CALIFORNIA HIGH-SPEED TRAIN

Environmental Report

Fresno to Bakersfield Section

Checkpoint C Summary Report

November 2013

CALIFORNIA High-Speed Rail Authority

U.S. Department of Transportation
Federal Railroad Administration

California High-Speed Train Project

Checkpoint C Summary Report
Fresno to Bakersfield Section

PERMIT APPLICATION NUMBER:
SPK-2009-01482

APPLICANTS:
California High-Speed Rail Authority (Authority) and
Federal Railroad Administration (FRA)

PROJECT:
California High-Speed Train Project
Fresno to Bakersfield Section

November 2013

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Acronyms

2008 Mitigation Rule	“Compensatory Mitigation for Losses of Aquatic Resources” (Final Rule) (33 CFR Parts 325 and 332 and 40 CFR Part 230)
Allensworth ER	Allensworth Ecological Reserve
Allensworth SHP	Colonel Allensworth State Historic Park
APE	Area of Potential Effect
Applicants	California High Speed Rail Authority and Federal Railroad Administration
Atwell Island	Atwell Island Land Retirement Demonstration Project
Authority	California High-Speed Rail Authority
BMP	Best Management Practices
BNSF	BNSF Railway
CDFG	California Department of Fish and Game
CDFW	California Department of Fish and Wildlife (changed from CDFG effective 2013)
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
CFR	Code of Federal Regulations
CMP	Compensatory Mitigation Plan
CNPS	California Native Plant Society
CRAM	California Rapid Assessment Method
CRHR	California Register of Historic Resources
CVFPB	Central Valley Flood Protection Board
CVRWQCB	Central Valley Regional Water Quality Control Board
CWA	(federal) Clean Water Act
dBA	decibel(s), A-weighted
DEIR/DEIS	Draft Environmental Impact Report/Draft Environmental Impact Statement
DOC	Department of Conservation
EIR/EIS	Environmental Impact Report/Environmental Impact Statement
EJ	environmental justice

EMF/EMI	electromagnetic fields and electromagnetic interference
EPA	U.S. Environmental Protection Agency
ESA	(federal) Endangered Species Act
FEMA	Federal Emergency Management Agency
FMMP	Farmland Mapping and Monitoring Program
FR	Federal Register
FRA	Federal Railroad Administration
FSZ	Farmland Security Zone
GIS	geographic information system
HMF	heavy maintenance facility
HMMP	Habitat Mitigation and Monitoring Plan
HSA	Habitat Study Area
HST	high-speed train
Kern NWR	Kern National Wildlife Refuge
LEDPA	Least Environmentally Damaging Practicable Alternative
LOS	level of service
MBHCP	Metropolitan Bakersfield Habitat Conservation Plan
MOU	NEPA/404/408 Memorandum of Understanding
mph	miles per hour
NEPA	National Environmental Policy Act
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
NWR	National Wildlife Refuge
PA	Programmatic Agreement
Pixley NWR	Pixley National Wildlife Refuge
PP	Park Project
Project	Fresno to Bakersfield Section of the California High-Speed Train System
PSA	Plant Study Area

Revised DEIR/Supplemental DEIS	Revised Draft Environmental Impact Report/Supplemental Draft Environmental Impact Statement, Fresno to Bakersfield Section
RWQCB	Regional Water Quality Control Board
Revised DEIR	Revised Draft EIR
SEL	sound exposure level
SFHA	special flood hazard areas
SHPO	State Historic Preservation Officer
SJVR	San Joaquin Valley Road
SR	State Route
Statewide Program EIR/EIS	2005 Final Program EIR/EIS for the Proposed California High-Speed Train System
Summary Report	Checkpoint C Summary Report
Supplemental DEIS	Supplemental Draft EIS
SWPPP	Storm Water Pollution Prevention Plan
SWRCB	State Water Resources Control Board
TWG	Technical Working Group
UPRR	Union Pacific Railroad
USACE	U.S. Army Corps of Engineers
U.S.C.	United States Code
USFWS	U.S. Fish and Wildlife Service
V/C	volume-to-capacity
VMT	vehicle miles traveled
WER	Watershed Evaluation Report
WSA	Wetland Study Area

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Chapter 1.0
Authority and Scope of Analysis

1.0 Authority and Scope of Analysis

1.1 Checkpoint C Purpose and Relationship to the Memorandum of Understanding

This Checkpoint C Summary Report (Summary Report) for the Fresno to Bakersfield Section (Project) of the proposed California High-Speed Train (HST) System was prepared pursuant to the Memorandum of Understanding (MOU) between the California High-Speed Rail Authority (Authority), Federal Railroad Administration (FRA), U.S. Army Corps of Engineers (USACE), and U.S. Environmental Protection Agency (EPA) (Authority et al. 2010).

This Summary Report complies with the Checkpoint C requirements of the MOU. Pursuant to the MOU, the Checkpoint C Summary Report provides the information needed for
(1) concurrence/nonconcurrence with the Draft Mitigation Plan by USACE;
(2) concurrence/nonconcurrence with the Proposed Preliminary Least Environmentally Damaging Practicable Alternative (Proposed Preliminary LEDPA) under Section 404(b)(1) of the Clean Water Act (CWA) by USACE; and (3) preliminary recommendation of USACE approval/disapproval under Section 408 (Rivers and Harbors Act Section 14, 33 U.S.C. Section 408).

The Proposed Preliminary LEDPA will be selected from the range of alternatives for the Project that was identified through the alternatives analysis process described in detail in Appendix C and as part of the Checkpoint B process for the Fresno to Bakersfield Section (Dunning 2011; Jewell 2011). The environmental impacts of these alternatives were analyzed in the *Fresno to Bakersfield Section: Revised Draft Environmental Impact Report/Supplemental Draft Environmental Impact Statement* (Revised DEIR/Supplemental DEIS) (Authority and FRA 2012d). FRA is the lead agency for National Environmental Policy Act (NEPA) compliance. The Authority is the lead agency for the California Environmental Quality Act (CEQA) compliance.

The evaluation of the alternatives below is based largely on the Revised DEIR/Supplemental DEIS and on technical studies and other information, as listed in Table 1-1. However, for a few resource areas technical information has been updated. In particular, updated information with respect to aquatic resources, Section 106 historic properties, Section 4(f) uses, and noise and vibration are presented throughout this document; these changes are summarized in Section 1.6, Technical Updates since the Public Review of the Revised DEIR/Supplemental DEIS.

Data requests included in Table 1-1 are based on MOU data needs and information required as part of the regulations and guidance associated with Clean Water Act (CWA) Section 404(b)(1) (33 CFR Section 320.4, 40 CFR 230.10[a]).

1.2 Scope of Analysis of the Draft Mitigation Plan

Appendix B of the MOU provides that the Draft Mitigation Plan is a "[c]ompensatory mitigation plan to offset permanent losses of waters of the U.S." It "should be based on the watershed approach and should comply with the final mitigation rule issued by the EPA and the USACE on April 10, 2008, and USACE-issued Habitat Mitigation and Monitoring Guidelines (Authority et al. 2010)." The amount, type, and location of compensatory mitigation should be described if a mitigation bank or in-lieu fee program will not be used. If the mitigation proposal includes project activities to create, restore, and/or enhance waters of the U.S. and aquatic ecosystems, a prospectus of candidate mitigation sites should be provided.

This Checkpoint C Summary provides the information needed for USACE concurrence or nonconcurrence with the Draft Mitigation Plan.

1.3 Scope of Alternatives Analysis under Clean Water Act Section 404(b)(1) (33 CFR Section 320.4, 40 CFR 230.10[a])

USACE regulations governing the issuance of permits, set forth at 33 CFR Section 320.4, state that permits for discharge to wetlands must be based on application of the Clean Water Act Section 404(b)(1) Guidelines.

These guidelines are found at 40 CFR Section 230.10(a). They provide that the USACE cannot issue a permit if there is a practicable alternative to the proposed discharge that would have less adverse impact on the aquatic ecosystem and would not have other significant adverse environmental consequences (40 CFR Section 230.10[a]). Accordingly, this Checkpoint C Summary Report bases its evaluation of alternatives on impacts on the aquatic ecosystem, other significant environmental consequences, and practicability.

As discussed further below, the Revised DEIR/Supplemental DEIS evaluates 10 Project alternatives (Figure 1-1): the No Project Alternative; one end-to-end alternative (the BNSF Alternative, which follows the route of the existing BNSF railway); and 8 alternative alignment bypasses: Hanford West Bypass 1 (at-grade and below-grade options), Hanford West Bypass 2 (at-grade and below-grade options), Corcoran Elevated, Corcoran Bypass, Allensworth Bypass, Wasco-Shafter Bypass, Bakersfield South, and Bakersfield Hybrid. In some areas, where no bypass alternative was evaluated, the BNSF Alternative is the only Project alternative. These portions of the BNSF Alternative are referred to as the “common components.” In other areas, the Project alternatives bypass existing communities or sensitive resources (Figure 1-2).

Discussion of the heavy maintenance facility (HMF) site alternatives is not included in this analysis because the HMF will be considered separately in the context of the overall system requirements. One HMF is required for the entire California HST System, and logically it should be near the center of the system. Therefore, the HMF may be built in either the Merced to Fresno Section, the Fresno to Bakersfield Section, or the San Jose to Merced Section. The Authority and FRA plan to make a decision on the location of the HMF in the Merced to Fresno Section Supplemental EIR/Supplemental EIS because selection of the HMF is highly dependent on the selection of the wye connecting the HST System from the Bay Area to the Central Valley.

The Applicants have identified a Proposed Preferred Alternative for the entire length of the Project (Figure 1-2, Figure 1-3). The Proposed Preferred Alternative extends from Fresno to Bakersfield and includes portions of the BNSF Alternative (the common components) in combination with the BNSF-Hanford East, the Corcoran Bypass, Allensworth Bypass, BNSF–Through Wasco-Shafter, and Bakersfield Hybrid alternatives. A preferred Fresno Station was identified as part of the Merced to Fresno Section. The Proposed Preferred Alternative has three stations: the proposed Kings/Tulare Regional Station-East Alternative in Hanford and the Bakersfield Station Hybrid Alternative. The Proposed Preferred Alternative also includes the Fresno Station–Mariposa Alternative, which was selected as the Preferred Alternative as part of the Final EIR/EIS for the Merced to Fresno Section.

At this time, a Proposed Preliminary LEDPA concurrence is requested only for the portion of the project for which construction funding is available, which extends from Santa Clara Street, south of the Fresno station, to Seventh Standard Road in Kern County, south of Shafter. Two stations correspond to this alignment, one in Fresno and the other in Hanford.

The Summary Report addresses the impacts of all the alternatives. Chapter 7, Aquatic Resources, Environmental Impacts, and Practicability Analysis for Alternatives, describes the reasons for the selection of the Proposed Preliminary LEDPA, including impacts on aquatic resources, other non-aquatic environmental resources, and practicability factors.

1.4 Scope of Section 408 Analysis

Pursuant to Title 33 of the U.S.C. Section 408, USACE must approve any proposed modification involving a federal flood-control project. A Section 408 permit is required if construction modifies a federal levee or if the project encroaches on a federal facility without modifying it. A permit may be granted if an alteration or modification is not injurious to the public interest and will not impair the usefulness of the federal facility.

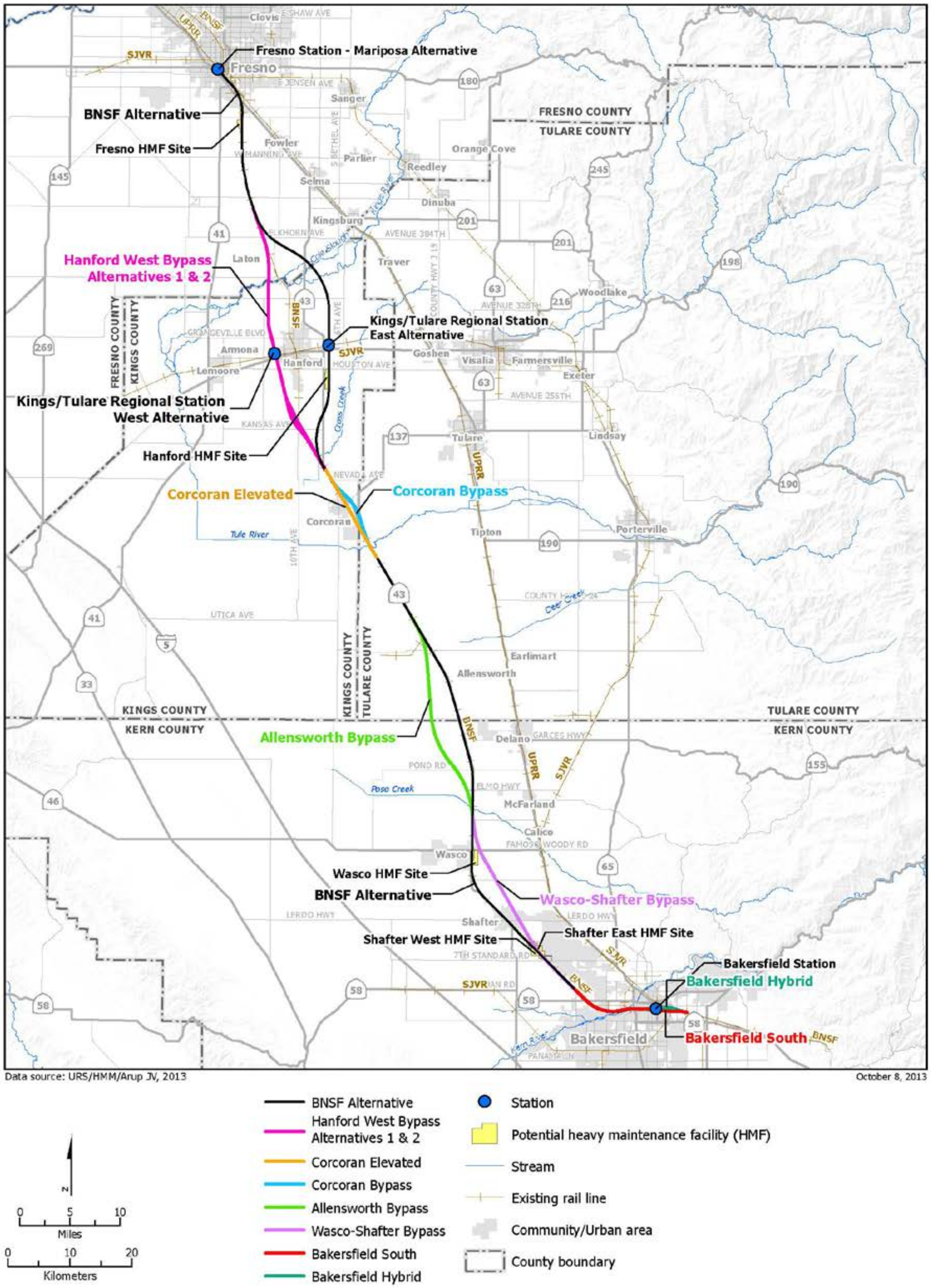

Figure 1-1
Fresno to Bakersfield Section project alternatives

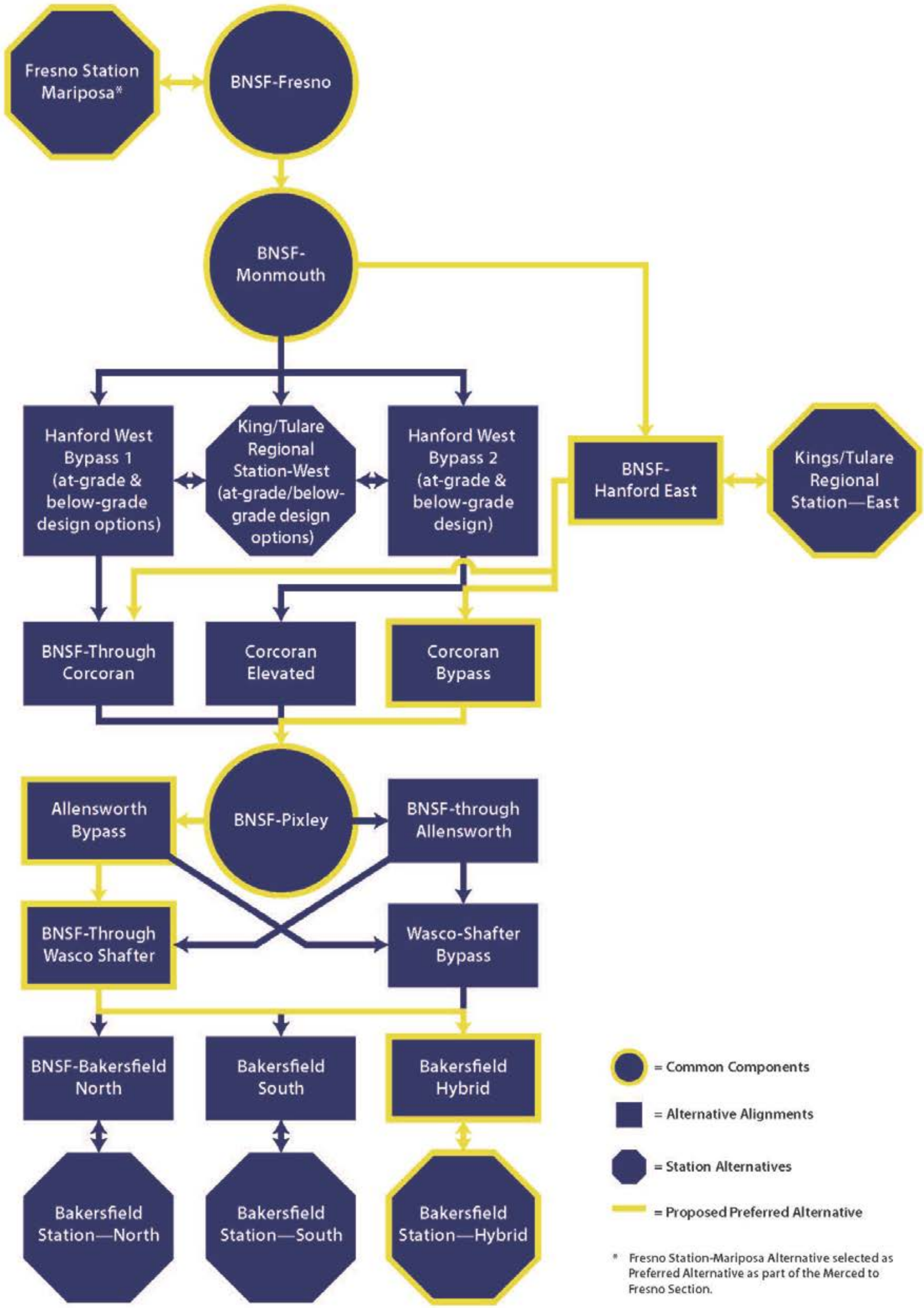

Figure 1-2
Fresno to Bakersfield Alternative Alignments, Common Components and Stations

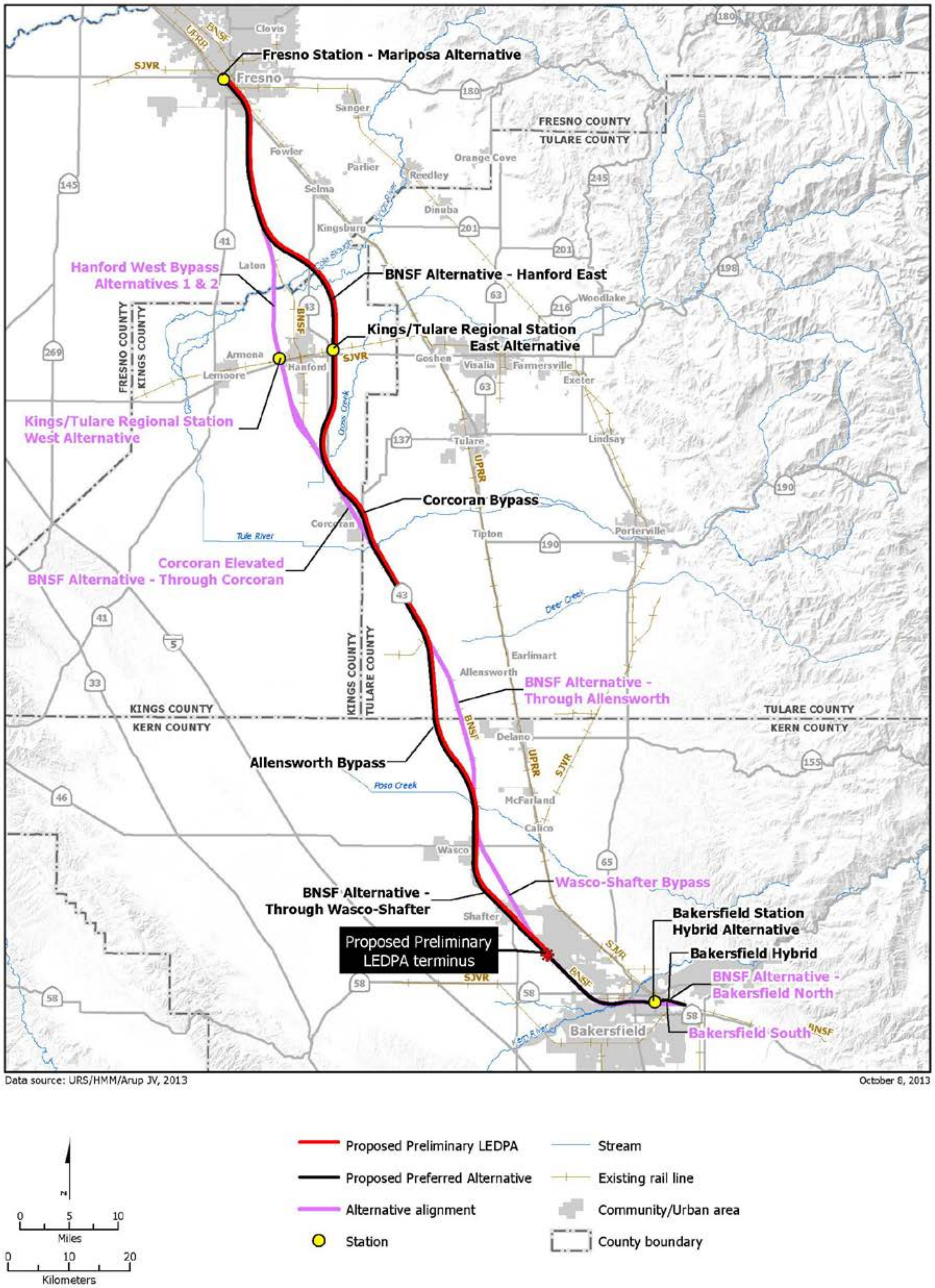

Figure 1-3
Proposed Preferred Alternative and other HST alternatives

Appendix B of the MOU describes the Checkpoint C USACE Section 408 Draft Response as follows:

> When the Authority has provided sufficient engineering and hydraulic analysis, the USACE District shall determine if the types of alterations/modifications to a Federal flood-control facility would require approval by the District Engineer or by U.S. Army Corps of Engineers Headquarters under 33 U.S.C. 408. If proposed alterations/modifications are minor, low impact modifications, the Authority shall coordinate with the local sponsor of the flood-control facility and/or the USACE District, as appropriate.

The purpose of the Checkpoint C 408 determination, therefore, is to provide "sufficient engineering and hydraulic analysis" of the Proposed Preliminary LEDPA to allow USACE to make a preliminary recommendation regarding approval or disapproval of the proposed modifications of federal flood-control facilities.

1.5 Compliance with USACE/EPA Data Needs

The information required by the MOU is contained in the Revised DEIR/Supplemental DEIS and in other technical documents, as referenced in this document and in the appendices. However, for a few resource areas technical information has been updated. In particular, updated information with respect to aquatic resources, Section 106 historic properties, Section 4(f) uses, and noise and vibration are presented throughout this document; these changes are summarized below.

The following table describes the information required by the MOU and explains how and where the required information has been provided (Table 1-1).

Table 1-1
EPA/USACE Data Needs for Checkpoint C

NEPA 404/408 MOU and EPA/USACE Data Needs	Source of Data	Document Location	Request Status
Checkpoint C: Proposed Preliminary LEDPA Determination			
Data Request 1: Response to Comments			
FRA/Authority responses to substantive public comments on the Revised DEIR/Supplemental DEIS	Comments Summary Report	To be submitted as Volumes IV and V of the Final EIR/EIS	Pending (to be completed winter 2013/2014)
FRA/Authority responses to comments on the USACE Public Notice	Response to comments received on the USACE Public Notice	To be submitted as part of the Section 404 Application	Pending (to be completed winter 2013/ 2014)
Data Request 2: Updated Project Activities Description			
Updated project description and/or plans for alternatives, including a draft operations and maintenance plan (if changed)	15% Engineering Design Plans Operations and Service Plan Summary	Available on the Authority's website; Volume II: Appendix A-2 of the Revised DEIR/Supplemental DEIS; Chapter 8, Factual Determinations Regarding Impacts of the Proposed Preliminary LEDPA (40 CFR Section 230.11 and Subparts C, D, E, and F) Available on the Authority's website; Volume III of the Revised DEIR/ Supplemental DEIS	Data request complete (to be updated in Final EIR/EIS)
Data Request 3: Functional/Condition Assessment of Aquatic Resources			
Report of findings and application of the results from the Functional/Condition Assessment of Aquatic Resources occurring within the Wetland Study Area	Fresno to Bakersfield Section Watershed Evaluation Report Fresno to Bakersfield Evaluation of Wetland Condition Using the California Rapid Assessment Method Report	Appendix A Appendix B	Data request complete
Data Request 4: Final Draft 404(b)(1) Alternatives Analysis			
Final Draft 404(b)(1) alternatives analysis (compliance evaluation with 404[b][1] Guidelines), if it is a separate and distinct document from the NEPA alternatives analysis	Checkpoint C Summary Report	Checkpoint C Summary Report	Data request complete

Table 1-1
EPA/USACE Data Needs for Checkpoint C

NEPA 404/408 MOU and EPA/USACE Data Needs	Source of Data	Document Location	Request Status
Data Request 5: Documentation of Avoidance/Minimization Measures in Project Design			
Documentation of any avoidance and minimization measures incorporated into the project design; documentation to consist of a quantification and qualification of the acres of impacts on waters of the U.S. avoided for each alternative (as applicable)	Site-specific avoidance information	Checkpoint C Summary Report, Chapter 3, Aquatic Resources: Existing Conditions and Mitigation Measures for All Project Alternatives	Data request complete
Data Request 6: Waters of U.S./Aquatic Resources Impacts Summary (Permanent)			
Based on engineering plans/drawings, a written description and quantification of the permanent impacts (direct, indirect, and cumulative) on waters of the U.S., including special aquatic sites; the impacts to be clearly depicted and accurately characterized by providing a quantification of the impacts (acres and/or linear feet) and an assessment of the losses and gains in functions and services	Revised DEIR/Supplemental DEIS Final EIR/EIS Fresno to Bakersfield Watershed Evaluation Report Fresno to Bakersfield Evaluation of Wetland Condition Using the California Rapid Assessment Method Report	Available on the Authority's website, Volume I Appendix A Appendix B	Data request complete: acreages presented in this report based on Final EIR/EIS Project Footprint.
Data Request 7: Waters of the U.S./Aquatic Resources Impacts Summary (Temporary)			
Based on engineering plans/drawings, a written description and quantification of the temporary impacts (direct, indirect, and cumulative) on waters of the U.S., including special aquatic sites; the impacts to be clearly depicted and accurately characterized by providing a quantification of the impacts (acres and/or linear feet) and a qualitative and quantitative assessment of the losses and gains in functions and services	Revised DEIR/Supplemental DEIS Fresno to Bakersfield Watershed Evaluation Report Fresno to Bakersfield Evaluation of Wetland Condition Using the California Rapid Assessment Method Report	Available on the Authority's website Appendix A Appendix B	Data request complete: acreages presented in this report based on Final EIR/EIS Project Footprint.
Data Request 8: Long-Term Operational Impacts			
Based on the draft Operations and Service Plan Summary, a written description detailing long-term operational impacts (direct, indirect, and cumulative) on waters of the U.S., including special aquatic sites	Operations and Service Plan Summary	Available on the Authority's website , Volume II: Appendix A-2 of the Revised DEIR/Supplemental DEIS	Data request complete (to be updated in Final EIR/EIS)

Table 1-1
EPA/USACE Data Needs for Checkpoint C

NEPA 404/408 MOU and EPA/USACE Data Needs	Source of Data	Document Location	Request Status
Data Request 9: Updated Environmental Summary Table/Maps			
Refinement and expansion of the environmental summary table and environmental constraints map(s) developed during Checkpoint B, incorporating data from the jurisdictional determination, functional/condition assessment, and other pertinent data stemming from the Draft EIR/EIS	Summary Table and Environmental Constraints Maps included as part of Summary Report	Checkpoint C Summary Report	Data request complete
Compliance with federal and state laws	Fresno to Bakersfield Section Revised DEIR/Supplemental DEIS (with updates)	Checkpoint C Summary Report: Chapter 10, Compliance with Federal and State Laws	Data request complete
Data Request 10: Draft Biological Assessment Report			
Quantification of direct, indirect, and cumulative impacts on biological resources, including federally listed, endangered, and threatened species and designated critical habitat, and other wildlife and habitat resource concerns	Biological Assessment (Authority and FRA 2012a) Biological Resources and Wetland Technical Report (Authority and FRA 2012b)	Available on the California High-Speed Rail Authority's website	Data request complete
Data Request 11: Cultural Resources Impacts			
Consideration of temporary, permanent, and cumulative impacts on cultural resources, including sites listed on the National Register of Historic Places or National Historic Landmarks	Historic Property Survey Report (Authority and FRA 2011c) Archaeological Survey Report (Authority and FRA 2011a)	Available on Authority's website	Data request complete
Data Request 12: Draft Mitigation Plan			
A description of FRA's and Authority's proposed compensatory mitigation for losses of aquatic resources that specifies the amount, type, and location of compensatory mitigation; the proposal to indicate whether the FRA and Authority intend to pursue permittee-responsible mitigation or use a USACE-approved mitigation bank or in-lieu fee program	Compensatory Mitigation Plan (CMP) (Authority and FRA 2013a)	Submitted under separate cover as part of the Checkpoint C package	Data request complete

Table 1-1
EPA/USACE Data Needs for Checkpoint C

NEPA 404/408 MOU and EPA/USACE Data Needs	Source of Data	Document Location	Request Status
Data Request 13: 408 Determination			
Process for obtaining the 408 permit	Section 408 Determination	Submitted under separate cover as part of the Checkpoint C package	Technical report submitted to USACE; coordination with local sponsors and USACE ongoing
Additional Information			
Effects Illustration	Appendix A of Watershed Evaluation Report	Attachment 1	Data request complete
Impact Category and Effects Definition	Watershed Evaluation Report (Authority and FRA 2013c)	Appendix A	Data request complete
Community Disruption Impacts That Differentiate among HST Alternatives	Revised DEIR/Supplemental DEIS Community Impact Analysis Relocation Impact Report	Available on the Authority's website; Volume 1: Section 3.12, Socioeconomics, Communities, and Environmental Justice, of the Revised DEIR/Supplemental DEIS Available on the Authority's website Available on the Authority's website	Data request complete (to be updated in FEIR/FEIS)
Capital Cost Estimate Report (Authority and FRA 2012k)	Revised DEIR/Supplemental DEIS	Available on the Authority's website	Data request complete (to be updated in FEIR/FEIS)

Acronyms:
DEIR = Draft Environmental Impact Report
DEIS = Draft Environmental Impact Statement
EIR/EIS = Environmental Impact Report/ Environmental Impact Statement
EPA = U.S. Environmental Protection Agency
FEIR/FEIS = Final Environmental Impact Report/Final Environmental Impact Statement
FRA = Federal Rail Authority
HST = high-speed train
LEDPA = least environmentally damaging practicable alternative
MOU = memorandum of understanding
NEPA = National Environmental Policy Act of 1969
USACE = U.S. Army Corps of Engineers

1.6 Technical Updates since the Public Review of the Revised DEIR/Supplemental DEIS

This chapter describes the changes to the potential proposed project since the public review of the Revised DEIR/Supplemental DEIS. It describes engineering and environmental modifications in detail and provides updated biological, other environmental, and community information as required. The following modifications are discussed in more detail below:

- Modifications associated with the Hanford West Bypass 1 and 2 alternatives to reduce impacts on resources protected by Section 106 of the National Historic Preservation Act (NHPA) and Section 4(f) of the U.S. Department of Transportation Act of 1966 (Section 4(f)).
- Modifications to methods associated with noise and vibration.
- Modifications to reduce conflicts with California Department of Transportation State Route 43 Rights of Way.
- Changes in nomenclature and extent of aquatic resources through additional coordination efforts with the USACE and as a result of the project design changes made after the Revised DEIR/Supplemental DEIS was distributed.
- Modifications to avoid Section 106 impacts and Section 4(f) uses of the Kern-Friant Canal.
- Corrections to the identification of the location of an historic resource, 2509 E. California Avenue (previously identified as being in the Area of Potential Effect (APE) of the Bakersfield Hybrid Alternative, but actually in the APE of the Bakersfield South Alternative).
- Addition of Salón Juárez as a Traditional Cultural Property eligible for listing under Section 106, subject to analysis under Section 106 and Section 4(f).

1.6.1 Hanford West Bypass 1 and 2 Modifications

As part of the ongoing process to avoid and minimize biological, other environmental, and community impacts, the Hanford West Bypass 1 and 2, below-grade alternatives have been modified (Figure 1-4). The intended purpose of these modifications is to avoid uses of the Section 4(f) properties at 13148 Grangeville Blvd., Kings County, and 9860 13th Avenue, in rural Kings County. In addition, the Revised DEIR/Supplemental DEIS identified a Section 4(f) use for a historic structure at 11029 Kent Avenue, which is in the Hanford West Bypass 1 Alternative area. However, the Authority and FRA have determined that the structure at this property no longer exists and is thus not a Section 4(f) property.

These engineering design modifications may result in slight changes associated with biological, other environmental, and community impacts; however, overall these impacts to these resources are expected to be similar in nature and magnitude as they were before the modifications.

The results of the modifications as they affect historic properties and Section 4(f) uses have been incorporated throughout the body of this Summary Report (see Section 6.1, Hanford Area Alternatives, for the preliminary Least Harm Analysis for Section 4(f), and Section 6.1.2.1 for the Section 106 modification). The modifications minor effects on aquatic resources are also included in the analysis. However, the resultant minor changes in effects on non-aquatic biological resources and other environmental resources have not been incorporated into this report, but will be described in the Final EIR/EIS.

To identify the modified alternatives developed to avoid the historic property and Section 4(f) impacts mentioned above, the nomenclature for a design option for each of the alternatives presented in the Revised DEIR/Supplemental DEIS and the Final EIR/EIS has changed. In the Revised DEIR/Supplemental DEIS the Hanford West Bypass 1 and 2 both had two design options: at-grade and below-grade. For the Final EIR/EIS, the at-grade design options of both alternatives were not modified to avoid the Section 106 historic properties and Section 4(f) uses, and are named Hanford West Bypass 1 and Hanford West Bypass 2. The below-grade design options for both alternatives were modified to avoid Section 106 historic properties and Section 4(f) uses. In the Final EIR/EIS, these alternatives are now named Hanford West Bypass 1 Modified and Hanford West Bypass 2 Modified.

To avoid confusion and for consistency among the resource areas, the nomenclature of the alternatives in the main body of this report reflects that of the Revised DEIR/Supplemental DEIS. The one exception is associated with the Preliminary Least Harm Analysis discussion in Section 6.1.2.1, Section 4(f) Resources, as it contains important project modifications to avoid Section 106 historic properties and Section 4(f) uses and compares the Hanford West Bypass 1 and 2 Modified alternatives to the Hanford West Bypass 1 and 2 alternatives.

1.6.1.1 Preliminary Least Harm Analysis (Hanford)

As a result of the Hanford West Bypass 1 and 2 Modifications, as described above, the Least Harm Analysis provided in the Revised DEIR/Supplemental DEIS has been revised. The revised preliminary Least Harm Analysis evaluates the Hanford West Bypass 1 and 2 Modified alternatives and compares them to the other Hanford Area alternatives. The revised preliminary Least Harm Analysis is presented in Section 6.1.2.1, Section 4(f) Resources. A final Least Harm Analysis will be provided as part of the Final Section 4(f) Evaluation published with the Final EIR/EIS.

1.6.2 Noise and Vibration Methods

A change in the methodology for identifying sensitive noise receivers has resulted in updated information regarding impacted noise receivers. This information does not change the relative impacts of the Project noise impacts among the alternatives or the mitigation measures that will apply to noise impacts. These changes have been incorporated throughout the body of the report.

1.6.3 SR 43 Caltrans Right-of-Way Preservation

In the area north of Corcoran, the BNSF-Hanford East, Hanford West Bypass 2, Corcoran Elevated, and Corcoran Bypass alternatives lie between the BNSF tracks and California Department of Transportation (Caltrans) State Route (SR) 43, occupying part of the existing Caltrans right of way. The Caltrans right-of-way in this area varies from 142 to 192 feet wide and is intended to allow Caltrans to widen SR 43 from the current two lanes to a four-lane expressway in the future (2030 and beyond), according to Caltrans' Transportation Concept Report (Caltrans 2006). After meetings with Caltrans to discuss this alignment, the Authority revised the alternatives to allow for Caltrans plans for future widening of SR 43.

The BNSF-Hanford East, Hanford West Bypass 2 Modified, Corcoran Elevated, and Corcoran Bypass alternatives will be moved slightly to the east of the current alignment. This change is required because Caltrans Highway Design Manual (Topic 309-Clearances) states, in part:

> 309.1 Horizontal Clearances for Highways
>
> (4) High Speed Rail Clearances. When a high speed rail corridor is to be constructed longitudinally to a freeway, expressway or a conventional highway with posted speeds over 40 miles per hour, the nearest fixed object or feature associated with the operation

of the rail facility should be located a minimum of 52 feet horizontally from the planned ultimate edge of the traveled way.

The resultant modification moves the HST to east of SR 43, maintains the widest offset of 192 feet through the entire length of the section, and leaves Caltrans unaffected by the HST, but it requires encroachment into the man-made lacustrine areas to the east. This lacustrine feature consists of a water storage feature operated by Corcoran Irrigation District. The existing levee that forms the western boundary of this water storage feature would be relocated farther east, into the lacustrine area.

Alignment options to the west of SR 43 would require a viaduct to elevate the HST over the BNSF tracks and Cross Creek, making this option prohibitively expensive.

These changes have been incorporated into the estimated effects on waters of the U.S. in the body of this document.

1.6.4 Friant-Kern Canal

Effects on the Friant-Kern Canal, crossed by all Bakersfield Area alternatives, have been avoided by spanning the historic canal property from bank to bank and spanning the canal spillway into the Kern River. No other historic Friant-Kern Canal features appear in the vicinity of the Bakersfield Area alternatives.

Also, minor modifications were made to account for maintenance access along the alignment and to account for design refinements on the location of communications and power traction facilities. These changes have been incorporated throughout the body of the report.

1.6.5 2509 E. California Avenue

In the course of environmental studies for the Fresno to Bakersfield Section, the residence at 2509 E. California Avenue in Bakersfield was identified as being eligible for the National Register of Historic Places (NRHP).

In the Revised DEIR/Supplemental DEIS preliminary 4(f)/6(f) evaluation, the residence at 2509 E. California Avenue was inadvertently reported to be within the BNSF-Bakersfield North Alternative. In fact, the residence at this address is located approximately 400 feet south of the BNSF Bakersfield North Alternative, within the footprint of disturbance of the Bakersfield South Alternative. The preliminary 4(f)/6(f) evaluation contained in Chapter 4, Section 4(f)/6(f), of the Revised DEIR/Supplemental DEIS was corrected in July 2012 to reflect the correct location. The corrected version of Chapter 4 of the Revised DEIR/Supplemental DEIS was made available for download from the Authority’s website. These changes have now been incorporated throughout the body of the report, and the revised text will appear in the Final EIR/Final EIS.

1.6.6 Salón Juárez

After the publication of the Revised DEIR/Supplemental DEIS, additional supplemental technical reports were prepared to address additional refinements. On April 2, 2013, the State Historic Preservation Officer (SHPO) concurred with the NRHP eligibility of the Section 106 historic resources in the supplemental technical reports and requested additional information regarding Salón Juárez in conjunction with the Preferred Bakersfield Area Alternative. The additional information collected is described below.

The Sociedad Juárez Mutualista Mexicana (SJMM) consists of a mutual aid society in the city of Bakersfield associated with the local Mexican-American community. The SJMM operates the Salón Juárez within the city of Bakersfield. Salón Juárez consists of a small stucco building and a larger

Quonset hut. These two buildings provide a venue for community gatherings, including celebrations, funerals, and other significant events. The FRA recommended—and the SHPO concurred—that this property is eligible for listing on the NRHP as a traditional cultural property under Criterion A of the NRHP because it is associated with events that have made a significant contribution to the broad patterns of our history (SHPO 2013).

After preliminary research and dialogue with the SHPO, the FRA anticipates that the Project will not result in either an adverse effect under Section 106 of the NHPA or the use of the property under Section 4(f).

1.6.7 Other Engineering and Environmental Modifications

Minor changes to the Project Footprint have been incorporated throughout the Fresno to Bakersfield Section to accommodate changes in engineering design criteria.

As one example, the design of the Kings River Complex has been modified from a mixed at-grade and bridge structure over the seasonal riverine features and now includes a viaduct spanning the entire area from the north bank of the Dutch John Cut to south bank of the Kings River. This will reduce indirect impacts and reduce the amount of fill required within the seasonal riverine resources. These changes have been accounted for in the calculation of estimated impacts to waters of the U.S. throughout the body of the report.

1.6.8 Aquatic Resource Modifications

After publication of the Revised DEIR/Supplemental DEIS in 2012, the Authority and USACE continued to coordinate regarding the delineation of aquatic resources in the Wetland Study Area (WSA). During this period, the extent and classification of a number of aquatic resources were revised, and in some instances new features were added. On February 5, 2013 the USACE issued a Preliminary Jurisdictional Determination, which incorporated these changes and concurred with the measured areas and identified locations of wetlands and other waters of the U.S.

Where necessary, the identification and delineation of jurisdictional waters is ongoing to ensure that all waters of the U.S that may be affected by the Project are identified. The Authority is coordinating with USACE to delineate and classify aquatic resources associated with the Final EIR/Final EIS WSA, including the changes described in this chapter. The Authority and FRA have also investigated and identified design changes that could further avoid and minimize impacts on aquatic resources.

The most current available wetland delineation mapping, and classification, in conjunction with the Project Footprint associated with the Final EIR/Final EIS, and the resultant impact calculations, have been incorporated throughout the body of the report.

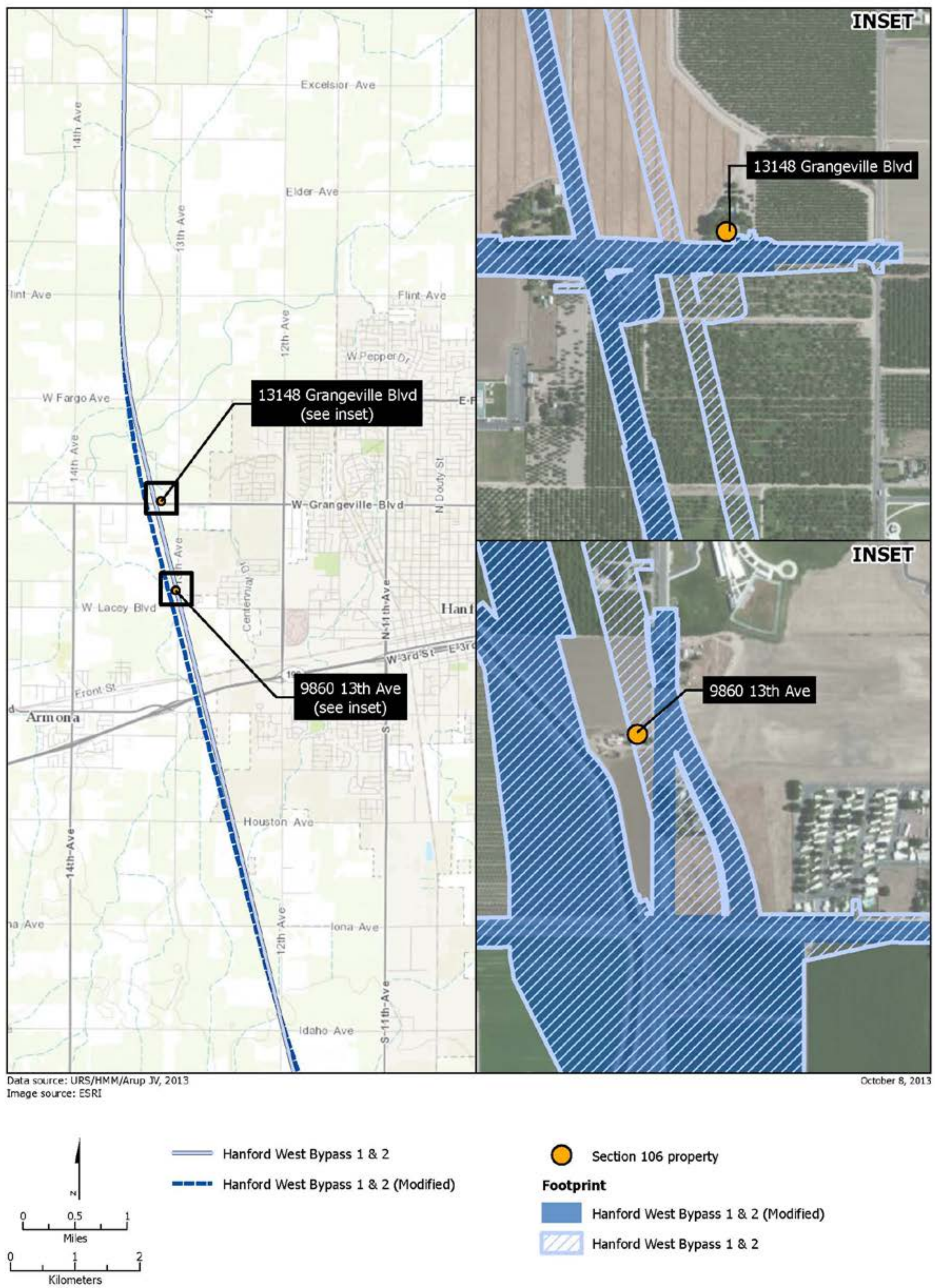

Figure 1-4
Modifications to the Hanford West Bypass 1 and 2 below grade alternatives

Chapter 2.0
Alternatives

2.0 Alternatives

2.1 Purpose and Need and Project Objectives

To comply with the Clean Water Act (CWA) Section 404(b)(1), USACE must take into consideration the Applicants' needs in the context of the geographic area of the proposed action and the type of project being proposed.

2.1.1 HST Objectives Established by the Enabling Legislation

The selection and analysis of alternatives are influenced by the requirements of the state law that authorizes the HST System. The HST System must meet California's need for reliable, high-speed, lower-emission transportation in a manner that is consistent with the provisions of Proposition 1A, the Safe, Reliable, High-Speed Passenger Train Bond Act, which California voters adopted in November 2008 (Streets & Highways Code Section 2704 et seq.).

State law provides that:

1. The HST System must be capable of sustained operating speeds of at least 200 miles per hour where conditions permit those speeds (Streets & Highway Code Sections 2704.1[d], 2704.09[a]). The speed requirement of Section 2704.1(d), in turn, necessitates a design with limited flexibility to change the alignment of the proposed Project to avoid features such as jurisdictional waters because the curve radius for changes in the alignment is a minimum of 5 miles.

2. Maximum express service travel times are specified for each corridor (Streets and Highway Code Section 2704.09[a]). Therefore, the travel times of the alternatives are factors in analyzing alternatives.

3. State law provides that "[i]n order to reduce impacts on communities and the environment, the alignment for the high-speed train system shall follow existing transportation or utility corridors to the extent possible" (Streets & Highway Code Section 2704.09[g]). This component of purpose and need requires consideration of regional and community needs for the alignment to remain within the existing corridor, as discussed further below.

4. The HST System must be designed to "[p]reserv[e] wildlife corridors and mitigating impacts to wildlife movement, where feasible, as determined by the [A]uthority, in order to limit the extent to which the system may present an additional barrier to wildlife's natural movement" (Streets & Highways Code Section 2407.09[j]).

