eligible for listing in the NRHP. However, both a field survey and a Line of Sight analysis suggests that implementation of these alternatives would have a less-than-significant effect on the eligible silos. Because the location of additional activities occurring under Alternative 4 are not known at this time, there is a potential for a significant effect on historical resources, depending on the location of the earthwork.
Chapter 8, Paleontological Resources		
Potential to damage unique paleontological resources	Alternative 1 – S Alternative 2 – S Alternative 3 – S Alternative 4 – S Alternative 5 – S	Much of the proposed action area is underlain by younger (Holocene-age) sediments, which is considered to have a low potential (low sensitivity) rating for containing significant paleontological resources. However, older sediments (Pleistocene Modesto Formation) have been mapped immediately east of the proposed action area, and this formation may also be present subsurface in the proposed action area. Thus, earthwork required to construct the alternatives would have the potential to damage and/or disturb vertebrate and other fossil resources. The likelihood of encountering paleontological resources would not vary between the alternatives.

Effect	Findings[a]	Comments
Chapter 9, Land Use		
Consistency with land use plans	Alternative 1 – NE Alternative 2 – NE Alternative 3 – NE Alternative 4 – S Alternative 5 – NE	There would be no inconsistency with land use plans under Alternatives 1, 2, 3, or 5, because direct changes are consistent with the relevant local jurisdiction plans, and no general plan or specific plan amendments would be required to support the proposed action documents. Because the location of additional activities under Alternative 4 are not known at this time and additional acreage required under this alternative would be outside the WLSP planning area and would likely require amendments to the general plan and specific plan from the City or County, there is a potential for a significant effect regarding consistency with land use plans.
Chapter 10, Agricultural Resources		
Conversion of Important Farmland to non-agricultural uses	Alternative 1 – S Alternative 2 – S Alternative 3 – S Alternative 4 – S Alternative 5 – S	Construction of all alternatives would result in the permanent conversion of Prime Farmland and Farmland of Statewide Importance. The effect finding would not differ among any of the alternatives.
Adjacent landowner/user conflicts	Alternative 1 – S Alternative 2 – S Alternative 3 – S Alternative 4 – S Alternative 5 – S	Construction of all alternatives would result in development that would abut ongoing agricultural operations, resulting in a potential significant effect regarding adjacent landowner/user conflicts. The effect finding would not differ among any of the alternatives.
Chapter 11, Recreation		
Availability of local land-based recreational facilities and opportunities	Alternative 1 – B Alternative 2 – B Alternative 3 – B Alternative 4 – B Alternative 5 – B	Under all alternatives, approximately 73 acres of community parks, 55 acres of lakefront parks, 45 acres of river vista parks, and 44 acres of village parks and paseos would be created, for a total of approximately 217 acres. This system of parks would increase the overall availability of public parks in the Lathrop area, exceeding the required extent of parklands for the buildout population (under all alternatives) by 119 acres—an excess of more than 100%. Effects on the availability of local land-based recreation facilities and opportunities would be beneficial.
Availability of regional land-based recreational facilities and opportunities	Alternative 1 – LTS Alternative 2 – LTS Alternative 3 – LTS Alternative 4 – LTS Alternative 5 – LTS	Implementation of all alternatives would add approximately 19,514 residents to the City and County. However, each alternative would construct a substantial amount of local recreational facilities to meet the increased demand, offsetting the use of regional facilities. Effects are expected to be less than significant under all alternatives.

Effect	Findings[a]	Comments
Access to water-based recreation	Alternative 1 – B Alternative 2 – B Alternative 3 – B Alternative 4 – B Alternative 5 – S	Development of Alternatives 1, 3, and 4 would add a total of 675 boat berths to the waterways around River Islands. These new recreational facilities are considered beneficial effects relative to the availability of water-based recreation. Alternative 2 would add 200 fewer boating docks, but would still increase access to water-based recreation, resulting in a beneficial effect. Alternative 5 would not change current water-based recreational activities, but the large increase in the local population could overwhelm regional facilities. There would be a beneficial effect under the action alternatives and a significant effect under Alternative 5.
Changes in character of existing water-based recreational activities	Alternative 1 – LTS Alternative 2 – LTS Alternative 3 – LTS Alternative 4 – LTS Alternative 5 – S	Changes in the character of existing water-based recreational activities under the action alternatives are expected to be less than significant. Most of the current users of the local waterways are presumably accustomed to boating and fishing; boat speed restrictions would be employed in a relatively small area of the Delta, and the additional water-based recreational opportunities could be perceived as advantageous. No group boat docks or fishing piers would be installed under Alternative 5. However, the buildout population of 19,514 residents would constitute a substantial number of new users for water-based recreation who could not be accommodated by existing water-based recreation facilities. This would be a significant effect.
Chapter 12, Transportation and Circulation		
Degradation of intersection LOS from operational traffic	Alternative 1 – S Alternative 2 – S Alternative 3 – S Alternative 4 – S Alternative 5 – S	The overall development for commercial and residential space at full buildout would be realized under all alternatives. Traffic resulting from operation would be the same under each alternative, since residential and commercial buildout would be identical under each. The effect finding does not differ among any of the alternatives.
Degradation of roadway LOS from operational traffic	Alternative 1 – S Alternative 2 – S Alternative 3 – S Alternative 4 – S Alternative 5 – S	The overall development for commercial and residential space at full buildout would be realized under all alternatives. Traffic resulting from operation would be the same under each alternative, since residential and commercial buildout would be identical under each. The effect finding does not differ among any of the alternatives.
Degradation of freeway mainline LOS from operational traffic	Alternative 1 – S Alternative 2 – S Alternative 3 – S Alternative 4 – S Alternative 5 – S	The overall development for commercial and residential space at full buildout would be realized under all alternatives. Traffic resulting from operation would be the same under each alternative, since residential and commercial buildout would be identical under each. The effect finding does not differ among any of the alternatives.
Degradation of freeway ramp LOS from operational traffic	Alternative 1 – S Alternative 2 – S Alternative 3 – S Alternative 4 – S Alternative 5 – S	The overall development for commercial and residential space at full buildout would be realized under all alternatives. Traffic resulting from operation would be the same under each alternative, since residential and commercial buildout would be identical under each. The effect finding does not differ among any of the alternatives.