2.1.2 HST and Project Objectives

The Authority's statutory mandate is to plan, build, and operate an HST System coordinated with California's existing transportation network, particularly intercity rail and bus lines, commuter rail lines, urban rail lines, highways, and airports. The Authority has responded to this mandate by adopting the following objectives and policies for the proposed HST System:

- Provide intercity travel capacity to supplement critically overused interstate highways and commercial airports.

- Meet future intercity travel demand, which will be unmet by current transportation systems, and increase capacity for intercity mobility.

- Maximize intermodal transportation opportunities by locating stations to connect with local transit, airports, and highways.
- Improve the intercity travel experience for Californians by providing comfortable, safe, frequent, and reliable high-speed travel.
- Provide a sustainable reduction in travel time between major urban centers.
- Increase the efficiency of the intercity transportation system.
- Maximize the use of existing transportation corridors and rights-of-way, to the extent feasible.
- Develop a practical and economically viable transportation system that can be implemented in phases by 2020 and generate revenues in excess of operations and maintenance costs.
- Provide intercity travel in a manner sensitive to and protective of the region's natural and agricultural resources and reduce emissions and vehicle miles traveled for intercity trips.

The approximately 113-mile-long Fresno to Bakersfield Section is an essential component of the statewide HST System. The Fresno to Bakersfield Section would connect the northern and southern portions of the system; provide a potential location for the heavy maintenance facility (HMF) where the HSTs would be assembled and maintained (along with the test track for the trains); provide Fresno, Visalia, Tulare, Hanford, and Bakersfield access to a new transportation mode; and contribute to increased mobility throughout California. Further details about the project objectives are provided in Chapter 1, Project Purpose, Need, and Objectives, of the Revised DEIR/Supplemental DEIS.

2.1.3 Purpose and Need

The purpose of the Project is to implement the Fresno to Bakersfield Section of the California HST System to provide the public with electrically powered, high-speed rail service that provides predictable and consistent travel times between major urban centers and connectivity to airports, mass transit systems, and the highway network in the south San Joaquin Valley, and that connects the northern and southern portions of the system. Further details about the Project's purpose are provided in Chapter 1, Project Purpose, Need, and Objectives, of the Revised DEIR/Supplemental DEIS.

The need for the HST System exists statewide, with regional areas contributing to this need. Because it has not kept pace with the tremendous increase in population, economic activity, and tourism in the state, the capacity of California's intercity transportation system, including the south San Joaquin Valley, is insufficient to meet existing and future travel demand. Without the HST System, current and projected future system congestion will continue to result in deteriorating air quality, reduced reliability, and increased travel times. The interstate highway system, commercial airports, and conventional passenger rail system serving the intercity travel market are operating at or near capacity and will require large public investments for maintenance and expansion to meet existing demand and future growth over the next 25 years and beyond. Moreover, the feasibility of expanding many major highways and key airports is uncertain; some needed expansions may be impracticable or may be constrained by physical, political, and other factors.

The need for improvements to intercity travel in California, including intercity travel between the south San Joaquin Valley, the Bay Area, Sacramento, and Southern California, relates to the following issues:

- Future growth in demand for intercity travel, including the growth in demand within the south San Joaquin Valley.
- Capacity constraints that will result in increasing congestion and travel delays, including those in the south San Joaquin Valley, particularly along the State Route (SR) 99 corridor.
- Unreliability of travel stemming from congestion and delays, weather conditions, accidents, and other factors that affect the quality of life and economic well-being of residents, businesses, and tourism in California, including the south San Joaquin Valley.
- Reduced mobility as a result of increasing demand on limited modal connections between major airports, transit systems, and passenger rail in the state, including the south San Joaquin Valley.
- Poor and deteriorating air quality and pressure on natural resources and agricultural lands as a result of expanded highways and airports and urban development pressures, including those within the south San Joaquin Valley.

2.2 Environmental Impact Assessment under the National Environmental Policy Act

2.2.1 Programmatic Assessment: Tier 1

The Authority and FRA prepared the Final Program Environmental Impact Report and Environmental Impact Statement (Final EIR/EIS) for the Proposed California High-Speed Train System (Statewide Program EIR/EIS) (Authority and FRA 2005), which evaluated the HST's ability to meet the existing and future capacity demands on California's intercity transportation system. Preparation of this report in August 2005 was the first phase of a tiered environmental review process (Tier 1) for the proposed California HST System.

The Authority and FRA completed a second Program EIR/EIS in July 2008 to identify a preferred alignment for the Bay Area to Central Valley section (Authority and FRA 2008). The Bay Area to Central Valley HST Program EIR/EIS resulted in a decision by the Authority and FRA to connect the Bay Area and the Central Valley through the Pacheco Pass and to proceed along the Caltrain rail right-of-way from San Francisco to San Jose.

2.2.2 Project-Level Assessment: Tier 2

In 2008, the Authority initiated the preparation of project-level (Tier 2) engineering, design, and environmental work for all nine of the project sections comprising the San Francisco to Los Angeles HST System: San Francisco to San Jose, San Jose to Merced, Merced to Sacramento, Merced to Fresno, Fresno to Bakersfield, Bakersfield to Palmdale, Palmdale to Los Angeles, Los Angeles to Anaheim, and Los Angeles to San Diego. This site-specific effort assessed the direct, indirect, and cumulative effects of the proposed action; considered public and agency input in the scoping process; and engaged in consultation with resource and regulatory agencies, including the EPA and USACE.

From August 15 to October 12, 2011 (60 days), the Authority and FRA circulated the Draft EIR/EIS for the Fresno to Bakersfield Section to affected local jurisdictions, state and federal agencies, tribes, community organizations, other interest groups, and interested individuals. As a result of comments received during the review, the Authority decided to reintroduce a Project alternative west of Hanford that had been evaluated in the Statewide Program EIR/EIS and introduce a new Project alternative through Bakersfield. The Revised DEIR/Supplemental DEIS was prepared and circulated between July 20, 2012, and October 19, 2012 (90 days). The

Revised DEIR/Supplemental DEIS included new Project alternatives and station locations west of Hanford, an additional alternative and station location through Bakersfield, and refinements to the existing Fresno to Bakersfield alternative alignments. This analysis reflects the sequenced search for less environmentally damaging alternatives, as described in Section 2.4, Sequenced Search for Less Environmentally Damaging Alternatives.

Pursuant to the MOU, the Applicants concluded Checkpoint A (defining the purpose and need for the Fresno to Bakersfield Section) on January 9, 2011, and received concurrence letters from EPA and USACE (dated January 20, 2011, February 2, 2011, respectively). The Applicants' development of the range of alternatives considered as part of the Revised DEIR/Supplemental DEIS was provided, as required by the MOU, as part of the Checkpoint B submittals. In accordance with the MOU, the Applicants concluded Checkpoint B in a letter to EPA and USACE on January 11, 2012.

The Revised DEIR/Supplemental DEIS (Authority and FRA 2012d) document, which is the foundation of the alternatives analysis in this Checkpoint C package, demonstrated:

- Compliance with certain federal laws concerning water quality, endangered species, and marine sanctuaries.
- Determination that the project does not cause or contribute to significant degradation of waters of the U.S.
- Determination that appropriate and practicable steps have been taken that would minimize potential adverse impacts of the discharge on the aquatic ecosystem.

2.3 Section 404(b)(1) Guidelines Criteria for Consideration of Alternatives

The Council on Environmental Quality's regulations implementing the National Environmental Policy Act (NEPA) (40 CFR 1502.14), FRA's Procedures for Considering Environmental Impacts (64 FR 28546. May 26, 1999) and USACE's NEPA Implementation Procedures (33 CFR 325, Appendix B) require the consideration of a range of reasonable alternatives for a proposed action.

The Clean Water Action Section 404(b)(1) Guidelines (40 CFR 230.10[a]) (Guidelines) establish the requirements for consideration of alternatives when a Section 404 permit is sought. USACE's memorandum entitled "Appropriate Level of Analysis Required for Evaluating Compliance with the Section 404(b)(1) Guidelines Alternatives Requirements" describes these requirements as follows:

> "The fundamental precept of the Guidelines is that discharges of dredged or fill material into waters of the United States, including wetlands, should not occur unless it can be demonstrated that such discharges, either individually or cumulatively, will not result in unacceptable adverse effects on the aquatic ecosystem. The Guidelines specifically require that 'no discharge of dredged or fill material shall be permitted if there is a practicable alternative to the proposed discharge which would have less adverse impact on the aquatic ecosystem, so long as the alternative does not have other significant adverse environmental consequences' (40 CFR 230.10[a]). Based on this provision, the applicant is required in every case (irrespective of whether the discharge site is a special aquatic site or whether the activity associated with the discharge is water dependent) to evaluate opportunities for use of non-aquatic areas and other aquatic sites that would result in less adverse impact on the aquatic ecosystem. A permit cannot be issued, therefore, in circumstances where a less environmentally damaging practicable alternative for the proposed discharge exists (except as provided for under Section 404[b][2])."

The term *practicable* means available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes (30 CFR 230.2[q]).

The 404(b)(1) Guidelines provide that the analysis of alternatives for NEPA environmental documents will in most cases provide the information required to evaluate the alternatives under the guidelines (40 CFR 230.10[a][4]).

This chapter describes the Proposed Preferred Alternative and the criteria and process for identifying it. The analyses required by the Guidelines are contained in subsequent chapters.

2.4 Sequenced Search for Less Environmentally Damaging Alternatives

The Statewide Program EIR/EIS (Authority and FRA 2005) provided a first-tier analysis of the general effects of implementing the HST System across two-thirds of the state. That document provided the Authority and the FRA with the environmental analysis necessary to evaluate the overall HST System and to make broad decisions about general HST alignments and station locations for further study in second-tier EIR/EIS documents. This analysis included identification of a BNSF alignment as the “preferred option” from Fresno to Bakersfield. The Statewide Program EIR/EIS also identified preferred station locations in Downtown Fresno and Downtown Bakersfield, with no station in between. The *Visalia-Tulare-Hanford Station Feasibility Study* (VTH Study) (Authority 2007) provided additional findings regarding a mid-section station. The conclusions of the Statewide Program EIR/EIS and the VTH Study provided the basis for the initial range of alternatives to be considered in the Project-level alternatives analysis process.

To define the Project-level alternatives to be considered in the formal environmental process, the Authority and FRA prepared a Preliminary Alternatives Analysis (June 2010) and two Supplemental Alternatives Analyses (September 2010 and May 2011), With the recommendations contained in these documents, the Project description and the alternatives to be considered in the Draft EIR/EIS (published in August 2011) were established.

Pursuant to the MOU, the Checkpoint B Summary Report identified the range of alternatives to be carried forward in the Draft EIR/EIS and for identification of a LEDPA. The MOU specifically stipulates that for each project EIR/EIS a range of alternatives is to be identified that will be carried forward for project-level analysis and consideration under the 404(b)(1) guidelines. The FRA and Authority submitted—and the parties to the MOU concurred with—the Checkpoint B Summary Report in 2011.

In response to stakeholder, agency, and public feedback regarding the HST alignment that bypasses Hanford to the east (included in the Draft EIR/EIS), an additional Supplemental Alternatives Analysis (December 2011) was undertaken that presented documentation and analysis of a new alignment and station location west of Hanford in Kings County. After the December 2011 Supplemental Alternatives Analysis, a series of meetings and outreach activities led to further refinement of the Bakersfield alternatives. The Authority and FRA, in cooperation with the affected stakeholders, developed a hybrid alternative alignment for the Bakersfield subsection to address substantive comments received during public and agency review of the Draft EIR/EIS. This hybrid alternative is a variation of the two Bakersfield subsection alternatives evaluated in the Draft EIR/EIS. With these recommendations and refinements, the project description and alternatives to be considered in the Revised DEIR/Supplemental DEIS (Authority and FRA 2012d) were established (Figure 1-1).

A complete description of this process is provided in Appendix C.

2.5 Description of the Alternatives

2.5.1 No Fill Alternative

A No Fill Alternative has been evaluated to determine whether the Project can be practicably implemented (i.e., built) without the discharge of fill into waters of the U.S. This evaluation and determination is important, because if a practicable No Fill Alternative is feasible, then the No Fill Alternative is the LEDPA.

Throughout the project development process, the Authority and FRA sought to balance the regulatory need to minimize and avoid the use of fill materials in waters of the U.S. with the project's purpose and need, design, engineering, cost, and other environmental criteria. Despite adherence to a rigorous alternatives screening and evaluation process, the Authority and FRA are unable to identify a practicable No Fill Alternative. The practicability of the No Fill Alternative and its impacts on aquatic and non-aquatic resources are analyzed in Chapter 7, Aquatic Resources, Environmental Impacts, and Practicability Analysis for Alternatives.

2.5.2 Components of the Alternatives

This section describes the rail line, rail corridor improvements, crossings and crossing improvements, bridges, elevated rail sections, station improvements, intermodal connections, and maintenance facilities of the alternatives in the Fresno to Bakersfield Section of the HST. Further details on ridership and descriptions of each alternative are contained in Chapter 1, Project Purpose, Need, and Objectives, and Chapter 2, Alternatives, of the Revised DEIR/Supplemental DEIS. The composition of the construction and project footprints are described in Chapter 2 of the Revised DEIR/Supplemental DEIS, and the footprints are shown in detail in the 15% Engineering Design Plans (Volume III of the Revised DEIR/Supplemental DEIS). However, modifications to the project footprint have occurred as the Authority and FRA have continued to refine the Project design and identify additional ways to avoid and minimize impacts on natural and cultural resources as well as community features.

Project components include the HST right-of-way and associated facilities, such as traction-power substations, switching and paralleling stations, as well as the shifts in roadway rights-of-way associated with those facilities, including overcrossings and interchanges that would be modified or shifted to accommodate the HST Project.

The components of electrification and power for HST are (1) the overhead contact system (OCS), which is the wiring system above the track that electrifies the train; (2) the traction power substations, which is the power supply system that provides power to the OCS; and (3) the electrical support facilities. Four electrical support facility types are required: switching stations, paralleling stations, backup and emergency power supply sources, and signaling and train control elements. Facilities supporting maintenance, including one maintenance-of-way facility, would be required along the HST right-of-way. These facilities are described more fully in Chapter 2, Alternatives, of the Revised DEIR/Supplemental DEIS.

The Project will include three stations: in the city of Fresno, in the Kings/Tulare County region, and in the city of Bakersfield. These stations are depicted on Figures 2-1 through 2-7. Station areas will include intermodal connectivity, drop-off facilities, an entry plaza, a station house area for ticketing and support services, a station box where passengers wait and access the HST, and parking facilities.

Pursuant to California's Proposition 1A, all alternatives must be able to transport passengers between San Francisco and Los Angeles in no more than 2 hours and 40 minutes. Projected ridership is based on assumptions of a ticket price relative to airfare and is forecast to be similar for all alternatives in the Fresno to Bakersfield Section. Because the Fresno to Bakersfield HST Project alternatives lie along the same corridor, travel times by alternative are similar.

The dedicated, fully grade-separated right-of-way needed to operate HSTs has more stringent alignment requirements than those of lower-speed trains. The HST would use four different track profiles: at-grade, where tracks are near the ground; retained fill, where higher tracks are elevated on retained earth; retained cut, where the HST crosses under existing roads or highways; and elevated, where the HST travels over existing roadways and railroads on structures supported by piers. Types of bridges that might be built include full-channel spans, large box culverts, and, for some larger river crossings, piers within the ordinary high-water channel.

2.5.3 Description of Project Alternatives

The Revised DEIR/Supplemental DEIS evaluates 10 right-of-way alternatives: the No Project Alternative, one end-to-end alternative (the BNSF Alternative, which follows the route of the existing BNSF railway), and 8 alternative alignment bypasses: Hanford West Bypass 1 (at-grade and below-grade options), Hanford West Bypass 2 (at-grade and below-grade options), Corcoran Elevated, Corcoran Bypass, Allensworth Bypass, Wasco-Shafter Bypass, Bakersfield South, and Bakersfield Hybrid. In some areas, where no bypass alternative was evaluated, the BNSF Alternative is the only Project alternative. These portions of the BNSF Alternative are referred to as the “common components.” In other areas, the Project alternatives bypass existing communities (Figure 1-1). This section provides a comparative description of the alignments where there are alternatives.

2.5.3.1 Description of Fresno Area Station Alternatives

Two alternative station sites were under consideration in Fresno as part of the Merced to Fresno environmental analysis. The Fresno Station–Kern Alternative would be located on the BNSF Alternative, centered on Kern Street between Tulare Street and Inyo Street. The Fresno Station–Mariposa Alternative would be centered on Mariposa Street and bordered by Fresno Street on the north, Tulare Street on the south, H Street on the east, and G Street (Figure 2-1). The Authority Board selected the Fresno Station–Mariposa Alternative as the station location on May 3, 2012, following certification of the Merced to Fresno Section EIR/EIS (Authority and FRA 2012j). FRA selected the Fresno Station-Mariposa Alternative as the station location in Section 4.3.2 of its Record of Decision for the California High Speed Train Merced to Fresno Section (FRA 2012). The Mariposa Alternative is the preferred station for Fresno because it provides the best opportunity for enhancement of land-use densities consistent with the city’s current planning for transit-oriented development in the draft *Fulton Corridor Specific Plan* and the draft *Downtown Neighborhoods Plan* (City of Fresno 2010, City of Fresno 2011). Station locations in Hanford and Bakersfield are correlated with alignment alternatives because each alignment alternative can be served only by its corresponding station location. These station locations are discussed with their corresponding Project alternatives below.

2.5.3.2 Description of Hanford Area Alternatives

The Hanford area has five alternatives:

- BNSF–Hanford East Alternative.
- Hanford West Bypass 1 Alternative.
- Hanford West Bypass 1 Modified Alternative.
- Hanford West Bypass 2 Alternative.
- Hanford West Bypass 2 Modified Alternative.

After the publication of the Revised DEIR/Supplemental DEIS, the Hanford West Bypass 1 and 2, below-grade option, alternatives were modified to reduce impacts on Section 106 historic properties and Section 4(f) uses by realigning the tracks slightly to the west, from approximately West Fargo Avenue to south of Iona Avenue, to avoid properties at 13148 Grangeville Boulevard and 9860 13th Avenue in Kings County (see Figure 1-4). These modifications and other modifications are described in Section 1.6, Technical Updates since the Public Review of the Revised DEIR/Supplemental DEIS. The Hanford West Bypass 1 and 2 Modified alternatives have the same beginning and end points as the original Hanford West Bypass 1 and 2 alternatives. All four Hanford West Bypass alternatives begin in the northern portion of the Fresno to Bakersfield Section, at approximately East Kamm Avenue in Fresno County, and continue south to Nevada Avenue in Kings County.

The Hanford West Bypass 1 and 2 alternatives and the Hanford West Bypass 1 and 2 Modified alternatives are approximately the same from East Kamm Avenue. Just south of Flint Avenue, the Hanford West Bypass 1 and 2 Modified alternatives diverge to the east of the Hanford West Bypass 1 and 2 alternatives to avoid Section 4(f) uses of the two Section 4(f) properties in Kings County at 13148 Grangeville Boulevard and 9860 13th Avenue.

Also, the Hanford West Bypass 1 and Hanford West Bypass 1 Modified alternatives and the Hanford West Bypass 2 and Hanford West Bypass 2 Modified alternatives have different alignments as they approach the Corcoran area alternatives. The Hanford West Bypass 1 and Hanford West Bypass 1 Modified alternatives connect only with the BNSF–Through Corcoran Alternative, maintaining an alignment on the western side of the BNSF Railway corridor. The Hanford West Bypass 2 and Hanford West Bypass 2 Modified alternatives connect with either the Corcoran Elevated or the Corcoran Bypass alternatives, which occur on the east side of the BNSF Railway corridor.

BNSF–Hanford East Alternative

The BNSF–Hanford East Alternative elevates where it crosses from the western side to the eastern side of the BNSF tracks near East Conejo Avenue. This alternative diverges from the BNSF corridor to the east and returns to grade until SR 43. The alternative would pass over SR 43, Cole Slough, Dutch John Cut, and the Kings River on an elevated structure into Kings County. The alternative would return to grade just north of Douglas Avenue and travel southward, passing Hanford to the east parallel to SR 43. The BNSF-Hanford East Alternative would then pass over the San Joaquin Valley Railroad (SJVR) and SR 198 on an elevated structure and return to grade just north of Hanford Armona Road. It would continue at-grade and curve to the west in the vicinity of Idaho Avenue, rejoining the BNSF Railway right-of-way on its western side just north of Corcoran.

Selection of the BNSF–Hanford East Alternative would result in selection of the Kings/Tulare Regional Station–East Alternative, as it is the only station alternative associated with this segment of the alignment. The Kings/Tulare Regional Station–East Alternative would be located east of SR 43 (Avenue 8) and north of the SJVR on the BNSF Alternative (Figure 2-2). The station building would be approximately 40,000 square feet with a maximum height of approximately 75 feet. The entire site would be approximately 25 acres, including 8 acres designated for the station, bus bays, short-term parking, and kiss-and-ride areas. An additional approximately 17.25 acres would support a surface parking lot with approximately 2,280 spaces. The balance of parking spaces necessary to meet the 2035 parking demand (2,800 total spaces) would be accommodated in Downtown Hanford, Visalia, and/or Tulare, with local transit or shuttle services connecting to the station. Reducing the number of parking spaces provided at the station would allow for more open-space areas, discourage growth at the station, encourage revitalization of the downtown areas of Hanford, Visalia, and/or Tulare, and contain the development footprint of the station.

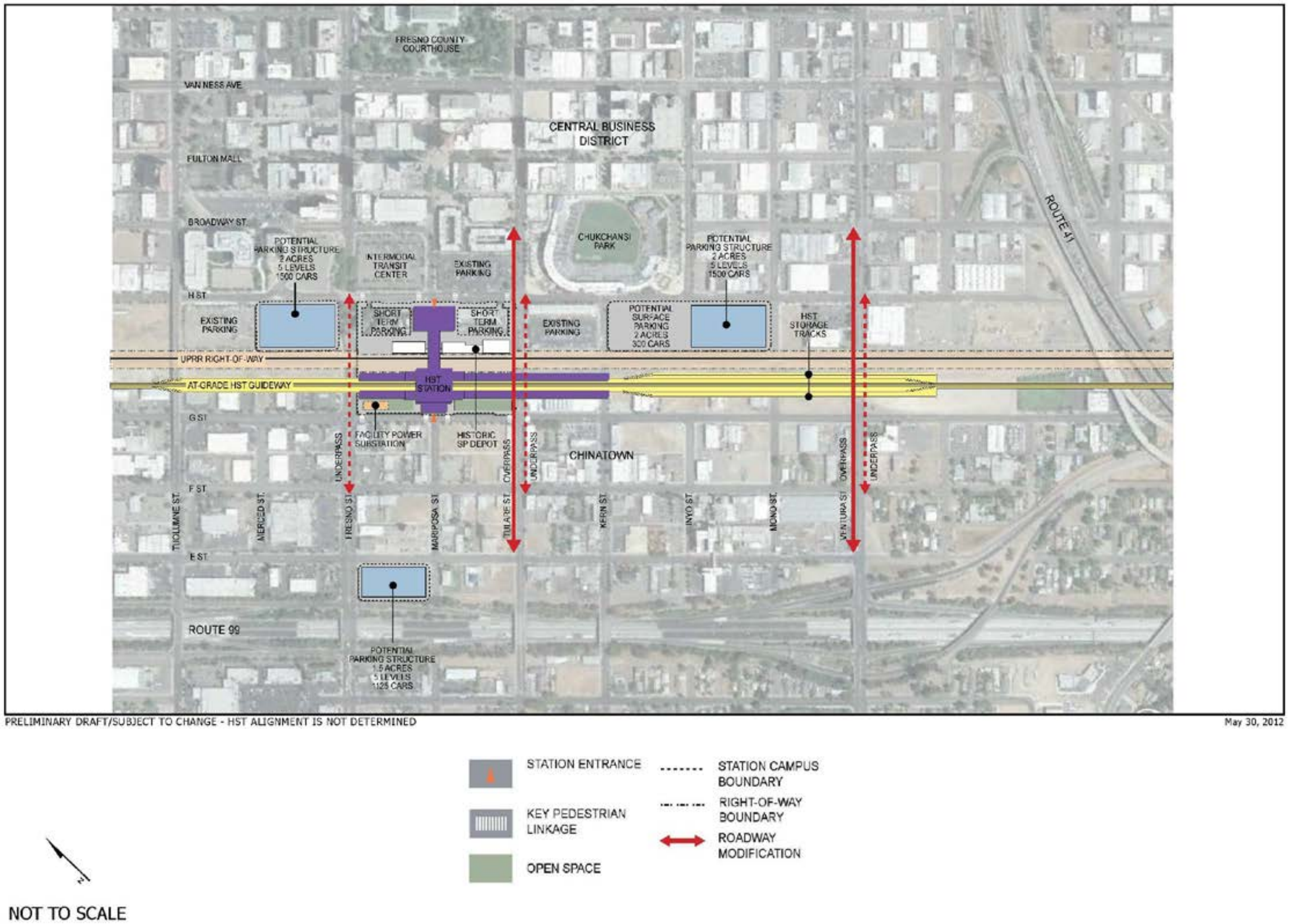

Figure 2-1
Fresno Station–Mariposa Alternative

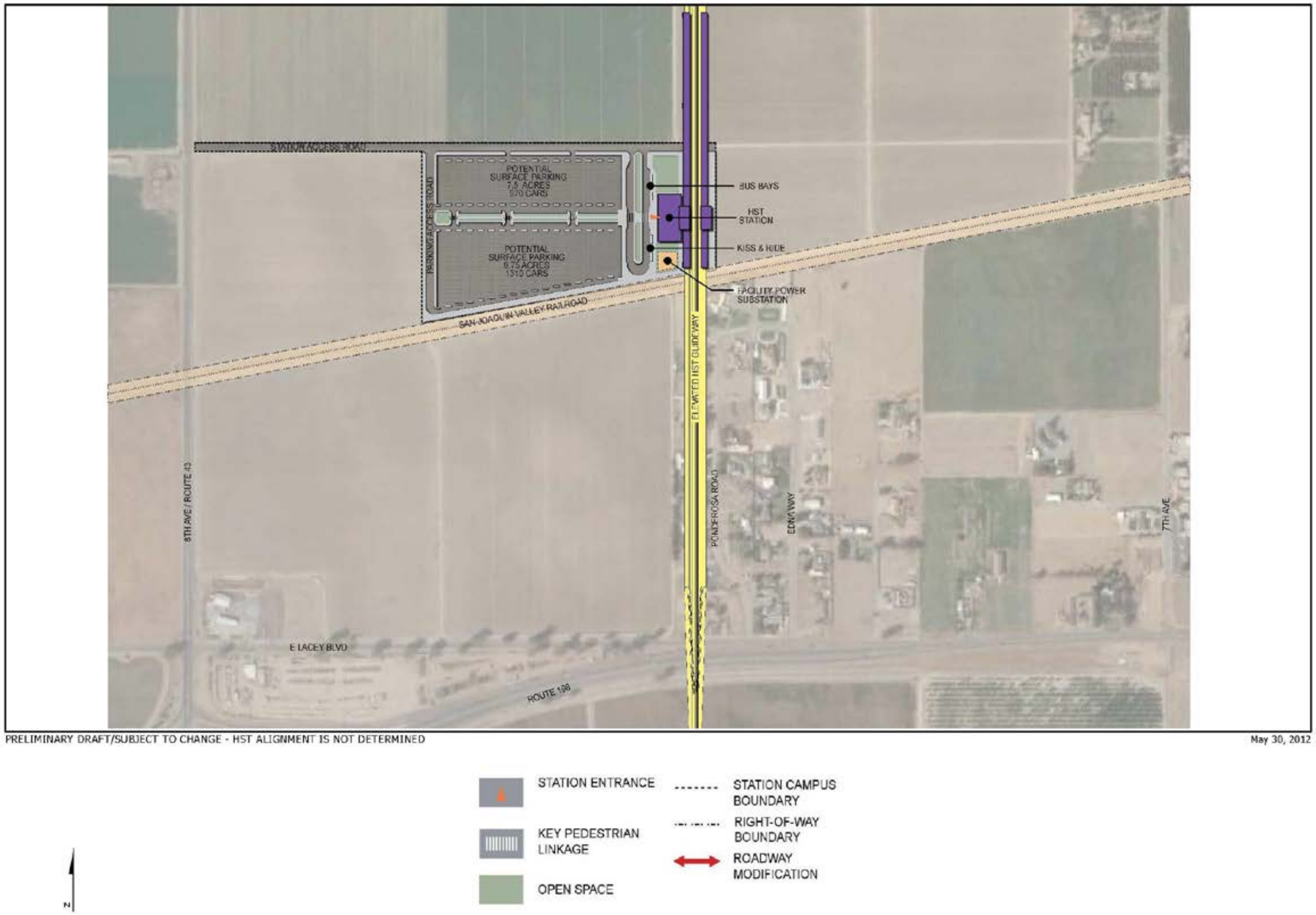

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Figure 2-2
Kings/Tulare Regional Station–East Alternative

Hanford West Bypass 1 Alternative

The Hanford West Bypass 1 Alternative diverges from the BNSF corridor just south of East Elkhorn Avenue, ascends onto an elevated structure just south of East Harlan Avenue, crosses over Murphy Slough and the Kings River complex, and passes the community of Laton to the west. The alternative returns to grade just north of Dover Avenue and travels between the community of Armona to the west and the city of Hanford to the east on a southeasterly route toward the BNSF Railway corridor. The alternative rejoins the BNSF corridor adjacent to its western side at about Lansing Avenue. The alternative continues on the western side of the BNSF corridor and ascends onto another elevated structure, traveling over Cross Creek and the special aquatic features that exist north of Corcoran and returning to grade just north of Nevada Avenue.

The Hanford West Bypass 1 Alternative connects only with the BNSF–Through Corcoran Alternative, maintaining an alignment on the western side of the BNSF Railway corridor.

This alternative would include the at-grade Kings/Tulare Regional Station–West Alternative, located east of 13th Avenue, between Lacey Boulevard and the SJVR railroad spur (Figure 2-3). This alternative would also include a station building of approximately 100,000 square feet with a maximum height of approximately 36 feet. The entire site would be approximately 48 acres, including 6 acres designated for the station, bus bays, short-term parking, and kiss-and-ride areas. Approximately 5 acres would support a surface parking lot with approximately 700 spaces. An additional 3.5 acres would support two parking structures with a combined parking capacity of 2,100 spaces.

Hanford West Bypass 1 Modified Alternative

The Hanford West Bypass 1 Modified Alternative is similar to the Hanford West Bypass 1 Alternative; however, this alternative was modified to avoid Section 106 adverse effects and Section 4(f) uses of the two properties in Kings County located at 13148 Grangeville Boulevard and 9860 13th Avenue. This alternative incorporates a below-grade alignment design between Grangeville Boulevard and Houston Avenue and would include the below-grade Kings/Tulare Regional Station–West Alternative, also located east of 13th Avenue, between Lacey Boulevard and the SJVR railroad spur (Figure 2-4). The below-grade station would include a station building of approximately the same size and height as the above-grade station as well as the same station components on the same number of acres. However, the station platform would be located below-grade instead of at ground level. Approximately 4 acres would support a surface parking lot with approximately 600 spaces, and an additional 4 acres would support two parking structures with a combined parking capacity of 2,200 spaces.

Similar to the Hanford West Bypass 1 Alternative, the Hanford West Bypass 1 Modified Alternative connects only with the BNSF–Through Corcoran Alternative, maintaining an alignment on the western side of the BNSF Railway corridor.

Hanford West Bypass 2 Alternative

The Hanford West Bypass 2 Alternative is the same as the Hanford West Bypass 1 Alternative from East Kamm Avenue to just north of Jackson Avenue. The Hanford West Bypass 2 Alternative then curves away from the Hanford West Bypass 1 Alternative and travels east of the intersection at Kent and 11th avenues toward the BNSF Railway corridor. The alternative ascends over Kent Avenue, crosses over the BNSF Railway right-of-way parallel to the tracks, and crosses over Kansas Avenue before returning to grade north of Lansing Avenue and continuing along the eastern side of the BNSF Railway corridor.

The Hanford West Bypass 2 Alternative connects with the Corcoran Elevated and the Corcoran Bypass alternatives on the eastern side of the BNSF Railway railroad.

The Hanford West Bypass 2 Alternative would include the same at-grade Kings/Tulare Regional Station–West Alternative described for the Hanford West Bypass 1 Alternative (Figure 2-3).

Hanford West Bypass 2 Modified Alternative

The Hanford West Bypass 2 Modified Alternative is similar to the Hanford West Bypass 2 Alternative; however, like the Hanford West Bypass 1 Modified Alternative, this alternative was refined to avoid Section 106 adverse effects and Section 4(f) uses for the two properties in Kings County located at 13148 Grangeville Boulevard and 9860 13th Avenue. The Hanford West Bypass 2 Modified Alternative would have the same below-grade design between Grangeville Boulevard and Houston Avenue as the Hanford West Bypass 1 Modified Alternative and the same below-grade Kings/Tulare Regional Station–West Alternative described for the Hanford West Bypass 1 Modified Alternative (Figure 2-4).

Similar to the Hanford West Bypass 2 Alternative, the Hanford West Bypass 2 Modified Alternative connects with the Corcoran Elevated and the Corcoran Bypass alternatives on the eastern side of the BNSF Railway railroad.

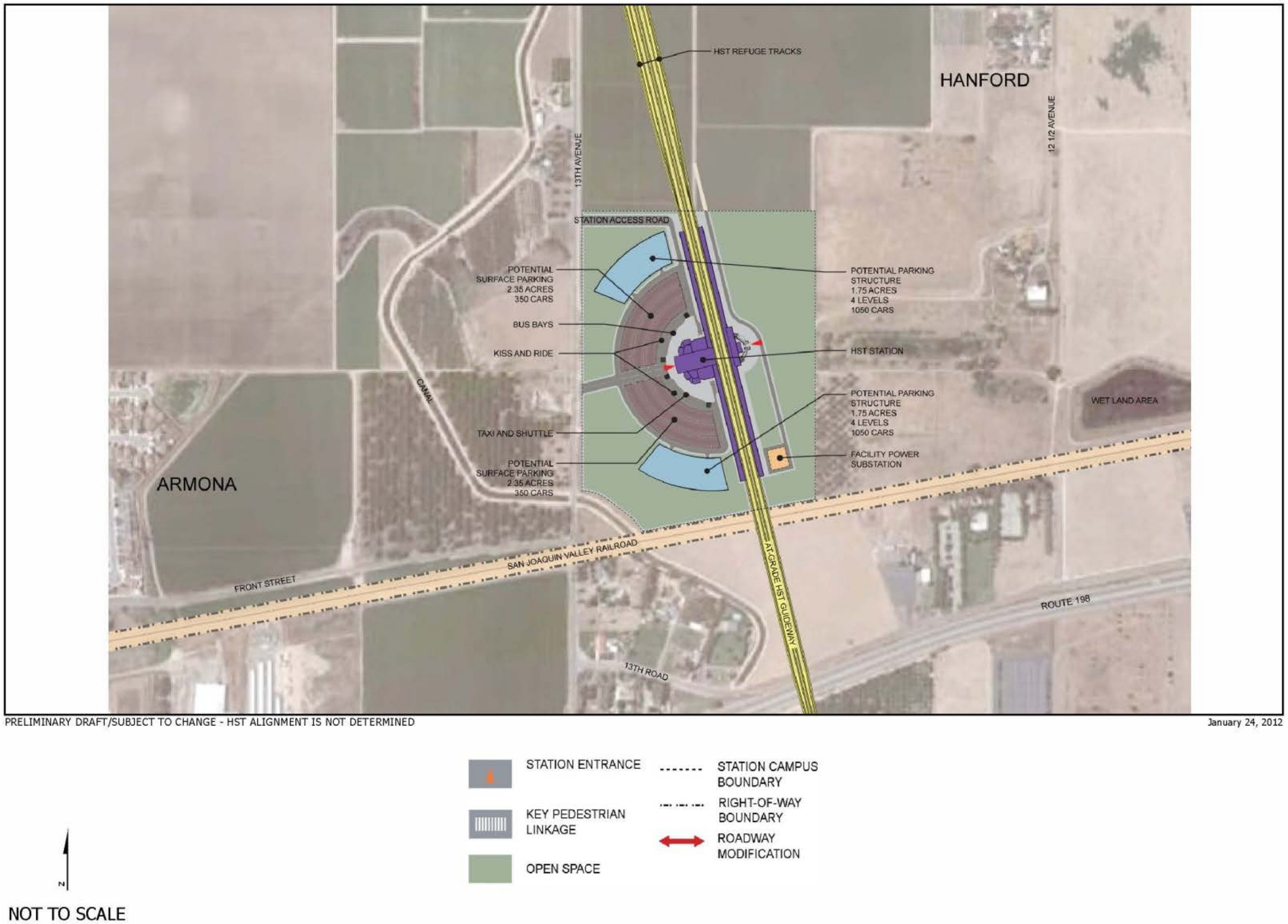


Figure 2-3
Kings/Tulare Regional Station–West Alternative (at-grade option)

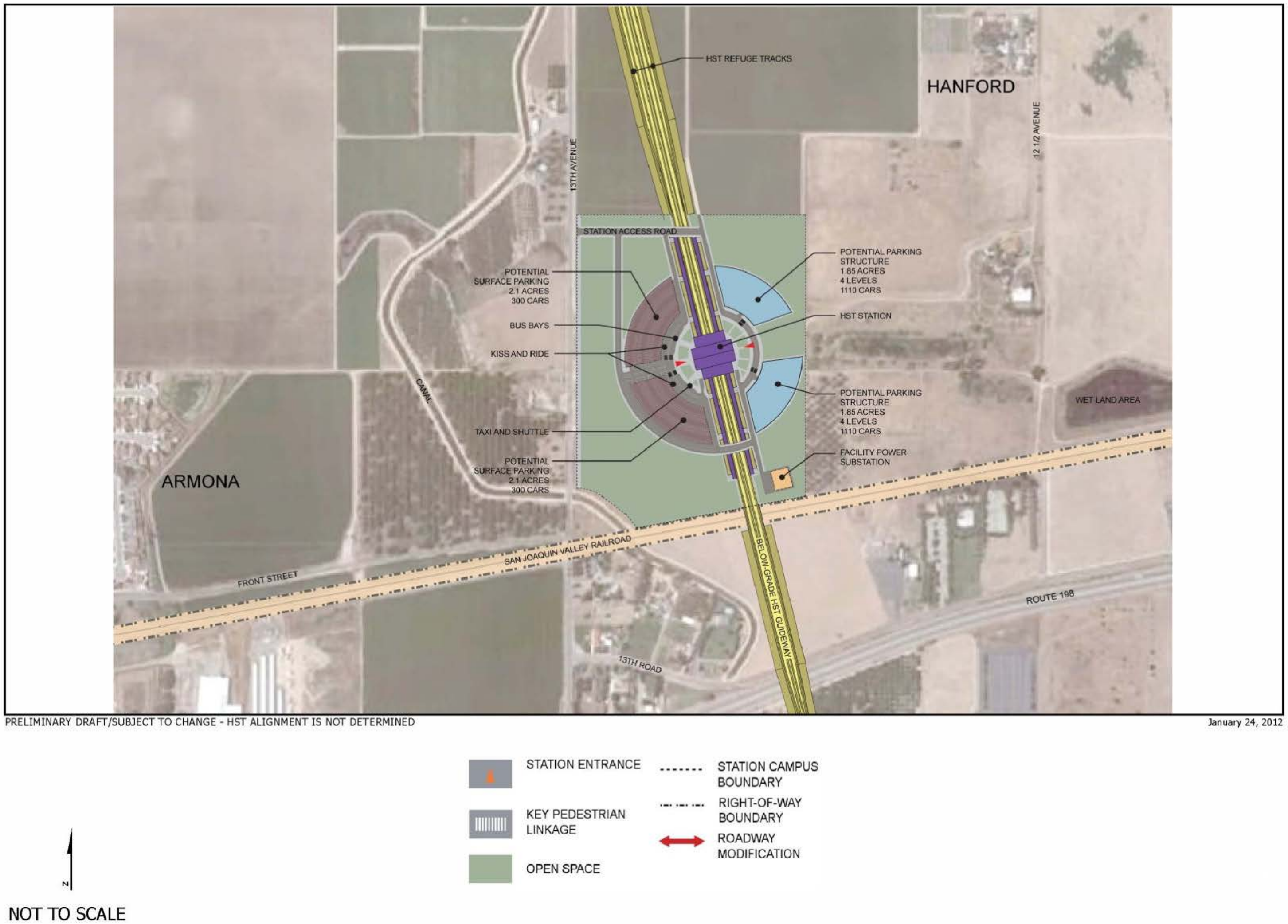


Figure 2-4
Kings/Tulare Regional Station–West Alternative (below-grade option)

2.5.3.3 Description of Corcoran Area Alternatives

The Corcoran area has three alternatives: the BNSF–Through Corcoran Alternative, the Corcoran Elevated Alternative, and the Corcoran Bypass Alternative. These alternatives begin north of Corcoran at approximately Nevada Avenue and continue south to Avenue 136.

BNSF–Through Corcoran Alternative

The BNSF–Through Corcoran Alternative follows the BNSF right-of-way on its western side through the community of Corcoran and travels through the eastern edge of the city. The majority of this part of the alignment passes through agricultural land except where it travels through Corcoran. The alignment continues at-grade until Patterson Avenue, where it ascends onto an elevated structure over Brokaw Avenue, Whitley Avenue, a BNSF spur, and agricultural facilities at the southern end of the city. The alternative then returns to grade and parallels the BNSF corridor.

Corcoran Elevated Alternative

The Corcoran Elevated Alternative is the same as the corresponding section of the BNSF–Through Corcoran Alternative from approximately Nevada Avenue to Avenue 136, except that it passes through Corcoran on the eastern side of the BNSF right-of-way on an aerial structure. The aerial structure begins at Niles Avenue and returns to grade south of Fourth Avenue.

Corcoran Bypass Alternative

The Corcoran Bypass Alternative diverges from the BNSF corridor at Nevada Avenue and swings east of Corcoran, rejoining the BNSF route at Avenue 136. The majority of the Corcoran Bypass Alternative is at-grade except for one elevated structure that crosses over SR 43, the BNSF tracks, and the Tule River.

2.5.3.4 Description of Allensworth Area Alternatives

The Allensworth area has two alternatives: the BNSF–Through Allensworth Alternative and the Allensworth Bypass Alternative. These alternatives begin at approximately Avenue 84 and continue until around Taussig Avenue.

BNSF –Through Allensworth Alternative

This alternative follows the BNSF corridor and passes through both the Allensworth Ecological Reserve and the Allensworth Historic District/Colonel Allensworth State Historic Park. It continues to follow the BNSF corridor until it elevates over the Tule River, Deer Creek, and the Stoil railroad spur from the BNSF corridor.

Allensworth Bypass Alternative

The Allensworth Bypass Alternative avoids both the Allensworth Ecological Reserve and the Allensworth Historic District/Colonel Allensworth State Historic Park. This alternative begins at Avenue 84 and rejoins the BNSF–Through Allensworth Alternative at Elmo Highway. The Allensworth Bypass Alternative would only be constructed on an elevated structure where the alignment crosses Deer Creek and the Stoil railroad spur.

2.5.3.5 Description of Wasco-Shafter Area Alternatives

The Wasco-Shafter area has two alternatives: the BNSF–Through Wasco-Shafter Alternative and the Wasco-Shafter Bypass Alternative. These alternatives begin around Taussig Avenue and continue until the alignment reaches Bakersfield.

BNSF–Through Wasco-Shafter Alternative

The BNSF–Through Wasco-Shafter Alternative is at-grade and parallels the BSNF Railway corridor as it passes through Wasco. The alternative elevates at First Street and closely follows the western side of the BNSF right-of-way until just south of Wasco where it crosses to the eastern side of the BNSF tracks and returns to an at-grade profile. The alternative continues on the eastern side of the BNSF right-of-way through Shafter, once again elevates at Cherry Avenue, and crosses over once more to the western side of the BNSF right-of-way, where it returns to an at-grade profile and follows the BNSF right-of-way into Bakersfield.

Wasco-Shafter Bypass Alternative

The Wasco-Shafter Bypass Alternative diverges from the BNSF–Through Wasco-Shafter Alternative between Taussig Avenue and Zachary Avenue, crosses over to the eastern side of the BNSF tracks, and bypasses Wasco and Shafter to the east. The Wasco-Shafter Bypass Alternative is at-grade except where it travels over Seventh Standard Road and the BNSF tracks to rejoin the common alignment.

2.5.3.6 Description of Bakersfield Area Alternatives

The Bakersfield area has three alternatives: the BNSF–Bakersfield North Alternative, the Bakersfield South Alternative, and the Bakersfield Hybrid Alternative. These alternatives begin at the northern boundary of Bakersfield and continue to the terminus of the alternatives at Oswell Street.

BNSF–Bakersfield North Alternative

The BNSF–Bakersfield North Alternative runs at-grade and follows both the BNSF corridor and SR 58 into Bakersfield. Although the alternative generally follows the BNSF corridor through Bakersfield, it elevates at Country Breeze Place and continues as an elevated structure all the way to the project terminus at Oswell Street.

The Bakersfield Station–North Alternative would be located at the corner of Truxtun and Union avenues/SR 204 on the BNSF Alternative. Access to the site would be from Truxtun Avenue, Union Avenue, and S Street (Figure 2-5). Two new boulevards would be built from Union Avenue and S Street to access the station and the supporting facilities. The three-level station building would be 52,000 square feet, with a maximum height of approximately 95 feet. The entire site would consist of 19 acres, with 11.5 acres designated for the station, bus transit center, short-term parking, and kiss-and-ride areas. An additional 7.5 acres would house two parking structures with a planned capacity of approximately 4,500 cars, In addition, another 175 spaces would be provided in surface lots. The balance of the supply necessary to accommodate the full 2035 parking demand would be provided through surface lots and the use of underutilized facilities around the station and in Downtown Bakersfield, identified as a part of a comprehensive parking strategy developed in coordination with the City of Bakersfield.

Figure 2-5
Bakersfield Station–North Alternative

Bakersfield South Alternative

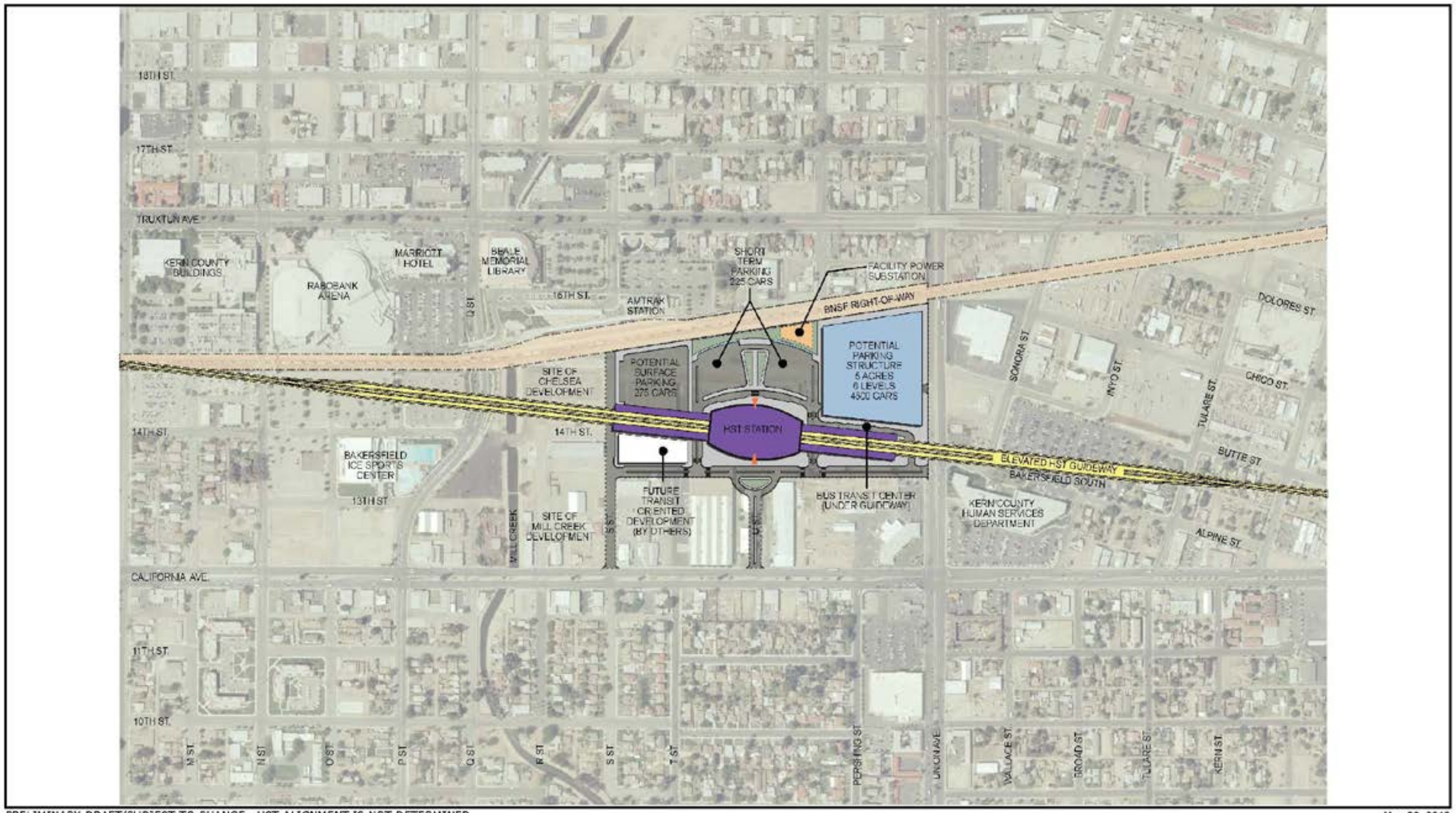
The Bakersfield South Alternative runs at-grade as it follows both the BNSF corridor and SR 58 into Bakersfield. It parallels the BNSF–Bakersfield North Alternative until Chester Avenue, where it curves south and then parallels California Avenue. As with the BNSF–Bakersfield North Alternative, the Bakersfield South Alternative begins at-grade but elevates at Country Breeze Place and continues as an elevated structure all the way to the project terminus at Oswell Street.