Effect	Findings[a]	Comments
Potential effects on internal vehicle circulation	Alternative 1 – S Alternative 2 – S Alternative 3 – S Alternative 4 – S Alternative 5 – S	The overall development for commercial and residential space at full buildout would be realized under all alternatives. Traffic resulting from operation would be the same under each alternative, since residential and commercial buildout would be identical under each. The effect finding does not differ among any of the alternatives.
Potential effects on onsite pedestrian circulation	Alternative 1 – S Alternative 2 – S Alternative 3 – S Alternative 4 – S Alternative 5 – S	The overall development for commercial and residential space at full buildout would be realized under all alternatives. The use of River Islands at Lathrop collector roadways by through traffic at peak hours could result in adverse safety conditions. The effect finding does not differ among any of the alternatives.
Potential effects on onsite bicycle circulation	Alternative 1 – S Alternative 2 – S Alternative 3 – S Alternative 4 – S Alternative 5 – S	The overall development for commercial and residential space at full buildout would be realized under all alternatives. In locations with moderate to high pedestrian volumes, the width of trails could give rise to conflicts between pedestrians and bicyclists. The effect finding does not differ among any of the alternatives.
Provisions for public transit	Alternative 1 – LTS Alternative 2 – LTS Alternative 3 – LTS Alternative 4 – LTS Alternative 5 – LTS	The River Islands at Lathrop development incorporates provisions for public transit facilities and programs in keeping with projected demand. The effect finding does not differ among any of the alternatives.
Disruption of street operations from construction traffic	Alternative 1 – S Alternative 2 – S Alternative 3 – S Alternative 4 – S Alternative 5 – S	Although construction activities would vary slightly among alternatives, overall construction traffic would be very similar under each. Therefore, the effect finding does not differ among the alternatives.
Chapter 13, Noise		
Increases in short-term construction-generated noise	Alternative 1 – S Alternative 2 – S Alternative 3 – S Alternative 4 – S Alternative 5 – S	The overall development for commercial and residential space at full buildout would be realized under all alternatives. Although construction activities would vary slightly under these alternatives, overall effects from construction noise would be very similar under each. Noise resulting from construction would be the same under each alternative, since residential and commercial buildout would be identical. Therefore, the effect finding does not differ among any of the alternatives.
Stationary source noise generated by onsite land uses	Alternative 1 – S Alternative 2 – S Alternative 3 – S Alternative 4 – S Alternative 5 – S	The overall development for commercial and residential space at full buildout would be realized under all alternatives. Although operational activities would vary slightly under these alternatives, overall effects from operational noise would be very similar under each. Noise resulting from operation would be the same under each alternative, since residential and commercial buildout would be identical. Therefore, the effect finding does not differ among any of the alternatives.

Effect	Findings[a]	Comments
Increases in traffic noise levels	Alternative 1 – LTS Alternative 2 – LTS Alternative 3 – LTS Alternative 4 – LTS Alternative 5 – LTS	The overall development for commercial and residential space at full buildout would be realized under all alternatives. Although traffic patterns might vary slightly between alternatives, overall effects from traffic noise would be very similar under each. Therefore, the effect finding does not differ among any of the alternatives.
Compatibility of proposed land uses with projected onsite noise levels	Alternative 1 – S Alternative 2 – S Alternative 3 – S Alternative 4 – S Alternative 5 – S	The overall development for commercial and residential space at full buildout would be realized under all alternatives. Exposure of sensitive receptors to noise from nearby sources would be the same under each alternative, since residential and commercial buildout would be identical under each. Therefore, the effect finding does not differ among any of the alternatives.
Chapter 14, Air Quality*		
River Islands at Lathrop emissions in excess of federal *de minimis* thresholds	Alternative 1 – S Alternative 2 – S Alternative 3 – S Alternative 4 – S Alternative 5 – S	Emissions of all criteria pollutants except SO_2 would exceed federal *de minimis* standards under all alternatives. Criteria pollutant emissions were only modeled for the proposed action; the percent of increase or decrease relative to the proposed action was modeled for each alternative. The variance between alternatives would be minimal; there would be no substantive difference in the magnitude of the adverse effects between alternatives.
Potential health risks from exposure of sensitive receptors to carbon monoxide	Alternative 1 – LTS Alternative 2 – LTS Alternative 3 – LTS Alternative 4 – LTS Alternative 5 – LTS	Emissions of all criteria pollutants except SO_2 would exceed federal *de minimis* standards under all alternatives. However, modeling indicated that the proposed action would not exceed the 1- or 8-hour CAAQS or NAAQS that have been established for CO. The variance between alternatives would be minimal; there would be no substantive difference in the magnitude of the adverse effects between alternatives.
Potential health risks from exposure of sensitive receptors to diesel particulate matter from construction equipment	Alternative 1 – S Alternative 2 – S Alternative 3 – S Alternative 4 – S Alternative 5 – S	Although mitigation is proposed to address this effect, sensitive receptors would be exposed to increased health risks from exposure to DPM associated with construction activities under all alternatives. The variance between alternatives would be minimal; there would be no substantive difference in the magnitude of the adverse effects between alternatives.
Corps action emissions in excess of federal de minimis thresholds	Alternative 1 – LTS Alternative 2 – LTS Alternative 3 – LTS Alternative 4 – LTS Alternative 5 – NE	

Effect	Findings[a]	Comments
Chapter 15, Climate Change‡		
Effects of GHG emissions	Alternative 1 – S Alternative 2 – S Alternative 3 – S Alternative 4 – S Alternative 5 – S	According to SJVAPCD CEQA guidance, all alternatives would contribute GHGs in an amount that constitutes a significant effect. Reduction measures have been recommended. There would be no substantive difference in the magnitude of the significant effects between alternatives.
Effects of climate change	Alternative 1 – LTS Alternative 2 – LTS Alternative 3 – LTS Alternative 4 – LTS Alternative 5 – LTS	Projections for the proposed action area under scenarios of sea level rise, extreme rainfall and precipitation, and energy demand and water scarcity all indicated that implementation of all alternatives would not expose structures or people to increased risk because of the effects of climate change.
Chapter 16, Public Health and Environmental Hazards		
Potential hazard associated with transport, use, storage, and disposal of hazardous materials	Alternative 1 – S Alternative 2 – S Alternative 3 – S Alternative 4 – S Alternative 5 – LTS	The alternatives are not expected to create a substantial hazard to the public through the routine transport, use, storage, or disposal of hazardous materials during construction or operation of residential and commercial components of these alternatives. However, in the event of an accidental release from a marina or boating facility, the adverse effect on public health—either through direct exposure or through environmental contamination—could be significant under any alternative. Alternative 5 does not include the construction of the Lathrop Landing back bay marina or boat docks, so the effect from implementing this alternative would be less than significant.
Exposure of construction workers, residents, and others to existing hazardous materials contamination	Alternative 1 – S Alternative 2 – S Alternative 3 – S Alternative 4 – S Alternative 5 – S	The Phase I report identified a number of potentially contaminated sites within the proposed action area, many of which could potentially affect construction of the alternatives. The potential for a significant effect is equally possible for each alternative.
Potential to support breeding or harborage of disease-carrying mosquitoes	Alternative 1 – S Alternative 2 – S Alternative 3 – S Alternative 4 – S Alternative 5 – S	All alternatives would include various internal waterways that could support standing water that is not subject to current circulation. Such bodies of standing water could provide additional areas of mosquito breeding habitat, potentially resulting in a significant effect related to vector-borne hazards.
Potential for health effects associated with use of recycled water	Alternative 1 – LTS Alternative 2 – LTS Alternative 3 – LTS Alternative 4 – LTS Alternative 5 – LTS	All alternatives would use recycled water to irrigate public landscaped areas, including parks, golf courses, commercial developments, and school grounds. The proposed reuse applications fall under the guidelines for “landscape irrigation with high public contact,” and would also meet the process requirements for “disinfected tertiary recycled water” as defined in Title 22 of the CCR. With Title 22 standards in place, use of recycled water is expected to result in less-than-significant effects on public health under all alternatives.

Effect	Findings[a]	Comments
Potential exposure to wildland fire hazards	Alternative 1 – LTS Alternative 2 – LTS Alternative 3 – LTS Alternative 4 – LTS Alternative 5 – LTS	The addition of the residential and commercial developments, recreational water features, irrigated private and public landscaping, and paved surfaces under all alternatives would replace most of the existing open-space vegetated areas with developed uses where fire hazards can be effectively managed through good design. Effects related to overall fire hazards would be less than significant under all alternatives.
Chapter 17, Public Services and Utilities		
Effects on communication services	Alternative 1 – LTS Alternative 2 – LTS Alternative 3 – LTS Alternative 4 – LTS Alternative 5 – LTS	The overall development for commercial and residential space at full buildout would be realized under all alternatives. Similar public services and utilities would be required, since residential and commercial buildout would be identical under each alternative. Therefore, the effect finding does not differ among any of the alternatives.
Effects on electrical services	Alternative 1 – LTS Alternative 2 – LTS Alternative 3 – LTS Alternative 4 – LTS Alternative 5 – LTS	The overall development for commercial and residential space at full buildout would be realized under all alternatives. Similar public services and utilities would be required, since residential and commercial buildout would be identical under each alternative. Therefore, the effect finding does not differ among any of the alternatives.
Effects on natural gas services	Alternative 1 – LTS Alternative 2 – LTS Alternative 3 – LTS Alternative 4 – LTS Alternative 5 – LTS	The overall development for commercial and residential space at full buildout would be realized under all alternatives. Similar public services and utilities would be required, since residential and commercial buildout would be identical under each alternative. Therefore, the effect finding does not differ among any of the alternatives.
Effects on educational services	Alternative 1 – S Alternative 2 – S Alternative 3 – S Alternative 4 – S Alternative 5 – S	The overall development for commercial and residential space at full buildout would be realized under all alternatives. Similar public services and utilities would be required, since residential and commercial buildout would be identical under each alternative. Therefore, the effect finding does not differ among any of the alternatives.
Effects on fire protection services	Alternative 1 – S Alternative 2 – S Alternative 3 – S Alternative 4 – S Alternative 5 – S	The overall development for commercial and residential space at full buildout would be realized under all alternatives. Similar public services and utilities would be required, since residential and commercial buildout would be identical under each alternative. Therefore, the effect finding does not differ among any of the alternatives.
Effects on police services	Alternative 1 – S Alternative 2 – S Alternative 3 – S Alternative 4 – S Alternative 5 – S	The overall development for commercial and residential space at full buildout would be realized under all alternatives. Similar public services and utilities would be required, since residential and commercial buildout would be identical under each alternative. Therefore, the effect finding does not differ among any of the alternatives.

Effect	Findings[a]	Comments
Effects on animal control services	Alternative 1 – S Alternative 2 – S Alternative 3 – S Alternative 4 – S Alternative 5 – S	The overall development for commercial and residential space at full buildout would be realized under all alternatives. Similar public services and utilities would be required, since residential and commercial buildout would be identical under each alternative. Therefore, the effect finding does not differ among any of the alternatives.
Effects on solid waste services	Alternative 1 – LTS Alternative 2 – LTS Alternative 3 – LTS Alternative 4 – LTS Alternative 5 – LTS	The overall development for commercial and residential space at full buildout would be realized under all alternatives. Similar public services and utilities would be required, since residential and commercial buildout would be identical under each alternative. Therefore, the effect finding does not differ among any of the alternatives.
Effects on water supply	Alternative 1 – S Alternative 2 – S Alternative 3 – S Alternative 4 – S Alternative 5 – S	The overall development for commercial and residential space at full buildout would be realized under all alternatives. Similar public services and utilities would be required, since residential and commercial buildout would be identical under each alternative. Therefore, the effect finding does not differ among any of the alternatives.
Effects on wastewater and sewer services	Alternative 1 – S Alternative 2 – S Alternative 3 – S Alternative 4 – S Alternative 5 – S	The overall development for commercial and residential space at full buildout would be realized under all alternatives. Similar public services and utilities would be required, since residential and commercial buildout would be identical under each alternative. Therefore, the effect finding does not differ among any of the alternatives.
Effects related to recycled water storage and disposal	Alternative 1 – S Alternative 2 – S Alternative 3 – S Alternative 4 – S Alternative 5 – S	The overall development for commercial and residential space at full buildout would be realized under all alternatives. Similar public services and utilities would be required, since residential and commercial buildout would be identical under each alternative. Therefore, the effect finding does not differ among any of the alternatives.
Effects on storm drainage	Alternative 1 – LTS Alternative 2 – LTS Alternative 3 – LTS Alternative 4 – LTS Alternative 5 – LTS	The overall development for commercial and residential space at full buildout would be realized under all alternatives. Similar public services and utilities would be required, since residential and commercial buildout would be identical under each alternative. Therefore, the effect finding does not differ among any of the alternatives.
Chapter 18, Aesthetics		
Temporary visual effects caused by construction activities	Alternative 1 – LTS Alternative 2 – LTS Alternative 3 – LTS Alternative 4 – LTS Alternative 5 – LTS	The response to temporary visual effects from construction of all alternatives would vary between residents, recreationalists, agricultural workers, and motorists. Overall, the effect is not expected to be adverse due to the temporary nature of construction, the buffering potential of surrounding levees or intervening homes, and the standard construction measures that would be implemented under each alternative.