The Bakersfield Station–South Alternative would be in the same area as the station North Alternative, but would be situated along Union and California avenues, just south of the BNSF Railway right-of-way (Figure 2-6). Access to the station site would be from two new boulevards: one branching off from California Avenue, and the other from Union Avenue. The two-level station building would be approximately 51,000 square feet, with a maximum height of approximately 95 feet. The entire site would be 20 acres, with 15 acres designated for the station, bus transit center, short-term parking, and kiss-and-ride areas. Five of the 20 acres would support one six-level parking structure with a capacity of approximately 4,500 cars. In addition, another 500 spaces would be provided in surface lots, with the balance of the supply necessary to accommodate the full parking demand to be identified as a part of a comprehensive parking strategy developed in coordination with the City of Bakersfield.

Bakersfield Hybrid Alternative

The Bakersfield Hybrid Alternative runs at-grade as it follows both the BNSF corridor and SR 58 into Bakersfield. It parallels the Bakersfield South Alternative until approximately A Street, where it diverges from the Bakersfield South Alternative, crosses over Chester Avenue and the BNSF right-of-way in a southeasterly direction, then curves back to the northeast to parallel the BNSF tracks toward Kern Junction. After crossing Truxtun Avenue, the alignment curves to the southeast to parallel the UPRR tracks and Edison Highway to its terminus at Oswell Street. As with the BNSF–Bakersfield North and the Bakersfield South alternatives, the Bakersfield Hybrid Alternative begins at-grade but elevates at Country Breeze Place and continues as an elevated structure all the way to the project terminus at Oswell Street.

The Bakersfield Station–Hybrid Alternative would be built at the corner of Truxtun and Union avenues/SR 204 (Figure 2-7). The entire site would be approximately 24 acres, with 15 acres designated for the station, bus transit center, short-term parking, and kiss-and-ride areas. Approximately 4.5 of the 24 acres would support three parking structures with a total capacity of approximately 4,500 cars. An additional 460 parking spaces would be provided in surface lots covering a total of approximately 4.5 acres of the station site. The balance of the supply needed to accommodate the full 2035 parking demand (8,100 total spaces) would be identified as a part of a comprehensive parking strategy developed in coordination with the City of Bakersfield.



PRELIMINARY DRAFT/SUBJECT TO CHANGE - HST ALIGNMENT IS NOT DETERMINED

May 30, 2012

STATION ENTRANCE
KEY PEDESTRIAN LINKAGE
OPEN SPACE
STATION CAMPUS BOUNDARY
RIGHT-OF-WAY BOUNDARY
ROADWAY MODIFICATION

N

NOT TO SCALE

Figure 2-6
Bakersfield Station–South Alternative

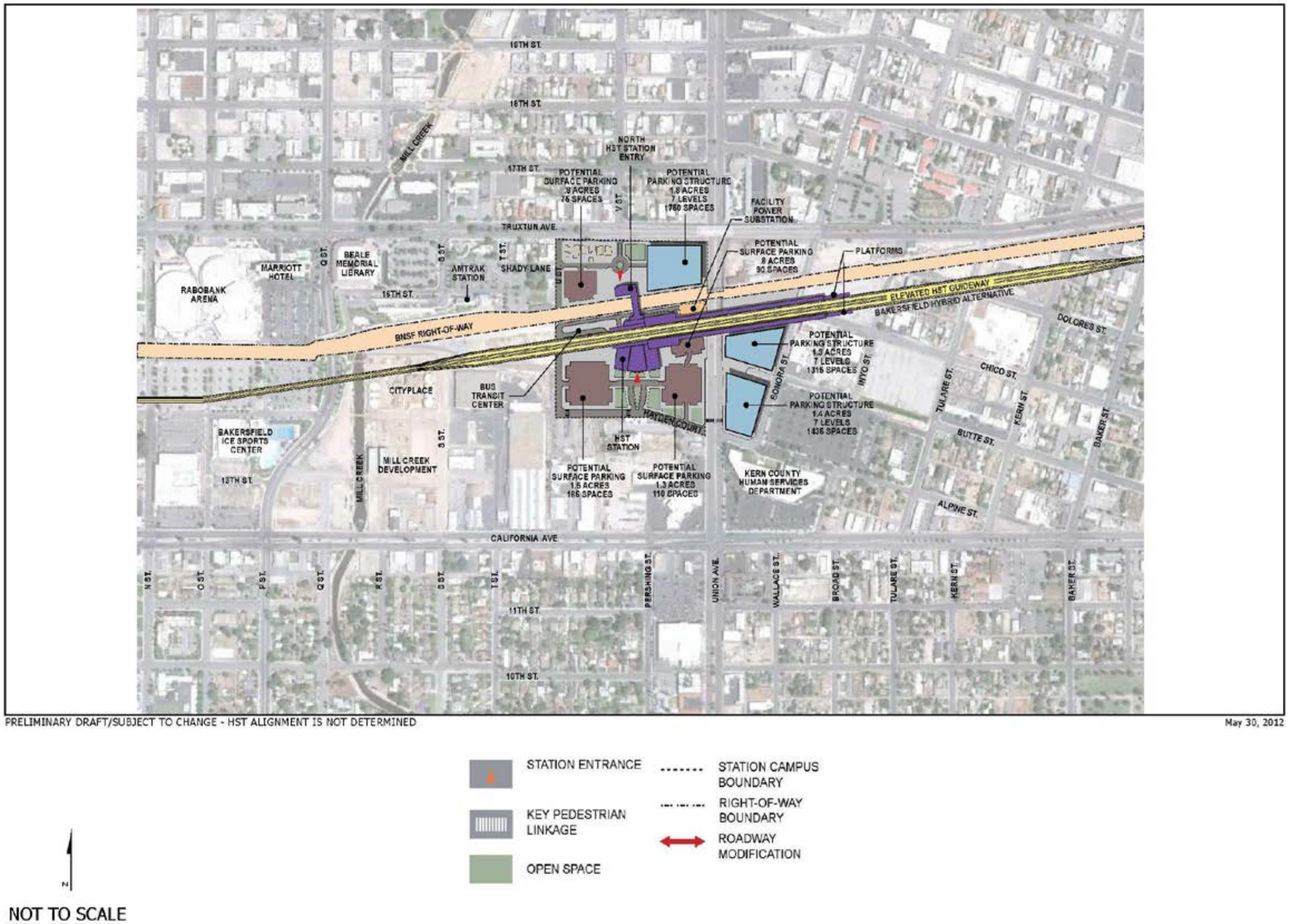


Figure 2-7
Bakersfield Station–Hybrid Alternative

Chapter 3.0

Aquatic Resources: Existing Conditions and Mitigation Measures for All Project Alternatives

3.0 Aquatic Resources: Existing Conditions and Mitigation Measures for All Project Alternatives

3.1 Definitions of Study Areas

The existing conditions described in this chapter include plant community and land cover types (wildlife habitat types) and aquatic resources. The types of aquatic resources present are described in terms of both quantity and quality or condition.[1]

The following areas are described as appropriate for the resources being analyzed:

- Project Footprint: includes the proposed HST right-of-way and associated facilities (traction power substations, switching and paralleling stations, and areas associated with modifying or relocating roadways for those facilities—including overcrossings and interchanges), station alternatives, and construction areas (including laydown, storage, and similar areas).
- Wetland Study Area (WSA): encompasses the Project Footprint, plus an additional 250-foot buffer on either side of the Project Footprint.

3.2 Aquatic Resources Addressed by this Summary

3.2.1 Jurisdictional Waters

The Clean Water Act defines "waters of the United States" as:

1. All waters that are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters that are subject to the ebb and flow of the tide;
2. All interstate waters including interstate wetlands;
3. All other waters, such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds, the use, degradation, or destruction of which could affect interstate or foreign commerce;
4. All impoundments of waters otherwise defined as waters of the U.S.;
5. Tributaries to the foregoing types of waters; and
6. Wetlands adjacent to the foregoing waters (33 Code of Federal Regulations [CFR] 328.3[a]). Waters of the U.S. include both wetlands and other waters of the U.S. All of the jurisdictional waters identified in this report as "waters of the U.S." are both waters of the state and waters of the U.S. because of overlapping jurisdictions.

Consequently, jurisdictional waters include wetlands and other waters of the U.S. (Figure 3-1). Identified wetland features include emergent wetlands, seasonal wetlands, and vernal pools and

[1] The analysis is based on reports and environmental documents, including the *Fresno to Bakersfield Section: Revised Draft Environmental Impact Report/Supplemental Draft Environmental Impact Statement, Fresno to Bakersfield Section Biological Resources and Wetland Technical Report, Fresno to Bakersfield Section: Supplemental Preliminary Jurisdictional Waters and Wetlands Delineation Report,* and the *Fresno to Bakersfield Section: Watershed Evaluation Report* (Authority and FRA 2012f, 2012b, 2011d, 2012h).

swales. Other waters of the U.S. identified in the WSA include canals/ditches, man-made lacustrine, and seasonal riverine.

Many of the jurisdictional waters have been leveled, drained, and/or leveed to prevent flooding for agricultural purposes. The physical and biological characteristics of the substrate within various features are largely dictated by whether the feature is manipulated or natural.

- Manipulated features include all jurisdictional water features except vernal pools and swales. These manipulated features contain substrates that have been altered through excavation, filling, dredging, and accretion of sediments, and that typically range from sandy and coarse-loamy, to fine-silty, fine-loamy, and fines (depending on location in the WSA).
- Natural features, such as vernal pools and swales, have substrates composed of natural alkaline soils, which are harsh environments for microbes and plants, and contain low levels of organic matter.

Jurisdictional waters are described in more detail in the *Fresno to Bakersfield Section: Biological Resources and Wetlands Technical Report* (Authority and FRA 2012b), the *Fresno to Bakersfield Section: Supplemental Preliminary Jurisdictional Waters and Wetland Delineation Report* (Authority and FRA 2011d), and the *Fresno to Bakersfield Section: Revised Draft EIR / Supplemental Draft EIS* (Authority and FRA 2012d), which provide detailed descriptions of the major surface water features in the region.

3.2.1.1 Wetlands

Wetland delineation field surveys were conducted of all Project alternatives within the WSA in accordance with the methods described in the U.S. Army Corps of Engineers (USACE) Wetlands Delineation Manual (Environmental Laboratory 1987) and the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region (USACE 2008). In areas where access was not granted, aquatic resources were identified through interpretation of aerial photographs.

Emergent Wetlands

Emergent wetlands appear to be man-made or highly manipulated. They are bounded by earthen walls and receive hydrologic input from surrounding canals, agricultural fields, and urban development. They are either composed of vegetated portions of lacustrine areas or have replaced former lacustrine areas that are now vegetated.

Emergent wetlands occur in two locations: (1) west of the city of Hanford and (2) in Bakersfield. They are characterized by topographic depressions that frequently flood or hold ponded water long enough to support hydrophytic vegetation and they typically feature hydric soils. Vegetation separates these features from man-made lacustrine. In general, these emergent wetlands are in fair-to-good ecological condition, although they have a highly manipulated hydrologic regime and have been engineered to a degree that they retain few natural characteristics; however, they offer physical structure to plants and wildlife and provide important biological functions.