Effect	Findings[a]	Comments
Long-term changes in visual character	Alternative 1 – LTS Alternative 2 – LTS Alternative 3 – LTS Alternative 4 – LTS Alternative 5 – LTS	The response to long-term changes in visual character resulting from all alternatives would vary between residents, recreationalists, agricultural workers, and motorists. Overall, the effect is not expected to be adverse. Although the long-term change in visual character would be substantial, most affected viewers of River Islands at Lathrop are not expected to experience it as an adverse effect; some viewers could perceive the changes in visual character as beneficial.
Increased light and glare	Alternative 1 – S Alternative 2 – S Alternative 3 – S Alternative 4 – S Alternative 5 – S	Because all alternatives would entail conversion from agricultural to residential and commercial uses, some level of increase in daytime glare (reflectivity) and nighttime light would likely be unavoidable.
Visual effects of compliance with Corps levee vegetation guidelines	Alternative 1 – S Alternative 2 – S Alternative 3 – S Alternative 4 – S Alternative 5 – S	Along the San Joaquin and Old Rivers, approximately 2.01 acres and 9.98 acres of vegetation, respectively, would need to be removed to comply with the Corps' levee vegetation guidelines under all alternatives. This aesthetic change has the potential to reduce visual experience for all viewer groups (residents, recreationists, agricultural workers, and motorists), and changes to the visual quality of the landscape could have an adverse effect under each alternative.
Chapter 19, Socioeconomics		
Potential effects on population growth, employment, and housing	Alternative 1 – LTS Alternative 2 – LTS Alternative 3 – LTS Alternative 4 – LTS Alternative 5 – LTS	The overall development for commercial and residential space at full buildout would be realized under all alternatives. Socioeconomic effects would be similar since residential and commercial buildout would be identical under each alternative, and the overall development footprint varies only slightly. Therefore, the effect finding does not differ among any of the alternatives.
Potential effects on the region's economic base	Alternative 1 – B Alternative 2 – B Alternative 3 – B Alternative 4 – B Alternative 5 – B	The overall development for commercial and residential space at full buildout would be realized under all alternatives. Socioeconomic effects would be similar since residential and commercial buildout would be identical under each alternative, and the overall development footprint varies only slightly. Therefore, the effect finding does not differ among any of the alternatives.
Potential effects on population growth and housing demand from project development	Alternative 1 – LTS Alternative 2 – LTS Alternative 3 – LTS Alternative 4 – LTS Alternative 5 – LTS	The overall development for commercial and residential space at full buildout would be realized under all alternatives. Socioeconomic effects would be similar since residential and commercial buildout would be identical under each alternative, and the overall development footprint varies only slightly. Therefore, the effect finding does not differ among any of the alternatives.
Potential housing displacement effects	Alternative 1 – LTS Alternative 2 – LTS Alternative 3 – LTS Alternative 4 – LTS Alternative 5 – LTS	The overall development for commercial and residential space at full buildout would be realized under all alternatives. Socioeconomic effects would be similar since residential and commercial buildout would be identical under each alternative, and the overall development footprint varies only slightly. Therefore, the effect finding does not differ among any of the alternatives.

Effect	Findings[a]	Comments
Potential effects on employment from project development	Alternative 1 – B Alternative 2 – B Alternative 3 – B Alternative 4 – B Alternative 5 – B	The overall development for commercial and residential space at full buildout would be realized under all alternatives. Socioeconomic effects would be similar since residential and commercial buildout would be identical under each alternative, and the overall development footprint varies only slightly. Therefore, the effect finding does not differ among any of the alternatives.
Chapter 20, Environmental Justice		
Potential health effects on minority populations	Alternative 1 – LTS Alternative 2 – LTS Alternative 3 – LTS Alternative 4 – LTS Alternative 5 – LTS	Potential health risks of hazardous material exposure associated with construction activities and existing hazardous materials remaining from previous land uses (especially agricultural practices), as well as increased potential for breeding or harborage of disease-carrying mosquitoes, would be addressed through mitigation measures specifying investigation and remediation of potential sources of contamination or exposure, design requirements to limit mosquito habitat, and development and implementation of a mosquito control plan. This effect would be the same under all five alternatives.
Potential environmental effects on minority populations	Alternative 1 – LTS Alternative 2 – LTS Alternative 3 – LTS Alternative 4 – LTS Alternative 5 – LTS	No subsistence-dependent populations have been identified in the study area; accordingly, no environmental justice effect related to such resources is expected to occur. This effect would be the same under all five alternatives.
Potential socioeconomic effects on minority populations	Alternative 1 – LTS Alternative 2 – LTS Alternative 3 – LTS Alternative 4 – LTS Alternative 5 – LTS	Because conversion of agricultural land to other uses would entail an estimated loss of only 0.6% of agricultural employment in the County and 3.2% in the study area, the effect is not sufficient to be considered a “high and adverse” effect in the geographical context. Furthermore, the proposed action would provide employment and housing opportunities that do not currently exist in the area. Accordingly, effects would be less than significant. This effect would be the same under all five alternatives.
Chapter 22, Growth Inducement and Related Effects		
Construction effects	Alternative 1 – LTS Alternative 2 – LTS Alternative 3 – LTS Alternative 4 – LTS Alternative 5 – LTS	The presence of a substantial labor force in the vicinity of the proposed action suggests that the increased demand for construction workers would not necessarily result in increased demand for housing in the area. No significant growth-inducing effects are expected to result from increased in the population of construction workers under any of the alternatives.
Commercial employment and population effects	Alternative 1 –S Alternative 2 –S Alternative 3 –S Alternative 4 –S Alternative 5 –S	All alternatives would entail development of 6,716 residential units and an estimated population of 19,514 at full buildout. Onsite services would likely meet only some of the needs of the projected population, potentially leading to regional growth to provide goods and services to the expanded population. This potential growth-inducing effect could have significant indirect effects on the environment.