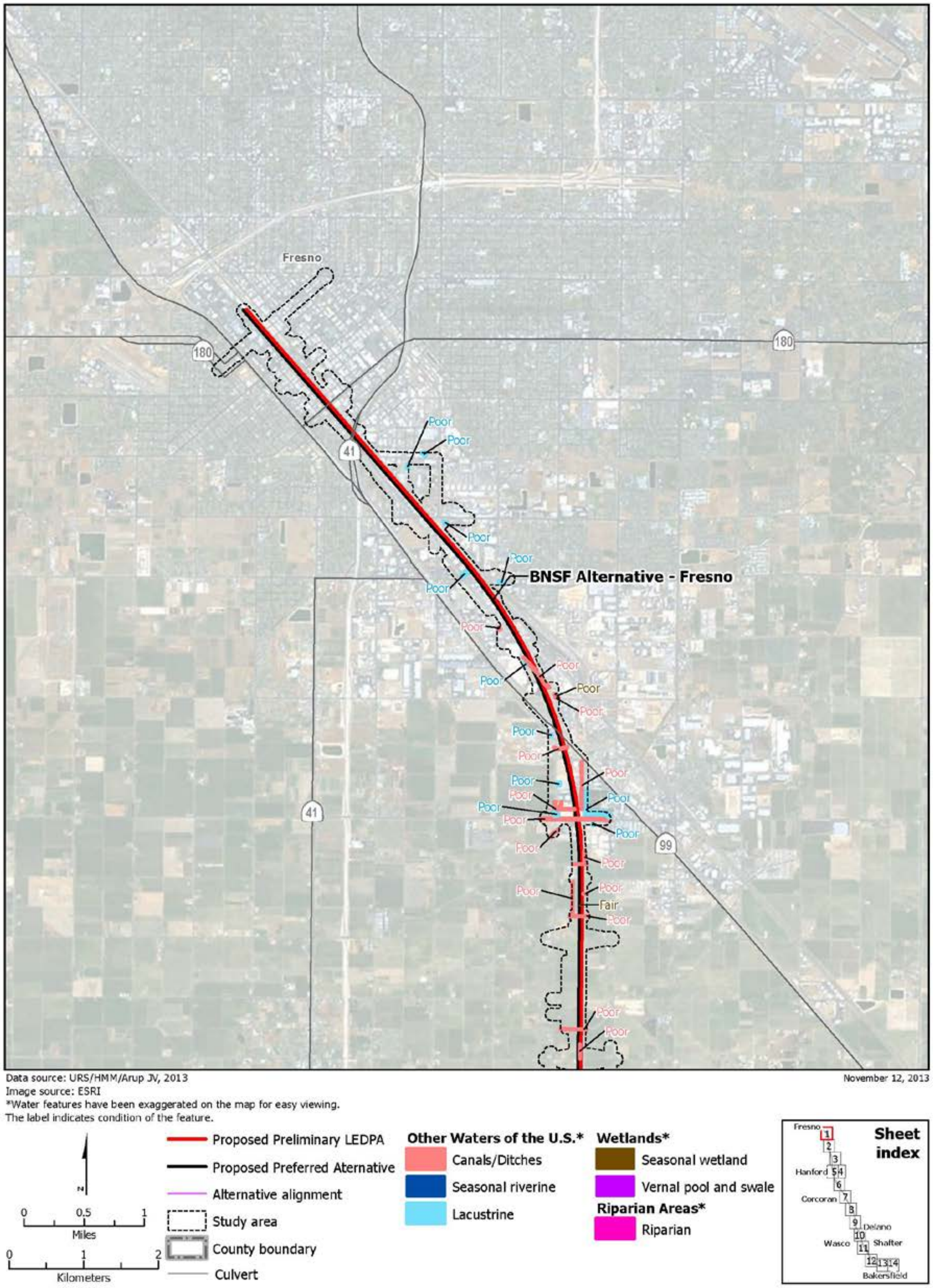


Figure 3-1
Jurisdictional waters delineation and condition
Sheet 1 of 14

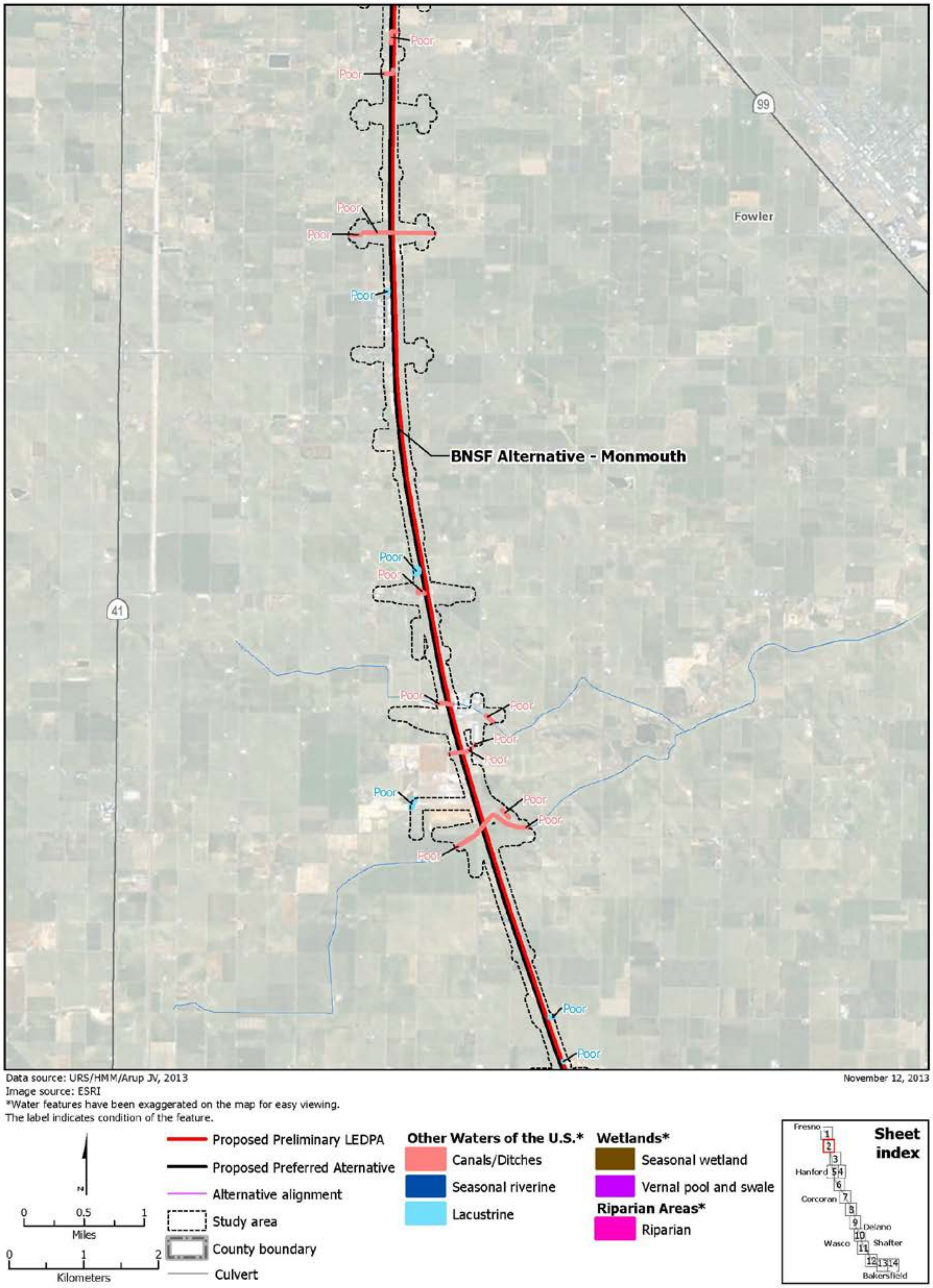


Figure 3-1
Jurisdictional waters delineation and condition
Sheet 2 of 14

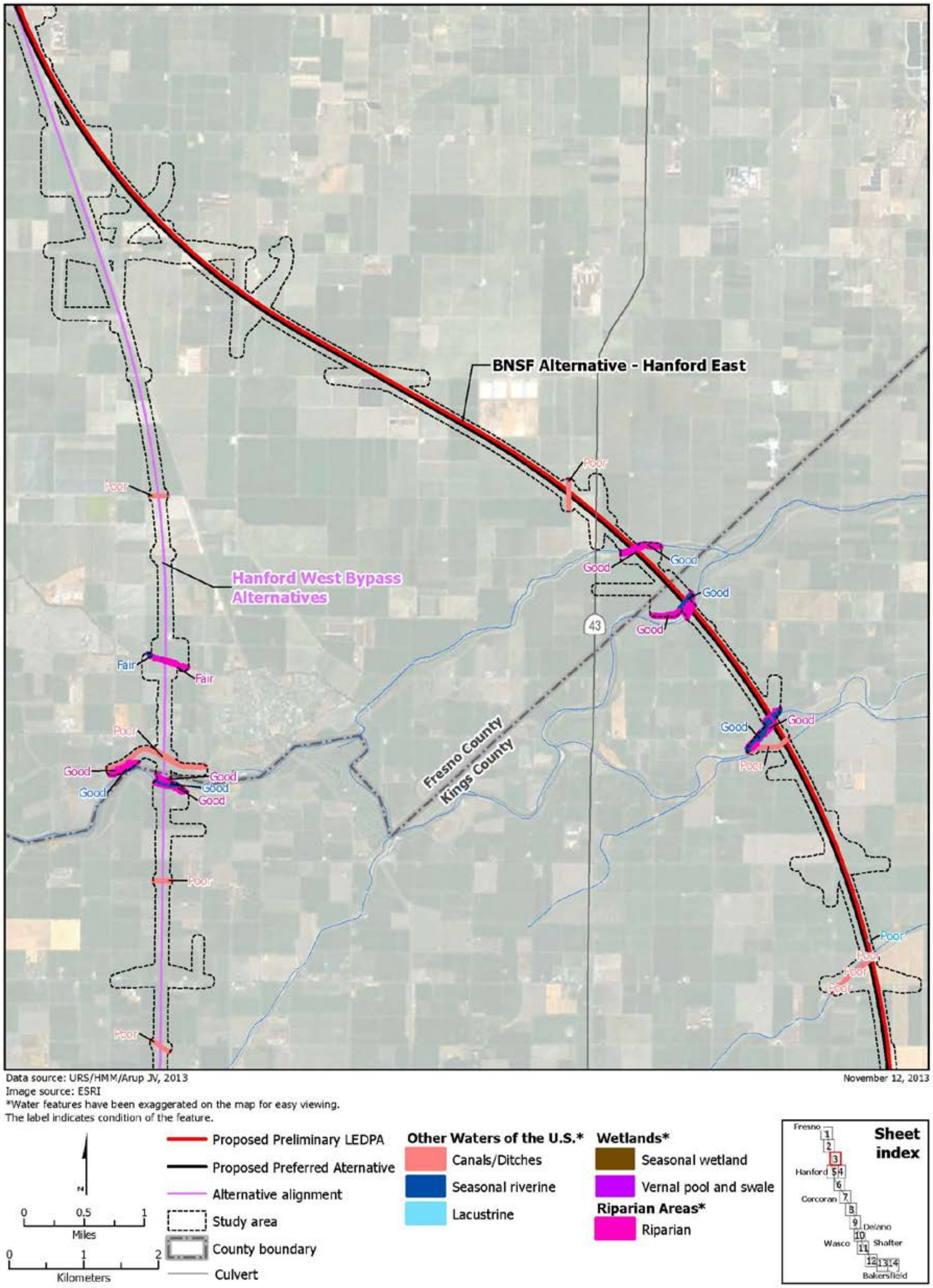


Figure 3-1
Jurisdictional waters delineation and condition
Sheet 3 of 14

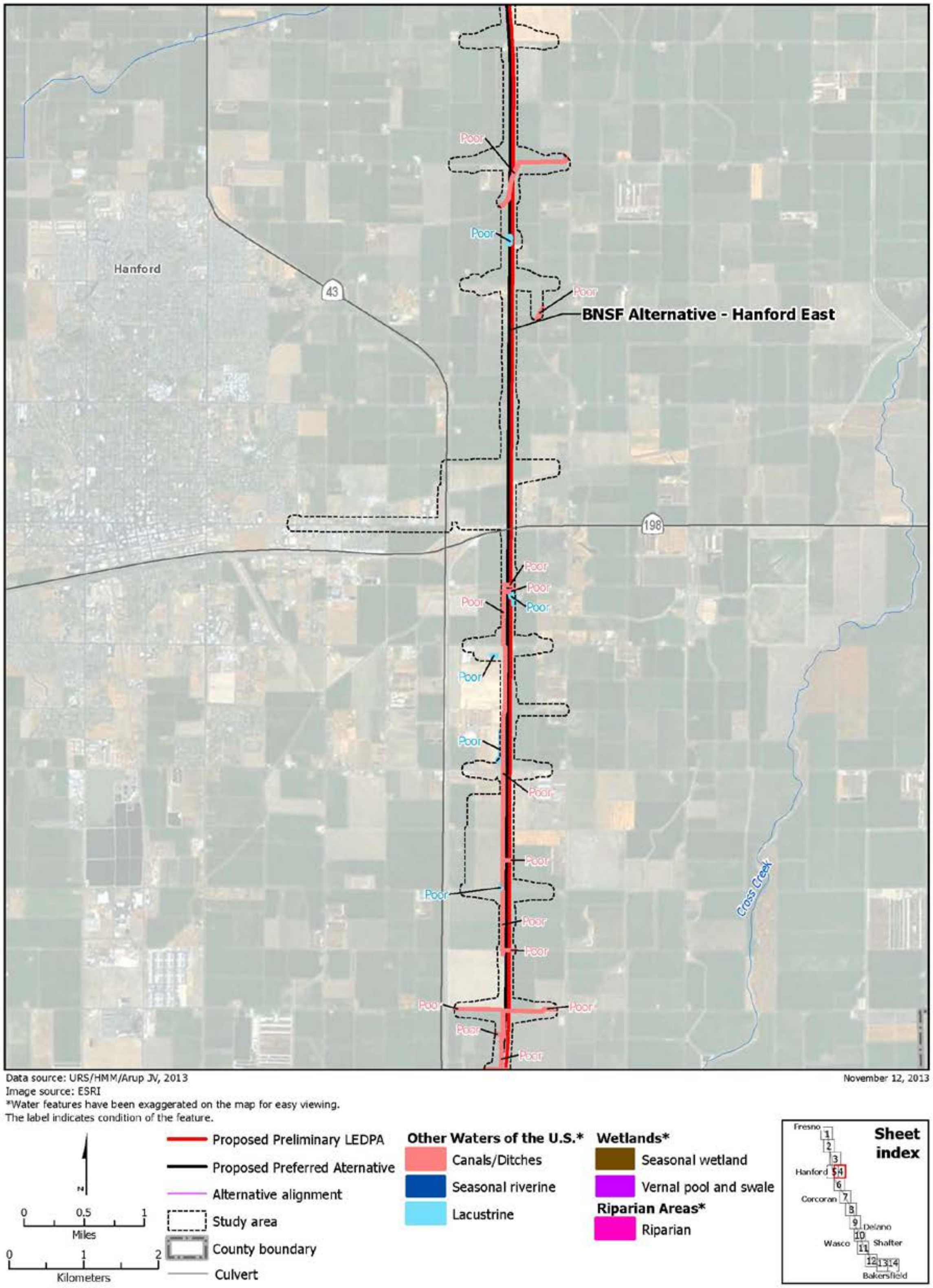


Figure 3-1
Jurisdictional waters delineation and condition
Sheet 4 of 14

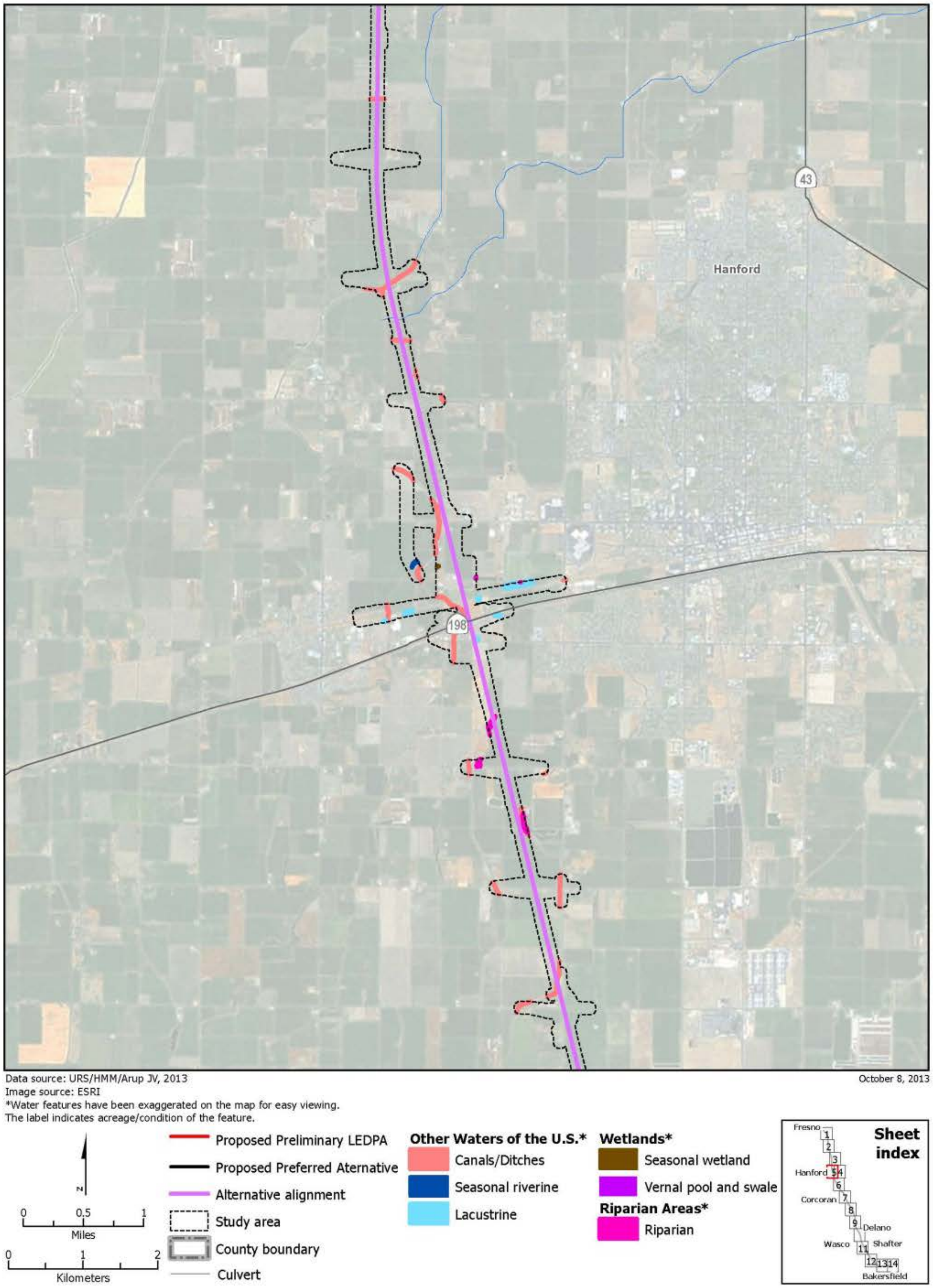


Figure 3-1
Jurisdictional waters delineation and condition
Sheet 5 of 14

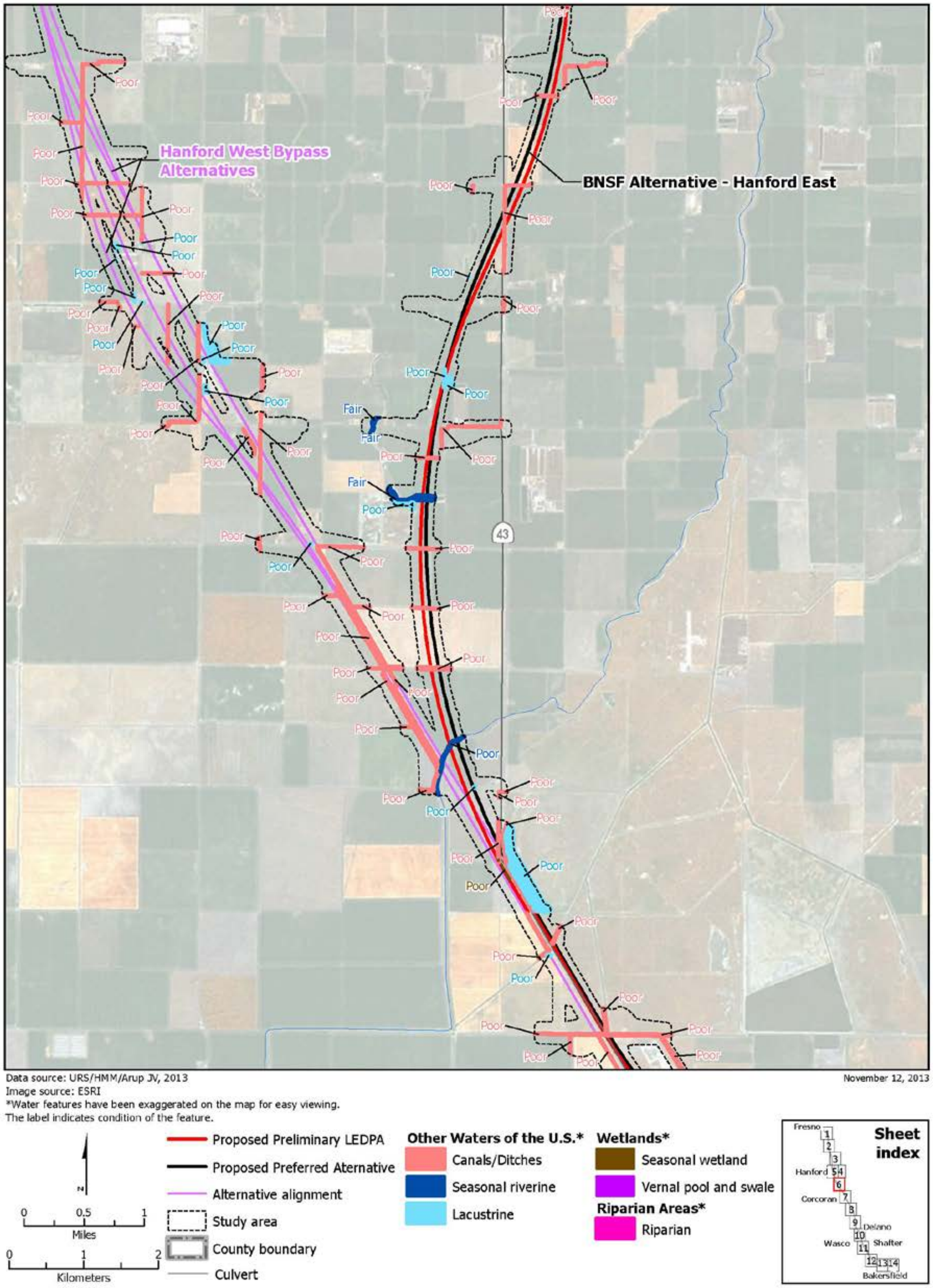


Figure 3-1
Jurisdictional waters delineation and condition
Sheet 6 of 14

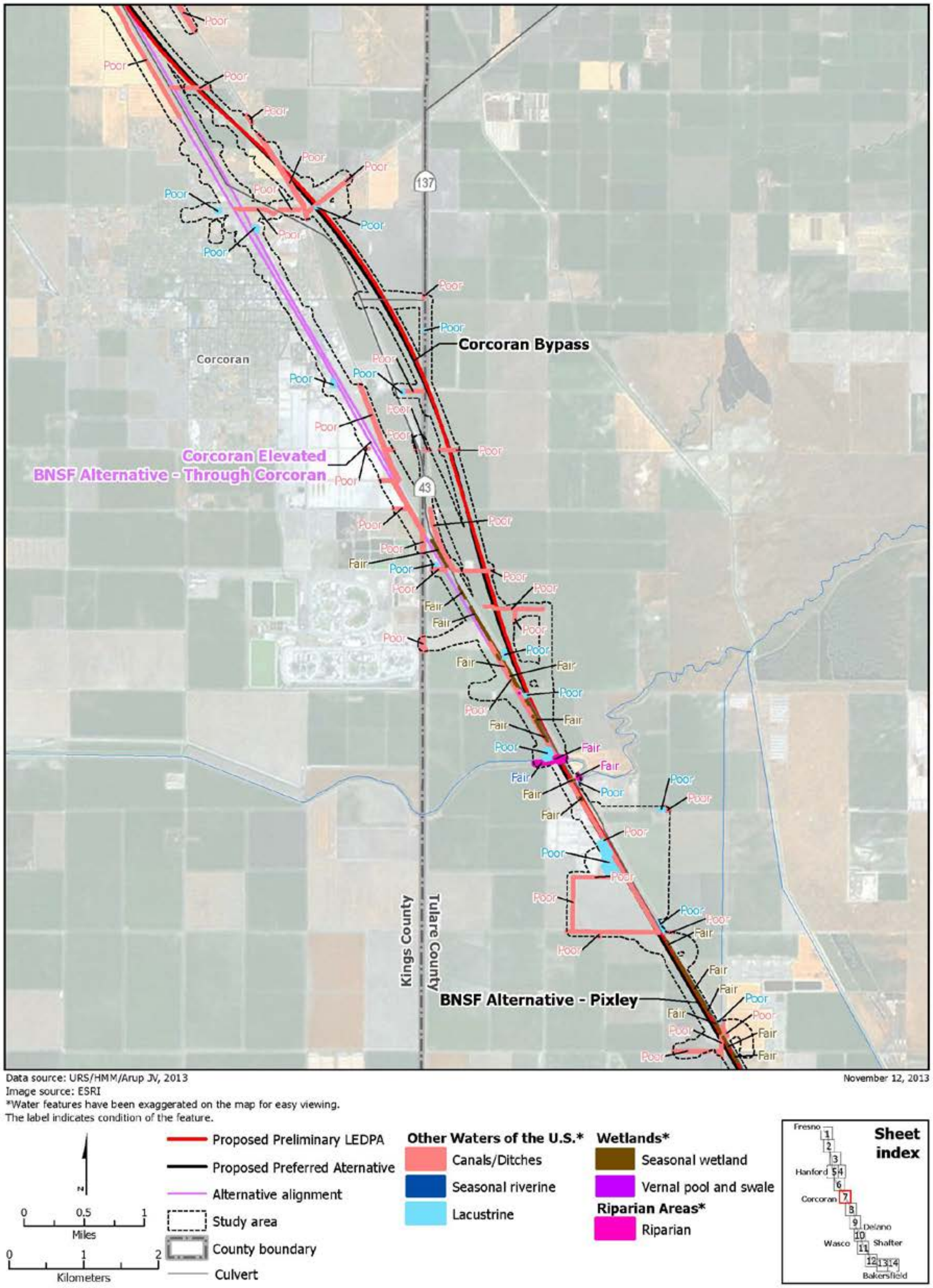


Figure 3-1
Jurisdictional waters delineation and condition
Sheet 7 of 14

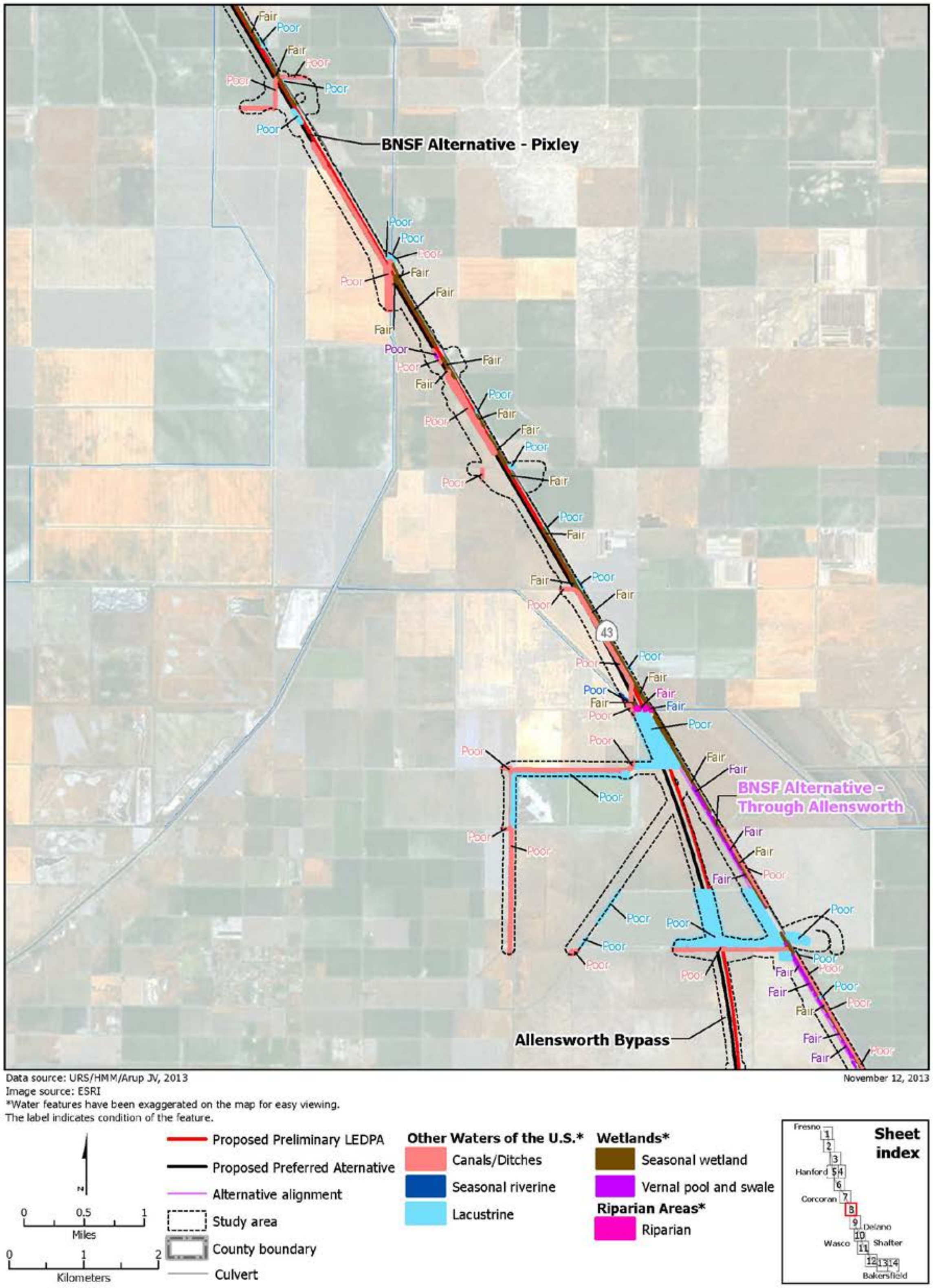


Figure 3-1
Jurisdictional waters delineation and condition
Sheet 8 of 14

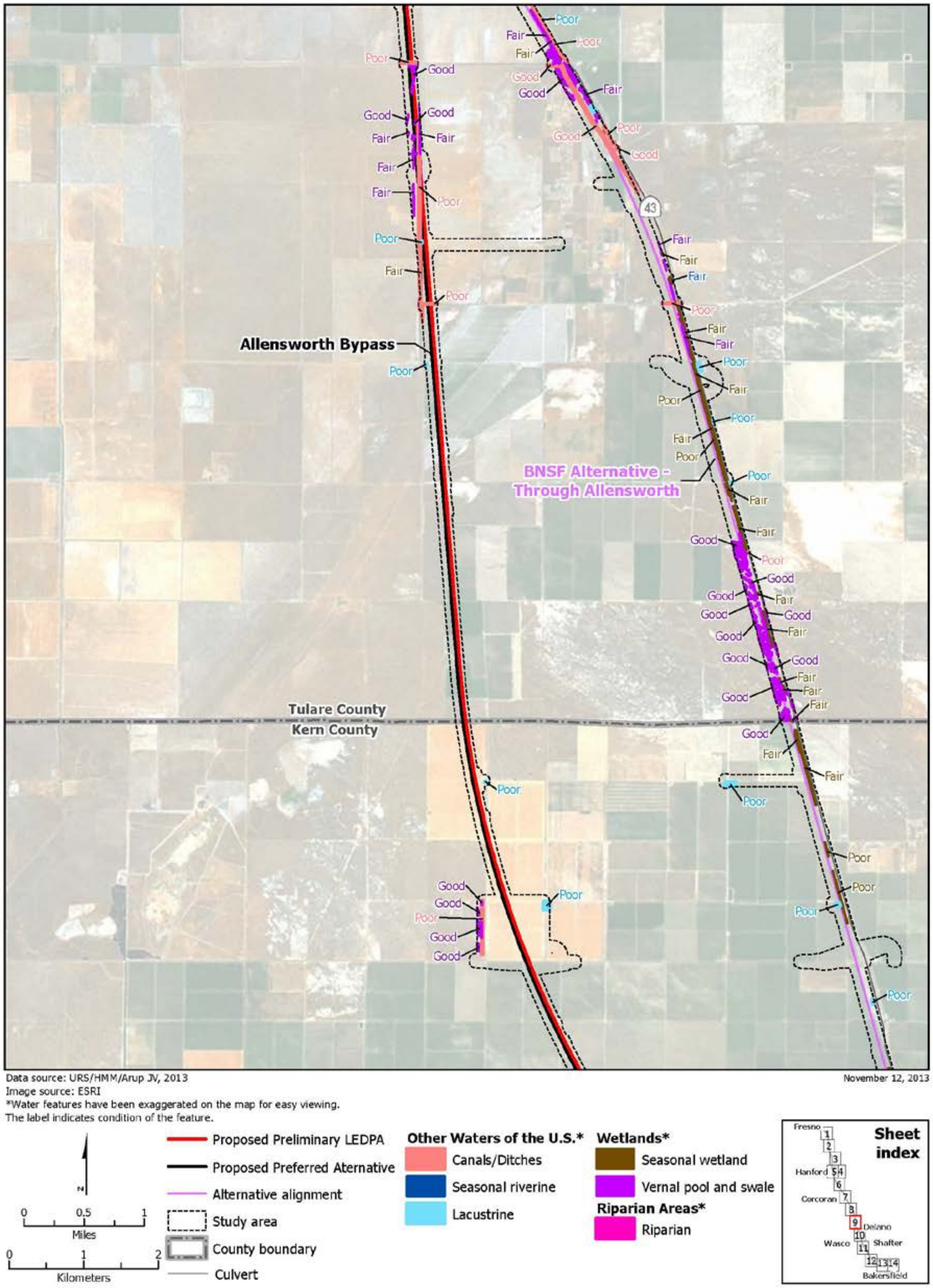


Figure 3-1
Jurisdictional waters delineation and condition
Sheet 9 of 14

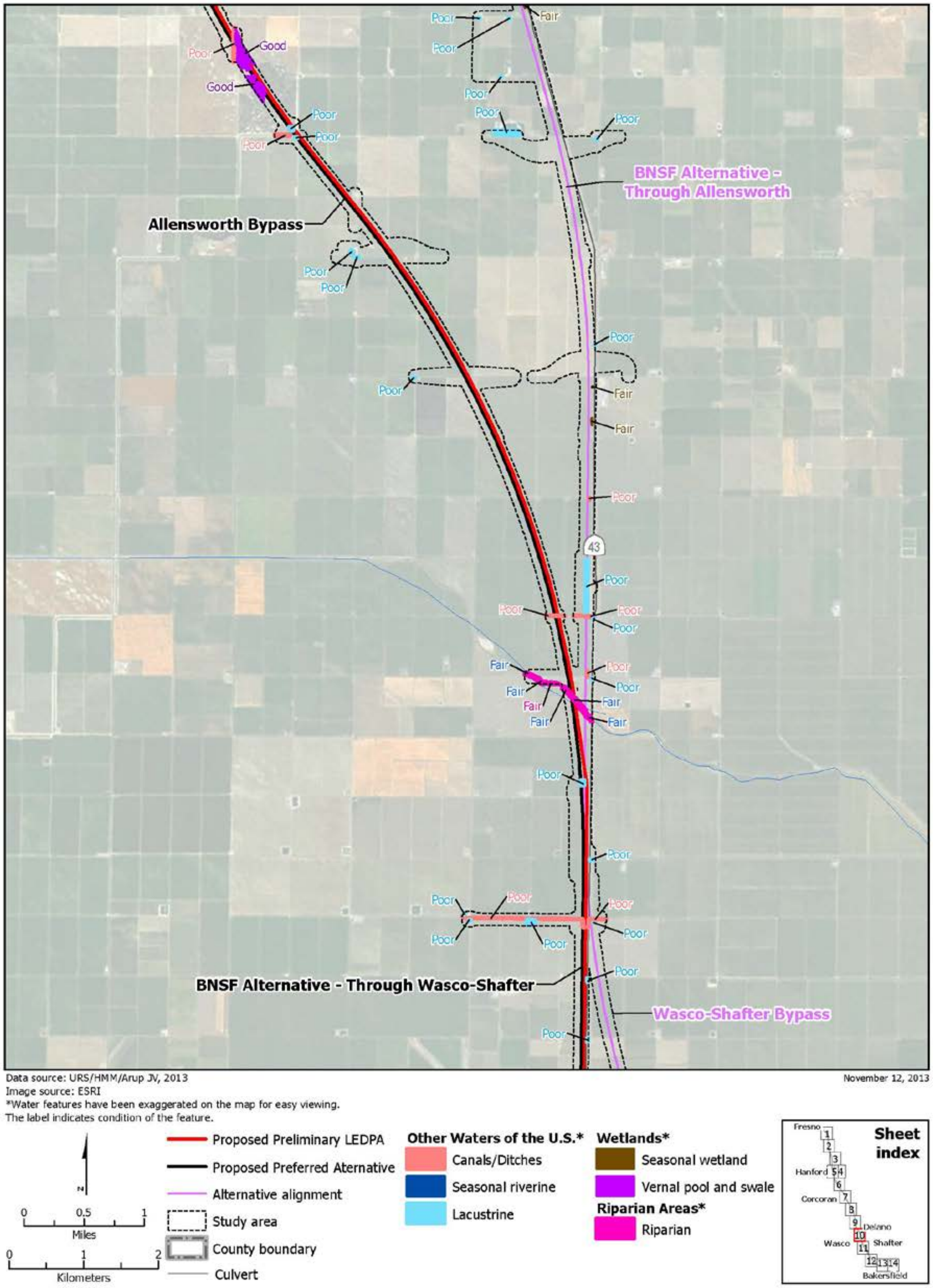


Figure 3-1
Jurisdictional waters delineation and condition
Sheet 10 of 14

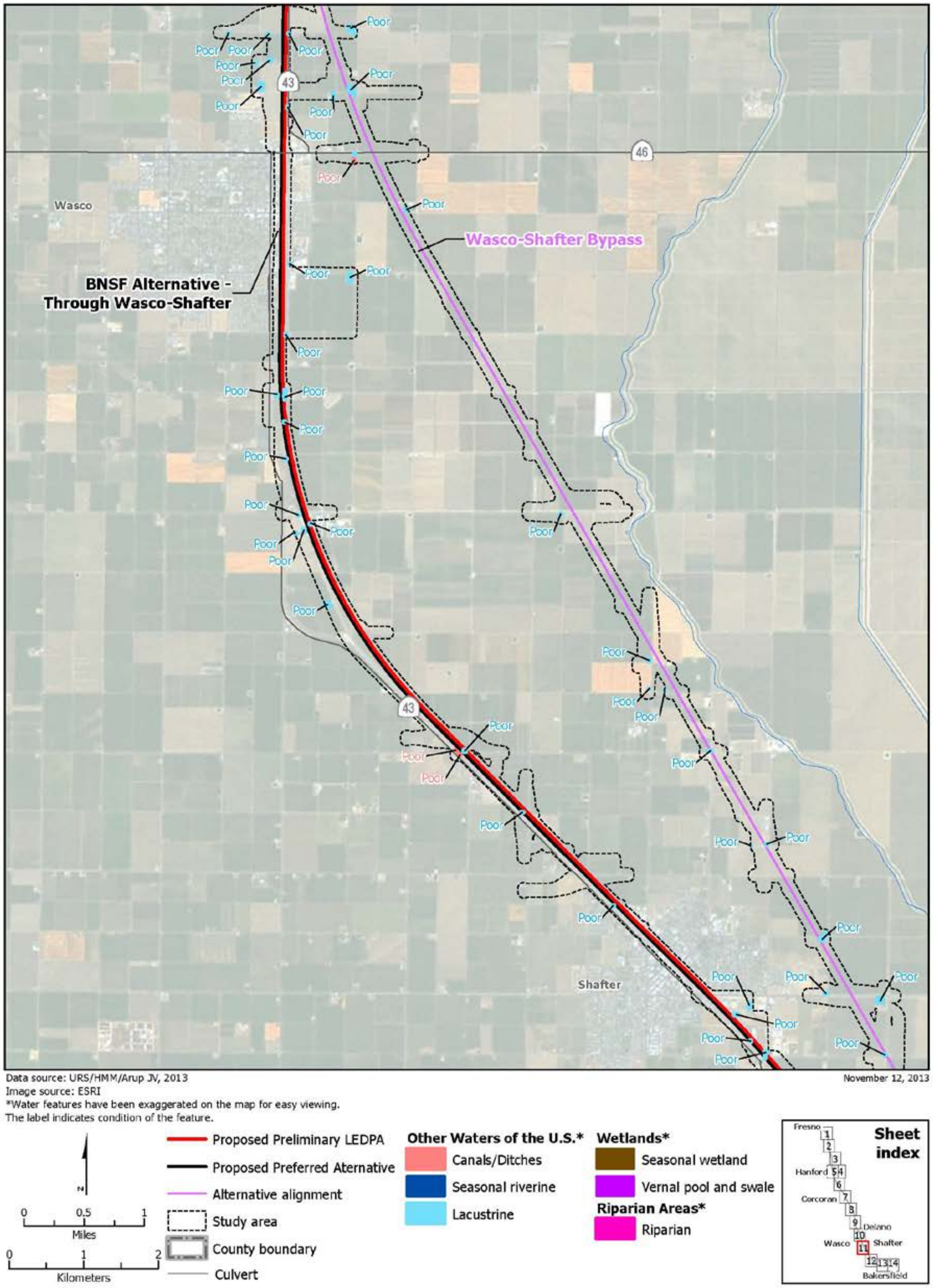


Figure 3-1
Jurisdictional waters delineation and condition
Sheets 11 of 14

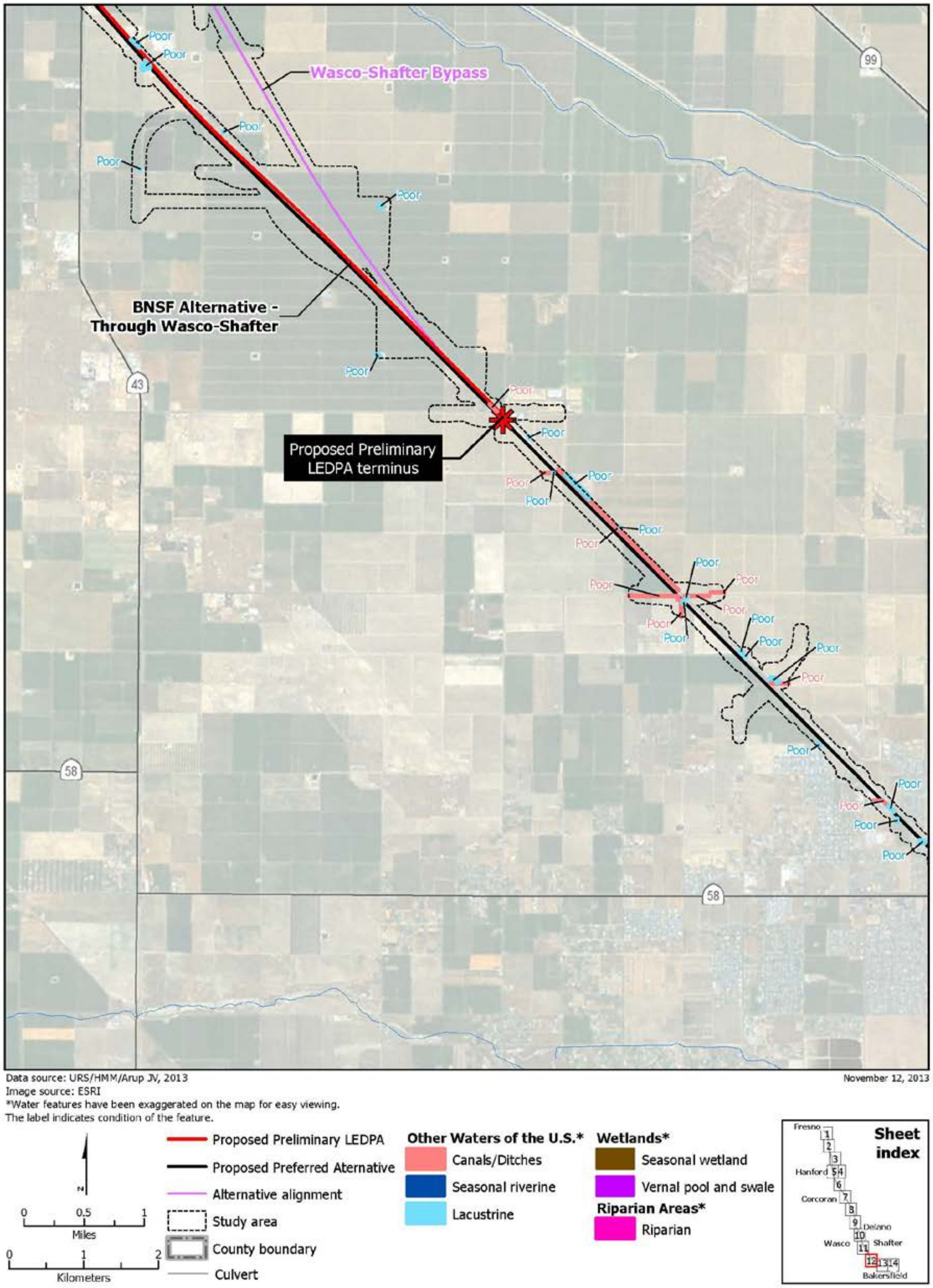


Figure 3-1
Jurisdictional waters delineation and condition
Sheet 12 of 14

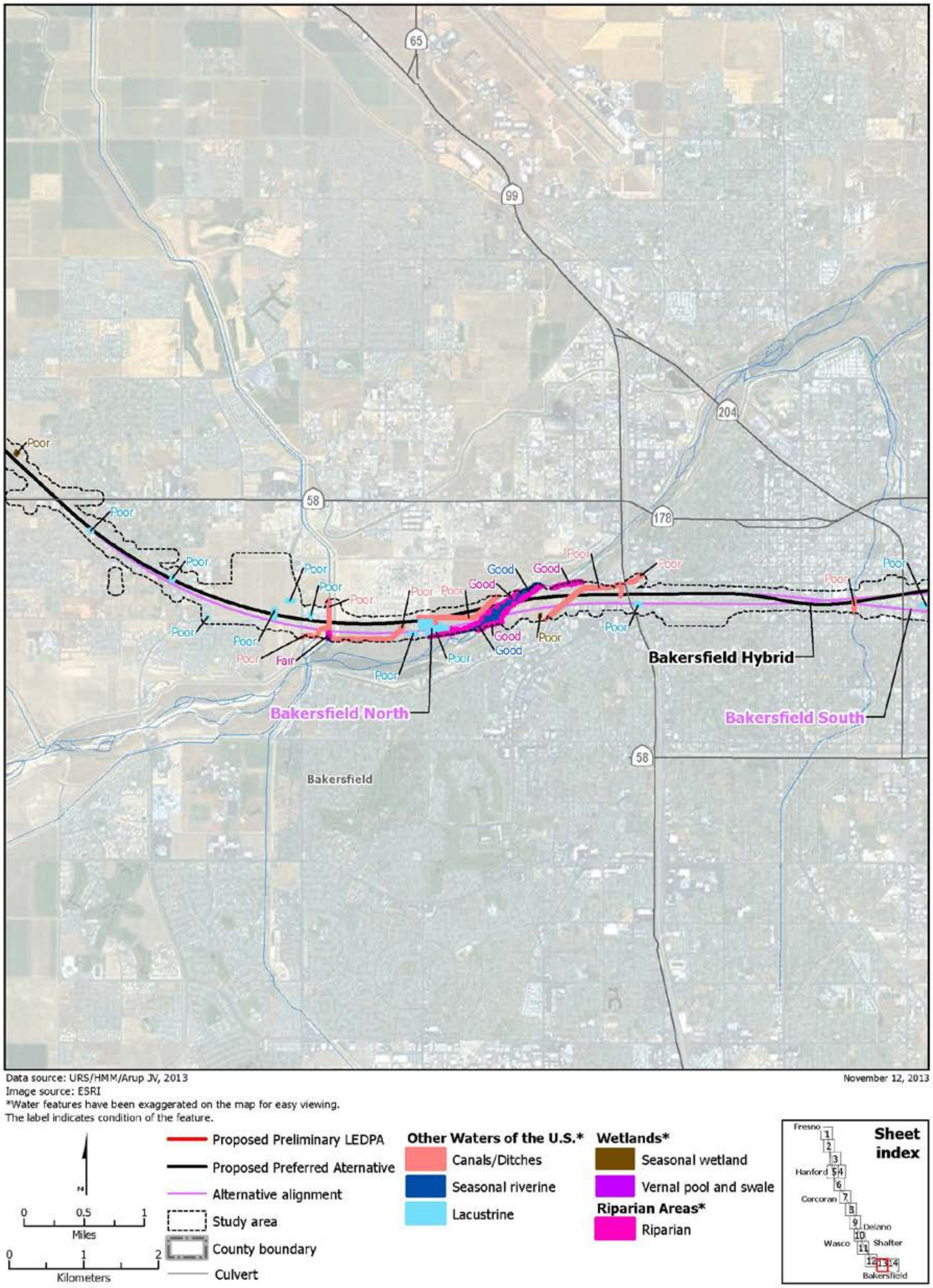


Figure 3-1
Jurisdictional waters delineation and condition
Sheet 13 of 14

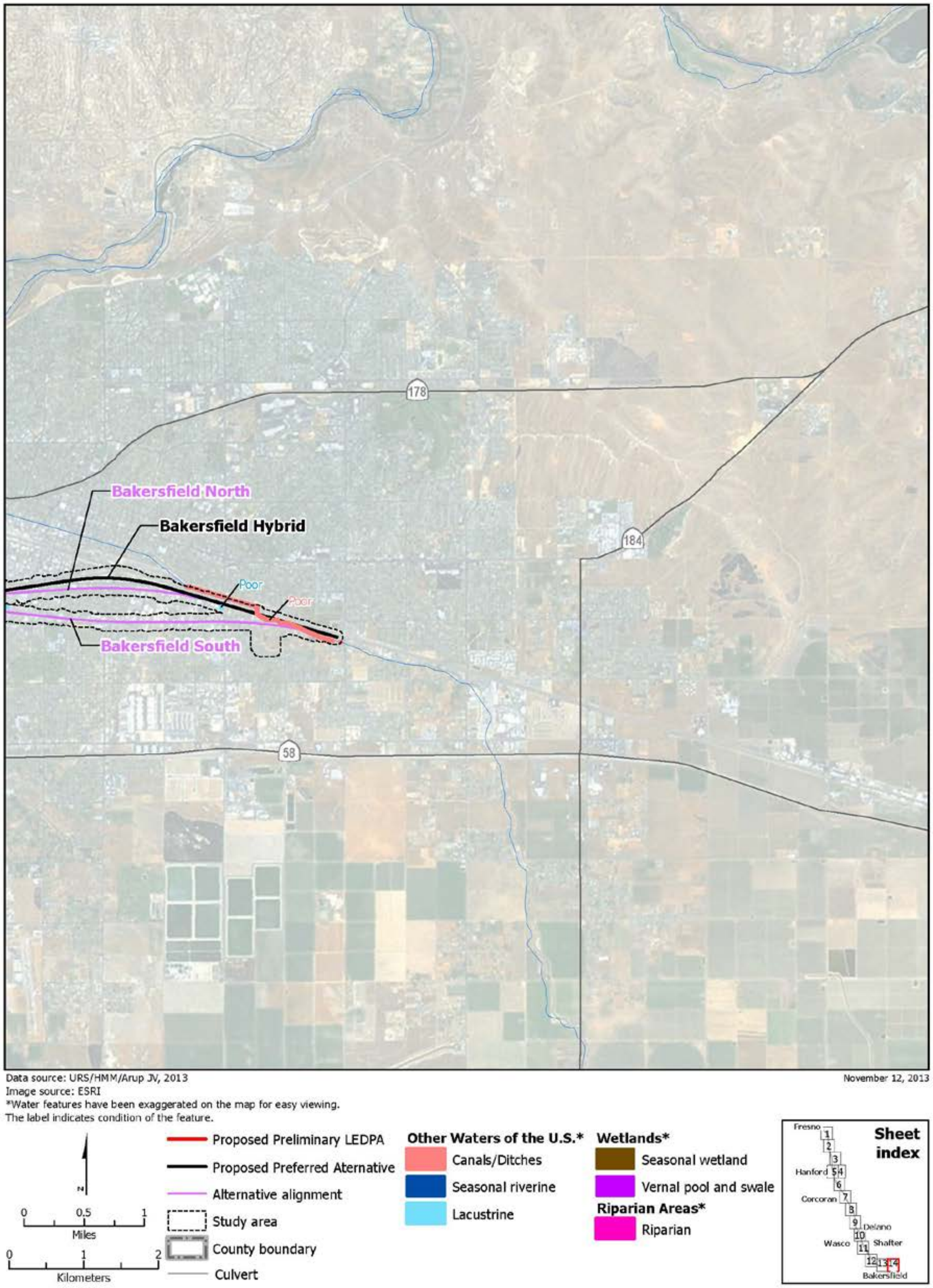


Figure 3-1
Jurisdictional waters delineation and condition
Sheet 14 of 14

Seasonal Wetlands

Seasonal wetlands are predominantly vegetated with hydrophytic plants, occur in topographic depressions, and have soils with sufficient clay content or compaction to support seasonal ponding. In manipulated areas, inundation is hydrologically controlled by pumps, weirs, and/or storm drain systems year-round. In more-natural areas, inundation or saturation occurs during the winter and spring seasons as the result of rainfall, snowmelt, and surface water runoff. During the summer and fall months, seasonal wetlands are dry. Although they share a similar hydrologic regime, seasonal wetlands are distinguished from vernal pools by their lack of distinctive floristic components and absence of claypans or hardpans.

Seasonal wetlands occur in scattered locations throughout the WSA, but are concentrated in the area between the towns of Corcoran and Wasco. They typically occur in disturbed habitats, including fallow agricultural areas, drainage ditches along the BNSF right-of-way, the margins of retention/detention basins, active agricultural fields, and roadside ditches. In general, seasonal wetlands are characterized by poor landscape position and altered hydrological regimes, and are in relatively fair ecological condition. They provide little support for plants and wildlife.

Vernal Pools and Swales

Vernal pools are shallow depressions with claypan or hardpan bottoms (fine-grained silts or clays) that form as a result of the saline-sodic soils and retain water during the rainy season. These ponded pools support a community of hydrophytic plants endemic to vernal pools. Vernal swales are linear shallow depressions that are hydrologically connected to vernal pools.

Vernal pools and swales occur in scattered locations throughout the WSA, but are concentrated in the area between the towns of Corcoran and Wasco. These resources have been fragmented through adjacent land disturbances and conversion to agricultural land uses. Fragmentation has reduced hydrologic input, connectivity to offsite vernal pool and swale features, and availability of water for plants and wildlife. As an example, the vernal pools and swales that lie right next to the fragmented landscapes or BNSF tracks near Pixley were probably man-made, are hydrologically altered, and are likely affected by routine maintenance of the right-of-way. For these reasons, these features are generally considered to be in fair ecological condition.

However, the vernal pool and swale aquatic resources adjacent to the WSA associated with Allensworth Ecological Reserve provide a number of aquatic and biological functions and services. Although some of these features are in fair condition, many are in good ecological condition because (1) they are not affected by adjacent land development; (2) they function within a natural hydrological regime, though some features are affected by a number of hydrological barriers (e.g., BNSF right-of-way, SR 43); (3) they provide considerable biological resources to plants and wildlife; and (4) they have an unaltered, natural physical structure.

3.2.1.2 Other Waters of the United States

Canals and Ditches

Canals and ditches are man-made linear features that appear throughout the WSA. They may be concrete-lined or unlined earthen features, and they range from approximately 10 to 50 feet in width. They are usually devoid of vegetation. Their purpose is to transport water, typically for agriculture purposes. A series of pumps are often used to transport water between canals, ditches, and/or under roads and other infrastructure.

Canals and ditches generally are in relatively poor ecological condition as a result of lack of maintenance, poor landscape position, and the fact that they constitute a highly manipulated hydrological regime. They are designed and managed to be devoid of natural habitat characteristics and support little plant or animal life.

Lacustrine

Lacustrine areas are limited to man-made basins (i.e., retention/detention basins and reservoirs) used for water storage and groundwater recharge. They occur throughout the WSA and range in size from less than 1,000 square feet to hundreds of acres. They typically have earthen berms and little or no emergent vegetation.

One observed large basin, which was partially bordered by a narrow band of willows, supported large colonies of nesting birds such as cormorants (*Phalacrocorax* spp.) and egrets (*Egretta* sp. or *Ardea* sp.). Other small basins had little or no sign of use by wildlife. Many of the smaller basins are surrounded by fences that limit wildlife access.

In general, man-made lacustrine features are in relatively poor ecological condition because of a disturbed environmental setting, have a highly manipulated hydrological regime, offer few biological resources to plants and wildlife; and are physically engineered to the extent that they are devoid of natural characteristics. However, reservoirs are unique in that they provide important habitat for wading birds and waterfowl.

Seasonal Riverine

Seasonal riverine waterways occur as discrete features throughout the WSA and include the Kings River Complex, Cross Creek, Tule River, Deer Creek, Poso Creek, and Kern River.

Many of these features originate in the Sierra Nevada in relatively intact ecosystems. Although their hydrology is affected by water storage and hydroelectric development in the headwaters, the upper reaches of these streams are less affected by hydrologic manipulation than the reaches in the WSA. By the time these features connect to the WSA, they are highly channelized for municipal and agricultural purposes, and much of their surface water and groundwater has been diverted, pumped, or captured. Further, their banks and floodplains have been channelized, and extensive adjacent riparian vegetation has been removed or confined by surrounding land use. Typically, these features are seasonally dry and have streambeds that are unvegetated and composed of accreted sandy or gravelly substrate.

Seasonal riverine features are in fair-to-good ecological condition because of landscape positions that have connectivity upstream and downstream. They function with altered and natural hydrological regimes, provide some biological resources to plants and wildlife, and are physically altered. However, these factors reduce their natural characteristics.

3.3 Existing Conditions of Jurisdictional Waters in the Wetland Study Area

Because access to all aquatic resources was not granted, the existing conditions of jurisdictional waters were determined using a two-step process. First, the conditions of a representative sample of jurisdictional water features were assessed using the California Rapid Assessment Method (CRAM). Second, the relative condition of features (i.e., poor, fair, good, or excellent) was extrapolated based on feature type and aerial photograph interpretation.

A total of 42 assessment areas were assessed within the Fresno to Bakersfield Section using CRAM, which score features based on four key attributes: Landscape and Buffer, Hydrology, Physical Structure, and Biotic Structure.

To extrapolate the results from the CRAM assessment and provide relative condition values for all jurisdictional waters in the WSA, the range of CRAM scores identified in the field for each sampled jurisdictional water type was identified and converted to a range of potential relative conditions for those jurisdictional water types. The relative condition of individual jurisdictional water features was determined from the range of conditions observed for that feature type through consideration of aerial photographs and other factors (e.g., land use and wildlife habitat mapping, proximity to hydrologic modifications), and the use of best professional judgment.

The relative condition of an aquatic feature can be used to estimate the potential CRAM score:

- Features in “excellent” relative condition would likely have a CRAM score between 81 and 100.
- Features in “good” relative condition would likely have a CRAM score between 62 and 80.
- Features in “fair” relative condition would like have a CRAM score between 44 and 61.
- Features in “poor” relative condition would likely have a CRAM score between 25 and 43.

More than 90% of the jurisdictional waters that would be affected by all Project alternatives are in poor or fair condition. The prevalence of low-condition features, including canals/ditches, man-made lacustrine, and emergent wetlands, is largely due to the fact that many features have been constructed or managed to support agricultural land-use practices. The condition of these features is reduced because they are often surrounded by agricultural land or urban development, lack physical and biotic structural complexity, and exhibit a highly manipulated hydrologic regime.

Remnant “natural” features are generally in better condition than the manipulated or man-made features. Jurisdictional waters (e.g., wetlands) in excellent condition are only found on the BNSF-Through Allensworth Alternative, where natural landscapes are present but fragmented. A limited number of features were found to be in good condition. These good-condition features include seasonal riverine features, such as the Kings and Kern rivers, and vernal pool and swale features, such as those associated with the Allensworth area alternatives. Factors that improve the condition scores of these features include occurrence in a natural landscape setting, high topographic complexity, hydrologic connectivity, and the absence of hydrology modifiers (e.g., berms, groundwater pumping systems, and agricultural canals and ditches).

Additional information about the methods used to determine existing conditions (including relative conditions) and the factors that contribute to the condition of jurisdictional waters is discussed in more detail in the *Fresno to Bakersfield Section: Watershed Evaluation Report* and the *Fresno to Bakersfield: Evaluation of Wetland Condition Using the California Rapid Assessment Method* (CRAM) (Appendix A and Appendix B; Authority and FRA 2013b, 2013c).

3.4 Summary of Avoidance, Minimization, and Mitigation of Impacts on Aquatic Resources

USACE may not permit a discharge unless appropriate and practicable steps have been taken to minimize the adverse effects on the aquatic ecosystem (40 CFR Section 230.10[d]). Subpart H of the 404(b)(1) guidelines identifies a range of minimization steps (40 CFR Section 230.70 through 230.77). This section of the guidelines indicates that “many actions” can be taken to fulfill the requirement of minimization, and identifies suggested actions rather than an exhaustive list of required measures. The guidelines identify the following specific steps to be used as appropriate.

- **Actions concerning the location of discharge**: The location of the discharge may be selected to avoid effects by avoiding sensitive components of aquatic ecosystems or by using locations that have previously been used for fill (40 CFR Section 230.70).

- **Actions concerning the material to be discharged**: The nature of proposed fill and the manner in which it is used may be designed to avoid adverse chemical effects and physical dispersal of fills into the aquatic ecosystem (40 CFR Section 230.71).
- **Actions controlling the material after discharge**: Best management practices, such as physical barriers and the manner of placement of fill, may be used to control the fill after discharge (40 CFR Section 230.72).
- **Actions affecting the method of dispersion**: Where environmentally desirable, the fill may be distributed broadly to minimize effects on the ecosystem, or screens or other turbidity and particulate barriers may be used to capture sediment (40 CFR Section 230.73).
- **Actions related to technology**: Appropriate technology for particular fill sites should be used, including, as relevant, the use of mats under equipment to avoid rutting and appropriate future maintenance to minimize erosion (40 CFR Section 230.74).
- **Actions affecting plant and animal populations**: Locations for placement of fill should be chosen to avoid impacts on flora and fauna, where feasible. In addition, appropriate restoration should be conducted to restore natural habitat and ecosystem functions (40 CFR Section 230.75).
- **Actions affecting human use**: Where feasible, fill activity and location should be selected to minimize permanent aesthetic effects and the effects on the timing of other human activities in the aquatic environment (40 CFR Section 230.76).
- **Other actions**: Where dredging or dams are proposed, the release of water or the manner of dredging should be designed to minimize effects on aquatic ecosystems (40 CFR 230.77).

To meet the requirements of 40 CFR 230.10(d), the following avoidance, minimization, and mitigation have been implemented:

- Some alternatives that had relatively greater effects on jurisdictional features were screened out of the alternatives selection process in Checkpoint B, as described below in Section 3.4.1, Avoidance and Minimization Through the Development of Project Alternatives. This screening process thus carries forward the approach of taking “actions concerning the location of discharge,” identified above, by avoiding alternatives that have greater effects on jurisdictional features.
- The Authority is implementing project design features, such as participation in the State Water Resources Control Board (SWRCB) Construction General Permit, with associated Best Management Practices to both control and minimize runoff and erosion and manage runoff that does occur. These steps thus qualify as “actions controlling the material after discharge,” and “actions affecting the method of dispersion” because temporary construction fills and stormwater runoff will be managed in a manner designed to minimize effects.
- Mitigation measures for all relevant effects have been identified in the Revised DEIR/Supplemental DEIS. These mitigation measures cover relevant technical disciplines, including human-use characteristics such as parks and cultural resources and therefore coincide with “actions affecting human use.”
- The Authority will also implement compensatory mitigation in consultation with USACE for affected aquatic resources.

The following subsections describe the various techniques used to avoid, minimize, and compensate for impacts on jurisdictional waters. These techniques include placement and selection of alternatives, project design features, and mitigation measures.

3.4.1 Avoidance and Minimization Through the Development of Project Alternatives

At multiple locations, the Project alternatives were altered to avoid impacts on and effects on biological resources, including jurisdictional waters. The revisions to the Project alternative were made before the publication of the Revised DEIR/Supplemental DEIS, during the development of the alternatives, and as part of the MOU Checkpoint B: Identification of Project Alternatives for Analysis in the DEIS process.

During the development of the Allensworth Bypass Alternative but before the Checkpoint B submittals, initial results from biological surveys identified areas of high-quality biological and wetland resources in the vicinity of Allensworth Ecological Reserve. Consequently, the Applicants refined the Allensworth Bypass Alternative to avoid significant impacts on high-quality biological resources. Specifically, the refinements of this alternative resulted in the avoidance of impacts on approximately 5,500 linear feet of vernal pool landscapes.

Engineering modifications were also made to the Project alternatives near the Corcoran Bypass Alternative to avoid impacts on the Tulare Lakebed Mitigation Site and the seasonal wetlands associated with Cross Creek. Alignment refinement in this area resulted in the avoidance of approximately 10,000 linear feet of impacts on jurisdictional waters.

The initial designs of the Project Footprint were altered for all Project alternatives to avoid impacts on jurisdictional waters from the placement of associated facilities (e.g., traction power substations, switching and paralleling stations) and temporary construction areas, such as laydown and storage areas. Where possible, these features were placed in locations that avoid or minimize impacts on jurisdictional waters.

The following project design features are part of the project and would result in the minimization of impacts on jurisdictional waters.

3.4.1.1 Project Design Features for Stormwater Management and Treatment

During the detailed design phase, each receiving stormwater system's capacity will be evaluated to accommodate project runoff for the design-year storm event. As necessary, onsite stormwater management measures, such as detention or selected upgrades to the receiving system, will be designed to provide adequate capacity and comply with the applicable stormwater design standards and criteria. Onsite stormwater management facilities will be designed and constructed to capture runoff and provide treatment for discharge of stormwater from pollutant-generating surfaces, including station parking areas, access roads, new road overpasses and underpasses, reconstructed interchanges, and new or relocated roads and highways. Low-impact development techniques will be used to detain runoff onsite and to reduce offsite runoff according to design standards and criteria. Constructed wetland systems, biofiltration and bioretention systems, wet ponds, organic mulch layers, planting soil beds, and vegetated systems (biofilters), such as vegetated swales and grass filter strips, will also be used, where appropriate. Vegetated setbacks from streams will be used, where feasible, and in compliance with various agency approvals and permit requirements (e.g., 404, 401, and 1602 permits).

3.4.1.2 Construction Stormwater Pollution Prevention Plan

The SWRCB Construction General Permit (Order No. 2009-0009 DWQ, NPDES No. CAS000002) establishes three project risk levels based on site erosion and receiving-water risk factors. Risk

Levels 1, 2, and 3 correspond to low-, medium- and high-risk levels for a project, respectively. Preliminary analysis indicates that most of the project would fall under Risk Level 1, the lowest risk level. However, sections of the project may be more appropriately categorized as Risk Level 2 given local rainfall, soil erodibility, and the lengths of the constructed slopes. For example, the portion that drains to Kings River would fall under Risk Level 2. Risk Level 2 measures also would be carried out anywhere in the project vicinity where construction activities are conducted within or right next to sensitive environmental areas such as streams, wetlands, and vernal pools.

The Construction General Permit requires preparation and implementation of a Storm Water Pollution Prevention Plan (SWPPP) providing Best Management Practices (BMPs) to minimize potential short-term increases in sediment transport caused by construction, including erosion-control requirements, stormwater management, and channel dewatering for affected stream crossings. Some BMPs include measures to provide permeable surfaces, where feasible, and to retain or detain and treat stormwater onsite. Other BMPs include strategies to manage the overall amount and quality of stormwater runoff. The Construction SWPPP will include, but will not be limited to, measures to address the following:

- Managing hydro-modification to ensure maintenance of pre-project hydrology by emphasizing onsite retention of stormwater runoff, using measures such as flow dispersion, infiltration, and evaporation supplemented by detention, where required. Additional flow control measures will be implemented where local regulations or drainage requirements dictate.
- Implementing practices to minimize contact of construction materials, equipment, and maintenance supplies with stormwater.
- Limiting fueling and other activities using hazardous materials to areas distant from surface water, providing drip pans under equipment, and checking vehicle condition daily.
- Implementing practices to reduce erosion of exposed soil, including soil stabilization, watering for dust control, and using perimeter silt fences and sediment basins.
- Implementing practices to maintain current water quality, such as using silt fences, stabilized construction entrances, grass buffer strips, ponding areas, and organic mulch layers; inlet protection; and Baker tanks and sediment traps to settle sediment.
- Implementing practices to capture and provide proper offsite disposal of concrete washwater, including isolation of runoff from fresh concrete during curing to prevent the runoff from reaching local drainage systems and possible treatment with dry ice or other acceptable means to reduce the alkaline character of the runoff (high pH) that typically results from new concrete.
- Developing and implementing a spill prevention and emergency response plan to handle potential fuel or other spills.
- Using diversion ditches to intercept offsite surface runoff.
- Avoiding areas that may have substantial erosion risk, where feasible, including areas with erosive soils and steep slopes.
- Where feasible, limiting construction to dry periods when flows in water bodies are low or absent.

Implementation of an SWPPP is the responsibility of the construction contractor's Qualified SWPPP Practitioner or designee. As part of that responsibility, the effectiveness of construction BMPs must be monitored before and after storm events. Records of these inspections and monitoring results will be submitted to the SWRCB/Regional Water Quality Control Board (RWQCB) for review as part of the annual report required by the Statewide Construction General Permit. The reports will be available to the public online.

3.4.1.3 Project Design Features for Flood Protection

The Central Valley Flood Protection Board (CVFPB) regulates specific river, creek, and slough crossings for flood protection. These crossings must meet the provisions of Title 23 of the California Code of Regulations. Title 23 requires that new crossings maintain hydraulic capacity through such measures as in-line piers, adequate stream bank height (freeboard), and measures to protect against stream bank and channel erosion.

Under 33 CFR Section 208.10, improvements, including crossings, must be constructed in a manner that does not reduce the capacity or functionality of the channel or any federal flood-control project. The CVFPB reviews applications for encroachment permits for approval of a new channel crossing or other channel modification. For a proposed crossing or placement of a structure near a federal flood-control project, the CVFPB coordinates review of the encroachment permit application with USACE pursuant to assurance agreements with USACE and USACE Operation and Maintenance Manuals under Title 33 CFR, Section 208.10 of the Rivers and Harbors Act, and Title 33 U.S.C. Section 408. Under Section 408, USACE must approve any proposed modification involving a federal flood-control project. A Section 408 permit is required if construction modifies a federal levee or if the project encroaches on a federal facility without modifying it.

3.4.2 Other Environmental Resources Avoided

As a result of the extensive land conversion that has occurred in the San Joaquin Valley, the remaining preservation areas are of high ecological value. The following preservation areas occur near or within the Project Footprint. However, in most instances the Project alternatives have been designed to avoid impacts on these areas (Figure 3-2). In some cases, alternatives considered during the EIR/EIS process would have had a greater impact on these areas; however, those alternatives were eliminated, in part, to avoid these additional impacts. The Proposed Preferred Alternative avoids these sensitive environmental resources.

- **Critical Habitat:** Designated critical habitat for the vernal pool fairy shrimp is present in the vicinity of the Project. However, the Proposed Preferred Alternative is more than 250 feet to the west of Critical Habitat Units 27C and 27B and is separated physically and hydraulically by the existing infrastructure, including SR 43 and the BNSF right-of-way. Therefore, the Proposed Preferred Alternative would not affect any designated or proposed critical habitat units.

- **Tulare Lakebed Mitigation Site:** The Tulare Lakebed Mitigation Site, a conservation easement in the vicinity of Cross Creek, is near the Project. All alternatives were designed to avoid the Tulare Lakebed Mitigation Site. Therefore, this site will not be affected by the Proposed Preferred Alternative.

- **Pixley National Wildlife Refuge:** The Pixley National Wildlife Refuge (Pixley NWR) is in Tulare County, just south of the Tule River. The Pixley NWR is near the BNSF-Through Allensworth and Allensworth Bypass Alternative (1,000 feet west of the alignment near Allensworth). None of the Project alternatives overlap this NWR. Because of the considerable distance and the existing SR 43 and BNSF barriers between Pixley NWR and the Proposed Preferred Alternative, no indirect impacts are expected to occur.

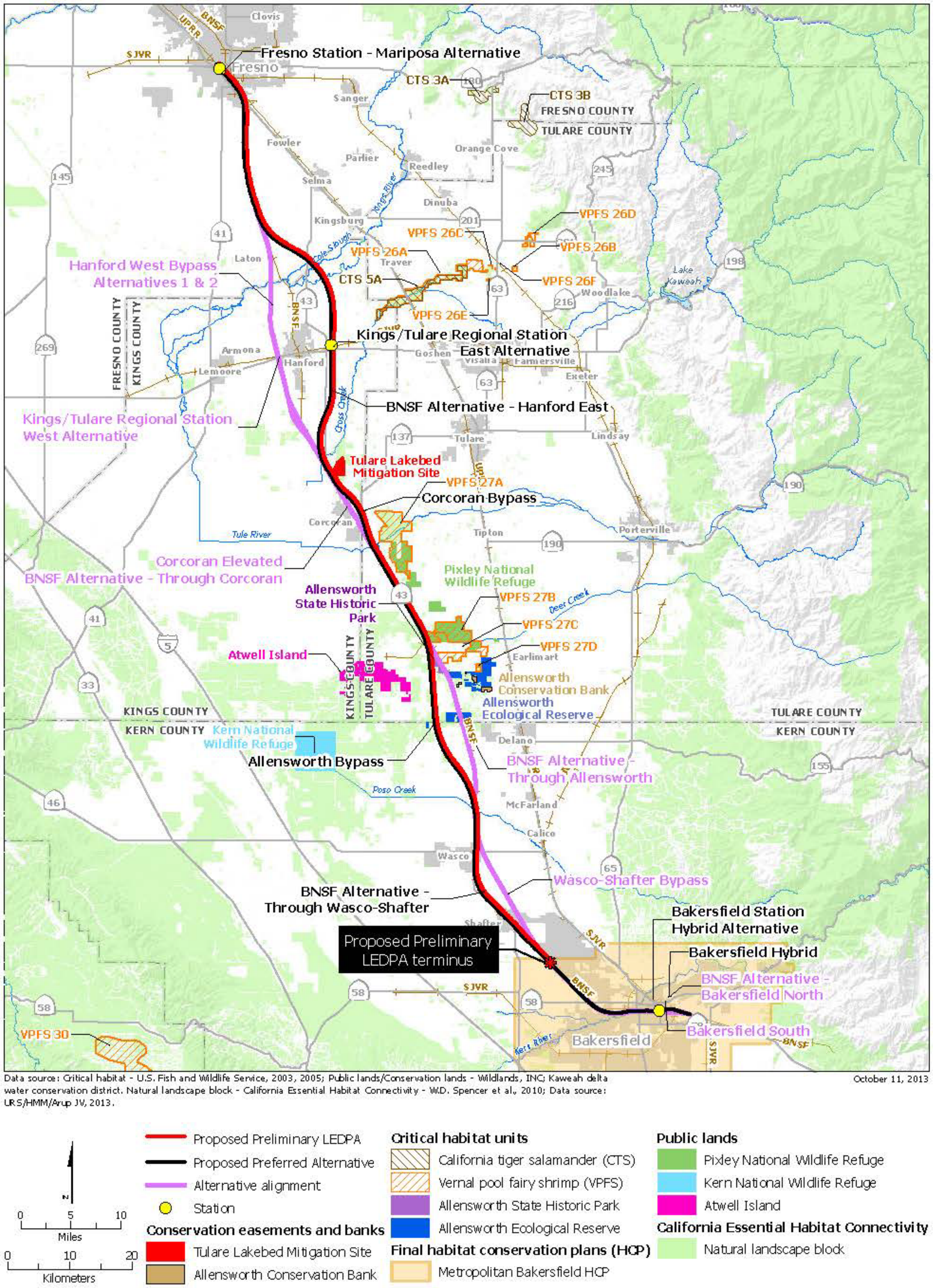


Figure 3-2
Preservation areas near the alignment alternatives

- **Colonel Allensworth State Historic Park:** The Colonel Allensworth State Historic Park (Allensworth SHP) is in Tulare County near the town of Allensworth. A portion of the BNSF-Through Allensworth Alternative would require acquisition of the park lands and result in direct and indirect impacts on the Allensworth SHP. However, the Allensworth Bypass Alternative (Proposed Preferred Alternative) would occur approximately 0.5 mile west of the Allensworth SHP. Because the Proposed Preferred Alternative does not overlap with the Allensworth SHP, the Proposed Preferred Alternative would only result in indirect impacts.

- **Allensworth Ecological Reserve:** The Allensworth Ecological Reserve is managed by the California Department of Fish and Wildlife (CDFW) and is composed of a number of fragmented parcels in southern Tulare County and northern Kern County. The BNSF-Through Allensworth would result in direct and indirect impacts on the Allensworth Ecological Reserve. However, the Proposed Preferred Alternative (Allensworth Bypass) does not overlap with the Allensworth Ecological Reserve; therefore, the Proposed Preferred Alternative would only result in indirect impacts on this conservation area.

- **Kern National Wildlife Refuge:** The Kern NWR is in Tulare County, west of Delano at the southern end of the San Joaquin Valley. The Kern NWR is 9.8 miles west of the Allensworth Bypass Alternative in the vicinity of Allensworth. Therefore, the Project would not overlap this NWR. The construction of the Proposed Preferred Alternative would not result in direct or indirect impacts on this public land.

- **Atwell Island Land Retirement Demonstration Project:** The Atwell Island Land Retirement Demonstration Project (Atwell Island) lies between the Pixley NWR and Kern NWR. Atwell Island is west of SR 43 and 2 miles west of the Allensworth Bypass Alternative; therefore, the Project does not overlap this area. Because of the considerable distance, no direct or indirect impacts are expected to occur on Atwell Island as a result of the Proposed Preferred Alternative.

- **Metropolitan Bakersfield Habitat Conservation Plan:** The Metropolitan Bakersfield Habitat Conservation Plan (MBHCP) is a joint program of the City of Bakersfield and Kern County (Chapter 17.62 of the Kern County ordinances) to assist urban development applicants in complying with federal and state endangered species regulations (City of Bakersfield and Kern County 2007). The program uses mitigation fees paid by applicants for grading or building permits to fund the purchase and maintenance of habitat land to compensate for the impact of urban development on endangered species habitat. Kern County and the City of Bakersfield have entered into a legal agreement with the CDFW and the U.S. Fish and Wildlife Service (USFWS) detailing obligations under the MBHCP. The provisions of the MBHCP include mitigation ratios that must be met to ensure adequate mitigation for permitted land conversion activities. None of the Project alternatives (including the Proposed Preferred Alternative) conflicts with the provisions of the MBHCP because proposed mitigation ratios are similar to the “adequate mitigation” ratios presented in the plan. Also, the alternatives (including the Proposed Preferred Alternative) do not overlap with the Conceptual Focus Areas identified as potential preservation areas.

3.4.3 Minimization and Mitigation Measures

The Fresno to Bakersfield Section Revised DEIR/Supplemental DEIS (Authority and FRA 2012d), identifies measures to avoid, minimize, and compensate for potential impacts on jurisdictional waters. These measures, as well as additional measures to avoid and minimize impacts on biological resources, are presented in Section 3.7.7, Mitigation Measures, of the Revised DEIR/Supplemental DEIS*.* The mitigation measures listed below are proposed to directly or indirectly reduce impacts and effects on aquatic resources.

- BIO-MM#18. Conduct Preconstruction Sampling and Assessment for Vernal Pool Fauna.
- BIO-MM#19. Seasonal Vernal Pool Work Restriction.
- BIO-MM#20. Implement and Monitor Vernal Pool Protection.
- BIO-MM#47. Restore Temporary Riparian Impacts.
- BIO-MM#48. Restore Temporary Impacts on Jurisdictional Waters.
- BIO-MM#49. Monitor Construction Activities within Jurisdictional Waters.
- BIO-MM#61. Compensate for Permanent Riparian Impacts.
- BIO-MM#62. Prepare and Implement a Habitat Mitigation and Monitoring Plan.
- BIO-MM#63. Compensate for Permanent and Temporary Impacts on Jurisdictional Waters.
- BIO-MM#65. Offsite Habitat Restoration, Enhancement, and Preservation.

As part of the identified minimization and mitigation measures, the Applicants would obtain permits in compliance with 40 CFR 230.70 to 230.77 to minimize adverse effects.

BIO-MM#18. Conduct Preconstruction Sampling and Assessment for Vernal Pool Fauna. Before the start of ground-disturbing activities, the Project Biologist will conduct preconstruction aquatic assessment and sampling in seasonal wetlands and vernal pools in the Project Footprint. The approved biologists will visit the sites after initial storm events to determine when seasonal wetlands and vernal pools have been inundated. A seasonal wetland/vernal pool is considered to be inundated when it holds more than 3 cm of standing water 24 hours after a rain event. Approximately 2 weeks after the pools are inundated, the biologists will conduct general aquatic surveys in appropriate seasonal wetland and vernal pool habitats.

The sampling is an assessment that will be useful in understanding the species present and will help guide the implementation of the performance standards to be consistent with BIO-MM#20: Implement and Monitor Vernal Pool Protection. The Project Biologist will submit a report to the Mitigation Manager and to the Authority or its designee within 30 days of completing the field work. The report will provide the documentation and the results of the sampling, including the results of the data collection and a comparison with the performance standards.

BIO-MM#19. Seasonal Vernal Pool Work Restriction. For seasonal avoidance of special-status vernal pool branchiopods and vernal-pool-dependent species (e.g., vernal pool branchiopods, western spadefoot toads, California tiger salamanders), the Contractor will not work within 250 feet of suitable aquatic habitats (e.g., vernal pools, seasonal wetlands) from October 15 to June 1 (corresponding to the rainy season) or as determined through informal or formal consultation with the USFWS or USACE. Ground-disturbing activities may begin once the habitat is no longer inundated for the season and it is after April 15. If any work remains to be completed after October 15, the Project Biologist will install exclusion fencing and erosion control measures in those areas where construction activities need to be completed. The Project Biologist will document compliance by means of a memorandum to the Mitigation Manager during the establishment of the fencing activities.

BIO-MM#20. Implement and Monitor Vernal Pool Protection. Although all temporary impacts on vernal pools are considered to be permanent and will be mitigated through offsite compensatory mitigation (see BIO-MM#63), if they can be avoided, vernal pool(s) within the Project Footprint will be protected by erecting exclusion fencing. The Project Biologist will erect and maintain the exclusion fencing.

For temporary impacts on vernal pools within the Project Footprint that cannot be avoided, the Project Biologist will place rinsed gravel within the affected vernal pool(s) and will cover the affected vernal pool(s) with geotextile fabric before the start of ground-disturbing activities to minimize damage to the soils and protect the contours. The Project Biologist will collect a representative sampling of soils from the vernal pool(s) before initiating ground-disturbing activities within vernal pools. The representative soil sample(s) will contain viable plant seeds and vernal pool branchiopod cysts to be preserved from the vernal pool(s). These samples may be incorporated into other vernal pools, as applicable, with USFWS and/or CDFW consultation. The Contractor will implement these measures within temporary impact areas adjacent to or within the Project Footprint. Resource agency consultations with the USFWS and USACE will occur as needed and be based on permit conditions.

The Project Biologist will submit a memorandum, on a weekly basis or at other appropriate intervals, to the Mitigation Manager to document compliance with this measure.

Additionally, because temporary impacts on vernal pools within the Project Footprint are considered to be permanent impacts, these impacts will be mitigated through offsite mitigation, as described in BIO-MM#63. The Contractor will obtain approval from USACE before the implementation of the above-described mitigation measures for any unanticipated temporary impacts on vernal pools. If unanticipated temporary impacts take more than one full wet-dry season cycle, offsite mitigation will be implemented.

BIO-MM#47. Restore Temporary Riparian Impacts. During post-construction, the Contractor will revegetate all disturbed riparian areas using appropriate plants and seed mixes. The Project Biologist will monitor restoration activities in a manner consistent with provisions in the Habitat Mitigation and Monitoring Plan (HMMP), as described in BIO-MM#62. The Project Biologist will submit a memorandum, on a weekly basis or at other appropriate intervals, to the Mitigation Manager documenting compliance and other reporting requirements required by the regulatory agency permits (e.g., 1600 Streambed Alteration Agreement).

BIO-MM#48. Restore Temporary Impacts on Jurisdictional Waters. During or after the completion of construction, the Contractor will restore disturbed jurisdictional waters to original topography using stockpiled and segregated soils. In areas where gravel or geotextile fabrics have been placed to protect substrate and minimize impacts on jurisdictional waters, these materials will be removed and affected features will be restored to the extent possible. The Contractor will conduct revegetation using appropriate plants and seed mixes. The Authority will conduct maintenance monitoring consistent with the provisions in the HMMP (BIO-MM#62). The Project Biologist will submit a memorandum, on a weekly basis or at other appropriate intervals, to the Mitigation Manager to document compliance with this measure.

BIO-MM#49. Monitor Construction Activities within Jurisdictional Waters. During ground-disturbing activities, the Contractor’s Biologist and Project Biological Monitor will conduct monitoring within and adjacent to jurisdictional waters, including monitoring of the installation of protective devices (silt fencing, sandbags, fencing, etc.), installation and/or removal of creek crossing fill, construction of access roads, vegetation removal, and other associated construction activities. The Project Biological Monitor will conduct biological monitoring to document adherence to habitat avoidance and minimization measures addressed in the project mitigation measures and as listed in the USFWS, CDFW, SWRCB, and USACE permits conditions. The Project Biologist will submit a memorandum, on a weekly basis or at other appropriate intervals, to the Mitigation Manager to document compliance with this measure.

BIO-MM#61. Compensate for Permanent Riparian Impacts. The Authority will compensate for permanent impacts on riparian habitats (i.e., valley foothill riparian), as determined in consultation with the appropriate agencies (e.g., CDFW), by restoring nearby areas to suitable habitat and/or by purchasing credits in a mitigation bank. The HMMP will provide the planning details. Compensation will be based on a ratio of 2:1 acres of mitigation to acres of impact on Valley Foothill Riparian habitat, pending agency confirmation.

The Project Biologist will submit a memorandum to the Mitigation Manager to document compliance with this measure.

BIO-MM#62. Prepare and Implement a Habitat Mitigation and Monitoring Plan. As part of USFWS, USACE, SWRCB, and CDFW permit applications, and before the start of ground-disturbing activities, the Authority will prepare an HMMP to mitigate for temporary and permanent impacts on jurisdictional waters and state streambeds. The HMMP will be prepared in accordance with the requirements of *Compensatory Mitigation for Losses of Aquatic Resources: Final Rule* (2008 Mitigation Rule). The Project Biologist will work with USACE, SWRCB, and CDFW to incorporate into the HMMP appropriate avoidance, minimization, mitigation, and monitoring measures. The HMMP will outline the intent to mitigate for lost conditions, functions, and values on jurisdictional waters and state streambeds consistent with resource agency requirements and conditions presented in Sections 404 and 401 of the CWA and Section 1600 of the California Fish and Game Code. The HMMP will incorporate the following standard requirements consistent with USACE, SWRCB, and CDFW guidelines:

- Description of the project impact/site.
- Goal(s) (i.e., functions and values or conditions) of the compensatory mitigation project.
- Description of the proposed compensatory mitigation site.
- Implementation plan for the proposed compensatory mitigation site.
- Maintenance activities during the monitoring period.
- Monitoring plan for the compensatory mitigation site.
- Completion of compensatory mitigation.
- Contingency measures.

Additionally, the following will be included, at a minimum, for the implementation plan:

- Site analysis for appropriate soils and hydrology.
- Site preparation specifications based on site analysis, including but not limited to, grading and weeding.
- Soil and plant material salvage from impact areas, as appropriate to the timing of impact and restoration as well as the location of restoration sites.
- Specifications for plant and seed material appropriate to the locality of the mitigation site.
- Specifications for site maintenance to establish the habitats, including but not limited to, weeding and temporary irrigation.

Habitat preservation, enhancement, and/or establishment or restoration activities will be conducted on some of the compensatory (i.e., selected permittee-responsible) mitigation sites to achieve mitigation goals. A detailed design of mitigation habitats will be created in coordination with permitting agencies and will be described in the HMMP. Several HMMPs will be developed consistent with selected mitigation sites and the resources mitigated at each. Primary engineering and construction contractors will ensure, through coordination with the Project Biologist, that construction is implemented in a manner that minimizes disturbance of such areas to the extent feasible. Temporary fencing will be used during construction to avoid sensitive biological resources adjacent to construction areas to the extent possible.

Performance standards are targets for determining the effectiveness of mitigation and assessing the need for adaptive management (e.g., mitigation design or maintenance revisions). Performance standards are developed so that progress toward meeting final success criteria can be assessed on an annual basis. Each year’s standard is closer to the final criteria than the prior year’s standard (e.g., vegetation cover standards may increase annually until reaching the success criteria objective in the final year of monitoring). Success criteria are formal criteria that must be met after a specific time frame to meet the regulatory requirements of the permitting agencies. Where applicable, replacement planting/seeding will be implemented if monitoring demonstrates that performance standards or success criteria are not met during a particular monitoring interval.

Performance standards will be used to determine whether habitat improvement is trending toward sustainability (i.e., reduced human intervention) and to assess the need for adaptive management. These standards must be met for habitat improvement to be declared successful, both during a particular monitoring year and at the end of the establishment period. Performance standards will be developed in consultation with permitting agencies and described in the HMMP.

Final success criteria will be developed in coordination with regulatory agencies and presented in the HMMP. Examples of success criteria that could be included in the HMMP and assessed at the end of the monitoring period (assumed to be 5 years for wetlands and 5–10 years for riparian areas, or as directed by agencies) include:

- Percentage of survival of planted trees (65–85%, depending on species and habitat).
- Percentage of absolute cover of highly invasive species, as defined by the California Invasive Plant Council (<5%).
- Percentage of total absolute cover of plant species (50–80%, depending on habitat type).
- Designed wetlands to meet U.S. Army Corps of Engineers criteria for hydrophytic vegetation, hydric soils, and hydrology as defined in the *Corps of Engineers Wetland Delineation Manual* (Environmental Laboratory 1987).
- Designed vernal pools and seasonal wetlands to meet inundation and seasonal drying requirements as specified in the design and indicated by agencies.
- Species composition and community diversity, relative to reference sites, and/or as described in the guidelines issued by permitting agencies (e.g., USFWS conservation guidelines for valley elderberry longhorn beetle).

Performance standards and success criteria will be provided for each of the years of monitoring and will be specific to habitat types at each permittee-responsible mitigation site. The monitoring schedule will be detailed in site-specific HMMPs. To be deemed successful, the site may be required to meet performance standards only in selected years. However, if performance standards are not met in specific years, remedial measures, such as regrading, adjustment to modify the hydrological regime, and/or replacement planting or seeding, must be implemented and that year's monitoring must be repeated the following year until the performance standards are met. Specified success criteria must be reached without human intervention (e.g., irrigation, replacement plantings) aside from maintenance practices described in the site-specific HMMPs for maintenance during the establishment period.

The Project Biologist will oversee implementation of all HMMP elements, prescribed maintenance, remedial measures, and monitoring requirements.

The Project Biologist will prepare annual monitoring reports for the requisite time period and/or other documentation prescribed in the resource agency permits. The Project Biologist will submit a memorandum to the Mitigation Manager to document compliance with this measure.

BIO-MM#63. Compensate for Permanent and Temporary Impacts on Jurisdictional Waters. The Authority will mitigate permanent and temporary wetland impacts through compensation determined in consultation with the USACE, SWRCB, USFWS, and CDFW, in order to be consistent with the HMMP (BIO-MM#62). Regulatory compliance for jurisdictional waters includes relevant terms and conditions from the USACE 404 Permit, SWRCB 401 Permit, and CDFW 1600 Streambed Alteration Agreement.

Compensation will include aquatic resources restoration, establishment, enhancement, or preservation through one or more of the following methods:

- Purchase of credits from an agency-approved mitigation bank.
- Fee-title acquisition of natural resource regulatory agency-approved property.
- Permittee-responsible mitigation through the purchase or establishment of a conservation easement or other permanent site protection method with financial assurance for long-term management of the property-specific conservation values.
- In-lieu fee contribution determined through negotiation and consultation with the various natural resource regulatory agencies.

The following ratios are proposed as a minimum for compensation for permanent impacts; final ratios will be determined in consultation with the appropriate agencies:

- Vernal pools: 2:1.
- Seasonal wetlands: between 1.1:1 and 1.5:1 based on impact type and function and values lost.
  - 1:1 offsite for permanent impacts.
  - 1:1 onsite and 0.1:1 to 0.5:1 offsite for temporary impacts.

The Authority will mitigate impacts on jurisdictional waters by replacing, creating, restoring, enhancing, or preserving aquatic resources, at the above ratios or at other ratios as determined in consultation with appropriate agencies, to compensate for functions and values lost. The Authority will consider modifying the vernal pool mitigation ratios in the final permits based on site-specific conditions and specific life-history requirements of vernal pool branchiopods, California tiger salamander, and western spadefoot toad.

Through the HMMP reporting program and applicable terms and conditions from the USACE 404 Permit, SWRCB 401 Permit, and the CDFW 1600 Streambed Alteration Agreement, the Project Biologist will document compliance and submit documentation to the Mitigation Manager.

BIO-MM#65: Offsite Habitat Restoration, Enhancement, and Preservation. Before site preparation at a mitigation site, the Authority will consider the offsite habitat restoration, enhancement, and preservation program and identify short-term temporary and/or long-term permanent effects on the natural landscape. A determination will be made on any effects from the physical alteration of the site to onsite biological resources, including plant communities, land cover types, and the distribution of special-status plant and wildlife.

Appropriate seasonal restrictions (e.g., breeding season) on activities that result in physical alteration of the site may be applicable if suitable habitats for special-status species and sensitive habitats exist onsite. Activities resulting in the physical alteration of the site include grading/modifications to onsite topography, stockpiling, storage of equipment, installation of temporary irrigation, removal of invasive species, and alterations to drainage features. In general, the long-term improvements to habitat functions and values will offset temporary effects during restoration, enhancement, and preservation activities.

The offsite habitat restoration, enhancement, and preservation program will be designed, implemented, and monitored in ways that are consistent with the terms and conditions of the USACE Section 404 Permit, CDFW 1600 Streambed Alteration Agreement, and CESA and federal ESA as they apply to their jurisdiction and resources onsite. Potential effects on site-specific hydrology and the downstream resources will be evaluated as a result of implementation of the restoration-related activity. Site-specific BMPs and a Storm Water Pollution Prevention Plan (SWPPP) will be implemented as appropriate.

The Authority will report on compliance with the permitting requirements. The Project Biologist will be responsible for the monitoring and tracking of the program, will prepare a memorandum of compliance, and will submit it to the Mitigation Manager.

3.4.4 Approach to Mitigation

A *Fresno to Bakersfield Section: Compensatory Mitigation Plan* (CMP) (Authority and FRA 2013a) has been prepared for the project alternatives to identify mitigation options to offset environmental losses resulting from unavoidable impacts on sensitive natural resources, including jurisdictional waters, along the Fresno to Bakersfield Section. In accordance with state and federal natural resource agency guidance (USACE, USFWS, and CDFW), this CMP was prepared to maximize available mitigation and conservation credits and opportunities; provide for regional variations in resource conditions, functions, and values; and applying equivalent standards to each type of compensatory mitigation. The compensatory mitigation options under consideration will be evaluated on the basis of their likelihood for ecological success and sustainability, their location relative to the impact site, their significance within the local and/or regional landscape of the Central Valley, and their anticipated costs. Final mitigation requirements will be determined through consultation with USACE and SWRCB in coordination with other state and federal resource agencies.

The *Fresno to Bakersfield Section: Watershed Evaluation Report* (Authority and FRA 2012k, Appendix A) contains a summary of the watershed perspective (approach) and compensatory mitigation options, and a discussion of the net watershed conditions and of the focus of compensatory mitigation project in terms of overall watershed improvement.

3.4.4.1 Watershed Approach

Compensatory mitigation for impacts on aquatic resources should be conducted using a watershed approach (33 CFR Parts 332 and 40 CFR Part 230 [“2008 Mitigation Rule”]). The watershed approach is a process for making compensatory mitigation decisions that support the sustainability or improvement of aquatic resources in a watershed. Typically, a project’s impacts (within a given watershed) are mitigated at other locations within the same watershed. However, the preamble to the 2008 Mitigation Rule recognizes that mitigating impacts in the same watershed presents particular challenges for linear projects. District engineers therefore have flexibility to allow compensation for linear projects to be conducted on one or multiple sites, based on environmentally preferable and practicable compensatory mitigation options.

For linear projects like the Project, district engineers may determine that consolidated compensatory mitigation projects provide appropriate compensation for the authorized impacts and are environmentally preferable to requiring numerous small permittee-responsible compensatory mitigation projects in a number of watersheds along the linear project corridor. Additionally, in areas such as the San Joaquin Valley, where watersheds have been highly modified and fragmented and are highly controlled for agricultural uses, the function and value of jurisdictional waters may better be restored if sites are chosen on the basis of quality, location, size, and connectivity even if mitigation within the same watershed is sacrificed.

The Project would affect jurisdictional waters in seven watersheds within the Tulare Lake Basin. Under a strict interpretation of the watershed approach, a number of small compensatory mitigation projects would be required in each of these affected watersheds. The numerous small projects required under a strict interpretation would have a limited influence on the overall condition of jurisdictional waters in the region. Because the project watershed boundaries are blurred as a result of extensive water diversions and similar features are observed in all watersheds, the watershed is more effectively considered as a single hydrologic unit. Focusing compensatory mitigation efforts in this larger watershed would result in more effective wetland and stream preservation, enhancement, or creation, thereby improving water quality and habitat conditions and providing a greater degree of functional lift overall for natural resources in the region. With consideration of these factors, compensatory mitigation should be designed to maintain the condition (both quantity and quality) of aquatic resources in the greater project region rather than mitigating on a watershed-by-watershed basis.

3.4.4.2 Mitigation Options

Mitigation banks, in-lieu fee programs, and permittee-responsible mitigation options may be used to satisfy the 2008 Mitigation Rule requirements. However, there are currently no USACE-approved in-lieu fee programs or wetland mitigation banks in any of the Project watersheds, the Tulare Basin, or South San Joaquin Valley. Three special-status species conservation banks have been identified that provide mitigation for aquatic special-status species (e.g., vernal pool branchiopods). However, USACE has not approved any of these conservation banks to provide aquatic resource credits. Therefore, the mitigation options for aquatic resources are limited to permittee-responsible activities.

To date, several permittee-responsible mitigation options have been identified that may be suitable to partially or fully mitigate potential impacts on jurisdictional waters (Figure 3-3). Methods used to identify these mitigation options are described in Section 5.3.3 of the CMP. Currently, 11 potential mitigation sites are under consideration for compensatory mitigation purposes because they contain aquatic features and the property titles are free of encumbrances.[2] These 11 properties include lands adjacent to or in the immediate vicinity of public lands, including the Kern NWR, the Allensworth ER, the Kern Water Bank Authority Conservation Bank, the Semitropic Ecological Reserve, the Center for Natural Lands Management lands, vernal pool fairy shrimp critical habitat, Poso Creek, and the Tule River. These properties have been, or are in the process of being, surveyed for any aquatic resources (wetland delineation), and CRAM assessments have been or are scheduled to be conducted to determine the baseline extent, condition, and suitability for mitigation (preservation, enhancement, establishment, or creation) consistent with the 2008 Mitigation Rule.

The results of the wetland delineation and CRAM assessment are provided in *Appendix C, Mitigation Property Prospectuses* of the CMP (submitted as part of the Checkpoint C package), and in the *Fresno to Bakersfield Section: Evaluation of Wetland Condition Using the California Rapid Assessment Method (CRAM)* (Appendix B of the Summary Report). The types of jurisdictional waters identified on these properties include vernal pools, depressional wetlands, and riverine resource types. Some of these properties include riparian habitat in addition to jurisdictional waters. Proposed compensatory mitigation will be based on the types and conditions of the jurisdictional waters and riparian habitats present at these sites and will include both in-kind and out-of-kind establishment (creation), restoration, preservation, and enhancement.

[2] A 12th property depicted in Figure 3-3—the Burr property—is under consideration solely for special-status wildlife species; no wetland resources are available at this location.

Figure 3-3
Potential mitigation properties

Each potential mitigation site is described in detail in the CMP. The following baseline information is provided for each site, if available:

- General geographic description, including adjacent public/natural lands.
- Existing environmental stressors.
- Wetland delineation and CRAM conditional assessment results.
- Potential wildlife and botanical resources present, if applicable.
- Preservation, restoration, enhancement, and establishment opportunities.

Table 3-1 provides a summary of potential mitigation properties, including acreage and type of jurisdictional waters present, along with the CRAM score and proposed mitigation approach for each feature.

Determination of the amount of compensatory mitigation required to offset the Project's impacts will be based on a ratio assigned for each mitigation. USACE recently released guidance on the method used to determine ratios for different mitigation scenarios (*Special Public Notice: Standard Operating Procedure for Determination of Mitigation Ratios* [USACE 2012]). Under these guidelines, mitigation ratios are determined through a standardized procedure that quantitatively and qualitatively compares project impacts on proposed mitigation sites. Proposed mitigation sites are also evaluated on the basis of their size, location, and type (or type conversion) as well as on their certainty of success and on any temporal losses.

Impact areas and mitigation sites are compared using CRAM evaluations or other more qualitative methods. Numerical or categorical values are assigned to the results of these evaluations and are used to calculate the required mitigation ratio. The guidelines establish a preference for onsite and in-kind mitigation but if this is not practicable or compatible with the proposed project, offsite and/or out-of-kind mitigation may be used. District engineers have the flexibility to allow for out-of-kind mitigation based on environmentally preferable and practicable mitigation options (33 CFR Parts 325 and 332 and 40 CFR Part 230).

Table 3-1
Potential Mitigation Properties: Acreage, CRAM Scores, and Mitigation Suitability

Mitigation Property	Resource Type	Acres[a]	Average CRAM Score[b]	Mitigation Category
Middle Kern-Upper Tehachapi-Grapevine Watershed				
Buena Vista Dairy property (715 acres)	Vernal pool	83.7	79.2	Preservation
	Depressional wetland	33.6	70.7	Preservation
Old River Dairy property (751 acres)	Alkali rain pool	161–295	N/A	Reestablishment
Panorama Vista Preserve (1,044 acres)	Riverine	17.4 (7,912 lf)	N/A	Preservation
Upper Deer–Upper White Watershed				
Yang property (316 acres)	Vernal pool	97.7	81.0	Preservation
Staffel Family Trust property (61 acres)	Vernal pool	2.8	73.9	Preservation
	Depressional wetland	0.1	N/A	Enhancement
Smith Offering (2,793 acres)	Alkali rain pool	TBD	N/A	Enhancement

Table 3-1
Potential Mitigation Properties: Acreage, CRAM Scores, and Mitigation Suitability

Mitigation Property	Resource Type	Acres[a]	Average CRAM Score[b]	Mitigation Category
Tulare-Buena Vista Lakes Watershed				
River Ranch (286 acres)	Riverine	28.8 (21,650 lf)	N/A	Preservation
		4.3 (3,250 lf)	N/A	Reestablishment/ Establishment
Davis property (158 acres)	Vernal pool/swale	28.3	N/A	Preservation
	Depressional wetland	4.1	69.7	Preservation
Valadez property (120 acres)	Vernal pool	0.2	57.7	Preservation
	Depressional wetland	0.8	58.5	Preservation
Peck Island property (415 acres)	Seasonal wetland	4	N/A	Establishment
	Riverine	31.7 (29,330 lf)	N/A	Preservation
		2.3 (5,000 lf)	N/A	Reestablishment/ Establishment
Upper Kaweah Watershed				
Fagundes property (483 acres)	Vernal pool	7.6	N/A	Preservation
		8.7	N/A	Establishment
	Seasonal wetland	2.7 (13,250 lf)	N/A	Preservation
	Riverine	14.7 (19.000 lf)	N/A	Rehabilitation/ Enhancement

[a] The acreage and linear feet of preservation, rehabilitation/enhancement, and reestablishment/establishment are based on conceptual designs and may change as designs are further developed after additional field studies.

[b] Features without a CRAM score are the result of CRAM and wetland protocols classifying features differently. For example, the wetland delineation listed acreage for riverine features, but these features were historical; CRAM classified these same features as depressional wetlands.

CRAM California Rapid Assessment Method
lf linear foot (feet)
N/A not available

The following plans, requirements, and assurances will be developed for each of the potential mitigation properties, as warranted, and are described in detail in the CMP:

- **Mitigation Work Plan:** The mitigation work plan will include specific instructions for design, construction, and materials acquisition for the mitigation site.
- **Maintenance Plan:** The maintenance plan will include a description and schedule of maintenance requirements to ensure the continued viability of the resource(s) after initial construction is completed.
- **Performance Standards/Success Criteria:** Ecologically based performance standards and success criteria will be included in the final CMP and will be used to determine whether the project is achieving its objectives.

- **Monitoring and Reporting Requirements:** Monitoring and reporting requirements for each mitigation site will be developed and will include the parameters to be monitored, the length of the monitoring period, the party responsible for conducting the monitoring, the frequency for submitting monitoring reports to the responsible agencies, and the party responsible for submitting those monitoring reports to the responsible agencies.

- **Long-Term Management Plan:** A long-term management plan will be developed to identify long-term financing mechanisms and the party responsible for long-term management to ensure long-term sustainability of the resource after performance standards have been achieved.

- **Adaptive Management Plan:** An adaptive management plan will be developed to guide decisions for revising compensatory mitigation plans and implementing measures to address both foreseeable and unforeseen circumstances that adversely affect compensatory mitigation success.

- **Financial Assurances:** A description of financial assurances will be included in the mitigation work plan and will ensure a high level of confidence that the compensatory mitigation project will be successfully completed in accordance with its performance standards.

Chapter 4.0

Comparative Analysis of Impacts on Aquatic Resources for Project Alternatives

4.0 Comparative Analysis of Impacts on Aquatic Resources for Project Alternatives

This chapter provides a comparative analysis of potential aquatic resources for the alternatives within the various segments of Project that are discussed in the *Fresno to Bakersfield Section: Revised Draft Environmental Impact Report/Supplemental Draft Environmental Impact Statement* (Revised DEIR/Supplemental DEIS) (Authority and FRA 2012d) (see Figure 1-1 in Chapter 1, Authority and Scope of Analysis). Because of the geographic locations of the alternatives, a side-by-side comparison of the different alternatives is possible within a given area. This chapter provides a comparative evaluation for the Hanford, Corcoran, Allensworth, Wasco-Shafter, and Bakersfield area alternatives. Impacts of the station alternatives are included in the acreage totals for the various alternatives.

The impact analysis provided in this chapter is based primarily on the analysis presented in the Revised DEIR/Supplemental DEIS. However, the impact acreage calculations are based on the Project Footprint that will be included in the Final EIR/EIS, including the modifications associated with the Hanford West Bypass 1 and 2 Modified alternatives and State Route (SR) 43 California Department of Transportation Right-of-Way preservation (see Section 1.6). As described in Section 1.6 (technical updates since the public review of the Revised DEIR/Supplemental DEIS), the majority of aquatic resources identified in the Project Footprint have been delineated and verified.[3] The Authority will continue to coordinate with the USACE to ensure that all waters of the U.S. that may be affected by the Project are delineated and verified consistent with the design footprint used for the Final EIR/EIS and the pending permit application.

4.1 Aquatic Resource Direct and Indirect Impacts

The impact evaluation approach used in this Summary Report evaluates and quantifies aquatic resource impacts based on the area that could potentially be affected by the construction or operation of the Project. These effects include maximum area of potential placement of fill material, removal of vegetation, and effects associated with shading. The impact evaluation presented in this Summary Report is conservative, because the acreage of waters of the U.S. that will be affected by the Project will be smaller than the area of maximum potential effect that is represented in this Checkpoint C analysis.

Direct and indirect impacts are qualified for each alternative. A comparative evaluation is presented by the type of aquatic resource (wetlands, other waters of the U.S.), the feature type (seasonal wetlands, vernal pools, and swales), and by relative condition class (regardless of aquatic resource type). The relative conditions of aquatic resources (poor, fair, good, or excellent) allow for an evaluation of the quality of the aquatic resource affected by the Project alternatives. This qualitative evaluation is important to understand cases where a quantitatively small impact would affect an excellent- or good-quality resource compared to cases where an alternative has slightly higher quantitative impacts but would affect lower-quality jurisdictional waters.

In this Summary Report, impacts are quantified according to four categories: direct permanent, direct temporary, indirect, and indirect bisected, as described below.

[3] The USACE has verified the extent of potential jurisdictional waters within the Wetland Study Area (WSA) for the Revised DEIR/Supplemental DEIS and provided a verification letter on February 5, 2013. As described in Section 1.6, technical updates to the Project required additional delineation of aquatic resources. Most of the additional delineated features include extensions of previously mapped aquatic resources, which the USACE has not verified to date.

Direct impacts would occur within the Project Footprint and were classified as either permanent or temporary. Indirect impacts would occur outside and within 250 feet of the Project Footprint and were classified as either indirect or indirect bisected.

Schematic drawings representing the types of footprint features and the four types of impacts are provided in Attachment 1. For additional details, see the Revised DEIR/Supplemental DEIS (Authority and FRA 2012d) and the *Fresno to Bakersfield Section: Watershed Evaluation Report* (Authority and FRA 2012i).

The four impact categories are defined as:

- Direct Permanent: Direct permanent impacts include any permanent structure or impact resulting from the Project, and are associated with permanent infrastructure, including the right-of-way for the HST tracks, the stations, the road overcrossings, and the electrical facilities.
- Direct Temporary: Direct temporary impacts are temporary in duration and include the Project Footprint necessary for construction. Temporary impacts are associated with construction activities (laydown and storage areas) and utility relocations in the Project Footprint. These impacts would be restored to pre-Project condition following the completion of construction. No permanent structures, such as tracks, stations, or other facilities, are included in this category.

  Because of their sensitivity to disturbance, vernal pools and swales are difficult to restore to pre-Project conditions after being affected by temporary impacts. Therefore, all impacts on these features are considered permanent.
- Indirect: Indirect impacts include waters of the U.S that are not directly affected but that fall within the 250-foot buffer of the Project Footprint. Within this buffer, many of the aquatic resources are not subject to changes in hydrology, water quality degradation, or change in condition from the Project. Where there are significant barriers, such as a large berm or a roadway, that protect or buffer such aquatic resources from construction or operation effects, indirect impacts are not included in the calculation.
- Indirect Bisected: Indirect bisected impacts only occur to vernal pools and swales where the feature straddles the Project Footprint. Only the portion outside the Project Footprint is considered to be subject to indirect bisected impacts. An impact on any portion of the vernal feature that occurs inside the footprint is defined as a direct impact. For the purposes of USACE permitting, indirect bisected vernal pools and swales are considered a full loss of the feature. Where indirect bisected impacts occur to vernal pool and swales features, mitigation is proposed for the entirety of that vernal pool feature (even portions that extend into and beyond the WSA), and out to 250 feet from direct permanent impacts for vernal swale features. Impacts on vernal features located entirely within the WSA but outside the Project Footprint are identified and quantified as an indirect impact.

4.2 Impacts of Project Alternatives on Aquatic Resources

4.2.1 Relationship of the Impact Analysis to Regulated Discharge of Dredged and Fill Material

The guidelines implementing Section 404(b)(1) of the Clean Water Act require the USACE to determine if there is a practicable alternative to proposed discharges that would reduce or avoid effects on aquatic resources (40 CFR 230.10[a]). Accordingly, this document estimates effects on waters of the U.S. for the range of alternatives identified in Checkpoint B consistent with the

Project Footprint that will be included in the Final EIR/Final EIS. As described above in Section 4.1, the comparative analysis of the Project alternatives uses a conservative estimate of direct and indirect effects. Table 4-1 provides a narrative description of the effects and impacts presented in the Final EIR/EIS and this Summary Report, as well as those which will be presented in the Section 404 individual permit application. Figure 4-1 provides a cross section schematic of the relationship between the conservative effects analysis used in the Final EIR/EIS (NEPA analysis) and the more detailed analysis of discharge of fill material that will be provided in the Section 404 permit application.

Table 4-1
Impact Analysis for Waters of the U.S.

Impacts Analyzed and Compared in the Checkpoint C Summary Report (Plan View)	
***Outside Project Footprint but within Wetland Study Area (Project Footprint Plus 250 Feet)**	**Project Footprint (at-grade or viaduct)**
Conservative Approach **Revised DEIR/Supplemental DEIS and this Section 404(b)(1) Alternative Analysis (Summary Report)**	
Indirect Impacts: (no direct fill but potential for indirect effects) Indirect Bisected Impacts: (vernal pools and swales that are only partially filled where loss of hydrology may result in loss of the entire feature)	Regardless of Profile (below drip line of viaduct structure) Direct Permanent Impacts: permanent fills associated with tracks, rights-of-way, road overpasses and underpasses, power infrastructure, etc. Direct Temporary Impacts: temporary construction areas to be restored following construction
Refined Approach **Section 404 Permit Application: For at-grade and embankment profiles**	
Indirect Bisected Impacts: (vernal pools and swales that are only partially filled where loss of hydrology may result in loss of the entire feature)	HST rights-of-way used to calculate fill: Direct Permanent Impacts: permanent fills associated with tracks, rights-of-way, road overpasses and underpasses, power infrastructure, etc. Direct Temporary Impacts: temporary construction areas to be restored following construction
Revised Approach **Section 404 Permit Application: For elevated profiles**	
Indirect Bisected Impacts: (vernal pools and swales that are only partially filled where loss of hydrology may result in loss of the entire feature)	Area under drip line of the viaduct may experience direct temporary impacts during construction, but would be restored following construction. Direct Permanent Impacts: piers and abutments or other structures used to calculate fill
*Note that indirect effects are calculated on both sides of the direct impact footprint, as depicted in Figure 4-1.	

The impact assumptions used in the Revised DEIR/Supplemental DEIS, the Final EIR/EIS, and this Summary Report (depicted on Figure 4-1 and described in Table 4-1) provide an inclusive and conservative estimate of the anticipated effects on waters of the U.S. and allow the comparison of the estimated effect on aquatic resources across all Project alternatives. This comparison, in turn, will support USACE selection of the practicable alternative that is the Least Environmentally Damaging Practicable Alternative (LEDPA).

For purposes of consistency in comparing the alternatives and consistency with the impacts described under NEPA (as presented in the Final EIR/EIS), the impact assumptions and methods, as illustrated in Attachment 2, were applied to each alternative. These assumptions correspond to the maximum spatial extent of each alternative in which regulated discharges, as further described below, may occur.

Project design will only be carried forward for the preliminary LEDPA. USACE review and approval of regulated fill may only occur after the preliminary LEDPA determination. The Authority and FRA are using a design-build approach to procurement and engineering of the Project. The design-build approach consists of a unified approach to construction design and contracting in which a design-build contractor carries preliminary design forward to completion and also constructs that design. In the design-build method of implementing infrastructure, project design refinements will also occur after the preliminary LEDPA determination. This iterative refinement of design after the preliminary LEDPA analysis and selection will result in a minimized and concise impact footprint relative to the conservatively broad estimates used in the Final EIR/EIS and in this Summary Report (alternative analysis). Accordingly, Table 4-1 and Figure 4-1 show how the impact assumptions for all alternatives bracket and contain the spatial extent of impacts the Applicant will cover in the permit application.

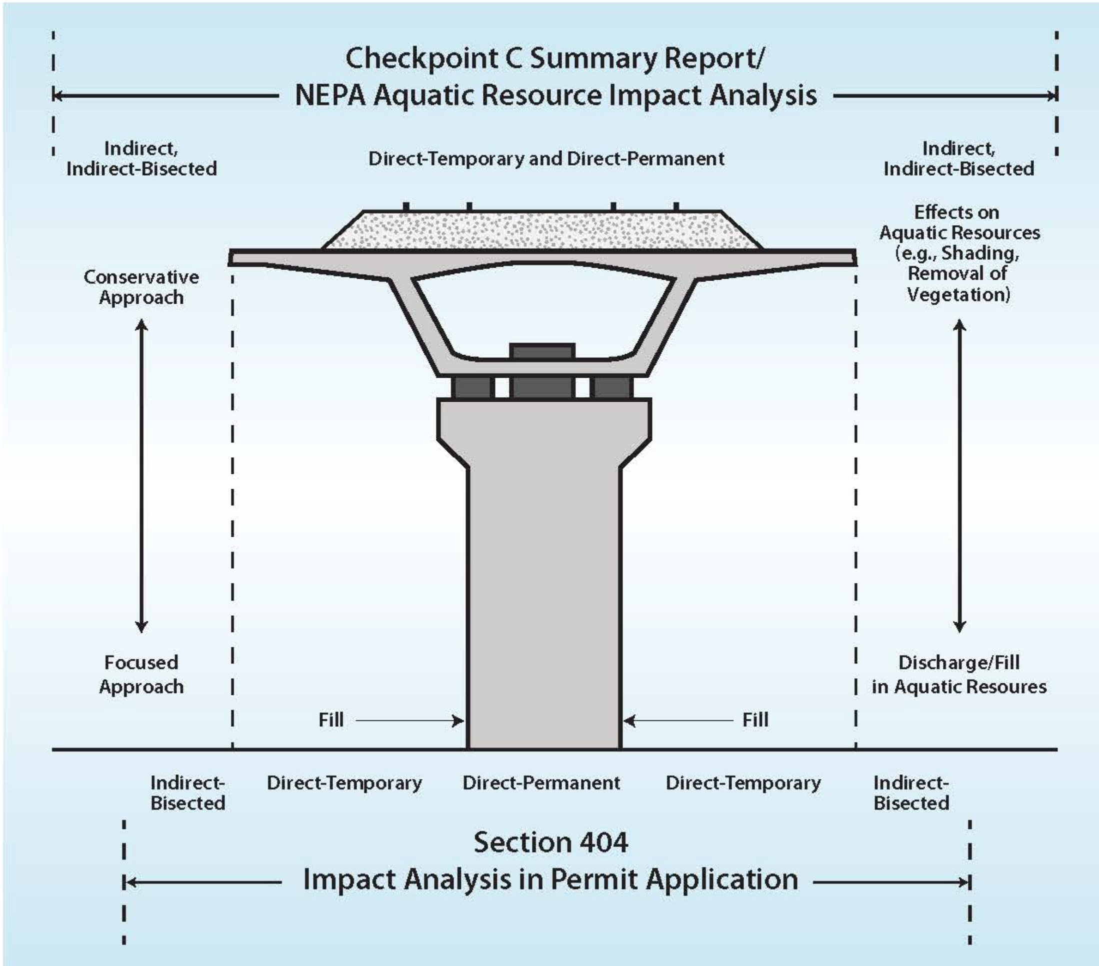


Figure 4-1
NEPA and Section 404 impact comparison

Because the permit application will be based upon a more refined design for the alternative selected through the LEDPA screening, the permit application will only cover actions that result in regulated discharge of dredged or fill material (33 CFR Part 323.3). Dredged and fill material are defined by regulation as follows:

- The discharge of dredged material means material that is excavated or dredged from waters of the U.S. (33 CFR 323.2[c]).
- The discharge of fill material means the addition of fill material into waters of the U.S., including placement of infrastructure and associated rock, sand, dirt, concrete, or other durable materials (33 CFR 323.2[f]).

Typically, where placement of fill will indirectly result in a loss of jurisdictional waters by altering hydrology, the lost surface area is also carried forward for permitting even though the entire surface area may not be subject to discharge of dredged or fill material as described above.

For each alternative described below, the direct permanent, direct temporary, indirect, and indirect bisected impacts thus correspond to the maximum spatial extent within which discharge of dredged or fill material or associated lost surface area may occur. The effects proposed for

Section 404 permitting will therefore occur within the extent of impacts compared across all alternatives identified in this Summary Report.

4.2.2 Hanford and Corcoran Area Alternatives

It is important to note that the Hanford West Bypass 1 and Hanford West Bypass 1 Modified alternatives only physically connect to the BNSF-Through Corcoran Alternative and do not connect to the Proposed Preferred Corcoran Alternative (Corcoran Bypass). The two alternatives that connect to the Corcoran area alternatives east of the BNSF tracks (Corcoran Bypass and Corcoran Elevated) are the BNSF-Hanford East Alternative and the Hanford West Bypass 2 and Hanford West Bypass 2 Modified alternatives. It is also important to note that the Hanford West Bypass 1 and 2 alternatives result in use of one more Section 4(f) property than the BNSF-Hanford East and the Hanford West Bypass 1 Modified and the Hanford West Bypass 2 Modified alternatives.

For these reasons, the LEDPA evaluation must consider the Hanford and Corcoran area impacts on aquatic resources together. This chapter, in combination with Chapter 6, Comparative Analysis of Impacts on Non-Aquatic Resources for All Project Alternatives, provides an analysis of the aquatic and other environmental impacts associated with the various Hanford and Corcoran area alternatives. Chapter 7, Proposed Preferred Alternative and Proposed Preliminary LEDPA, discusses the selection of the Proposed Preliminary LEDPA based on the combined Hanford and Corcoran area alternatives and describes the facts leading to the selection of the BNSF-Hanford East and Corcoran Bypass alternatives as the Proposed Preliminary LEDPA.

This chapter provides a comparison of the aquatic resources impacts for the various combinations of Hanford and Corcoran area alternatives. There are nine potential combinations of Hanford and Corcoran area alternatives:

- BNSF-Hanford East and Corcoran Bypass Alternative (Proposed Preferred Alternative and Preliminary LEDPA)
- BNSF-Hanford East and BNSF-Through Corcoran Alternative
- BNSF-Hanford East and Corcoran Elevated Alternative
- Hanford West Bypass 1 and BNSF-Through Corcoran Alternative
- Hanford West Bypass 1 Modified and BNSF-Through Corcoran Alternative
- Hanford West Bypass 2 and Corcoran Elevated Alternative
- Hanford West Bypass 2 and Corcoran Bypass Alternative
- Hanford West Bypass 2 Modified and Corcoran Elevated Alternative
- Hanford West Bypass 2 Modified and Corcoran Bypass Alternative

4.2.2.1 Affected Environment

Aquatic resources that could potentially be affected by the Hanford and Corcoran area alternatives include canals/ditches, emergent wetlands, man-made lacustrine, seasonal riverine, seasonal wetlands, and vernal pools and swales.

In the Hanford and Corcoran region, agricultural land uses dominate the landscape. Portions of the alternative combinations include urban land uses and, in some limited instances, barren land, and natural terrestrial communities are present in the landscape. The natural terrestrial communities are limited, highly fragmented, and typically disturbed or highly altered due to recent and past land use practices. Remnant portions of seasonal riverine features, including the Kings River, Cross Creek, and the Tule River, can be found in the footprints of all Hanford and Corcoran area alternatives.

4.2.2.2 Comparison of Direct and Indirect Impacts

Because of the large number of possible alternative combinations, a summary comparison of the impacts of the alternative combinations that have the smallest impacts on the aquatic ecosystem is provided for analysis and evaluation. The descriptions of the combined Hanford/Corcoran alternatives are presented in two tables. Table 4-2 provides a summary of the impacts on the aquatic resources by feature type and jurisdiction (i.e., wetlands and other waters), and Table 4-3 quantifies the direct and indirect impacts associated with the alternative combinations by relative condition (i.e., good, fair or poor) regardless of feature type.

The BNSF-Hanford East and Corcoran Bypass alternative combination has the fewest total direct impacts on waters of the U.S. Two other combinations are close, but slightly greater in total direct effects; BNSF-Hanford East to BNSF-Through Corcoran and Hanford West Bypass 1 to BNSF-Through Corcoran. All other combinations have substantially greater total direct effects, ranging from approximately 6 acres more to approximately 31 acres more direct effects than the Proposed Preferred Alternative. The Proposed Preferred Alternative also has the fewest total direct effects on wetlands. Between the three best alternatives with respect to total direct impacts, effects on features in good condition do not differ substantially. Direct impacts on features in good condition, such as the Kings River, will be further reduced if feasible. Calculations of direct impacts on features in good condition such as the Kings River conservatively include the entire dripline of the viaduct that will cross riverine features, reflecting potential impacts of shading.

Canals, ditches, and man-made lacustrine features make up the majority of the types of other waters of the U.S. affected by the Hanford and Corcoran area alternatives. However, the primary function of canals and ditches would remain through construction of the Project design features, which will continue to allow and facilitate the movement and transportation of water across the region in support of agricultural operations. The man-made lacustrine features can be reconfigured or relocated to provide the same water storage functions that they currently provide.

Table 4-2
Comparison of Quantity of Impacts on Waters of the U.S. in the Hanford and Corcoran Area Alternative Combinations (acres)

Wetlands and Other Waters (TYPE / HST water type)	Impact Type[a]	Preferred Alternative (BNSF-Hanford East with Corcoran Bypass)	BNSF – Hanford East with BNSF-Through Corcoran	BNSF-Hanford East with Corcoran Elevated	Hanford West Bypass 1 with BNSF-Through Corcoran	Hanford West Bypass 1 Modified with BNSF-Through Corcoran	Hanford West Bypass 2 with Corcoran Elevated	Hanford West Bypass 2 with Corcoran Bypass	Hanford West Bypass 2 Modified with Corcoran Elevated	Hanford West Bypass 2 Modified with Corcoran Bypass
TOTAL IMPACTS ON WETLANDS[b]	*Direct permanent*	*1.33*	*1.99*	*1.23*	*1.62*	*1.88*	*1.21*	*1.31*	*1.48*	*1.58*
	Direct temporary	*0.09*	*0.69*	*1.91*	*0.73*	*0.68*	*1.95*	*0.12*	*1.91*	*0.09*
	Indirect bisected	—	*0.01*	—	*0.01*	*0.01*	—	—	—	—
	Indirect	*1.38*	*8.15*	*5.94*	*10.37*	*8.75*	*6.04*	*1.48*	*6.14*	*1.58*
Emergent wetlands	Direct permanent	0.01	0.38	0.01	—	—	—	—	—	—
	Direct temporary	—	—	—	—	—	—	—	—	—
	Indirect	0.60	0.23	0.60	1.75	—	—	—	—	—
Seasonal wetlands	Direct permanent	1.31	1.61	1.20	1.62	1.88	1.20	1.31	1.47	1.58
	Direct temporary	0.09	0.69	1.91	0.73	0.68	1.95	0.12	1.91	0.09
	Indirect	0.77	7.92	5.34	8.62	8.75	6.04	1.47	6.14	1.57

Table 4-2
Comparison of Quantity of Impacts on Waters of the U.S. in the Hanford and Corcoran Area Alternative Combinations (acres)

Wetlands and Other Waters (TYPE/ HST water type)	Impact Type[a]	Preferred Alternative (BNSF-Hanford East with Corcoran Bypass)	BNSF – Hanford East with BNSF-Through Corcoran	BNSF-Hanford East with Corcoran Elevated	Hanford West Bypass 1 with BNSF-Through Corcoran	Hanford West Bypass 1 Modified with BNSF-Through Corcoran	Hanford West Bypass 2 with Corcoran Elevated	Hanford West Bypass 2 with Corcoran Bypass	Hanford West Bypass 2 Modified with Corcoran Elevated	Hanford West Bypass 2 Modified with Corcoran Bypass
Vernal Pools and Swales	Direct permanent	—	0.0007	0.01	0.0007	0.0007	0.01	—	0.01	—
	Direct temporary	—	—	—	—	—	—	—	—	—
	Indirect bisected	—	0.01	—	0.01	0.01	—	—	—	—
	Indirect	0.01	—	—	—	—	—	0.01	—	0.01
TOTAL IMPACTS ON OTHER WATERS OF THE U.S.[b]	*Direct permanent*	*33.38*	*39.08*	*47.26*	*41.20*	*42.08*	*48.32*	*34.43*	*66.38*	*52.50*
	Direct temporary	*11.61*	*4.95*	*10.83*	*7.06*	*7.50*	*21.24*	*22.02*	*7.74*	*8.52*
	Indirect	*96.82*	*84.67*	*91.47*	*62.09*	*63.09*	*65.40*	*71.34*	*64.94*	*70.87*
Canals/ ditches	Direct permanent	20.48	25.10	30.63	30.35	31.62	32.51	22.36	35.47	25.32
	Direct temporary	4.49	4.24	3.79	6.09	6.52	4.97	5.67	5.48	6.17
	Indirect	32.27	25.32	27.65	35.39	34.24	37.84	42.47	37.07	41.70

Table 4-2
Comparison of Quantity of Impacts on Waters of the U.S. in the Hanford and Corcoran Area Alternative Combinations (acres)

Wetlands and Other Waters (TYPE/ HST water type)	Impact Type[a]	Preferred Alternative (BNSF-Hanford East with Corcoran Bypass)	BNSF – Hanford East with BNSF-Through Corcoran	BNSF-Hanford East with Corcoran Elevated	Hanford West Bypass 1 with BNSF-Through Corcoran	Hanford West Bypass 1 Modified with BNSF-Through Corcoran	Hanford West Bypass 2 with Corcoran Elevated	Hanford West Bypass 2 with Corcoran Bypass	Hanford West Bypass 2 Modified with Corcoran Elevated	Hanford West Bypass 2 Modified with Corcoran Bypass
Man-made lacustrine	Direct permanent	9.73	11.73	13.41	10.03	9.53	13.69	10.02	28.76	25.08
	Direct temporary	6.90	0.45	6.83	0.45	0.48	15.79	15.85	1.78	1.85
	Indirect	39.29	34.83	36.97	17.16	19.19	17.39	19.71	17.52	19.84
Seasonal riverine	Direct permanent	3.17	2.25	3.23	0.82	0.93	2.12	2.06	2.16	2.10
	Direct temporary	0.23	0.26	0.21	0.52	0.50	0.48	0.50	0.48	0.50
	Indirect	24.92	24.52	25.93	9.55	9.66	10.18	9.17	10.35	9.34
TOTAL IMPACTS ON WATERS OF THE U.S.[b]	Direct permanent	34.70	41.07	48.49	42.83	43.95	49.54	35.75	67.86	54.08
	Direct temporary	11.70	5.64	12.74	7.79	8.18	23.19	22.15	9.65	8.61
	TOTAL DIRECT	46.40	46.72	61.23	50.62	52.13	72.73	57.89	77.52	62.68
	Indirect bisected	—	0.01	—	0.01	0.01	—	—	—	—
	Indirect	99.87	92.82	96.49	72.47	71.84	71.44	72.82	71.07	72.45

Table 4-2
Comparison of Quantity of Impacts on Waters of the U.S. in the Hanford and Corcoran Area Alternative Combinations (acres)

Wetlands and Other Waters (TYPE/ HST water type)	Impact Type[a]	Preferred Alternative (BNSF-Hanford East with Corcoran Bypass)	BNSF – Hanford East with BNSF-Through Corcoran	BNSF-Hanford East with Corcoran Elevated	Hanford West Bypass 1 with BNSF-Through Corcoran	Hanford West Bypass 1 Modified with BNSF-Through Corcoran	Hanford West Bypass 2 with Corcoran Elevated	Hanford West Bypass 2 with Corcoran Bypass	Hanford West Bypass 2 Modified with Corcoran Elevated	Hanford West Bypass 2 Modified with Corcoran Bypass

Notes:

= least-impact alternative

— = no impact or not applicable

[a] Indirect impacts are calculated within a 250-foot buffer of the Project Footprint (including areas of permanent and temporary impacts) and areas outside of vernal pools and swales intersected by the Project Footprint.