Effect	Findings[a]	Comments
Infrastructure improvement effects	Alternative 1 –S Alternative 2 –S Alternative 3 –S Alternative 4 –S Alternative 5 –S	The proposed action and all alternatives are expected to reduce existing barriers to growth by upgrading transportation, drainage, water supply, and wastewater infrastructure on Stewart Tract. These improvements could be conducive to growth south and west of Paradise Cut in the direction of Tracy. The significant effects associated with such growth would be similar to the direct and indirect effects of the proposed action in the context of the environmental analyses presented in this EIS.
Chapter 23, Energy Resources and Environmental Sustainability		
Construction-related energy and resource use	Alternative 1 – LTS Alternative 2 – LTS Alternative 3 – LTS Alternative 4 – LTS Alternative 5 – LTS	Construction of all alternatives would result in a substantial increase in energy use, which could potentially result in inefficient, wasteful, and unnecessary energy consumption and/or use of fuels. However, inefficient or wasteful use of fuels and other petroleum resources during construction would not be economical for the River Islands at Lathrop project or its contractors. Each alternative would entail implementation of existing and proposed CARB measures and SJVAPD's recommended emissions reduction measures for heavy-duty construction equipment. Because no alternative is expected to cause wasteful, inefficient, or unnecessary use of fuel or energy resources during construction, this effect would be less than significant under all alternatives.
Long-term energy use during occupancy and operation	Alternative 1 – LTS Alternative 2 – LTS Alternative 3 – LTS Alternative 4 – LTS Alternative 5 – LTS	Energy required for the long-term occupancy and operation of all alternatives is not expected to constitute a significant effect. Although operation would increase overall, long-term consumption of natural gas and electricity, this was not considered to be a substantial increase in energy use relative to the total amount of energy supplied by PG&E in its northern and central California service area. In addition, each alternative would also require implementation of Title 24 standards and consideration of design recommendations in the draft Architectural Guidelines.
Chapter 25, Indian Trust Assets		
Changes in value, use, quantity, quality, or enjoyment of any ITAs	Alternative 1 – NE Alternative 2 – NE Alternative 3 – NE Alternative 4 – NE Alternative 5 – NE	There are no identified Indian Trust Assets in the proposed action area based on existing available information. Therefore, the effect finding does not differ among any of the alternatives.

[a] S = Significant
LTS = Less than significant
B = Beneficial
NE = No effect

* Estimates were determined through a comparison of criteria pollutant emissions against federal de minimis thresholds. At full buildout, 2032, emissions of all criteria pollutants (ROG, NOX, PM10, PM2.5 and CO) are over the federal de minimis threshold.

Effect	Findings[a]	Comments

‡ Preliminary data for GHG emissions associated with full buildout of the RID Area are more than 400,000 metric tons (MT) of carbon dioxide equivalents (CO_2e) per year. This is approximately 10% of all emissions in San Joaquin County. No government entity or agency with jurisdictional control over the RID Area has established thresholds for determining what level of GHG emissions from a development project would constitute an adverse effect. Only one air district in California, the BAAQMD, has adopted a threshold of significance for GHG emissions for development projects. For projects other than stationary sources, the BAAQMD has adopted a threshold of 1,100 MT CO_2e/yr or 4.6 MT CO_2e/service population/yr. The SJVAPCD, which has jurisdictional control in the area, is not proposing quantitative thresholds for GHG emissions. Other proposed significance thresholds and adopted thresholds for mandatory reporting are approximately 10,000–25,000 MT CO_2e per year. Preliminary data for River Islands at Lathrop indicate that the operational emissions of the development exceed the range of emissions being considered as thresholds for a variety of project types. Additionally, per capita GHG emissions at full buildout are roughly 27 MT CO_2e per person per year. The state average is currently 13 MT CO_2e per person per year. The state has identified goals to achieve reductions to 10 MT CO_2e per person per year by 2020. Rural communities tend to have higher per capita emissions than urban communities. To date, air quality analysts have not identified any cities or counties (of those that have performed a GHG inventory) in California that exceed 22 MT CO_2e per person per year. Judged on a per capita emissions basis, the River Islands at Lathrop project is inconsistent with the state's GHG reduction goals.

Chapter 25
Indian Trust Assets

This section describes the existing environmental conditions and the consequences of the proposed action and alternatives on Indian Trust assets (ITAs) such as real property, physical assets, or intangible property rights. Specifically, it evaluates and discusses the consequences associated with construction and operation of the proposed action. Effects are determined by the presence of an ITA within the proposed action area, or the proposed action's potential to affect ITAs regardless of its proximity to the ITAs in question.

ITAs are legal interests in assets held in trust by the federal government for Indian tribes or individuals. The trust relationship usually stems from a treaty, executive order, or act of Congress. ITAs can be anything that holds monetary value, such as real property, physical assets, or intangible property rights. Indian reservations, rancherias, and public domain allotments (off-reservation properties) are common ITAs. The land associated with these ITAs, as well as the resources within their boundaries (e.g., trees, minerals, fossil fuels) are also considered trust assets. Reserved hunting, fishing, and water rights may be ITAs.

The key sources of data listed below were used in the preparation of this chapter.

- CALFED Programmatic Final EIR/EIS (CALFED Bay-Delta Program 2000).
- DWR's California Indian Trust Land Map (California Department of Water Resources no date).

Specific reference information is provided in the text.

25.1 Affected Environment

25.1.1 Regulatory Framework

25.1.1.1 Federal Regulations

While no state or local regulations pertain to ITAs, many federal laws, executive orders, policy directives, and regulations place legal responsibilities on executive branch agencies. Collectively, these legally binding authorities guide federal-tribal relations and serve to protect tribal trust assets. Specific regulatory mandates and Corps guidance that relate to ITAs are described in this section.

Laws and Statutes

Government-to-Government Relations with Native American Tribal Governments (Memorandum signed by President Clinton, April 29, 1994; 59 FR 85)

President William J. Clinton's 1994 memorandum, *Government-to-Government Relations with Native American Tribal Governments*, requires federal agencies to assess the effects of their programs on tribal trust resources and federally recognized tribal governments by actively engaging federally recognized tribal governments and consulting with such tribes on a government-to-government level when its actions affect ITAs.

Executive Order 13175 (65 FR 67249)

Executive Order 13175 requires agencies to have regular and meaningful consultation and collaboration with Native American tribal governments on development of regulatory policies that have tribal implications. Policies that have tribal implications are defined in the order to include regulations and other policy statements or actions that have "substantial direct effects on one or more Indian tribes, on the relationship between the Federal government and Indian tribes, or on the distribution of power and responsibilities between the Federal government and Indian tribes."

National Environmental Policy Act of 1969 (NEPA; 83 Stat. 852; 42 USC 4321 et seq./P.L. 91-190)

NEPA establishes a framework of public and tribal involvement in land management planning and actions. NEPA also provides for consideration of historic, cultural, and natural aspects of the environment.