[b] Calculations are based on raw, unrounded Geographic Information System (GIS) source data. As a result, the subtotals and totals may not match the rounded feature values because of the number of aquatic features. These minor discrepancies may result in small differences in the presentation of the acreage.

Impact calculations in this table include Project alternatives and station alternatives, but do not include heavy maintenance facility site alternatives.

All impacts were calculated based on the Final EIR/EIS 15% engineering design Project Footprint.

Table 4-3

Comparison of Quality (Relative Condition) of Impacts on Waters of the U.S. in the Hanford and Corcoran Area Alternative Combinations (acres)[a]

Impact Type[b]	Relative Condition	Preferred Alternative (BNSF-Hanford East with Corcoran Bypass)	BNSF – Hanford East with BNSF-Through Corcoran	BNSF-Hanford East with Corcoran Elevated	Hanford West Bypass 1 with BNSF-Through Corcoran	Hanford West Bypass 1 Modified with BNSF-Through Corcoran	Hanford West Bypass 2 with Corcoran Elevated	Hanford West Bypass 2 with Corcoran Bypass	Hanford West Bypass 2 Modified with Corcoran Elevated	Hanford West Bypass 2 Modified with Corcoran Bypass
Waters of the U.S.										
Direct permanent	Poor	30.47	37.07	44.30	40.54	41.38	47.70	33.88	65.73	51.90
	Fair	3.51	3.28	3.47	2.01	2.30	1.55	1.60	1.85	1.90
	Good	0.72	0.72	0.73	0.27	0.27	0.28	0.27	0.28	0.27
Direct temporary	Poor	11.38	4.76	10.64	6.57	7.00	20.73	21.49	7.23	7.99
	Fair	0.16	0.72	1.97	1.15	1.11	2.39	0.59	2.35	0.55
	Good	0.16	0.16	0.16	0.07	0.07	0.07	0.07	0.07	0.07
TOTAL DIRECT[b]	*Poor*	41.85	41.83	54.93	47.11	48.38	68.44	*55.37*	*72.96*	*59.90*
	Fair	3.67	4.00	5.43	3.16	3.41	3.94	*2.18*	*4.21*	*2.45*
	Good	1.93	0.88	0.89	0.34	0.34	0.35	*0.34*	*0.35*	*0.34*
Indirect - Bisected	Good	—	0.01	—	0.01	0.01	—	—	—	—
Indirect[a]	Poor	75.69	64.22	69.74	54.57	55.42	57.95	64.90	57.32	64.27
	Fair	10.81	17.24	16.39	11.38	11.66	8.73	3.14	8.99	3.41
	Good	11.37	11.36	11.36	6.52	4.76	4.76	4.77	4.76	4.77

Table 4-3

Comparison of Quality (Relative Condition) of Impacts on Waters of the U.S. in the Hanford and Corcoran Area Alternative Combinations (acres)[a]

Impact Type[b]	Relative Condition	Preferred Alternative (BNSF-Hanford East with Corcoran Bypass)	BNSF – Hanford East with BNSF-Through Corcoran	BNSF-Hanford East with Corcoran Elevated	Hanford West Bypass 1 with BNSF-Through Corcoran	Hanford West Bypass 1 Modified with BNSF-Through Corcoran	Hanford West Bypass 2 with Corcoran Elevated	Hanford West Bypass 2 with Corcoran Bypass	Hanford West Bypass 2 Modified with Corcoran Elevated	Hanford West Bypass 2 Modified with Corcoran Bypass
Total[b]	Poor	117.54	106.05	123.66	101.69	103.80	126.39	120.28	130.28	124.16
	Fair	14.49	21.24	21.83	14.54	15.07	12.67	5.33	13.20	5.86
	Good	12.25	12.25	12.25	6.87	5.12	5.12	5.12	5.12	5.12

Notes:

— = no impact or not applicable

[a] Calculations are based on raw, unrounded Geographic Information System (GIS) source data. As a result, the subtotals and totals may not match the rounded feature values because of the number of aquatic features. These minor discrepancies may result in small differences in the presentation of the acreage.

[b] Indirect impacts are calculated within a 250-foot buffer of the Project Footprint (including areas of permanent and temporary impacts) and areas outside of vernal pools and swales intersected by the Project Footprint. Impact calculations in this table include Project alternatives and station alternatives, but do not include the heavy maintenance facility site alternatives.

All impacts were calculated based on the Final EIR/EIS 15% engineering design Project Footprint.

Impact types and/or existing condition types that do not appear in the table are not present in these alternatives.

4.2.3 Allensworth Area Alternatives

4.2.3.1 Affected Environment

Aquatic resources that could potentially be affected by the Allensworth area alternatives include canals/ditches, man-made lacustrine, seasonal riverine, seasonal wetlands, and vernal pools and swales. The Allensworth area has the largest concentration of vernal pools and swales along the Fresno to Bakersfield Section, particularly within the area of the BNSF–Through Allensworth Alternative (see Table 4-4). The BNSF–Through Allensworth Alternative is associated with a small acreage of aquatic resources in excellent condition and a significant acreage of aquatic resources in good condition. These resources constitute the vernal pools and swales that are associated with areas of alkali desert scrub that have not been disturbed recently and that in many cases are protected as part of the Allensworth Ecological Reserve. The existing condition of the aquatic resources in the Allensworth area ranges from poor to excellent. More aquatic resources are in good condition than in any other area (see Table 4-5).

4.2.3.2 Comparison of Direct and Indirect Impacts

The preferred alternative for the Allensworth region (Allensworth Bypass Alternative), has the least total direct impacts on waters of the U.S. The BNSF-Through Allensworth Alternative would result in approximately 10 more acres of direct effects. Both the BNSF-Through Allensworth and the Allensworth Bypass alternatives would result in direct and indirect impacts on wetlands and other waters of the U.S., including natural features such as seasonal wetlands and vernal pools and swales. The Allensworth Bypass Alternative was specifically designed to avoid impacts on biological resources, historic properties, and the Allensworth Ecological Reserve. As a result, the Allensworth Bypass Alternative has significantly fewer total direct and indirect bisected impacts on aquatic resources than the BNSF-Through Allensworth Alternative.

The Allensworth Bypass Alternative would result in significantly fewer direct permanent impacts on wetlands (approximately 7.10 acres less) and similar direct permanent impacts on other waters of the U.S. (approximately 0.47 acre more) than the BNSF-Through Allensworth (see Table 4-4). The Allensworth Bypass Alternative would have fewer impacts on vernal pools and swales compared with the BNSF-Through Allensworth Alternative. Both alternatives would have similar direct permanent impacts on seasonal riverine features. The BNSF-Through Allensworth Alternative would result in small direct permanent impacts on features in excellent condition (the only features in the entire WSA in excellent condition), whereas the Allensworth Bypass Alternative would not impact features in excellent condition (see Table 4-5). Furthermore, the Allensworth Bypass Alternative results in 7.90 fewer acres of direct permanent impacts on features in good condition than the BNSF-Through Allensworth Alternative. The Allensworth Bypass Alternative has lower direct permanent impacts on features in fair condition and higher impacts on features in poor condition than the BNSF-Through Allensworth Alternative.

The BNSF-Through Allensworth and Allensworth Bypass alternatives would result in direct temporary impacts on other waters of the U.S. in fair, poor, and good (BNSF-Though Allensworth only) condition. The Allensworth Bypass Alternative would result in a small amount of direct temporary impact (0.03 acre) on seasonal wetlands, and the BNSF-Through Allensworth Alternative would result in a slightly larger impact (0.58 acre). Direct temporary impacts on other waters of the U.S. would be smallest under the Allensworth Bypass Alternative, reducing impacts by almost 3 acres, compared with the BNSF-Through Allensworth Alternative. Because the impacts associated with both alternatives would occur to features in fair or poor condition and are predominately man-made, they can be restored with little risk following construction.

The Allensworth Bypass Alternative would result in fewer indirect bisected (vernal pools and swales, 3.05 acres less) and indirect impacts (3.86 acres less) than the BNSF–Through Allensworth Alternative (Table 4-4).

Table 4-4
Comparison of Quantity of Impacts on Waters of the U.S. in the Allensworth Area (acres)

Wetlands and Other Waters (TYPE/HST water type)	Impact Typea	Allensworth Bypass Alternative	BNSF–Through Allensworth Alternative
TOTAL IMPACTS ON WETLANDS[c]	*Direct permanent*	*6.02*	*13.12*
	Direct temporary	*0.03*	*0.58*
	Indirect bisected[a]	*11.54*	*14.59*
	Indirect[b]	*7.30*	*22.19*
Seasonal wetlands	Direct permanent	0.41	0.91
	Direct temporary	0.03	0.58
	Indirect[b]	1.00	12.03
Vernal pools and swales	Direct permanent	5.61	12.21
	Direct temporary	—	—
	Indirect bisected[a]	11.54	14.59
	Indirect[b]	6.30	10.16
TOTAL IMPACTS ON OTHER WATERS OF THE U.S.[c]	*Direct permanent*	*38.46*	*37.99*
	Direct temporary	*2.91*	*5.85*
	Indirect[b]	*107.27*	*105.08*
Canals/ditches	Direct permanent	11.43	11.00
	Direct temporary	1.28	0.47
	Indirect[b]	24.50	19.66
Man-made lacustrine	Direct permanent	26.79	26.70
	Direct temporary	1.60	5.27
	Indirect[b]	81.01	83.81
Seasonal riverine	Direct permanent	0.23	0.29
	Direct temporary	0.03	0.12
	Indirect[b]	1.76	1.61

Table 4-4
Comparison of Quantity of Impacts on Waters of the U.S. in the Allensworth Area (acres)

Wetlands and Other Waters (TYPE/HST water type)	Impact Typea	Allensworth Bypass Alternative	BNSF–Through Allensworth Alternative
TOTAL IMPACTS ON WATERS OF THE U.S.[c]	Direct permanent	44.47	51.11
	Direct temporary	2.94	6.43
	TOTAL DIRECT	47.42	57.54
	Indirect bisected[a]	11.54	14.59
	Indirect[b]	114.57	127.27

Notes:
[shaded box] = least-impact alternative
— = no impact or not applicable
[a] Indirect bisected quantifies impacts on features that are bisected by the boundary of the Project Footprint (i.e., where a vernal pool or swale straddles the Project Footprint boundary). This category presents the acreage for the portion of these features that lies outside the Project Footprint but within 250 feet of the Construction Footprint.
[b] Indirect impacts are calculated within a 250-foot buffer of the Project Footprint (including areas of permanent and temporary impacts) and areas outside of vernal pools and swales intersected by the Project Footprint.
[c] Calculations are based on raw, unrounded Geographic Information System (GIS) source data. As a result, the subtotals and totals may not match the rounded feature values because of the number of aquatic features. These minor discrepancies may result in small differences in the presentation of the acreage.
Impact calculations in this table include Project alternatives and station alternatives, but do not include the heavy maintenance facility site alternatives.
All impacts were calculated based on the Final EIR/EIS 15% engineering design Project Footprint.

Table 4-5
Comparison of Quality (Relative Condition) of Impacts on Waters of the U.S. in the Allensworth Area (acres)

Impact Type	Relative Condition	Allensworth Bypass Alternative	BNSF–Through Allensworth Alternative
Waters of the U.S.			
Direct permanent	Poor	38.23	33.96
	Fair	1.54	4.52
	Good	4.71	12.61
	Excellent	—	0.03
Direct temporary	Poor	2.88	5.58
	Fair	0.06	0.67
	Good	—	0.18

Table 4-5
Comparison of Quality (Relative Condition) of Impacts on Waters of the U.S. in the Allensworth Area (acres)

Impact Type	Relative Condition	Allensworth Bypass Alternative	BNSF–Through Allensworth Alternative
TOTAL DIRECT[c]	**Poor**	**41.11**	**39.53**
	Fair	**1.60**	**5.19**
	Good	**4.71**	**12.79**
	Excellent	—	**0.03**
Indirect bisected[a]	Fair	1.88	4.45
	Good	9.66	9.84
	Excellent	—	0.30
Indirect[b]	Poor	106.39	104.13
	Fair	3.85	13.27
	Good	4.34	8.58
	Excellent	—	1.30
Total[c]	**Poor**[c]	**147.49**	**143.67**
	Fair[c]	**7.32**	**22.90**
	Good[c]	**18.71**	**31.21**
	Excellent[c]	**—**	**1.63**

Notes:

= least-impact alternative

— = no impact or not applicable

[a] Indirect bisected quantifies impacts on features that are bisected by the boundary of the Project Footprint (i.e., where a vernal pool or swale straddles the Project Footprint boundary). This category presents the acreage for the portion of these features that lies outside the Project Footprint but within 250 feet of the Project Footprint.

[b] Indirect impacts are calculated within a 250-foot buffer of the Project Footprint (including areas of permanent and temporary impacts) and areas outside of vernal pools and swales intersected by the Project Footprint. Impact calculations in this table include Project alternatives and station alternatives but do not include the heavy maintenance facility site alternatives.

c Calculations are based on raw, unrounded Geographic Information System (GIS) source data. As a result, the subtotals and totals may not match the rounded feature values because of the number of aquatic features. These minor discrepancies may result in small differences in the presentation of the acreage.

All impacts were calculated based on the Final EIR/EIS 15% engineering design Project Footprint.

Impact types and/or existing condition types that do not appear in the table are not present in these alternatives.

4.2.4 Wasco-Shafter Area Alternatives

4.2.4.1 Affected Environment

Aquatic resources that could potentially be affected by the Wasco-Shafter area alternatives include canals/ditches and man-made lacustrine features. No natural aquatic resources (emergent wetlands, seasonal wetlands, vernal pools and swales, or seasonal riverine) occur in the Wasco-Shafter area. All of the aquatic resources in the Wasco-Shafter area are man-made and result from agricultural operations, and all are in poor condition.

4.2.4.2 Comparison of Direct and Indirect Impacts

Two man-made aquatic resource types—canals/ditches and lacustrine—would be affected by the Wasco-Shafter area alternatives, and the acreage affected would be relatively small (see Table 4-6). The portion of the Wasco Shafter Bypass Alternative proposed for permitting (ending at 7th Standard Road) would result in 1.3 acres fewer total direct impacts on waters of the U.S. than the BNSF-Through Wasco-Shafter Alternative. All of these features are in poor condition, and therefore the adverse effect of the two alternatives in this region on the aquatic ecosystem is comparable. Other differences in effects are summarized below.

The portion of the BNSF–Through Wasco-Shafter Alternative north of 7th Standard Road would result in approximately 0.55 more acres of direct permanent impacts on man-made features in poor condition compared with the Wasco-Shafter Bypass Alternative (see Table 4-9). However, the primary function of canals and ditches would remain through construction of the Project design features, and therefore they will continue to allow and facilitate the movement and transportation of water across the region in support of agricultural operations. The man-made lacustrine features can easily be reconfigured or relocated to provide the same water storage functions that they currently provide.

The Wasco Shafter Bypass would result in approximately 0.73 acres fewer direct temporary impacts on other waters of the U.S. than the BNSF-Through Wasco Shafter Alternative north of 7th Standard Road (Table 4-6). These impacts would occur solely on features in poor condition (see Table 4-7), which can be easily reconstructed to pre-Project conditions.

The Proposed Preliminary LEDPA stops approximately 5 miles north of the terminus of the Wasco-Shafter area alternatives (Hageman/Allen Road). The difference between the Proposed Preliminary LEDPA and the Proposed Preferred Alternative is that the Proposed Preliminary LEDPA ends at 7th Standard Road, and thus is included within but is shorter in length than the Proposed Preferred Alternative.

Table 4-6
Comparison of Quantity of Impacts on Waters of the U.S. in the Wasco-Shafter Area (acres)

Wetlands and Other Waters (TYPE/HST water type)	**Impact Type[a]**	*Portion of BNSF-Through Wasco-Shafter North of 7th Standard Road*	*Portion of BNSF-Through Wasco-Shafter South of 7th Standard Road*	**Preferred Wasco-Shafter Alternative (BNSF-Through Wasco-Shafter) Total**	*Portion of Wasco Shafter Bypass North of 7th Standard Road*	*Portion of Wasco Shafter Bypass South of 7th Standard Road*	**Wasco-Shafter Bypass Alternative Total**
TOTAL IMPACTS ON OTHER WATERS OF THE U.S.[b]	*Direct permanent*	*3.75*	*4.00*	*7.75*	*3.20*	*3.96*	*7.16*
	Direct temporary	*3.06*	*0.09*	*3.15*	*2.33*	*0.11*	*2.44*
	Indirect[a]	*10.04*	*4.75*	*14.79*	*1.54*	*4.72*	*6.26*

Table 4-6
Comparison of Quantity of Impacts on Waters of the U.S. in the Wasco-Shafter Area (acres)

Wetlands and Other Waters (TYPE/HST water type)	Impact Type[a]	*Portion of BNSF-Through Wasco-Shafter North of 7th Standard Road*	*Portion of BNSF-Through Wasco-Shafter South of 7th Standard Road*	Preferred Wasco-Shafter Alternative (BNSF-Through Wasco-Shafter) Total	*Portion of Wasco Shafter Bypass North of 7th Standard Road*	*Portion of Wasco Shafter Bypass South of 7th Standard Road*	Wasco-Shafter Bypass Alternative Total
Canals/ditches	Direct permanent	0.57	2.30	2.87	0.44	2.26	2.70
	Direct temporary	0.09	0.05	0.14	0.04	0.08	0.12
	Indirect[a]	2.99	4.38	7.37	0.43	4.36	4.78
Man-made lacustrine	Direct permanent	3.19	1.69	4.88	2.76	1.70	4.46
	Direct temporary	2.97	0.04	3.01	2.28	0.03	2.31
	Indirect[a]	7.05	0.37	7.42	1.11	0.37	1.48
TOTAL IMPACTS[b]	**Direct permanent**	**3.75**	**4.00**	**7.75**	**3.20**	**3.96**	**7.16**
	Direct temporary	**3.06**	**0.09**	**3.15**	**2.33**	**0.11**	**2.44**
	TOTAL DIRECT	**6.81**	**4.09**	**10.90**	**5.53**	**4.07**	**9.60**
	Indirect[a]	**10.04**	**4.75**	**14.79**	**1.54**	**4.72**	**6.26**

Notes:
= least-impact alternative
— = no impact or not applicable
[a] Indirect impacts are calculated within a 250-foot buffer of the Project Footprint (including areas of permanent and temporary impacts) and areas outside of vernal pools and swales intersected by the Construction Footprint.
[b] Calculations are based on raw, unrounded Geographic Information System (GIS) source data. As a result, the subtotals and totals may not match the rounded feature values because of the number of aquatic features. These minor discrepancies may result in small differences in the presentation of the acreage.
Impact calculations in this table include Project alternatives and station alternatives but do not include the heavy maintenance facility site alternatives.
All impacts were calculated based on the Final EIR/EIS 15% engineering design Project Footprint.

Table 4-7
Comparison of Quality (Relative Condition) of Impacts on Waters of the U.S. in the Wasco-Shafter Area (acres)

Impact Type	Relative Condition	*Portion of BNSF-Through Wasco-Shafter North of Seventh Standard Road*	*Portion of BNSF-Through Wasco-Shafter South of Seventh Standard Road*	Preferred Wasco-Shafter Alternative (BNSF–Through Wasco-Shafter) TOTAL	*Portion of Wasco Shafter Bypass North of Seventh Standard Road*	*Portion of Wasco Shafter Bypass South of Seventh Standard Road*	Wasco-Shafter Bypass Alternative TOTAL
Waters of the U.S.							
Direct permanent	Poor	3.75	4.00	7.75	3.20	3.96	7.16
Direct temporary	Poor	3.06	0.09	3.15	2.33	0.11	2.44
TOTAL DIRECT[b]	**Poor**	**6.81**	**4.09**	**10.90**	**5.53**	**4.07**	**9.60**
Indirect[a]	Poor	10.04	4.75	14.79	1.54	4.72	6.26

Notes:
▭ = least-impact alternative

[a] Indirect impacts are calculated within a 250-foot buffer of the Project Footprint (including areas of permanent and temporary impacts) and areas outside of vernal pools and swales intersected by the Project Footprint. Impact calculations in this table include Project alternatives and station alternatives, but do not include the heavy maintenance facility site alternatives.

[b] Calculations are based on raw, unrounded Geographic Information System (GIS) source data. As a result, the subtotals and totals may not match the rounded feature values because of the number of aquatic features. These minor discrepancies may result in small differences in the presentation of the acreage.

All impacts were calculated based on the Final EIR/EIS 15% engineering design Project Footprint.

Impact types and/or existing condition types that do not appear in the table are not present in these alternative alignments.

4.2.5 Bakersfield Area Alternatives

4.2.5.1 Affected Environment

It is important to note that this chapter does not identify a preliminary proposed LEDPA for the Bakersfield region, as no permit will be requested for the portion of the Project south of 7, Standard Road at this time. Design refinements in the Bakersfield region may allow further reduction of direct effects.

Canals/ditches, emergent wetlands, man-made lacustrine, seasonal riverine, and seasonal wetlands are among the aquatic resources that could potentially be affected by the Bakersfield area alternatives. These aquatic resources are in poor, fair, and good condition; under all three Bakersfield area alternatives, the majority of the direct and indirect impacts affect resources in poor condition.

In the Bakersfield region urban land uses dominate the landscape. Portions of the Bakersfield Area alternatives occur on barren land, and natural terrestrial communities are present, although limited in the landscape. The natural terrestrial communities are limited, highly fragmented, and typically disturbed or highly altered due to recent and past land use practices. All Bakersfield Area Alternatives have remnant portions of seasonal riverine features associated with the Kern River.

In the Bakersfield region, features in good condition are the most important resources with respect to the aquatic ecosystem. With other features, such as urban channelized concrete canals and retention basins, function is reduced in comparison to features such as the Kern River, which is in a more natural condition and thus has more habitat value.

4.2.5.2 Comparison of Direct and Indirect Impacts

The three Bakersfield Area Alternatives would result in similar impacts on aquatic resources; however, the Bakersfield Hybrid Alternative would have approximately 1.95 acres more total direct effects than the Bakersfield North Alternative, while the Bakersfield Hybrid and Bakersfield South alternatives would have effects on 0.62 acre less than the Bakersfield North Alternative (see Table 4-8).

With respect to direct and indirect impacts, both the Bakersfield Hybrid and the Bakersfield South alternatives would affect 6.88 fewer acres of features in good condition than the BNSF–Bakersfield North Alternative (see Table 4.2-9). Under all three alternatives, an elevated structure would be built to cross the Kern River; however, the magnitude of direct and indirect effects on the Kern River would be greater for the Bakersfield North Alternative. Impacts on the Kern River would be the same for the Bakersfield Hybrid and the Bakersfield South alternatives. The Bakersfield Hybrid and Bakersfield South alternatives would result in the fewest direct and indirect impacts on wetlands and would result in approximately 7 acres fewer indirect impacts on all waters of the U.S.

The Bakersfield Hybrid Alternative reduces direct permanent, direct temporary, and indirect impacts on waters of the U.S. in good condition (e.g., the Kern River), relative to the BNSF-Bakersfield North Alternative. The Bakersfield Hybrid Alternative also reduces effects on wetlands compared to the Bakersfield North Alternative.

Table 4-8
Comparison of Quantity of Impacts on Waters of the U.S. in the Bakersfield Area (acres)

Wetlands and Other Waters (TYPE/HST water type)	Impact Type[a]	Preferred Bakersfield Alternative (Bakersfield Hybrid Alternative)	BNSF-Bakersfield North Alternative	Bakersfield South Alternative
TOTAL IMPACTS ON WETLANDS[b]	*Direct permanent*	*0.51*	*0.63*	*0.51*
	Direct temporary	—	—	—
	Indirect[a]	*0.09*	*0.13*	*0.09*
Seasonal wetland	Direct permanent	0.51	0.63	0.51
	Direct temporary	—	—	—
	Indirect[a]	0.09	0.13	0.09

Table 4-8
Comparison of Quantity of Impacts on Waters of the U.S. in the Bakersfield Area (acres)

Wetlands and Other Waters (TYPE/HST water type)	Impact Type[a]	Preferred Bakersfield Alternative (Bakersfield Hybrid Alternative)	BNSF-Bakersfield North Alternative	Bakersfield South Alternative
TOTAL IMPACTS ON OTHER WATERS OF THE U.S.[b]	*Direct permanent*	*11.57*	*8.80*	*10.97*
	Direct temporary	*2.64*	*3.34*	*2.69*
	Indirect[a]	*30.31*	*37.59*	*30.02*
Canals/Ditches	Direct permanent	6.13	3.34	5.57
	Direct temporary	1.05	0.45	1.05
	Indirect[a]	12.33	9.07	11.72
Man-made lacustrine	Direct permanent	3.65	3.23	3.60
	Direct temporary	1.13	2.22	1.17
	Indirect[a]	3.92	8.31	4.24
Seasonal riverine	Direct permanent	1.80	2.24	1.80
	Direct temporary	0.47	0.67	0.47
	Indirect[a]	14.06	20.20	14.06
TOTAL IMPACTS ON WATERS OF THE U.S.[b]	**Direct permanent**	**12.08**	**9.43**	**11.48**
	Direct temporary	**2.64**	**3.34**	**2.69**
	TOTAL DIRECT	**14.72**	**12.77**	**14.18**
	Indirect[a]	**30.40**	**37.72**	**30.10**

Notes:
(shaded) = least-impact alternative
— = no impact or not applicable
[a] Indirect impacts are calculated within a 250-foot buffer of the Project Footprint (including areas of permanent and temporary impacts) and areas outside of vernal pools and swales intersected by the Project Footprint.
[b] Calculations are based on raw, unrounded Geographic Information System (GIS) source data. As a result, the subtotals and totals may not match the rounded feature values because of the number of aquatic features. These minor discrepancies may result in small differences in the presentation of the acreage.
Impact calculations in this table include Project alternatives and station alternatives but do not include the heavy maintenance facility site alternatives.
All impacts were calculated based on the Final EIR/EIS 15% engineering design Project Footprint.
Impact types and/or existing condition types that do not appear in the table are not present in these alternatives.

Table 4-9
Comparison of Quality (Relative Condition) of Impacts on Waters of the U.S. in the Bakersfield Area (acres)

Impact Type	Relative Condition	Preferred Bakersfield Alternatives (Bakersfield Hybrid Alternative)	BNSF Bakersfield Alternative (BNSF–Bakersfield North Alternative	Bakersfield South Alternative
Waters of the U.S.				
Direct permanent	Poor	10.28	7.19	9.69
	Fair	—	0.01	—
	Good	1.80	2.23	1.80
Direct temporary	Poor	2.18	2.67	2.23
	Fair	—	0.02	—
	Good	0.47	0.65	0.47
TOTAL DIRECT[b]	**Poor**	**12.46**	**9.86**	**11.92**
	Fair	—	**0.03**	—
	Good	**2.26**	**2.88**	**2.26**
Indirect[a]	Poor	16.34	17.51	16.05
	Fair	0.73	0.61	0.73
	Good	13.33	19.59	13.33
Total[b]	**Poor**[b]	**28.80**	**27.37**	**27.96**
	Fair[b]	**0.73**	**0.64**	**0.73**
	Good[b]	**15.59**	**22.47**	**15.59**

Notes:
= least-impact alternative
— = no impact or not applicable
[a] Indirect impacts are calculated within a 250-foot buffer of the Project Footprint (including areas of permanent and temporary impacts) and areas outside of vernal pools and swales intersected by the Project Footprint.
[b] Calculations are based on raw, unrounded Geographic Information System (GIS) source data. As a result, the subtotals and totals may not match the rounded feature values because of the number of aquatic features. These minor discrepancies may result in small differences in the presentation of the acreage.
Impact calculations in this table include Project alternatives and station alternatives but do not include the heavy maintenance facility site alternatives.
All impacts were calculated based on the Final EIR/EIS 15% engineering design Project Footprint.
Impact types and/or existing condition types that do not appear in the table are not present in these alternatives.

4.3 Summary Comparison of Aquatic Impacts for Project Alternatives

This section provides a summary comparative analysis of the Project alternatives to support analysis of the LEDPA determination.

4.3.1 Quantitative and Qualitative Comparison: Quantity and Relative Condition of Jurisdictional Waters Impacted by Alternative

To assist in summarizing and evaluating the LEDPA, impacts on aquatic features are presented in Tables 4-12 and 4-13 in a manner that allows for a comparison of each alternative to the Proposed Preliminary LEDPA in each segment.

The extent of effects and impacts on aquatic resources varies between alternatives. Table 4-10 provides a comparison of impacts on quantity, and Table 4-11 provides a comparison of impacts based on relative condition. Both tables compare impacts on aquatic resources for the Proposed Preferred Alternative, Proposed Preliminary LEDPA, and other HST alternatives. These calculations include the various technical changes to the Project since the Revised DEIR/Supplemental DEIS, as described in Section 1.6.

To compare the Project alternatives, Table 4-10 contains the amount of impact anticipated for a given aquatic resource type. For the Hanford and Corcoran Area all alternative combinations are presented. Combined alternatives, based on Hanford alternatives that will physically connect with Corcoran alternatives, are discussed in Chapter 7.

In addition to the quantitative measurement of acreage affected by each alternative, the quality or relative condition of the resources affected must also be taken into consideration as a factor used to evaluate which alternative would have the least adverse impact on the aquatic ecosystem (Table 4-11). This qualitative evaluation is important to understand where a quantitatively small impact would affect an excellent- or good-quality resource, compared to an alternative that may have slightly higher quantitative impacts but affect lower-quality jurisdictional waters. In contrast with Table 4-12, this assessment does not include a comparison between aquatic resource types or jurisdictional water types; Table 4-13 only evaluates relative condition, regardless of jurisdictional water type.

Excellent-condition features only exist in small quantities in the Allensworth area (Upper Deer–Upper White Watershed). The Allensworth area also has more acreage of jurisdictional waters, including those in good condition (vernal pools and swales, Deer Creek, and Poso Creek), than any of the other geographic areas.

The Hanford, Corcoran, and Bakersfield areas also contain good-condition aquatic resources, which are primarily associated with the Kings River Complex, the Tule River, seasonal wetlands, and the Kern River. All of the affected features in the Wasco-Shafter area are in poor condition.

The relative condition indicates that the vast majority of jurisdictional waters affected by all potential alternatives are in poor or fair condition. This holds true for all categories of impact (e.g., direct, indirect) with the exception of indirect bisected, which does not contain any poor-quality aquatic resources (see Table 4-11 for more details).

Table 4-10
Comparison of Quantity of Impacts on Waters of the U.S. by Alternative

Waters of the U.S.	Impact Type[a]	Proposed Prelimi-nary LEDPA	Proposed Preferred Alternative (in acres)	Common Compo-nents	High-Speed Train Alternatives																
					BNSF-Hanford East with Corcoran Bypass	BNSF-Hanford East with BNSF-Through Corcoran	BNSF-Hanford East with Corcoran Elevated	Hanford West Bypass 1 with BNSF-Through Corcoran	Hanford West Bypass 1 Modified with BNSF-Through Corcoran	Hanford West Bypass 2 with Corcoran Elevated	Hanford West Bypass 2 with Corcoran Bypass	Hanford West Bypass 2 Modified with Corcoran Elevated	Hanford West Bypass 2 Modified with Corcoran Bypass	BNSF-Through Allensworth	Allensworth Bypass	BNSF-Through Wasco-Shafter	Wasco-Shafter Bypass	BNSF-Bakersfield North	Bakersfield South	Bakersfield Hybrid
		Impact Acreage																			
WETLANDS TOTAL[c]	**Direct Permanent**	**8.48**	**8.99**	**1.13**	**1.33**	**1.99**	**1.23**	**1.62**	**1.88**	**1.21**	**1.31**	**1.48**	**1.58**	**13.12**	**6.02**	**—**	**—**	**0.63**	**0.51**	**0.51**
	Direct Temporary	**0.59**	**0.59**	**0.48**	**0.09**	**0.69**	**1.91**	**0.73**	**0.68**	**1.95**	**0.12**	**1.91**	**0.09**	**0.58**	**0.03**	**—**	**—**	**—**	**—**	**—**
	Indirect Bisected[a]	**11.54**	**11.54**	**—**	**—**	**0.01**	**—**	**0.01**	**0.01**	**—**	**—**	**—**	**—**	**14.59**	**11.54**	**—**	**—**	**—**	**—**	**—**
	Indirect[b]	**16.11**	**16.20**	**7.42**	**1.38**	**5.94**	**7.71**	**10.37**	**8.75**	**6.04**	**1.48**	**6.14**	**1.58**	**22.19**	**7.30**	**—**	**—**	**0.13**	**0.09**	**0.09**
Emergent wetland	Direct Permanent	0.01	0.01	—	0.01	0.38	0.01	—	—	—	—	—	—	—	—	—	—	—	—	—
	Direct Temporary	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	Indirect[b]	0.60	0.60	—	0.60	0.23	0.60	1.75	—	—	—	—	—	—	—	—	—	—	—	—
Seasonal wetland	Direct Permanent	2.83	3.34	1.11	1.31	1.61	1.20	1.62	1.88	1.20	1.31	1.47	1.58	0.91	0.41	—	—	0.63	0.51	0.51
	Direct Temporary	0.59	0.59	*0.48*	0.09	0.69	1.91	0.73	0.68	1.95	0.12	1.91	0.09	*0.58*	*0.03*	—	—	—	—	—
	Indirect[b]	9.19	9.28	7.42	0.77	7.92	5.34	8.62	8.75	6.04	1.47	6.14	1.57	12.03	1.00	—	—	0.13	0.09	0.09
Vernal pools and swales	Direct Permanent	5.63	5.63	0.03	—	0.0007	0.01	0.0007	0.0007	0.01	—	0.01	—	12.21	5.61	—	—	—	—	—
	Direct Temporary	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	Indirect Bisected[a]	11.54	11.54	—	—	0.01	—	0.01	0.01	—	—	—	—	14.59	11.54	—	—	—	—	—
	Indirect[b]	6.31	6.31	—	0.01	—	—	—	—	—	0.01	—	0.01	10.16	6.30	—	—	—	—	—
OTHER WATERS OF THE U.S. TOTAL[c]	**Direct Permanent**	**99.19**	**114.76**	**23.60**	**33.38**	**39.08**	**47.26**	**41.20**	**42.08**	**48.32**	**34.43**	**66.38**	**52.50**	**37.99**	**38.46**	**7.75**	**7.16**	**8.80**	**10.97**	**11.57**
	Direct Temporary	**22.92**	**25.65**	**5.34**	**11.61**	**4.95**	**10.83**	**7.06**	**7.50**	**21.24**	**22.02**	**7.74**	**8.52**	**5.85**	**2.91**	**3.15**	**2.44**	**3.34**	**2.69**	**2.64**
	Indirect[b]	**234.02**	**269.08**	**20.22**	**96.49**	**84.67**	**90.55**	**62.09**	**63.09**	**65.40**	**71.34**	**64.94**	**70.87**	**105.08**	**107.27**	**14.79**	**6.26**	**37.59**	**30.02**	**30.31**
Canals/ Ditches	Direct Permanent	55.08	63.51	22.60	20.48	25.10	30.63	30.35	31.62	32.51	22.36	35.47	25.32	11.00	11.43	2.87	2.70	3.34	5.57	6.13
	Direct Temporary	10.16	11.26	*4.30*	4.49	4.24	3.79	6.09	6.52	4.97	5.67	5.48	6.17	*0.47*	*1.28*	*0.14*	*0.12*	*0.45*	*1.05*	*1.05*
	Indirect[b]	67.87	84.58	8.10	32.27	25.32	27.65	35.39	34.24	37.84	42.47	37.07	41.70	19.66	24.50	7.37	4.78	9.07	11.72	12.33
Man-made lacustrine	Direct Permanent	40.72	46.06	1.00	9.73	11.73	13.41	10.03	9.53	13.69	10.02	28.76	25.08	26.70	26.79	4.88	4.46	3.23	3.60	3.65
	Direct Temporary	12.50	13.67	*1.03*	6.90	0.45	6.82	0.45	0.48	15.79	15.85	1.78	1.85	*5.27*	*1.60*	*3.01*	*2.31*	*2.22*	*1.17*	*1.13*
	Indirect[b]	139.47	143.76	12.12	39.65	34.83	37.92	17.16	19.19	17.39	19.71	17.52	19.84	83.81	81.01	7.42	1.48	8.31	4.24	3.92

Table 4-10
Comparison of Quantity of Impacts on Waters of the U.S. by Alternative

Waters of the U.S.	Impact Type[a]	Proposed Prelimi-nary LEDPA	Proposed Preferred Alternative (in acres)	Common Compo-nents	High-Speed Train Alternatives: BNSF-Hanford East with Corcoran Bypass	BNSF-Hanford East with BNSF-Through Corcoran	BNSF-Hanford East with Corcoran Elevated	Hanford West Bypass 1 with BNSF-Through Corcoran	Hanford West Bypass 1 Modified with BNSF-Through Corcoran	Hanford West Bypass 2 with Corcoran Elevated	Hanford West Bypass 2 with Corcoran Bypass	Hanford West Bypass 2 Modified with Corcoran Elevated	Hanford West Bypass 2 Modified with Corcoran Bypass	BNSF-Through Allensworth	Allensworth Bypass	BNSF-Through Wasco-Shafter	Wasco-Shafter Bypass	BNSF-Bakersfield North	Bakersfield South	Bakersfield Hybrid
		Impact Acreage																		
Seasonal riverine	Direct Permanent	3.40	5.19	—	3.17	2.25	3.23	0.82	0.93	2.12	2.06	2.16	2.10	0.29	0.23	—	—	2.24	1.80	1.80
	Direct Temporary	0.26	0.73	—	0.23	0.26	0.21	0.52	0.50	0.48	0.50	0.48	0.50	*0.12*	*0.03*	—	—	*0.67*	*0.47*	*0.47*
	Indirect[b]	26.68	40.74	—	24.92	24.52	25.93	9.55	9.66	10.18	9.17	10.35	9.34	1.61	1.76	—	—	20.20	14.06	14.06
TOTAL IMPACTS[c]	**Direct Permanent**	**107.67**	**123.75**	**24.74**	**34.70**	**41.07**	**48.49**	**42.83**	**43.95**	**49.54**	**35.75**	**67.86**	**54.08**	**51.11**	**44.47**	**7.75**	**7.16**	**9.43**	**11.48**	**12.08**
	Direct Temporary	**23.51**	**26.24**	**5.81**	**11.70**	**5.64**	**12.76**	**7.79**	**8.18**	**23.19**	**22.15**	**9.65**	**8.61**	**6.43**	**2.94**	**3.15**	**2.44**	**3.34**	**2.69**	**2.64**
	TOTAL DIRECT	**131.18**	**149.99**	**30.55**	**46.40**	**46.72**	**61.23**	**50.62**	**52.13**	**72.73**	**57.89**	**77.52**	**62.68**	**57.54**	**47.42**	**10.90**	**9.60**	**12.77**	**14.18**	**14.72**
	Indirect Bisected[a]	**11.54**	**11.54**	**—**	**—**	**0.01**	**—**	**0.01**	**0.01**	**—**	**—**	**—**	**—**	**14.59**	**11.54**	**—**	**—**	**—**	**—**	**—**
	Indirect[b]	**250.13**	**285.27**	**27.64**	**97.87**	**92.82**	**96.49**	**72.47**	**71.84**	**71.44**	**72.82**	**71.07**	**72.45**	**127.27**	**114.57**	**14.79**	**6.26**	**37.72**	**30.10**	**30.40**

Notes:
— = No impact or not applicable
[a] Indirect bisected quantifies impacts on features that are bisected by the boundary of the Project Footprint (i.e., where a vernal pool or swale straddles the Project Footprint boundary). This category presents the acreage for the portion of these features that lies outside but within 250 feet of the Project Footprint
[b] Indirect impacts are calculated within a 250-foot buffer of the Project Footprint (including areas of permanent and temporary impacts) and areas outside of vernal pools and swales intersected by the Project Footprint.
[c] Calculations are based on raw, unrounded Geographic Information System (GIS) source data. As a result, the subtotals and totals may not match the rounded feature values because of the number of aquatic features. These minor discrepancies may result in small differences in the presentation of the acreage.
Impact calculations in this table include Project alternatives and station alternatives but do not include heavy maintenance facility alternatives.
All impacts were calculated based on 15% engineering design Project Footprint.
Abbreviation:
LEDPA = Least Environmentally Damaging Practicable Alternative

Table 4-11
Comparison of Quality (Relative Condition) of Impacts on Waters of the U.S. by Alternative[a]

Relative Condition	Proposed Preliminary LEDPA	Preferred Alternative (in acres)	Common Compo-nents	BNSF-Hanford East with Corcoran Bypass	BNSF-Hanford East with BNSF-Through Corcoran	BNSF-Hanford East with Corcoran Elevated	Hanford West Bypass 1 with BNSF-Through Corcoran	Hanford West Bypass 1 Modified with BNSF-Through Corcoran	Hanford West Bypass 2 with Corcoran Elevated	Hanford West Bypass 2 with Corcoran Bypass	Hanford West Bypass 2 Modified with Corcoran Elevated	Hanford West Bypass 2 Modified with Corcoran Bypass	BNSF-Through Allensworth	Allensworth Bypass	BNSF-Through Wasco-Shafter	Wasco-Shafter Bypass	BNSF-Bakersfield North	Bakersfield South	Bakersfield Hybrid
	Impact Acreage																		
Direct Permanent Impacts[a,d]																			
Poor	96.08	110.36	23.63	30.47	37.07	44.30	40.54	41.38	47.70	33.88	65.73	51.90	33.96	38.23	7.75	7.16	7.19	9.69	10.28
Fair	6.16	6.16	1.11	3.51	3.28	3.47	2.01	2.30	1.55	1.60	1.85	1.90	4.52	1.54	—	—	0.01	—	—
Good	5.43	7.23	—	1.77	0.72	0.73	0.27	0.27	0.28	0.27	0.28	0.27	12.61	4.71	—	—	2.23	1.80	1.80
Excellent	—	—	—	—	—	—	—	—	—	—	—	—	0.03	—	—	—	—	—	—
Direct Temporary Impacts[a, d]																			
Poor	22.65	24.92	5.34	11.38	4.76	10.64	6.57	7.00	20.73	21.49	7.23	7.99	5.58	2.88	3.15	2.44	2.67	2.23	2.18
Fair	0.70	0.70	0.48	0.16	0.72	1.97	1.15	1.11	2.39	0.59	2.35	0.55	0.67	0.06	—	—	0.02		
Good	0.16	0.62	—	0.16	0.16	0.16	0.07	0.07	0.07	0.07	0.07	0.07	0.18	—	—	—	0.65	0.47	0.47
Excellent	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
TOTAL DIRECT IMPACTS[a, d]																			
Poor	118.74	135.29	28.97	41.85	41.83	54.93	47.11	48.38	68.44	55.37	72.96	59.90	39.53	41.11	10.90	9.60	9.86	11.92	12.46
Fair	6.85	6.85	1.58	3.67	4.00	5.43	3.16	3.41	3.94	2.18	4.21	2.45	5.19	1.60	—	—	0.03		
Good	5.59	7.85	—	0.88	0.88	0.89	0.34	0.34	0.35	0.34	0.35	0.34	12.79	4.71	—	—	2.88	2.26	2.26
Excellent	—	—	—	—	—	—	—	—	—	—	—	—	0.03	—	—	—	—	—	—
Indirect Bisected Impacts[a, b, d]																			
Poor	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Fair	1.88	1.88	—	—	—	—	—	—	—	—	—	—	4.45	1.88	—	—	—	—	—
Good	9.66	9.66	—	—	0.01	—	0.01	0.01	—	—	—	—	9.84	9.66	—	—	—	—	—
Excellent	—	—	—	—	—	—	—	—	—	—	—	—	0.30	—	—	—	—	—	—
Indirect Impacts[a, c, d]																			
Poor	212.34	233.43	20.22	75.69	64.22	69.74	54.57	55.42	57.95	64.90	57.32	64.27	104.13	106.39	14.79	6.26	17.51	16.05	16.34
Fair	22.08	22.81	7.42	10.81	17.24	16.39	11.38	11.66	8.73	3.14	8.99	3.41	13.27	3.85	—	—	0.61	0.73	0.73
Good	15.70	29.03	—	11.37	11.36	11.36	6.52	4.76	4.76	4.77	4.76	4.77	8.58	4.34	—	—	19.59	13.33	13.33
Excellent	—	—	—	—	—	—	—	—	—	—	—	—	1.30	—	—	—	—	—	—

Table 4-11
Comparison of Quality (Relative Condition) of Impacts on Waters of the U.S. by Alternative[a]

Relative Condition	Proposed Preliminary LEDPA	Preferred Alternative (in acres)	Common Compo-nents	BNSF-Hanford East with Corcoran Bypass	BNSF-Hanford East with BNSF-Through Corcoran	BNSF-Hanford East with Corcoran Elevated	Hanford West Bypass 1 with BNSF-Through Corcoran	Hanford West Bypass 1 Modified with BNSF-Through Corcoran	Hanford West Bypass 2 with Corcoran Elevated	Hanford West Bypass 2 with Corcoran Bypass	Hanford West Bypass 2 Modified with Corcoran Elevated	Hanford West Bypass 2 Modified with Corcoran Bypass	BNSF-Through Allensworth	Allensworth Bypass	BNSF-Through Wasco-Shafter	Wasco-Shafter Bypass	BNSF-Bakersfield North	Bakersfield South	Bakersfield Hybrid
	Impact Acreage																		
Totals[a, d]																			
Total Poor[a, d]	331.08	368.71	49.19	117.54	106.05	123.66	101.69	103.80	126.39	120.28	130.28	124.16	143.67	147.49	25.69	15.86	27.37	27.96	28.80
Total Fair[a,d]	30.81	31.55	9.00	14.49	21.24	21.83	14.54	15.07	12.67	5.33	13.20	5.86	22.90	7.32	—	—	0.64	0.73	0.73
Total Good[a,d]	30.95	46.54	—	12.25	12.25	12.25	6.87	5.12	5.12	5.12	5.12	5.12	31.21	18.71	—	—	22.47	15.59	15.59
Total Excellent[a, d]	—	—	—	—	—	—	—	—	—	—	—	—	1.63	—	—	—	—	—	—

Notes:
— = No impact or not applicable
[a] Impacts include only waters of the U.S.
[b] Indirect bisected quantifies impacts on features that are bisected by the boundary of the Project Footprint (i.e., where a vernal pool or swale straddles the Project Footprint boundary). This category presents the acreage for the portion of these features that lies outside the Project Footprint but within 250 feet of the Project Footprint.
[c] Indirect impacts are calculated within a 250-foot buffer of the Project Footprint (including areas of permanent and temporary impacts) and areas outside of vernal pools and swales intersected by the Project Footprint. Impact calculations in this table include Project alternatives and station alternatives but do not include the heavy maintenance facility site alternatives.
[d] Calculations are based on raw, unrounded Geographic Information System (GIS) source data. As a result, the subtotals and totals may not match the rounded feature values because of the number of aquatic features. These minor discrepancies may result in small differences in the presentation of the acreage.
All impacts were calculated based on the Final EIR/EIS 15% engineering design Project Footprint.
Abbreviation:
LEDPA = Least Environmentally Damaging Practicable Alternative

4.4 Cumulative Impacts

The cumulative impacts discussion for aquatic resources considers the WSA, the existing condition of the aquatic resources resource to which past projects contributed, concurrent construction activities, cumulative effects with the Project, and the contribution of the HST alternatives to those cumulative effects. The cumulative condition includes planned and projected development projects and roadway projects listed in Appendix 3.19-A and Appendix 3.19-B of the Revised DEIR/Supplemental DEIS. The cumulative impact analysis includes consideration of adjacent HST Sections and the entire Tulare Basin, where appropriate, for the environmental resource under consideration.

The southern Central Valley once sustained four large shallow terminal lakes and rich riparian wetland habitats. However, more than 88% of the wetlands in the southern Central Valley have been converted to agriculture or urban use (Kelly et al. 2005) and natural jurisdictional water features, seasonal riverine, seasonal wetlands, and vernal pools are now extremely rare on a regional scale.