National Historic Preservation Act of 1966 (P.L. 89-665, as amended by P.L. 91-423, P.L. 94-422, P.L. 94-458, and P.L. 96-515)

The NHPA explicitly directs federal agencies to involve tribes along with other consulting parties in the process of identifying historic properties. Specifically, places of cultural and religious significance to tribes are to be considered by federal agencies in policy and project planning. Cultural properties significant to traditional communities have become a type of historic property that federal agencies must identify and manage.

Corps Policy Guidance

Policy Guidance Letter No. 57

Policy Guidance Letter No. 57 is a memo for Commanders, Major Subordinate Commands, and District Commands regarding Indian sovereignty and government-to-government relations with Indian tribes.

CENWD-NA Regulation No. 5-1-1

CENWD-NA Regulation No. 5-1-1 is the Native American policy for the Northwestern Division, covering the policy, responsibilities, and implementation of the Corps' Tribal Policy Principles. This regulation applies to all Northwestern Division commands having responsibility for civil works; military; and hazardous, toxic, and radioactive waste functions.

25.1.2 Existing Conditions

25.1.2.1 Methods Used to Identify Existing Conditions

Information used to prepare this overview of existing conditions was collected from relevant environmental documents and mapping resources. Both Indian land and public domain allotments currently held in trust by the U.S. Government were considered in this analysis.

25.1.2.2 Setting

No Indian reservations, rancherias, or public domain allotments are located in the Sacramento–San Joaquin River Delta (CALFED Bay-Delta Program 2000; California Department of Water Resources no date). Of the11 rancherias or reservations located in the San Joaquin River region, none are located near the proposed action area. The nearest rancheria is the Jackson Rancheria, near Jackson, approximately 48 miles northeast Stewart Tract (Table 25-1).

Table 25-1. Indian Lands in the San Joaquin River Region

Primary Tribe[a]	Name[a]	Land Type[a]	Distance/Direction from River Islands Proposed Action Area
Chukchansi Indians	Picayune	Rancheria	95 miles southeast
Jackson Band of Me-Wuk	Jackson	Rancheria	48 miles northeast
Me-Wuk Indians	Chicken Ranch	Rancheria	50 miles northeast
	Sheep Ranch	Rancheria	58 miles northeast
Mono Indians	Cold Springs	Rancheria	118 miles southeast
	North Fork	Rancheria	107 miles southeast
Santa Rosa Indian Community	Santa Rosa	Rancheria	128 miles southeast
Tule River Indian Tribe	Tule River	Reservation	174 miles southeast
Tuolumne Band of Me-Wuk	Tuolumne	Rancheria	58 miles northeast
Western Mono Indians	Big Sandy	Rancheria	111 miles southeast
Yokut	Table Mountain	Rancheria	104 miles southeast

[a] Source: CALFED Bay-Delta Program 2000.

25.2 Environmental Consequences

25.2.1 Methods for Analysis of Effects

To assess whether construction of the proposed action would affect specific ITAs, areas of potential effects were evaluated for possible conflict with Indian lands and Indian trust assets. Ordinarily, the presence of an ITA within a project area or the project's potential to affect an ITA regardless of the project's proximity to the ITA triggers evaluation of potential effects on ITAs. If an effect on ITAs were to be determined to occur as a result of the proposed action, consultation with the potentially affected tribes would ensue to ensure that the affected tribe(s) would fully evaluate the potential effect of the proposed action and alternatives on ITAs.

25.2.2 Definition of Significant Effects

The proposed action and alternatives were evaluated in regard to their potential to adversely affect an ITA. Specifically, the proposed action would have a significant effect if it would result in an adverse change in the value, use, quantity, quality, or enjoyment of any ITAs. Operation and maintenance of the proposed action would have no effect on ITAs and are not discussed further.

25.2.3 Effects and Mitigation Approaches

Change in the value, use, quantity, quality, or enjoyment of any ITAs (no effect)

Because there are no ITAs in or near the River Islands proposed action area, no direct or indirect effects on ITAs are expected to occur under the proposed action or any of the alternatives.

25.3 References

CALFED Bay-Delta Program. 2000. *Final Programmatic Environmental Impact Report/Environmental Impact Statement*. July 21.

California Department of Water Resources. No date. *California Indian Trust Land Map*. Available: <http://www.waterplan.water.ca.gov/tribal2/docs/GW_Basins_and_Tribal_Trust_Lands_map.pdf>. Accessed: July 10, 2010.

Chapter 26
List of Preparers

26.1 U.S. Army Corps of Engineers

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26.2 ICF International

26.2.1 Management Team

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Resource	Primary Author	Peer Review
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Comparison of Alternatives	Kristin Hageseth	Steve Centerwall
Indian Trust Assets	Andrew Martin	Kristin Hageseth

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John Durnan—Graphics

Chapter 27

List of Recipients

The following elected officials and representatives, Federal, state, local agencies, private organizations, businesses, and residents will receive either a copy of the Draft EIS or notification of document availability. Individuals who may be affected by the project or have expressed interest through the public involvement process also will be notified.

27.1 Government Departments and Agencies

27.1.1 Federal Agencies

- Federal Emergency Management Agency, Region IX
- National Marine Fisheries Service
- U.S. Army Corps of Engineers, Sacramento District
- U.S. Bureau of Reclamation, Mid-Pacific Region
- U.S. Coast Guard
- U.S. Environmental Protection Agency, Environmental Review Office (CED-2)
- U.S.D.A. Natural Resources Conservation Service
- U.S. Fish and Wildlife Service

27.1.2 State Agencies

- California Air Resources Board
- California Department of Conservation
- California Department of Fish and Wildlife
- California Department of Parks and Recreation
- California Department of Toxic Substances Control
- California Department of Transportation, District 3
- California Department of Water Resources
- California Division of Boating and Waterways
- California Highway Patrol
- California Native American Heritage Commission
- California State Lands Commission
- Central Valley Flood Protection Board
- Central Valley Regional Water Quality Control Board
- Office of Historic Preservation
- Delta Stewardship Council

27.1.3 Elected Officials

- Sonny Dhaliwal, City of Lathrop Mayor
- Honorable Barbara Boxer, U.S. Senator
- Honorable Dianne Feinstein, U.S. Senator
- Honorable Jerry McNerney, U.S. Congresswoman, District 9
- Honorable Cathleen Galgiani, California State Senator, District 5
- Honorable Kristin Olsen, California Assembly member, District 12

27.1.4 Regional, County, and City

- City of Lathrop
- City of Lathrop City Council
- City of Lathrop Department of Economic Development
- City of Lathrop Planning Commission
- City of Lathrop Planning Division
- Delta Protection Commission
- Reclamation District 2062
- Reclamation District 2107
- San Joaquin Area Flood Control Agency
- San Joaquin County Planning and Environmental Review
- San Joaquin Mosquito and Vector Control District
- San Joaquin County Office of the Agricultural Commissioner
- San Joaquin County Board of Supervisors
- San Joaquin County Environmental Health Department
- San Joaquin County Planning Department
- San Joaquin County Regional Transit District
- San Joaquin Valley Air Pollution Control District

Acronyms and Abbreviations

$\mu g/m^3$	micrograms per cubic meter
AB	Assembly Bill
AB 32	Assembly Bill 32
AB 939	Assembly Bill 939
ACBM	asbestos-containing building material
ACE	Altamont Commuter Express
ADF	average daily flow
ADWF	average daily dry weather flow
AEP	annual exceedance probability
af	acre-feet
AFY	acre-feet per year
Alquist-Priolo Act	Alquist-Priolo Earthquake Fault Zoning Act
APE	Area of Potential Effects
APSA	Aboveground Petroleum Storage Act
AR4	IPCC Fourth Assessment Report
ARB	California Air Resources Board
ASTs	aboveground storage tanks
ATSDR	Agency for Toxic Substances and Disease Registry
BA	biological assessment
Basin Plans	water quality control plans
BAU	business as usual
Bay Area	San Francisco Bay Area
Bay region	San Francisco Bay region
BCDC	San Francisco Bay Conservation and Development Commission
BESD	Banta Elementary School District
BMPs	best management practices
BO	biological opinion
BOD	biochemical oxygen demand
BPSs	best performance standards
CAA	Clean Air Act
CAAQS	California Ambient Air Quality Standards
CAL Fire	California Department of Forestry and Fire Protection
Cal/EPA	California Environmental Protection Agency
Cal-OSHA	California Occupational Safety and Health Administration
Caltrans	California Department of Transportation
CAPs	Climate Action Plans
CAT	California Climate Action Team
CBC	California Building Code
CCAA	California Clean Air Act
CCAP	Climate Change Action Plan

CCAR	California Climate Action Registry
CCAs	Community Choice Aggregations
CCIC	Central California Information Center
CCR	California Code of Regulations
CDFW	California Department of Fish and Wildlife
CDPH	California Department of Public Health
CDS	continuous deflective separation
CEC	California Energy Commission
Central Valley Water Board	Central Valley Regional Water Quality Control Board
CEQ	Council on Environmental Quality
CEQA	California Environmental Quality Act
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CESA	California Endangered Species Act
cf	cubic feet
CFF	Capital Facilities Fee
CFGC	California Fish and Game Code
CFR	Code of Federal Regulations
CGC	California Government Code
CGS	California Geological Survey
CH_4	methane
CHRIS	California Historical Resources Information System
CIDH	cast-in-drilled-hole
CIF	California Irrigated Farms
CISS	cast-in-steel-shell
City	City of Lathrop
City's SEIR	River Islands at Lathrop Project Subsequent Environmental Impact Report
CIWMB	California Integrated Waste Management Board
CIWMP	Countywide Integrated Waste Management Plan
CNDDB	California Natural Diversity Database
CNEL	community noise equivalent level
CNPPA	California Native Plant Protection Act of 1977
CNPS	California Native Plant Society
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
Comprehensive Study	Sacramento–San Joaquin River Basins Comprehensive Study
Construction General Permit	General Permit for Storm Water Discharges Associated with Construction Activity
Corps	U.S. Army Corps of Engineers
County General Plan	San Joaquin County General Plan
CPRR	Central Pacific Railroad
CPT	cone penetration tests
CPUC	California Public Utilities Commission
CRHR	California Register of Historical Resources

Crossroads	Crossroads Wastewater Treatment Facility
CUPAs	Certified Unified Program Agencies
CVFPB	Central Valley Flood Protection Board
CVFPP	Central Valley Flood Protection Plan
CVP	Central Valley Project
CVRWQCB	Central Valley RWQCB
CWA	federal Clean Water Act
D.A.R.E.	Drug Abuse Resistance Education
dB	decibel
dBA	A-weighted decibel
Delta	Sacramento–San Joaquin Delta
DG/DS	Residential Design Guidelines and Development Standards of River Islands at Lathrop
DHCD	California Department of Housing and Community Development
DHS	California Department of Health Services' Division of Drinking Water and Environmental Management
DHS	California Department of Health Services
DO	dissolved oxygen
DOC	California Department of Conservation
DPM	diesel particulate matter
DPSs	distinct population segments
DRB	Stewart Tract Design Review Board
DTSC	California Department of Toxic Substances Control
du	dwelling units
DU	Dwelling Unit
DWR	California Department of Water Resources
EC	salinity
EDR	Environmental Data Resources
EFH	essential fish habitat
EIR	environmental impact report
EIS	environmental impact statement
ENR	Engineering News Record
EO	Executive Order
EPA	U.S. Environmental Protection Agency
ESA	federal Endangered Species Act of 1973 (16 USC Sec. 1531 et seq.)
ESPs	energy service providers
ESUs	environmentally significant units
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FHWG	Fisheries Hydroacoustic Working Group
FIRM	Flood Insurance Rate Map
FMMP	Farmland Mapping and Monitoring Program
FPPA	Farmland Protection Policy Act

FR	Federal Register
FTA	Federal Transit Administration
g	gravity
g/s-m2	grams per second per square meter
GAMAQI	Guide for Assessing and Mitigating Air Quality Impacts
General Construction Permit	General Permit for Construction Activities
General Dewatering Permit	General Order for Dewatering and Other Low Threat Discharges to Surface Waters
General Plan	Comprehensive General Plan for the City of Lathrop, California
GGS	Giant garter snake
GHAD	Geologic Hazards Abatement District
GHG	greenhouse gas
GLO	Government Land Office
GPD	gallons per day
GPM	gallons per minute
GWh	gigawatt hours
GWP	global warming potential
HFCs	hydrofluorocarbons
HMP	Habitat Management Plan
HOA	Homeowners Association
HOR	Head of Old River
HSWA	Hazardous and Solid Waste Amendments
HTAC	Habitat Technical Advisory Committee
Hz	Hertz
I-	Interstate
IOUs	investor-owned utilities
IPCC	Intergovernmental Panel on Climate Change
ISR	Indirect Source Review
ITAs	Indian Trust Assets
JPA	Joint Powers Authority
kV	kilovolt
kWh/day	kilowatt hours per day
LCFS	Low Carbon Fuel Standard
L_{dn}	day-night sound level
L_{eq}	equivalent sound level
LESA	Land Evaluation and Site Assessment
LID	Lathrop Irrigation District
L_{max}	Maximum Sound Level
LMFPD	Lathrop-Manteca Fire Protection District
L_{min}	Minimum Sound Level