Impacts of substantial intensity could result directly and indirectly from the Project and other past, present, and reasonably foreseeable projects. Cumulative impacts on jurisdictional wetlands and waters may be caused by the construction of numerous transportation and development projects. These projects include, but are not limited to the following:

- Fresno Freight Rail Alignment Project in Fresno County, which crosses the Kings River, Murphy Slough and several unnamed canals and ditches.
- State Route 99 in Kingsburg, which crosses the Kings River.
- Goose Lake Solar Project.
- Smyrna Solar Project.
- Corcoran Irrigation District Solar Project.
- Corcoran Irrigation District Solar Generation Facilities Project, which will affect jurisdictional wetlands.

Additionally, construction of adjacent HST Sections—the Merced to Fresno Section to the north and the Bakersfield to Palmdale Section to the south—would contribute to the net loss of wetlands and other habitats of concern.

Direct and indirect impacts of the Proposed Preferred Alternative on aquatic resources would result from the near- and long-term operation of the HST alternatives and other past, present, and foreseeable projects. Potential impacts on aquatic resources include the permanent placement of fill or increased erosion, siltation, and runoff in jurisdictional waters, or degradation or conversion of aquatic resources.

However, through implementation of the mitigation measures identified in Chapter 3, effects to jurisdictional waters would be avoided where possible or would be reduced and would result in minimal regional effects because mitigation measures would:

- Monitor construction activities (reduce or avoid impacts).
- Restore temporary impacts (rectify).
- Compensate for unavoidable loss of aquatic resources in accordance with the USACE's no net loss of wetlands policy.

4.5 Section 404 Permitting by Construction Packages

The Authority is currently considering a Project permitting strategy consistent with the Fresno to Bakersfield Construction Packages. Figure 4-2 provides a summary of the extent of the

Construction Packages associated with the Fresno to Bakersfield Project. Table 4-12 provides a summary of the direct and indirect bisected impacts under the Proposed Preliminary LEDPA for each of the identified Construction Packages.

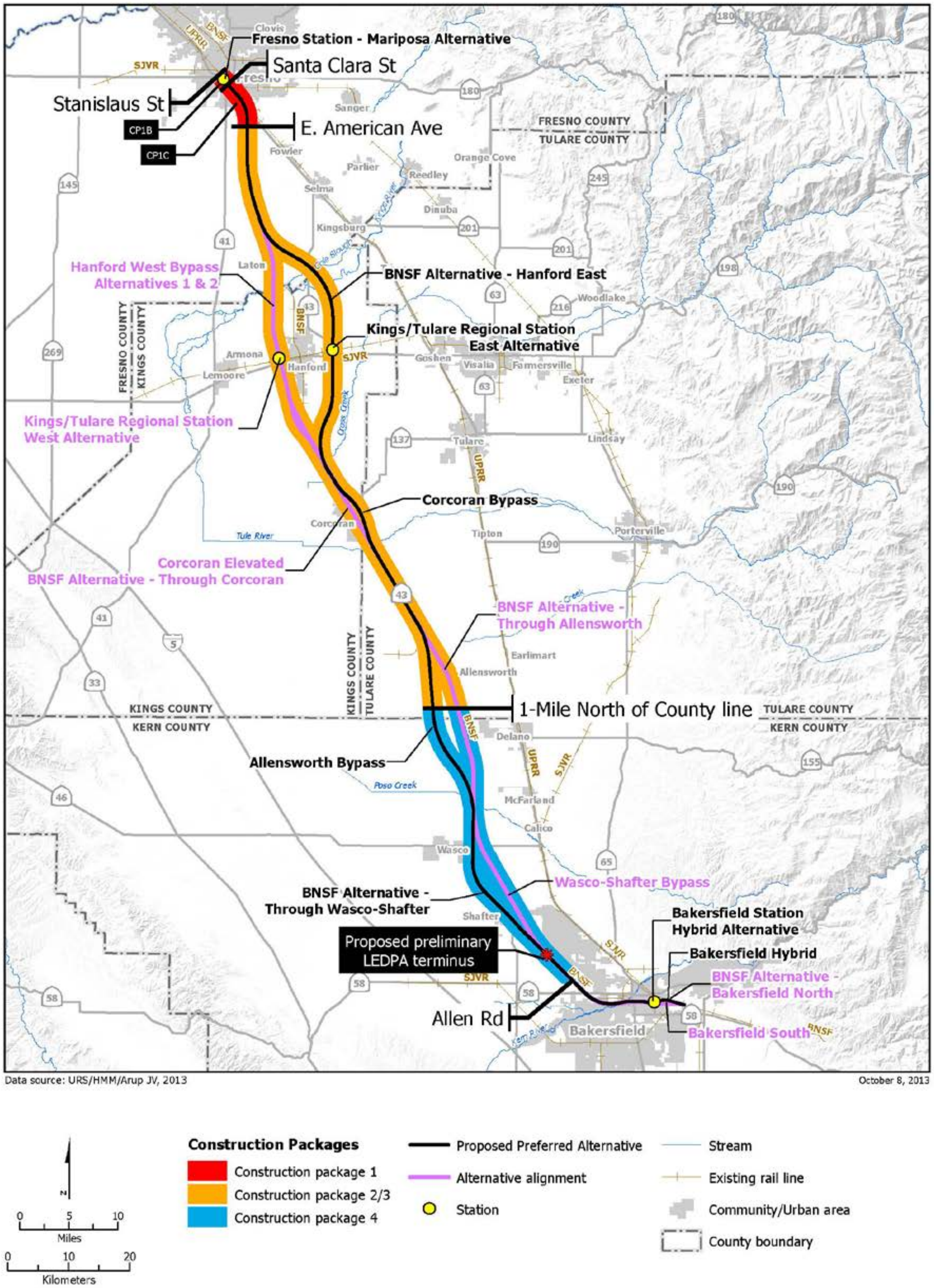


Figure 4-2
Fresno to Bakersfield Section Construction Packages

Table 4-12
Aquatic Resource Impacts for the Proposed Preliminary LEDPA[1] by Construction Package (acres)

Feature Type	Direct Permanent	Direct Temporary	Indirect - Bisect	Indirect
Construction Package 1C				
Seasonal wetlands	0.004	—	—	0.01
Total Wetlands	*0.004*	—	—	*0.01*
Canals	0.50	2.01	—	2.05
Lacustrine	0.04	1.03	—	6.17
Total Other Waters of the U.S.	*0.54*	*3.04*	—	*8.22*
Construction Package 2/3				
Emergent wetland	*0.01*	—	—	*0.60*
Seasonal wetlands	*2.83*	*0.59*	—	*9.19*
Vernal pools and swales	*1.01*	—	*3.25*	*2.64*
Total Wetlands	*3.85*	*0.59*	*3.25*	*12.43*
Canals and ditches	*53.43*	*7.21*	—	*61.13*
Lacustrine	*36.32*	*8.39*	—	*123.05*
Seasonal riverine	*3.28*	*0.26*	—	*26.18*
Total Other Waters of the U.S.	*93.03*	*15.87*	—	*210.36*
Construction Package 4[2]				
Vernal pools and swales	4.62	—	8.28	3.67
Total Wetlands	*4.62*	—	*8.28*	*3.67*
Canals and ditches	1.15	0.93	—	4.69
Lacustrine	4.36	3.07	—	10.25
Seasonal riverine	0.12	—	—	0.50
Total Other Waters of the U.S.	*5.63*	*4.01*	—	*15.44*

Notes:

[1] The Proposed Preliminary LEPDA includes the common components of the BNSF Alternative, BNSF-Hanford East Alternative, Corcoran Bypass Alternative, Allensworth Bypass Alternative, and portions of the BNSF-Through Wasco-Shafter alternatives.

[2] Portion of CP4 to the terminus of the Proposed Preliminary LEDPA (7th Standard Road, Kern County, California).

LEDPA = Least Environmentally Damaging Practicable Alternative

Chapter 5.0

Non-Aquatic Resources: Existing Conditions and Mitigation Measures for All Alignments

5.0 Non-Aquatic Resources: Existing Conditions and Mitigation Measures for All Alignments

This chapter provides an overview of the existing conditions for non-aquatic biological resources (including riparian habitats, special-status plant communities, and natural and semi-natural habitats), wildlife corridors, agricultural lands, and other environmental factors (including Section 4(f) Resources; Transportation and Traffic; Noise and Vibration; Agricultural Lands; Parks, Recreation, and Open Space; Aesthetics and Visual Resources; Cultural Resources; and Community Resources and Environmental Justice). The discussions in this chapter are for all alternative alignments, unless specifically stated otherwise. The existing conditions described in this chapter include plant community and land cover types (associated with wildlife habitat types) and special-status plant and wildlife species.[4]

5.1 Definition of the Study Areas for Non-Aquatic Biological Resources

The following areas are described as appropriate for the resources being analyzed:

- Habitat Study Area (HSA): includes the Wetland Study Area (WSA) plus an additional 750-foot buffer; also can be defined as the Project Footprint with a 1,000-foot buffer.
- Plant Study Area (PSA): includes the Project Footprint plus a 100-foot buffer.

5.2 Overview of Existing Conditions: Plant Communities and Land Cover Types in the HSA of All Alignments

Plant communities and land cover types that occur in the HSA are identified and mapped in Figure 5-1. Descriptions of the communities and land cover types are provided in the following subsections. The land cover categories identified in the HSA include agricultural lands, developed areas, natural and semi-natural areas, and aquatic communities.

The plant communities and land cover types were identified and mapped in the HSA on the basis of information found in *A Guide to Wildlife Habitats of California* and the California Wildlife Habitat Relationship System (Mayer and Laudenslayer 1988; CDFG 2008).

[4] The analysis is based on reports and environmental documents, including the *Fresno to Bakersfield Section: Revised Draft Environmental Impact Report/Supplemental Draft Environmental Impact Statement;* the *Fresno to Bakersfield Section: Biological Resources and Wetlands Technical Report; Fresno to Bakersfield Section: Supplemental Preliminary Jurisdictional Waters and Wetlands Delineation Report;* and the *Fresno to Bakersfield Section: Watershed Evaluation Report* (Authority and FRA 2011d, 2012b, 2012d, 2013c).

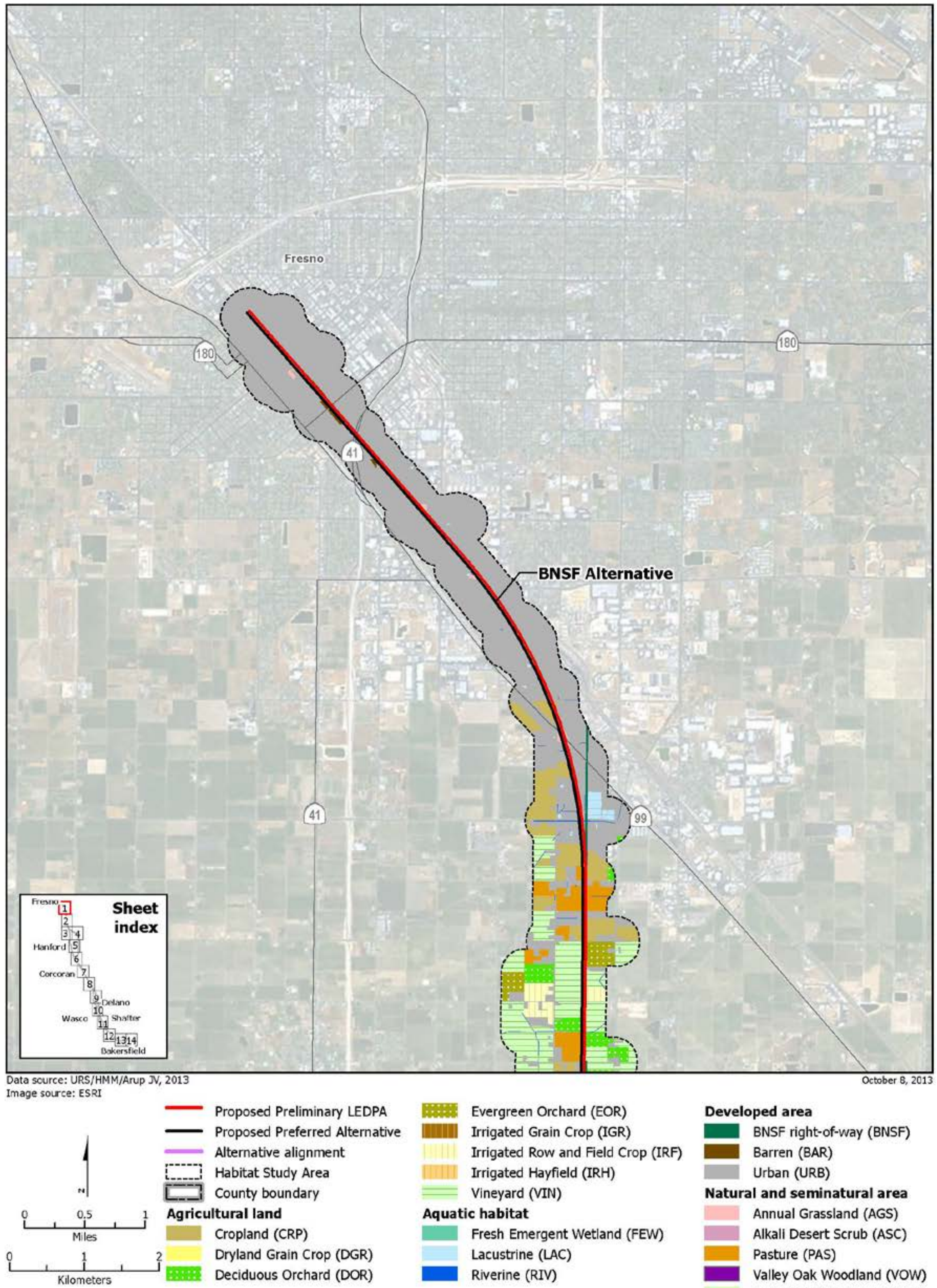


Figure 5-1
Plant community and land cover types in the HSA
Sheet 1 of 14

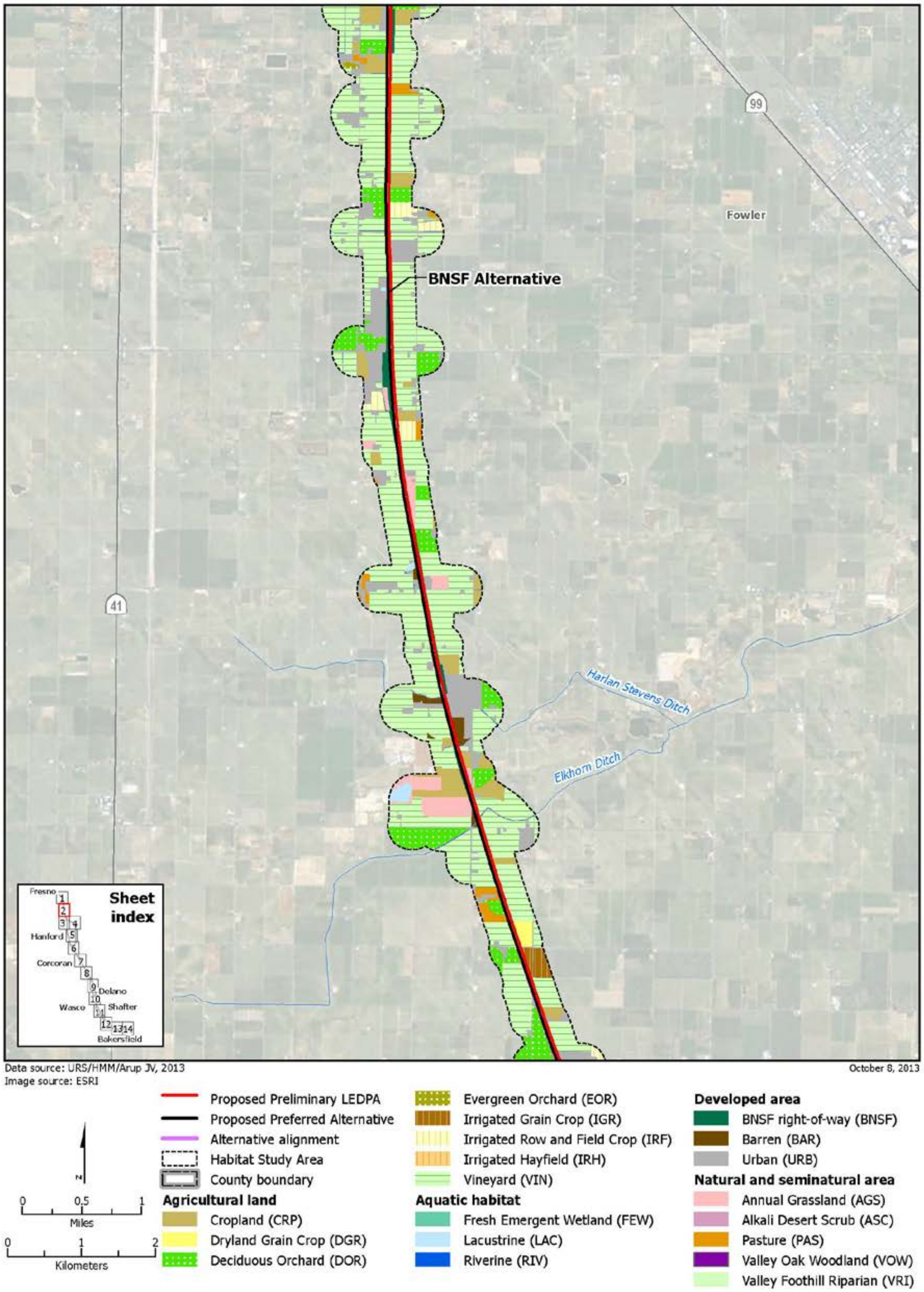


Figure 5-1
Plant community and land cover types in the HSA
Sheet 2 of 14

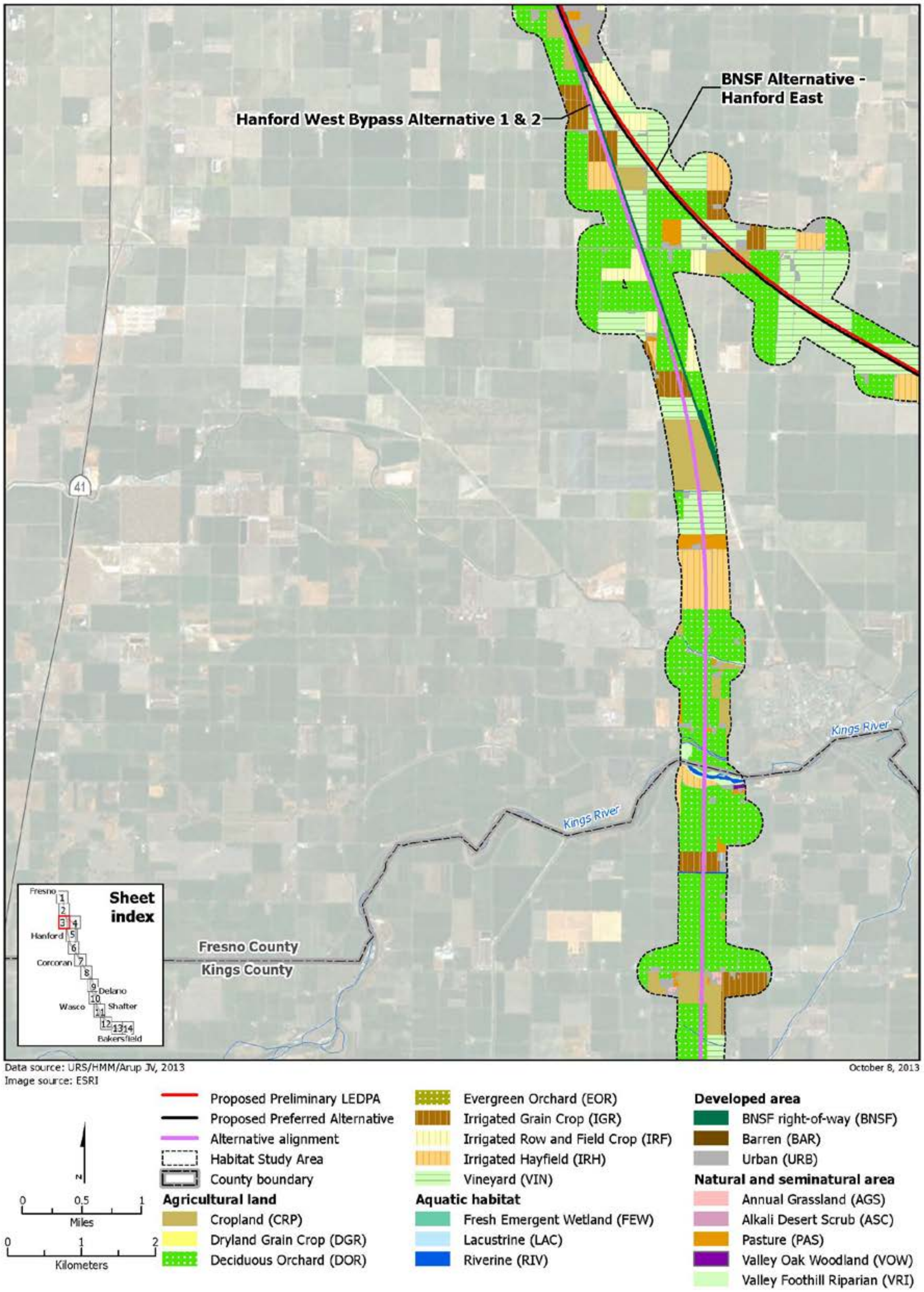


Figure 5-1
Plant community and land cover types in the HSA
Sheet 3 of 14

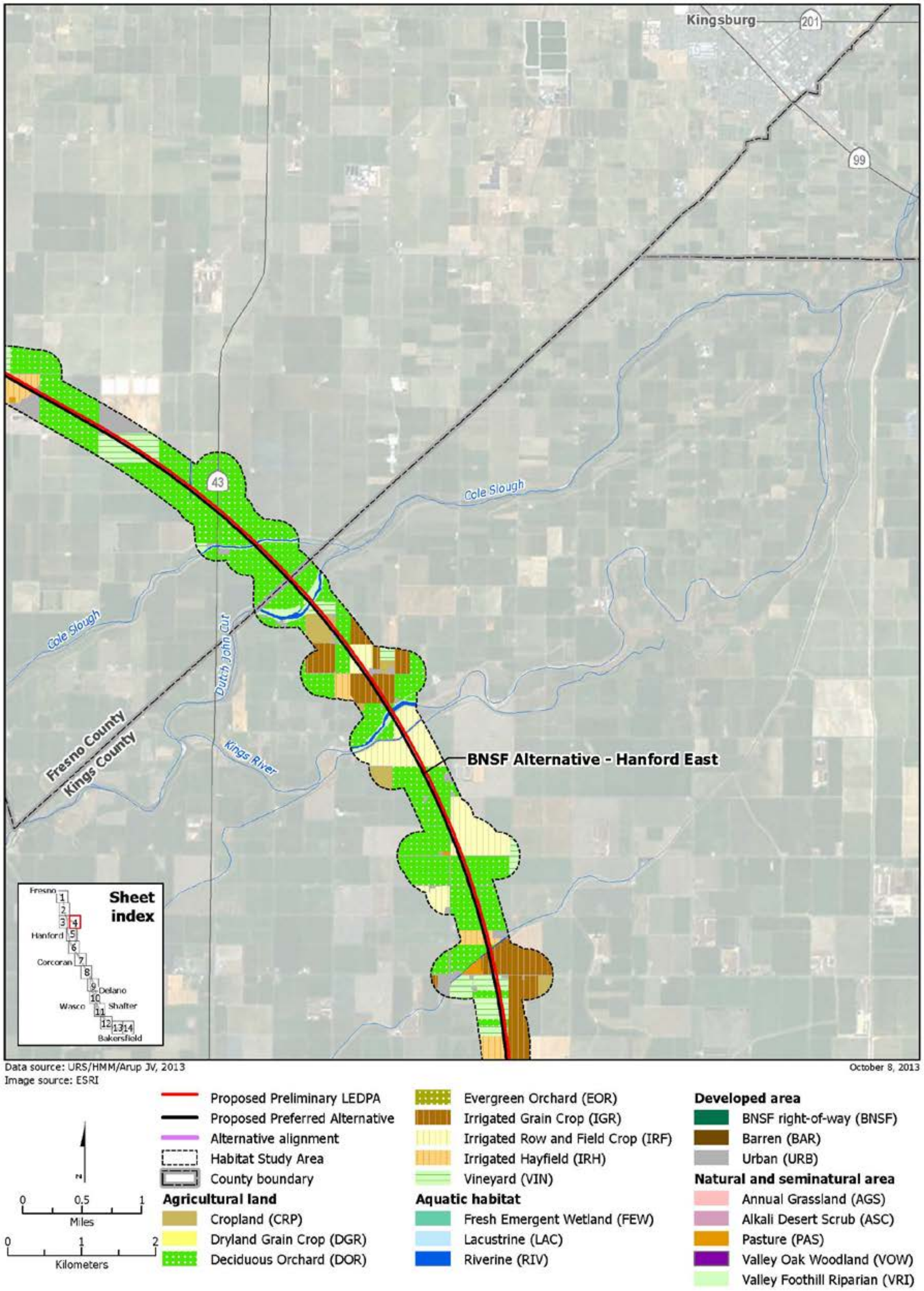


Figure 5-1
Plant community and land cover types in the HSA
Sheet 4 of 14

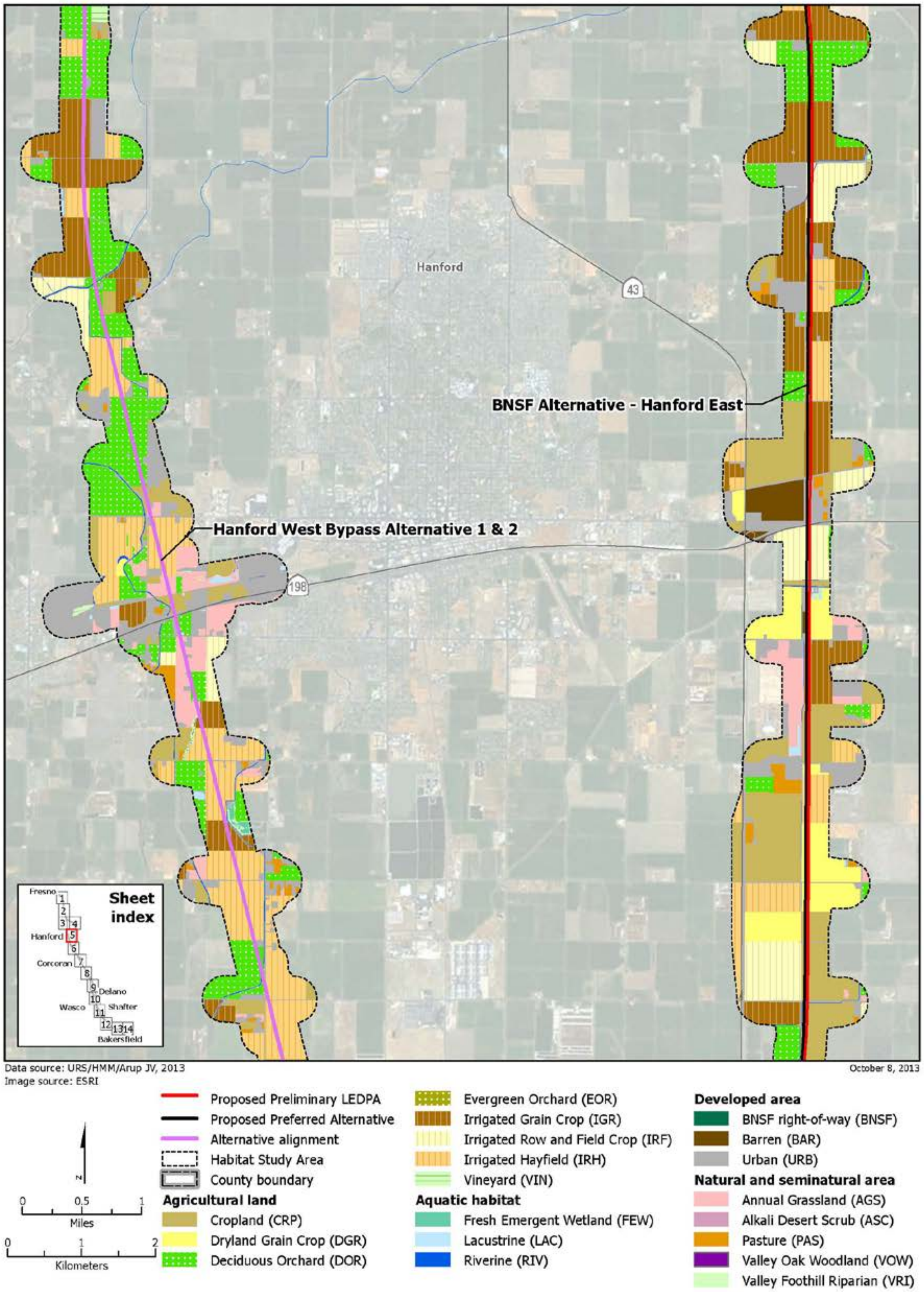


Figure 5-1
Plant community and land cover types in the HSA
Sheet 5 of 14

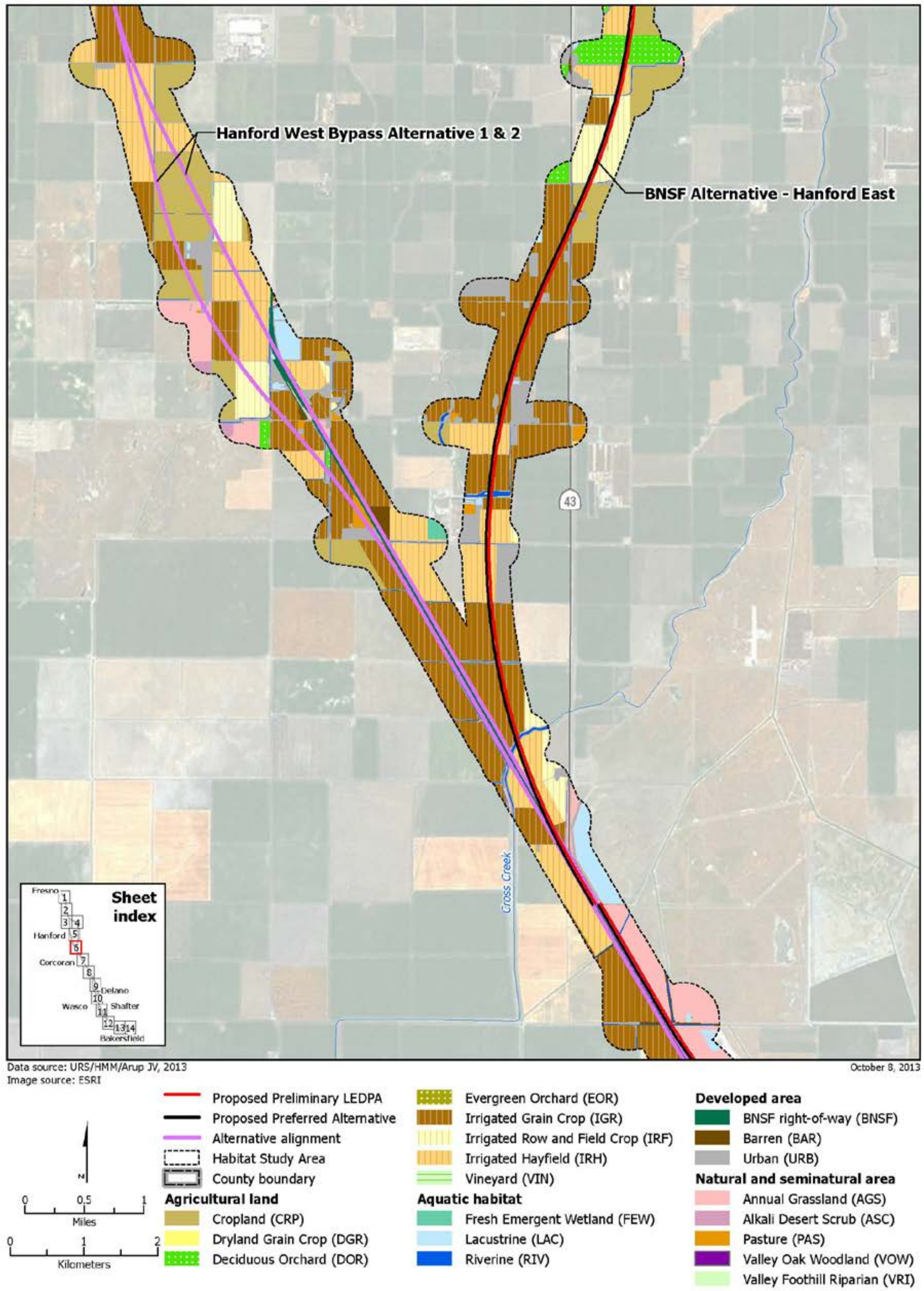


Figure 5-1
Plant community and land cover types in the HSA
Sheet 6 of 14

CALIFORNIA High-Speed Rail Authority
U.S. Department of Transportation Federal Railroad Administration