LOS	level of service
LSJB	Lower San Joaquin River Regional Flood Bypass
L_{xx}	Percentile-Exceeded Sound Level
MAF	million acre-feet
Magnuson-Stevens Act	Magnuson-Stevens Fishery Conservation and Management Act
Management Plan	Storm Water Management Plan
Master Plan	Water, Wastewater, and Recycled Water Master Plan
MBR	Membrane Bio-Reactor
MBTA	Migratory Bird Treaty Act (16 USC Sec. 703–712 et seq.)
MEI	maximally exposed individual
MG	million gallons
MGD	million gallons per day
MHTM	mean high tide mark
MPOs	metropolitan planning organizations
MRZ-2	Mineral Resource Zone-2
MRZs	mineral resources zones
MSDS	Material Safety Data Sheets
MSR	Municipal Service Review
MT	metric tons
MUSD	Manteca Unified School District
MW	megawatts
mya	million years ago
N_2O	nitrous oxide
NAAQS	national ambient air quality standards
NAHC	Native American Heritage Commission
NEPA	National Environmental Policy Act
NFIP	National Flood Insurance Program
NGVD	National Geodetic Vertical Datum
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NNL	National Natural Landmarks
NO	nitric oxide
NO_2	nitrogen dioxide
NOA	notice of availability
NOAA	National Oceanic and Atmospheric Administration
NOI	notice of intent
NOP	notice of preparation
NO_x	oxides of nitrogen
NPDES	National Pollutant Discharge Elimination System
NPL	National Priority List
NPS	National Park Service
NRCS	Natural Resources Conservation Service
NRHP	National Register for Historic Places
NRNL	National Registry of Natural Landmarks

NSR	New Source Review
NTUs	nephelometric turbidity units
NWPs	Nationwide permits
ODS	ozone-depleting substances
OES	California Office of Emergency Services
OHWM	ordinary high water mark
OPR	Office of Planning and Research
PCC Area	Paradise Cut Conservation Area
PCIP	Paradise Cut Improvement Project
PEA	preliminary endangerment assessment
PFCs	perfluorocarbons
PG&E	Pacific Gas and Electric Company
Phase I Assessment	Phase I Environmental Site Assessment
PM10	particulate matter 10 microns or less in diameter
PM2.5	particulate matter 2.5 microns or less in diameter
POCs	points of connection
ppb	parts per billion
ppm	parts per million
PPMP	pollution prevention and monitoring program
ppt	parts per thousand
PPV	Peak particle velocity
PRC	Public Resources Code
PTSF	percent time spent following
pvpmpl	passenger vehicles per mile per lane
RCRA	Resource Conservation and Recovery Act
RD	Reclamation district
Reclamation	Bureau of Reclamation
RHNA	regional housing needs allocation
RHNP	regional housing needs plan
RID	River Islands Development
RM	River Mile
ROD	record of decision
ROG	reactive organic gases
ROW	right-of-way
RPS	Renewable Portfolio Standard
RTP	regional transportation plan
RWQCBs	regional water quality control boards
SAA	streambed alteration agreement
SAR	Second Assessment Report
SARA	Superfund Amendments and Reauthorization Act
SB	Senate Bill
SCS	sustainable communities strategy

SCSWSP	South County Surface Water Supply Project
SDFPF	Skinner Delta Fish Protective Facility
SEL	sound exposure level
Settlement	Stipulation of Settlement
SF6	sulfur hexafluoride
SIPs	State Implementation Plans
SJCEHD	San Joaquin County Environmental Health Department
SJCOG	San Joaquin Council of Governments
SJMSCP	San Joaquin County Multi-Species Habitat Conservation and Open Space Plan
SJMVCD	San Joaquin Mosquito and Vector Control District
SJNWR	San Joaquin National Wildlife Refuge
SJRFCS	San Joaquin River Flood Control System
SJRRP	San Joaquin River Restoration Project
SJRT	San Joaquin River and Tributaries
SJRTD	San Joaquin Regional Transit District
SJVAB	San Joaquin Valley Air Basin
SJVAPCD	San Joaquin Valley Air Pollution Control District
SLE	St. Louis encephalitis virus
Small LUP General Permit	Statewide General Permit for Storm Water Discharges Associated with Construction Activity from Small Linear Underground/Overhead Projects
Small LUPs	Small Linear Underground/Overhead Projects
SO_2	sulfur dioxide
SPCCP	spill prevention, control, and countermeasure plan
SR	State Route
SRAs	state responsibility areas
SRFCP	Sacramento River Flood Control Project
SSJID	South San Joaquin Irrigation District
State Water Board	State Water Resources Control Board
SVP	Society of Vertebrate Paleontology
SWP	State Water Project
SWPPP	Storm Water Pollution Prevention Plan
TACs	toxic air contaminants
TCMs	traffic control measures
TDM	Transportation Demand Management
TDS	total dissolved solids
TFCF	Tracy Fish Collection Facility
TMDL	total maximum daily load
TNM	Traffic Noise Model
TUSD	Tracy Unified School District
UBC	Uniform Building Code
UDC	River Islands Urban Design Concept
UNFCCC	United Nations Framework Convention on Climate Change

UPRR	Union Pacific Railroad
USC	United States Code
USDOT	U.S. Department of Transportation
USFWS	U.S. Fish and Wildlife Service
USGS	United States Geological Survey
USTs	underground storage tanks
VELB	Valley elderberry longhorn beetle
VMT	vehicle miles traveled
VOCs	volatile organic compounds
Water/Wastewater Plan	Water, Wastewater, and Recycled Water/Wastewater Plan
WDRs	waste discharge requirements
WEE	western equine encephalomyelitis virus
Williamson Act	California Land Conservation Act of 1965, Section 51200
WLSP	West Lathrop Specific Plan
WNV	West Nile Virus
WQCF	Manteca Water Quality Control Facility
WQCF	Manteca-Lathrop Water Quality Control Facility
WRP	Water Recycling Plant
WRP1	City's Water Recycling Plant 1
WSA	Water Supply Assessment

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