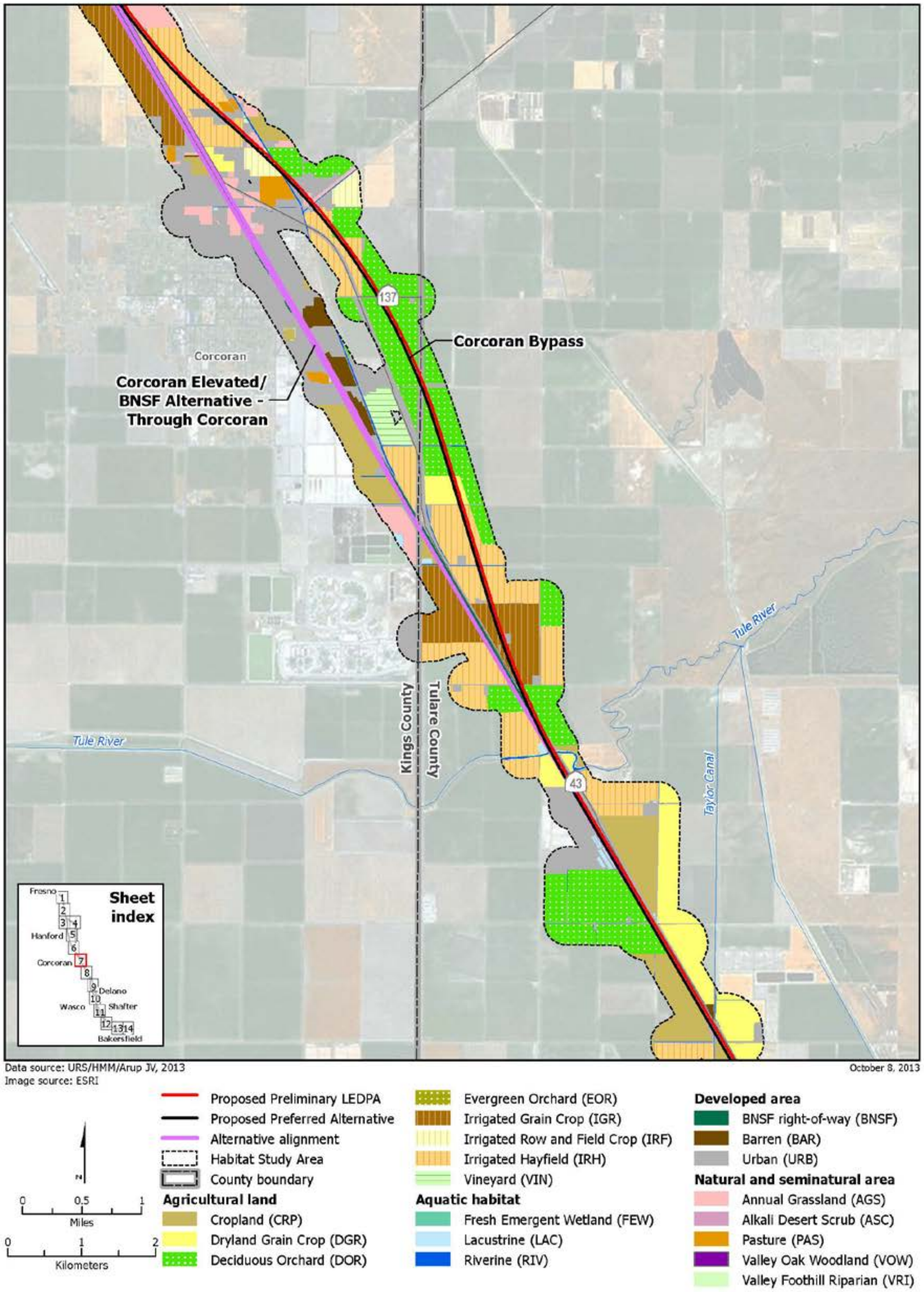


Figure 5-1
Plant community and land cover types in the HSA
Sheet 7 of 14

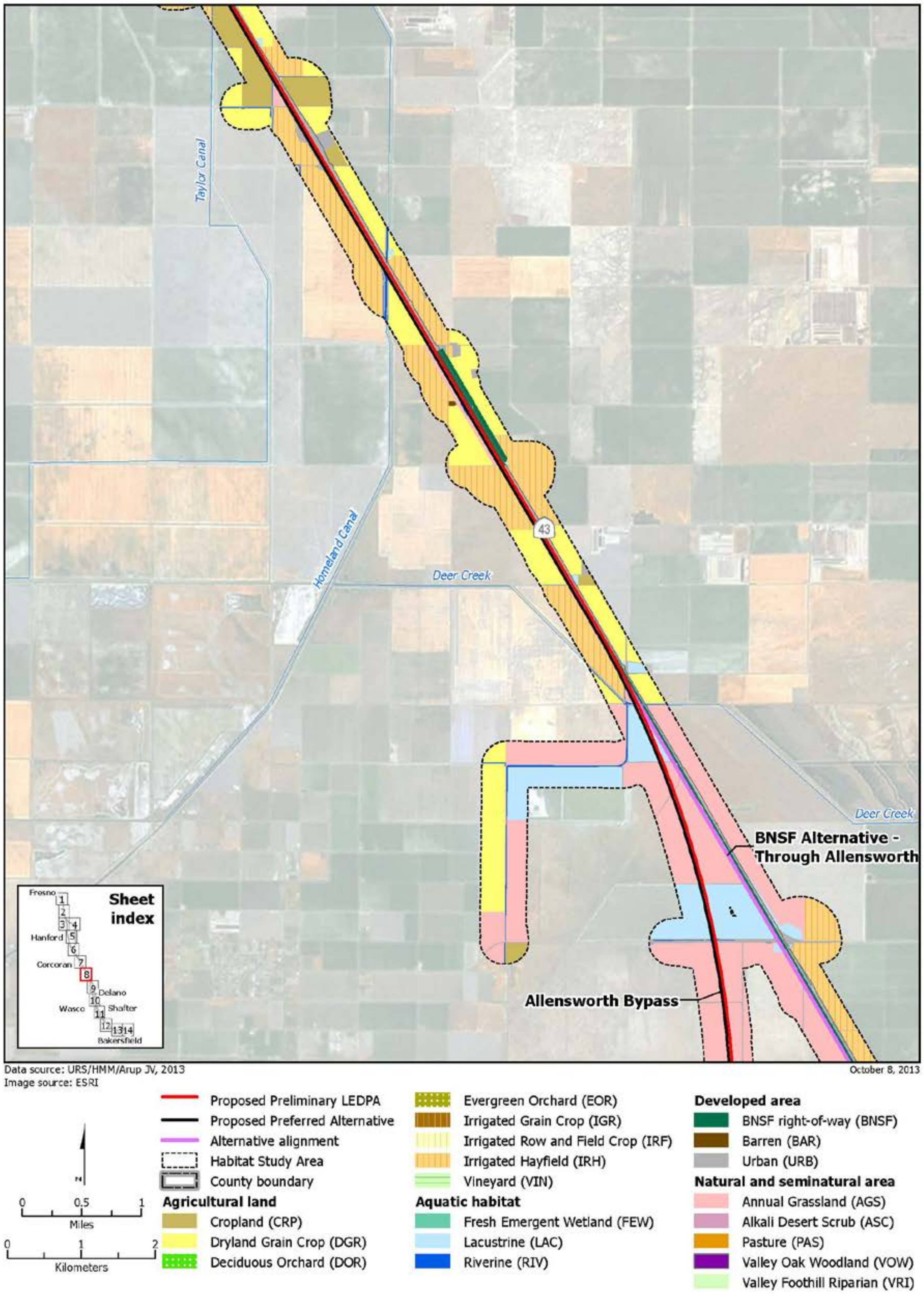


Figure 5-1
Plant community and land cover types in the HSA
Sheet 8 of 14

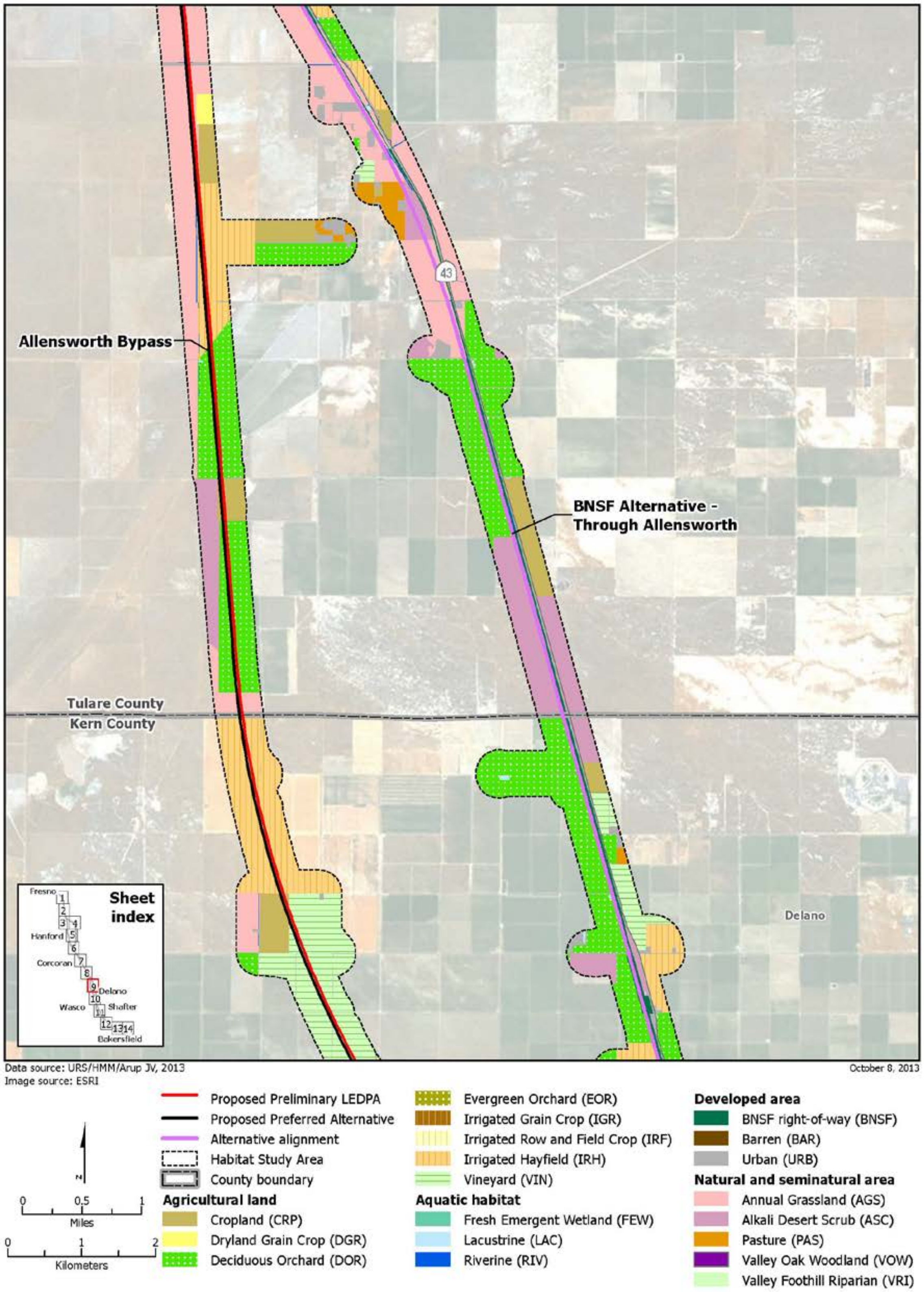


Figure 5-1
Plant community and land cover types in the HSA
Sheet 9 of 14

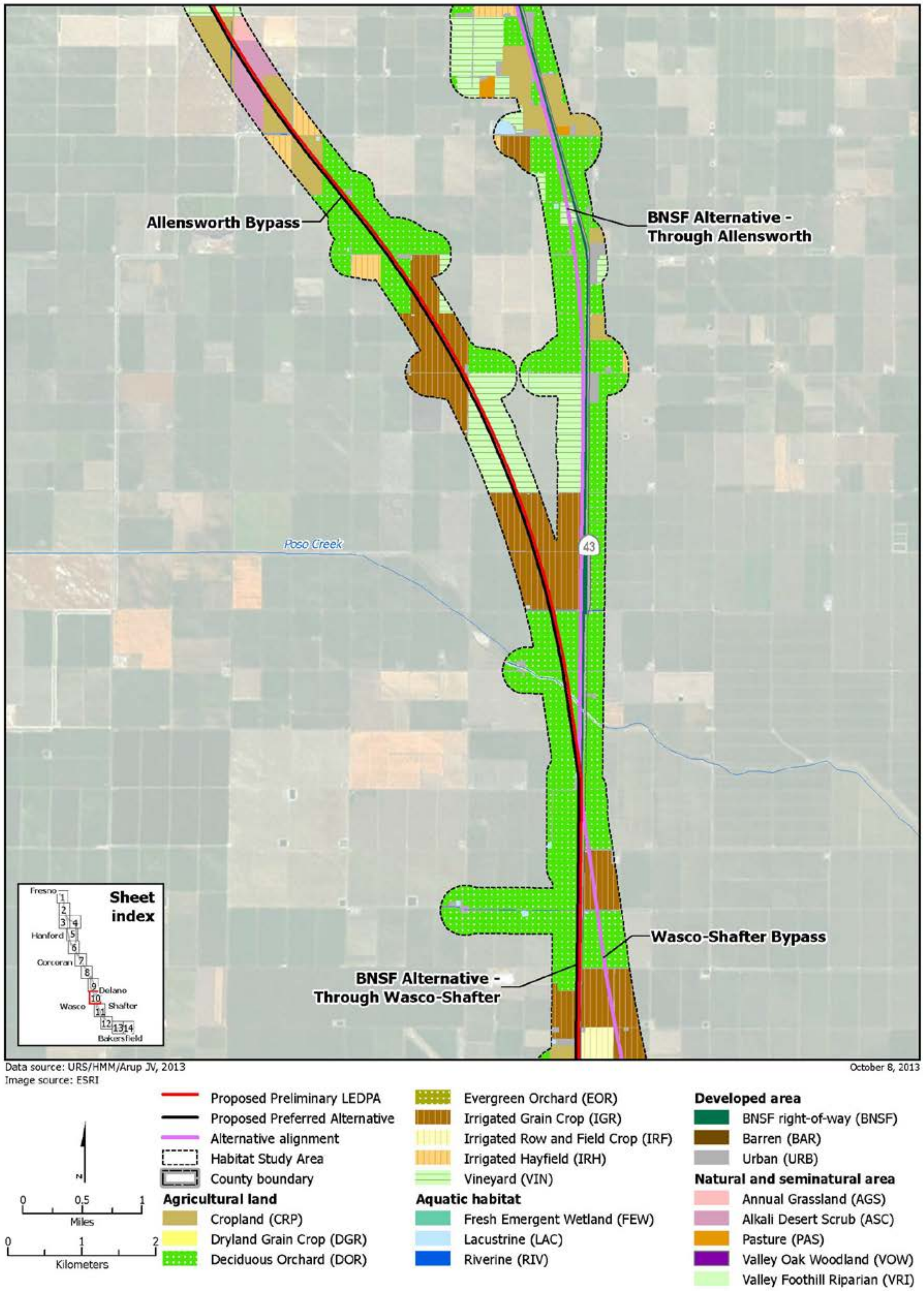


Figure 5-1
Plant community and land cover types in the HSA
Sheet 10 of 14

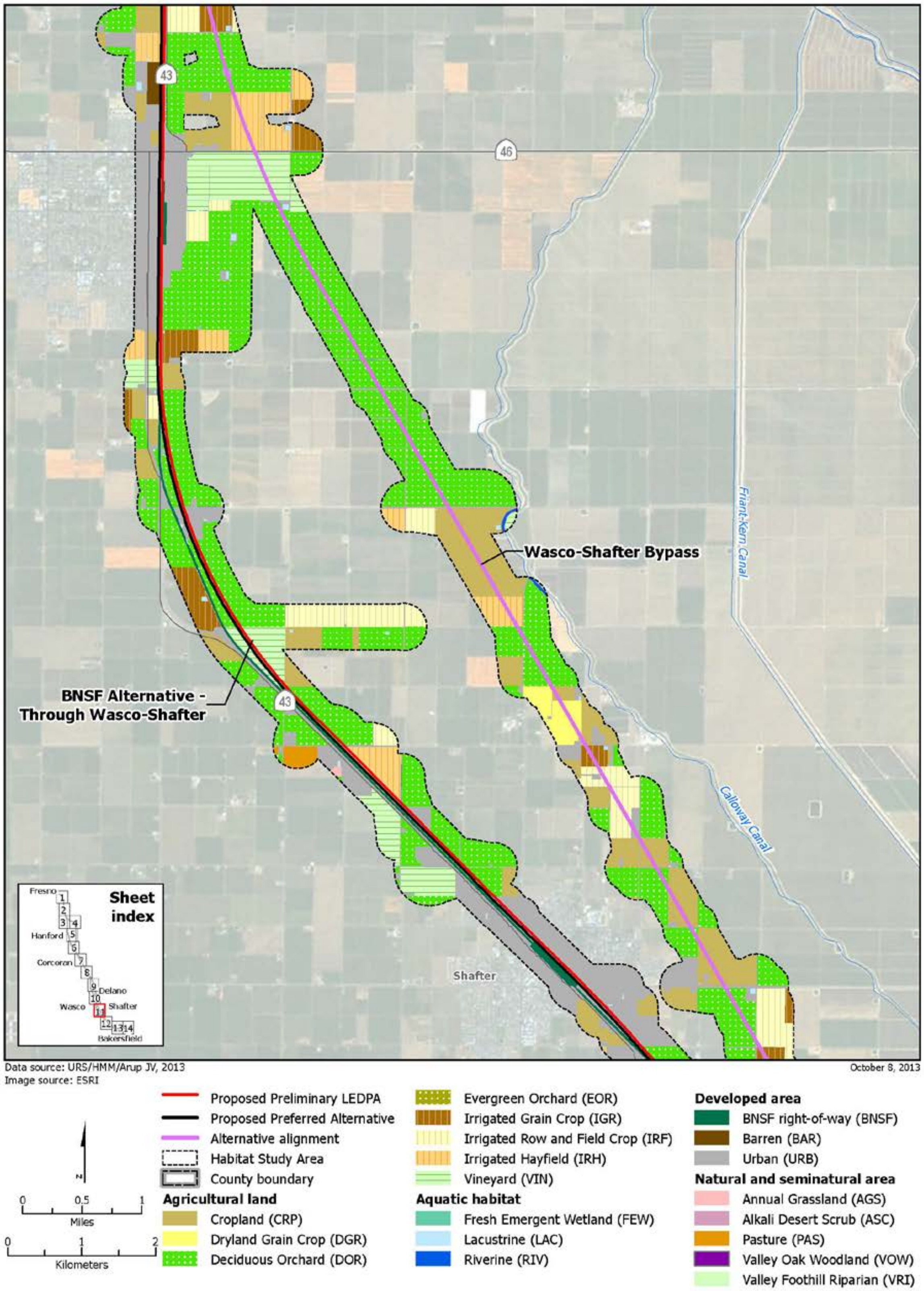


Figure 5-1
Plant community and land cover types in the HSA
Sheet 11 of 14

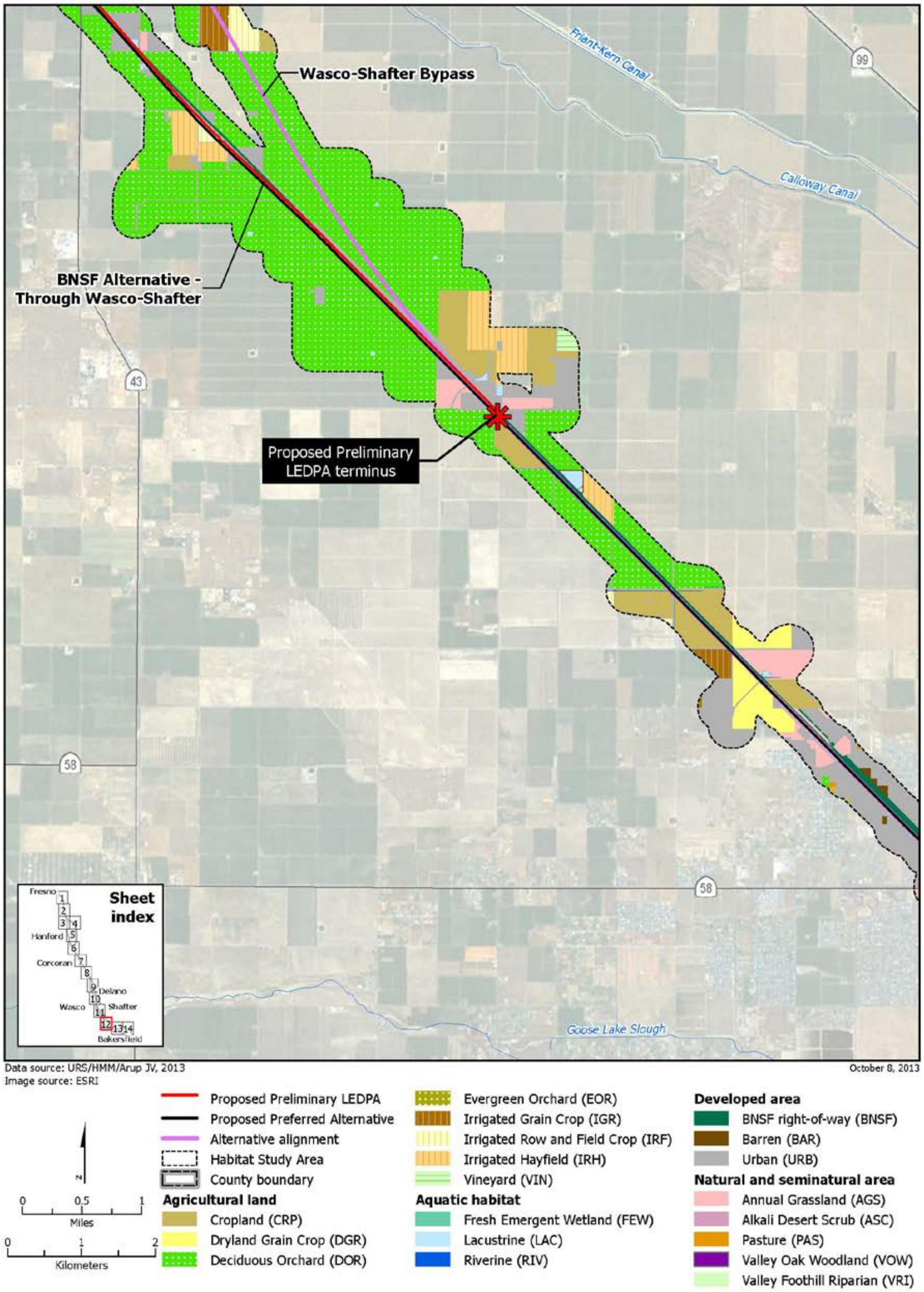


Figure 5-1
Plant community and land cover types in the HSA
Sheet 12 of 14

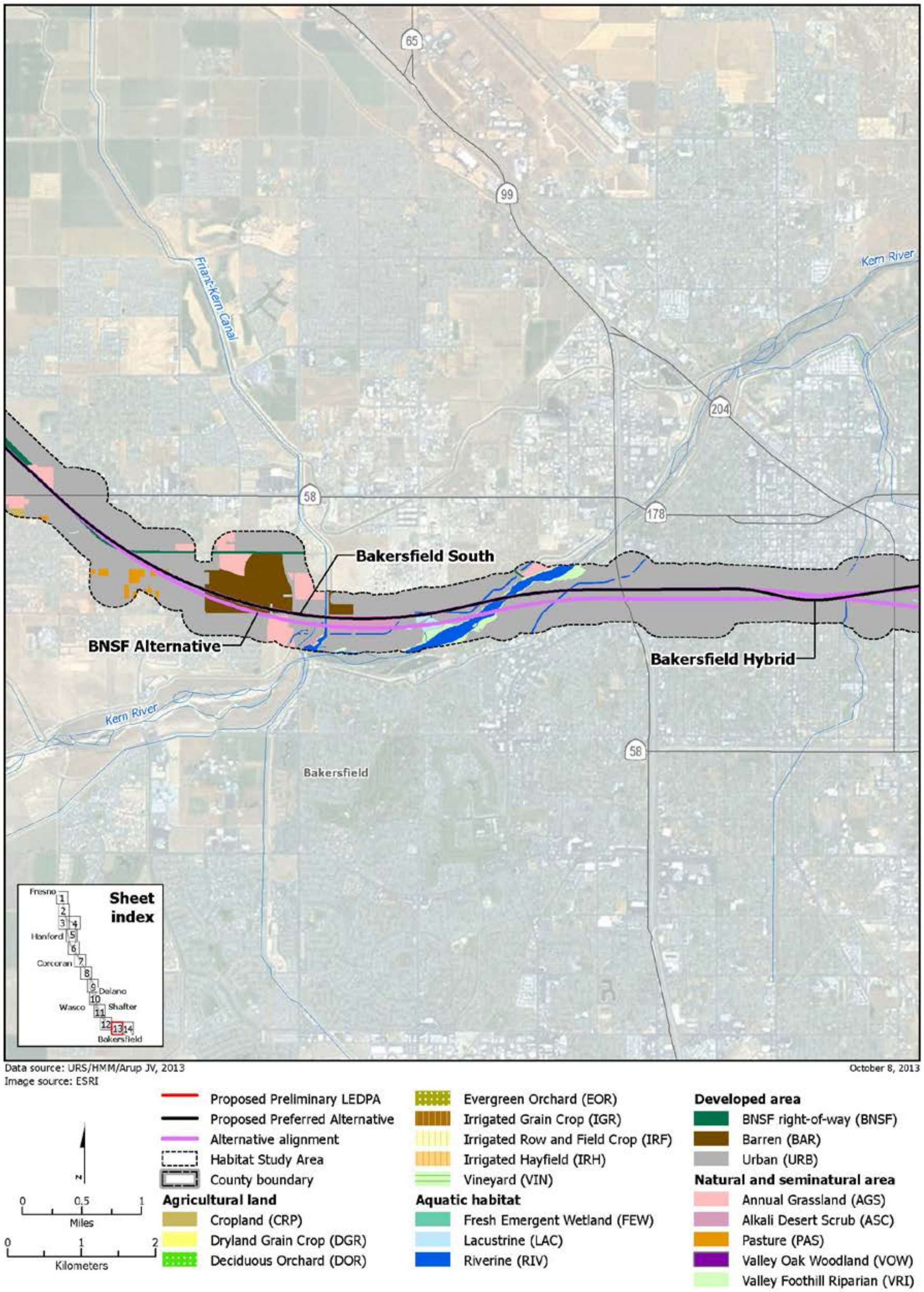


Figure 5-1
Plant community and land cover types in the HSA
Sheet 13 of 14

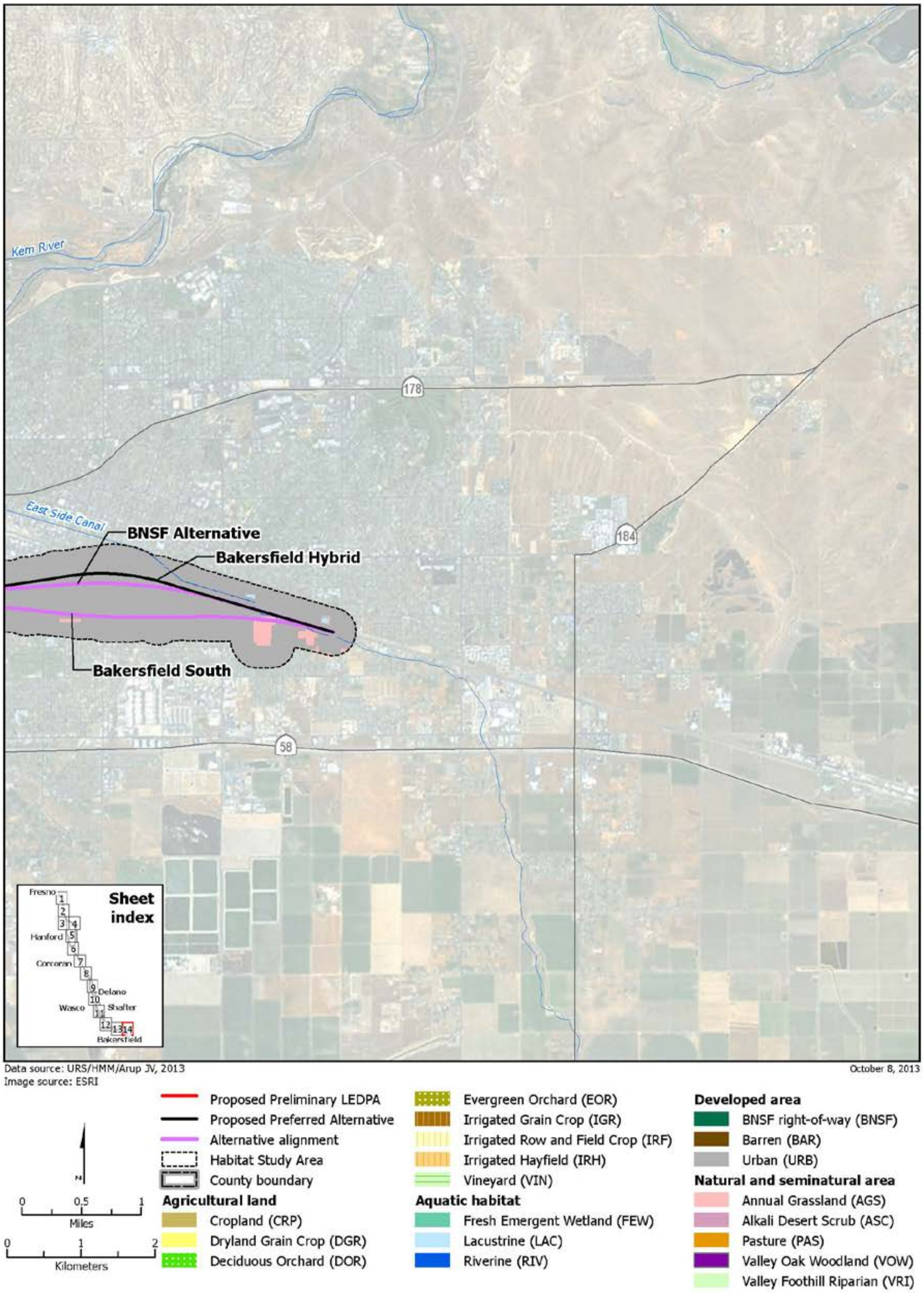


Figure 5-1
Plant community and land cover types in the HSA
Sheet 14 of 14

5.2.1 Agricultural Lands

Eight types of agricultural land are found in the HSA: cropland, dryland grain crops, irrigated grain crops, irrigated hayfield, irrigated row and field crops, deciduous orchard, evergreen orchard, and vineyard. These land uses, along with urban land uses, characterize the overwhelming majority of land in the HSA. Agricultural lands may provide marginal habitat for seasonal forage and refuge for a limited number of common species and special-status species. Ruderal plant species, which are defined as species that grow where the natural vegetation has been removed or significantly degraded by past or current human activity, are found in these agricultural land types, especially where these land types are bordered by roads, canals, ditches, or other highly disturbed features.

Vegetation in these areas is highly variable but often includes a mix of non-native annual grasses, such as ripgut brome (*Bromus diandrus*), soft chess (*Bromus hordeaceus*), red brome (*Bromus madritensis* ssp. *rubens*), wild oats (*Avena* spp.), Italian ryegrass (*Lolium multiflorum*), smooth barley (*Hordeum murinum*), and weedy forbs such as bur clover (*Medicago polymorpha*), redstem filaree (*Erodium cutarium*), yellow star thistle (*Centaurea solstitialis*), Russian thistle (*Salsola tragus*), tumbleweed, (*Amaranthus albus*), Johnson grass (*Sorghum jalapense*), and silver-leaf horsenettle (*Solanum elaeagnifolium*).

Some agricultural species have become naturalized outside the areas where they are planted. These include black mustard (*Brassica nigra*), rape mustard (*Brassica rapa*), Johnson grass (*Sorghum jalapense*), cultivated timothy (*Phleum pretense*), common barley (*Hordeum vulgare*), common wheat (*Triticum aestivum*), and peach (*Prunus persica*). Native species occurring in ruderal areas in agricultural lands often consist of saltgrass (*Distichlis spicata*), fiddleneck (*Amsinckia menziesii* var. *intermedia*), Canada horseweed (*Conyza canadensis*), annual sunflower (*Helianthus annuus*), alkali mallow (*Malva leprosa*), and tarplants (*Hemizonia* spp.).

Field and row crops such as alfalfa provide foraging habitat for raptors, particularly Swanson's hawks (*Buteo swainsoni*). Fallow fields and inactive farmland may provide nesting habitat for several wildlife species including northern harrier (*Circus cyaneus*) and western burrowing owl (*Athene cunicularia*). These and other agricultural lands may provide foraging or dispersal habitat for loggerhead shrike (*Laniuslud ovicianus*), white-tailed kite (*Elanus leucurus*), and American badger (*Taxidea taxus*).

5.2.2 Developed Areas

Developed areas are characterized by various types of cover, including barren and urban (e.g., commercial/industrial, transportation corridors). These areas generally include landscaped areas, yards, and various outbuildings and provide low-quality habitat for wildlife. However, certain species, such as the American peregrine falcon (*Falco peregrinus anatum*) and western mastiff bat (*Eumops perotis californicus*), have adapted to developed areas and may use these areas for nesting or roosting habitat.

Ruderal and ornamental plant species, which are generally composed of non-native species, are dominant in these developed areas, particularly where land use is in transition and bare ground has recently been revealed, such as along roadsides, in median strips, and in vacant lots. Vegetation in these areas is highly variable, but generally includes non-native grass species, including ripgut bromes (*Bromus* spp.), wild oats, Italian ryegrass, and smooth barley, and weedy forbs such as bur clover, redstem filaree, yellow star thistle, Italian thistle (*Carduus pycnocephalus*), black mustard, rape mustard, white goosefoot (*Chenopodium album*), stinking goosefoot (*Chenopodium vulvaria*), and silver-leaf horsenettle. Escaped ornamentals in these areas often include oleander (*Nerium oleander*), elms (*Ulmus* spp.), bachelor's buttons (*Centaurea cyanea*), spotted knapweed (*Centaurea maculosa*), butterfly bush (*Buddleja davidii*), Athel tree (*Tamarix aphylla*), tree tobacco (*Nicotiana glauca*), and Himalayan blackberry (*Rubus armeniacus*).

5.2.2.1 Barren

Barren areas are defined by the permanent absence of vegetation. Barren areas include areas of bare earth resulting from industrial activities such as gravel extraction. Barren habitats support few native wildlife or plant species, although rock dove (*Columba livia*), Brewer's blackbird (*Euphagus cyanocephalus*), killdeer (*Charadrius vociferus*), and western fence lizard (*Sceloporus occidentalis*) were observed in barren areas during the field survey effort.

5.2.2.2 Urban

Urban areas include municipalities; industrial, residential, and agricultural structures (e.g., feedlots and poultry farms); and adjacent dedicated areas, such as yards, roads and road shoulders, highways, parking lots, and stockpiles. Within the HSA, urban areas also include the BNSF Railway right-of-way. Both adaptive native species and non-native wildlife species occur in urban areas. Within urban areas, mapped aquatic features, such as canals/ditches, retention/detention basins, and seasonal wetlands, are present. In Bakersfield, special-status species, such as the San Joaquin kit fox, have also become acclimated to developed urban areas (CDFG 2012).

5.2.3 Natural and Semi-Natural Areas

The terms *natural* and *semi-natural areas* are used to distinguish the land uses and plant communities described in subsequent sections from communities where current human influences substantially affect plant composition and structure. Natural and semi-natural areas are characterized by various types of cover, including alkali desert scrub, annual grassland, valley foothill riparian, and pasture. Although past and present human activities have altered natural and semi-natural plant communities to some extent, the composition and structure of these communities are generally not actively managed or controlled. A distinction is also made between those habitats largely characterized by native plants and those in which the dominant plants are introduced species.

Ruderal plant species are found along the margins and sometimes within natural and semi-natural habitat types.

5.2.3.1 Alkali Desert Scrub

Alkali desert scrub vegetation is dominated by shrublands with understory cover of herbs and forbs, and by vernally inundated or saturated areas lacking a shrub layer (vernal pools). Herbs and forbs interspersed with barren, vernally inundated, or saturated alkali patches characterize these latter areas. Primary plant species observed during the various surveys included spinescale saltbush (*Atriplex spinifera*), cattle saltbush (*Atriplex polycarpa*), iodine bush (*Allenrolfea occidentalis*), goldenbush (*Isocoma acradenia*), and bush seepweed (*Suaeda moquinii*).

Alkali desert scrub may support a wide variety of wildlife species including special-status species, such as blunt-nosed leopard lizard (*Gambelia sila*), San Joaquin kit fox, Tipton kangaroo rat (*Dipodomys nitratoides nitratoides*), and coast horned lizard *(Phrynosoma blainvillii*). Many wildlife species found in this habitat type such as — the western burrowing owl, western spadefoot toad (*Spea hammondii*), American badger, foxes (*Vulpes* sp.), coyote (*Canis latrans*), California ground squirrel (*Spermophilus beecheyi*), and a variety of kangaroo rats (*Dipodomys* spp.) species — are burrowers or burrow-dependent species.

Alkali Desert Scrub habitat is concentrated in the vicinity of Allensworth and in relatively undisturbed areas.

5.2.3.2 Annual Grassland

Annual grasslands are typically characterized by non-native annual grass species. Dominant non-native grass species include several species of brome (*Bromus* spp.), fescue (*Festuca* spp. and *Vulpia* spp.), oats (*Avena* spp.), and barley (*Hordeum* spp.). Native species, including goldfields and owl's clover (*Castilleja* spp.), may be present in annual grasslands but typically in lower densities. Annual grasslands have typically experienced some level of past disturbance associated with various agriculture practices, row cropping, or grazing. Although these areas typically have a history of disturbance, they continue to provide suitable habitat for a number of special-status plant and wildlife species. Similar to alkali desert scrub habitats, annual grasslands that have experienced lower levels of disturbance often exhibit vernally inundated or saturated areas (vernal pools).

5.2.3.3 Valley Foothill Riparian

Valley foothill riparian plant communities are located along the riparian corridors and associated floodplains or terraces of the Kings River, Tule River, Deer Creek, Poso Creek, and Kern River, and along their associated sloughs and side channels. These areas are characterized by tall trees, including Fremont cottonwood (*Populus fremontii*), western sycamore (*Platanus racemosa*), and valley oak (*Quercus lobata*). Subcanopy trees include white alder (*Alnus rhombifolia*) and ash (*Fraxinus* sp.). Understory shrubs and herbaceous species typically include California blackberry *(Rubus ursinus)*, elderberry (*Sambucus* sp.), poison oak (*Toxicodendron diversilobum*), buttonbush (*Cephalanthus occidentalis*), willows (*Salix* spp.), rushes (*Juncus* spp.), mugwort (*Artemisia douglasiana*), poison hemlock (*Conium maculatum*), and stinging nettle (*Urticadioica* ssp. *holosericea*). An abrupt transition from valley foothill riparian vegetation to cropland or orchard results in narrow bands of riparian vegetation.

Valley foothill riparian habitat provides food, water, migration and dispersal corridors, and escape, nesting, and thermal cover for an abundance of wildlife. Riparian vegetation also supports physical and biological processes, including temperature regulation and valuable aquatic food web services (inputs for nutrient cycling and food availability). Protected insects, such as the valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*), are native to these habitats (Mayer and Laudenslayer 1988). Several sensitive natural communities overlap with this habitat type, including valley oak woodland, Fremont cottonwood forest, Goodding's willow thickets, and red willow thickets.

5.2.3.4 Pasture

Pastures are actively grazed fields associated with private property. Generally, these areas contain a mix of annual grasses, such as bromes, barley, oats, and annual fescues, with other herbaceous species. Typically, these areas are actively grazed by cattle or horses but not irrigated. These areas provide some potential to support special-status wildlife species and limited potential to support special-status plant species because of the high level of disturbance.

5.2.3.5 Valley Oak Woodland

Valley oak woodland is located along the floodplain of the Kings River and associated sloughs and side channels. This habitat falls within the HSA but not within the impact footprint; therefore, it will not be directly affected by the Proposed Preferred Alternative. This habitat is characterized by well-spaced stands of mature valley oak (*Quercus lobata*) with little or no sub-canopy, and a well-developed herbaceous layer. Dominant herbaceous species include brome, annual fescues (*Vulpia* spp.), oats (*Avena* spp.), and barleys. Other herbaceous plants, including soap root

(*Chlorogalum pomeridianum*), filaree, miner's lettuce, prickly ox-tongue (*Picris echioides*), and spiny sow thistle (*Sonchus asper*) may be present. In the HSA, valley oak woodland may intergrade with valley foothill riparian vegetation, or may abruptly transition to developed areas such as cropland or orchard.

5.3 Non-Aquatic Biological Resources

5.3.1 Riparian Areas

Riparian areas are not considered waters of the United States, but fall under state jurisdiction for protection of the function and value to ecological resources. These areas contribute to the functions and services of the aquatic resources features they are adjacent to (i.e., groundwater recharge, surface water supply, nutrient cycling, water filtration, temperature control, maintenance of plant and animal communities, sediment transport and storage, stream channel dynamic equilibrium, and stream bank stabilization).

5.3.1.1 Affected Environment

Riparian areas are generally associated with seasonal riverine features and occur in scattered locations throughout the WSA (as defined in Chapter 3). They are composed of the upland habitat between a seasonal riverine feature and the outer drip line of riparian vegetation along the Kings River Complex, Tule River, Deer Creek, Poso Creek, Kern River, and other aquatic resources. These areas vary in width from 50 feet to several hundred feet. The riparian areas are characterized by cottonwood, sycamore, valley oak, and willow trees. Riparian vegetation supports physical and biological processes, including temperature regulation and valuable aquatic food web services (inputs for nutrient cycling and food availability).

A description of the riparian areas can be found in Section 5.2.3.3, Valley Foothill Riparian. Riparian areas are generally in relatively fair to good ecological condition based on assessments of the adjacent seasonal riverine areas. They are associated with waterways that have varying levels of hydrologic manipulation, provide fair to good biological resources for plants and wildlife, and, due to existing land uses in the region, have been physically reduced and restricted to narrow strips along seasonal riverine features.

5.3.1.2 Mitigation Measures for Direct, Indirect and Cumulative Impacts

The Fresno to Bakersfield Section Revised DEIR/Supplemental DEIS (Authority and FRA 2012d), identifies measures to avoid, minimize, and compensate for potential impacts on riparian areas. These measures, as well as additional measures to avoid and minimize impacts on biological resources, are presented in Section 3.7.7, Mitigation Measures, of the Revised DEIR/Supplemental DEIS*.* The mitigation measures listed below are proposed to reduce direct, indirect and cumulative impacts on riparian areas and are described in more detail in Section 3.4.3, Minimization and Mitigation Approaches, of this Checkpoint C report:

- BIO-MM#47. Restore Temporary Riparian Impacts.
- BIO-MM#61. Compensate for Permanent Riparian Impacts.
- BIO-MM#62. Prepare and Implement a Habitat Mitigation and Monitoring Plan.
- BIO-MM#65. Offsite Habitat Restoration, Enhancement and Preservation.

5.3.2 Special-Status Plant Species

Plant species are considered to be special-status species if they are either listed as endangered or threatened under the state and federal Endangered Species Act or are on the California Native Plant Society (CNPS) Lists 1–4.

As discussed in the *Biological Resources and Wetlands Technical Report* (Authority and FRA 2012b), 56 special-status plant species were evaluated for their potential to occur in the PSA, defined as the Project Footprint plus a 100-foot buffer. Of the 56 special-status plant species evaluated, 30 species were eliminated from the evaluation of impacts based on the lack of suitable habitat, local or regional extirpations, and/or because the PSA lies outside of the known geographic or elevation range of these species. These species are identified as having no potential to occur or are not likely to occur in the PSA.

Of the remaining 26 special-status plant species that have the potential to occur in the PSA, only the heartscale (*Atriplex cordulata*) and little mouse tail (*Myosurus minimus* ssp. *apus*) were identified during the floristic surveys conducted in 2010 in the PSA where access was granted.

Where access was granted, focused special-status plant surveys were conducted. Where access was not granted, the determination of effects on special-status plants reflects a conservative approach: if suitable habitat was determined to be present, the special-status plant species associated with that habitat (including federally listed species such as Kern mallow [*Eremalche kernensis*] and California jewelflower [*Caulanthus californicus*]) may be present.

5.3.2.1 Affected Environment

From the field surveys, two special-status plant species, heartscale and little mouse tail, were identified in the BNSF–Through Allensworth Alternative. However, special-status plant species have the potential to occur in areas of suitable habitat in parcels that have not been surveyed throughout the Project alternatives. Generally, these unsurveyed habitats have a low potential to support special-status plant species. However, some areas of natural habitat have a moderate to high potential to support these species. If these species occur within the Project Footprint of the Proposed Preferred Alternative, they would be subject to the same adverse effects as those described in Chapter 6, Comparative Analysis of Impacts on Non-Aquatic Resources for All Project Alternatives, for species known to occur.

5.3.2.2 Mitigation Measures for Direct, Indirect, and Cumulative Impacts

Implementation of the general mitigation measures BIO-MM#1 through BIO-MM#15, as discussed in Section 3.7.7, Mitigation Measures, of the Revised DEIR/Supplemental EIS (Authority and FRA 2012d), coupled with the following additional mitigation measures, is proposed to reduce direct, indirect, and cumulative impacts and effects on special- status plant species, as applicable.

- BIO-MM#16. Conduct Preconstruction Surveys for Special-Status Plant Species and Special-Status Plant Communities.
- BIO-MM#17. Prepare and Implement Plan for Salvage, Relocation and/or Propagation of Special-Status Plant Species.
- BIO-MM#53. Compensate for Impacts on Special-Status Plant Species.

5.3.3 Special-Status Wildlife Species

Wildlife species are considered to be special-status species if they are legally protected under the federal or California Endangered Species Act or other regulations (e.g., Migratory Bird Treaty Act) or are species considered sufficiently rare by the scientific community to qualify for such listing.

The results of a background review indicated that 112 special-status wildlife species were initially evaluated for their potential to occur in the HSA. Of the 112 special-status wildlife species initially evaluated, 58 wildlife species were ruled out based on lack of suitable habitat, the extensive areas converted by human development, the extensive water diversions, local or regional extirpations, or because the HSA lies outside of these species' known geographic range.

The results of the wildlife habitat assessment indicated that 19 vegetation and wildlife and land use habitat types were mapped in the HSA. The distributions of these habitats are provided in Figure 5-1 and are described in Section 5.2. The potential for special-status wildlife species to occur in the HSA is based on the availability of these wildlife habitat types and the natural distribution and range of each species, as determined through a review of species-specific California Wildlife Habitat Relationships System range maps (CDFG 2008).

Descriptions of each special-status species' life history and the results of the field survey and habitat assessment are provided in the *Biological Resources and Wetlands Technical Report* (Authority and FRA 2012b).

5.3.3.1 Affected Environment

As discussed in the *Biological Resources and Wetlands Technical Report* (Authority and FRA 2012b)*,* 54 special-status wildlife species were determined to have a low, moderate, or high potential of occurring within the HSA.

The presence of and potential for special-status wildlife species to occur in a particular habitat is linked to the physical characteristics of the landscape. For instance, amphibians such as the California tiger salamander (*Ambystoma californiense*) and western spadefoot toad (*Spea [=Scaphiopus] hammondii*) require standing water to complete their life cycles. However, amphibious species may be linked to aquatic resources for a limited time during their breeding seasons and then spend significant amounts of time away from aquatic resources. Accordingly, this section addresses both aquatic and non-aquatic resources for species with these life cycles.

No protocol surveys for special-status wildlife species were conducted. Determinations of the effects of the alternatives on special-status wildlife species assume that if suitable habitat is present, then the associated special-status wildlife species is also present.

The Project passes through a mosaic of urban, agricultural, and natural habitats. Suitable habitats for special-status amphibian, reptile, mammal, and bird species as well as native fauna species are present in the areas through which the Project passes.

5.3.3.2 Mitigation Measures for Direct, Indirect, and Cumulative Impacts

The following mitigation measures, which are discussed in Section 3.7.7, Mitigation Measures, of the Revised DEIR/Supplemental EIS (Authority and FRA 2012d), are proposed to reduce direct, indirect, and cumulative impacts and effects on special-status wildlife species and associated habitats:

- BIO-MM#18. Conduct Preconstruction Sampling and Assessment for Vernal Pool Fauna.
- BIO-MM#19. Seasonal Vernal Pool Work Restriction.
- BIO-MM#20. Implement and Monitor Vernal Pool Protection.
- BIO-MM#21. Implement Conservation Guidelines for the Valley Elderberry Longhorn Beetle.
- BIO-MM#22. Conduct Preconstruction Surveys for Special-Status Reptile and Amphibian Species.
- BIO-MM#23. Conduct Special-Status Reptile and Amphibian Monitoring, Avoidance, and Relocation.
- BIO-MM#24. Conduct Preconstruction Surveys for California Tiger Salamander.
- BIO-MM#25. Implement Avoidance and Minimization Measures for California Tiger Salamander.
- BIO-MM#26. Conduct Protocol-Level Surveys for Blunt-Nosed Leopard Lizard.

- BIO-MM#27. Conduct Preconstruction Surveys for Blunt-Nosed Leopard Lizard.
- BIO-MM#28. Blunt-Nosed Leopard Lizard Avoidance.
- BIO-MM#29. Conduct Preconstruction Surveys and Delineate Active Nest Exclusion Areas for Other Breeding Birds.
- BIO-MM#30. Conduct Preconstruction Surveys and Monitoring for Raptors.
- BIO-MM#31. Raptor Protection on Power Lines.
- BIO-MM#32. Conduct Preconstruction Surveys for Swainson's Hawks.
- BIO-MM#33. Swainson's Hawk Nest Avoidance and Monitoring.
- BIO-MM#34. Monitor Removal of Nest Trees for Swainson's Hawks.
- BIO-MM#35. Conduct Protocol Surveys for Burrowing Owls.
- BIO-MM#36. Burrowing Owl Avoidance and Minimization.
- BIO-MM#37. Conduct Preconstruction Surveys for Nelson's Antelope Squirrel, Tipton Kangaroo Rat, Dulzura Pocket Mouse, and Tulare Grasshopper Mouse.
- BIO-MM#38. Implement Avoidance and Minimization Measures for Nelson's Antelope Squirrel, Tipton Kangaroo Rat, Dulzura Pocket Mouse, and Tulare Grasshopper Mouse.
- BIO-MM#39. Implement Avoidance and Minimization Measures for Fresno Kangaroo Rat.
- BIO-MM#40. Conduct Preconstruction Surveys for Special-Status Bat Species.
- BIO-MM#41 Bat Avoidance and Relocation.
- BIO-MM#42. Bat Exclusion and Deterrence.
- BIO-MM#43. Conduct Preconstruction Surveys for American Badger and Ringtail.
- BIO-MM#44. American Badger and Ringtail Avoidance.
- BIO-MM#45. Conduct Preconstruction Surveys for San Joaquin Kit Fox.
- BIO-MM#46. Minimize Impacts on San Joaquin Kit Fox.
- BIO-MM#54. Compensate for Impacts on Vernal Pool Fairy Shrimp and Vernal Pool Tadpole Shrimp.
- BIO-MM#55. Implement Conservation Guidelines During Project Operation for Valley Elderberry Longhorn Beetle.
- BIO-MM#56. Compensate for Impacts on California Tiger Salamander.
- BIO-MM#57. Compensate for Impacts on Blunt-Nosed Leopard Lizard, Tipton Kangaroo Rat, and Nelson's Antelope Squirrel.
- BIO-MM#58. Compensate for Loss of Swainson's Hawk Nesting Trees.
- BIO-MM#59. Compensate for Loss of Burrowing Owl Active Burrows and Habitat.
- BIO-MM#60. Compensate for Destruction of Natal Dens.

In addition, implementation of the BIO-MM#1 through BIO-MM#17, as described in Section 3.7.7, Mitigation Measures, of the Revised DEIR/Supplemental DEIS (Authority and FRA 2012d), and other mitigation measures pertaining to jurisdictional waters (including vernal pools) and special-status plant communities (including riparian areas) will also reduce impacts and effects on special-status wildlife species.

5.3.4 Habitat Linkages and Wildlife Movement Corridors

5.3.4.1 Affected Environment

Habitat linkages is a conceptual planning term used to denote an area, typically shown on a map, where a broad connection for wildlife movement exists or could be established between two or more habitat areas. The term *habitat linkage* is commonly used as a synonym for a wildlife movement corridor. However, a wildlife movement corridor refers to the physical connections that allow wildlife to move between patches of suitable habitat. Multiple habitat linkages that could potentially function as wildlife movement corridors have been identified as part of recent state- and regional-level studies addressing connectivity and wildlife movement in California (ESRP 2009; Penrod et al. 2001; Penrod et al. 2003; Spencer et al. 2010; USFWS 1998).

Seven habitat linkages overlap with the Project Footprint; these seven habitat linkages are described below and depicted on Figure 5-2. For a more detailed discussion of these linkages and opportunities for local wildlife movement, see the *Fresno to Bakersfield Section: Biological Resources and Wetlands Technical Report* (Authority and FRA 2012b).

The Kings River linkage is primarily an east-west linkage that follows the Kings River riparian corridor and floodplain (Penrod et al. 2001); this habitat linkage is approximately 60 miles long. This linkage may provide suitable habitat, including riparian forest and alkali sink, for a variety of special-status species. The Kings River riparian corridor linkage intersects all Hanford area alternatives.

The St. John's River–Cross Creek habitat linkage is a north-south linkage that follows the Cross Creek riparian corridor (Penrod et al. 2001); this linkage is approximately 36 miles long. The primary habitat types in this linkage were identified as valley oak, riparian forest, mixed riparian forest, grassland, and alkali sink. Conservation opportunities are good in this linkage because the land is currently part of a formal conservation plan. The *Recovery Plan for Upland Species of the San Joaquin Valley, California* (USFWS 1998) has been prepared and potential conservation partnerships are already in place between the California Department of Fish and Game (CDFG) (renamed as the California Department of Fish and Wildlife [CDFW] in 2013), the Corcoran Irrigation District, and the Endangered Species Recovery Program (Penrod et al. 2001). The St. John's River Cross Creek riparian corridor habitat linkage intersects all Hanford area alternatives.

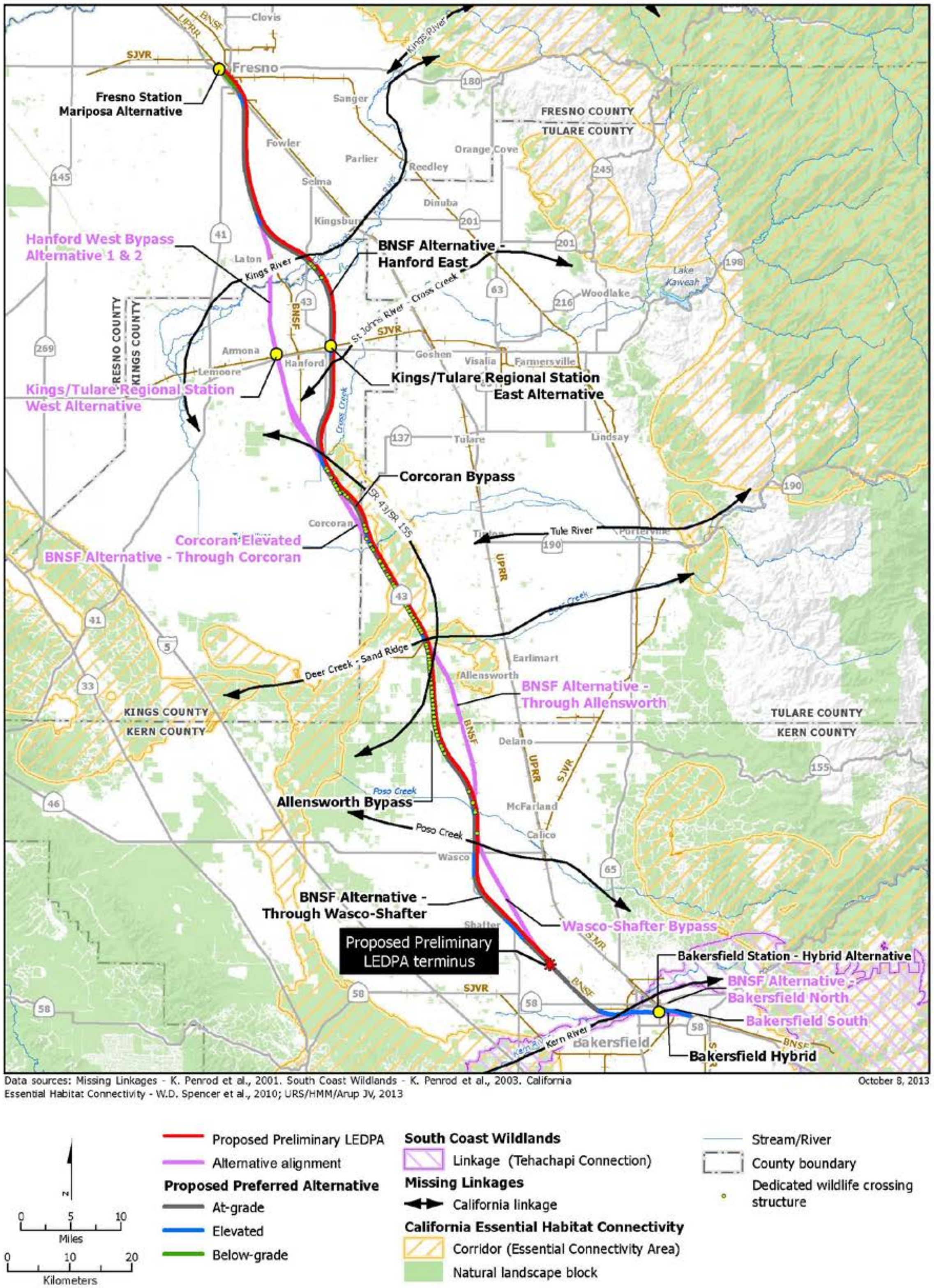


Figure 5-2
Habitat linkages and wildlife movement corridors

The Tule River habitat linkage is primarily an east-west linkage that follows the Tule River drainage (Penrod et al. 2001). This linkage is approximately 25 miles long and connects to natural lands within the State Route (SR) 43 / SR 155 habitat linkage. It consists of patchy valley foothill riparian, grassland, and vernal pool habitat over 25 miles throughout the eastern portion of the Central Valley, though the linkage is confined to the riparian corridor where it intersects all Corcoran area alternatives. This linkage may provide suitable habitat for a variety of special-status species.

The SR 43 / SR 155 habitat linkage is primarily a north-south linkage that closely follows SR 43 and SR 155; this linkage is approximately 20 miles long. The habitat linkage connects, among other natural areas, the Kern National Wildlife Refuge (NWR), the Pixley NWR, and other undisturbed tracts of land scattered throughout the San Joaquin Valley (Penrod et al. 2001). The SR 43 / SR 155 habitat linkage also connects the Pixley/Allensworth, Lost Hills, and Semitropic Ridge satellite areas, which are identified in the *Recovery Plan for Upland Species of the San Joaquin Valley, California* (USFWS 1998). The primary habitat types in the linkage were identified as alkali sink scrub, valley grassland, and saltbush scrub. The major land cover types are agriculture and natural vegetation. The most significant barriers to wildlife movement are natural habitat gaps of up to several miles long. Given that several thousand acres in this area need to be restored from agricultural land to natural communities for this linkage to function, the need for restoration in this area is extensive (Penrod et al. 2001). The SR 43 / SR 155 habitat linkage intersects all Corcoran area alternatives and Allensworth area alternatives.

The Deer Creek–Sand Ridge habitat linkage, identified in the vicinity of Allensworth, is a primarily east-west linkage that connects the Sequoia Foothills core area with the Kreyenhagan and Kettleman Hills core area identified in the *Recovery Plan for Upland Species of the San Joaquin Valley, California* (USFWS 1998). The Deer Creek–Sand Ridge habitat linkage also intersects portions of the Pixley/Allensworth, Lost Hills, and Semitropic Ridge satellite areas identified in the *Recovery Plan for Upland Species of the San Joaquin Valley, California* (USFWS 1998) and two essential connectivity areas identified in the *California Essential Habitat Connectivity* project that connect the Pixley/Allensworth reserves with the Carrizo Plain/Kettleman Hills natural landscape blocks (Spencer et al. 2010). The Deer Creek–Sand Ridge habitat linkage is approximately 25 miles long. The primary habitat types present in the linkage are riparian, grassland, vernal pool marshes, and dunes. The Deer Creek–Sand Ridge habitat linkage intersects all Allensworth area alternatives.

The Poso Creek habitat linkage is approximately 35 miles long, primarily an east-west linkage, and it follows the Poso Creek riparian corridor (Penrod et al. 2001). The habitat linkage connects northeast Bakersfield with the Kreyenhagan and Kettleman Hills populations of the San Joaquin kit fox, as identified in the *Recovery Plan for Upland Species of the San Joaquin Valley, California* (USFWS 1998). The recovery plan also identified the Poso Creek linkage as a linkage that connects populations of San Joaquin kit fox between Bakersfield and the Pixley/Allensworth, Lost Hills, and Semitropic Ridge areas that run along Poso Creek (USFWS 1998). The major habitat types in this linkage were identified as riparian and upland habitat, and the major land cover type in and surrounding the linkage is agricultural. Major barriers to wildlife movement include gaps in habitat cover from 1 to 5 miles long. The features that currently facilitate wildlife movement include underpasses and bridges over a major highway (SR 99). The Poso Creek habitat linkage intersects all Allensworth area alternatives.

The Kern River linkage is primarily an east-west habitat linkage that follows the Kern River riparian corridor (Penrod et al. 2001); this linkage is approximately 30 miles long. The linkage connects natural lands identified in the *Recovery Plan for Upland Species of the San Joaquin Valley, California* (USFWS 1998) that support special-status species (e.g., the Carrizo Plain National Monument) to Bakersfield and the Sierra Nevada foothills. Major habitat types in the linkage were identified as riparian and upland, and the major land cover types were natural vegetation, agricultural land, and urban development. The most significant barriers to wildlife movement were identified as gaps in riparian habitat and water impoundments, which potentially restrict the movement of terrestrial species across areas that formerly had only intermittent water flow (Penrod et al. 2001). The habitat linkage is currently part of the *Recovery Plan for Upland Species of the San Joaquin Valley, California* (USFWS 1998). The Kern River riparian corridor habitat linkage intersects all Bakersfield area alternatives.

The Pacific Flyway is a common route of bird migration that extends along the west coast of North and South America from Alaska to Patagonia and from pelagic areas of the Eastern Pacific to the Great Basin. This flyway spans most of California, including the Project Footprint. Migratory birds travel along this route in spring and fall to reach breeding and overwintering grounds. Such birds may occur transiently in the Project Footprint or use areas of suitable habitat for breeding or overwintering.

The *Fresno to Bakersfield Section: Biological Resources and Wetlands Technical Report* (Authority and FRA 2012b) provides a detailed summary of the seven major habitat linkage areas and describes the key species used to identify the habitat linkage areas.

5.3.4.2 Mitigation Measures for Direct, Indirect, and Cumulative Impacts

Implementation of BIO-MM#1 through BIO-MM#15, discussed in Section 3.7.7, Mitigation Measures, of the Revised DEIR/Supplemental DEIS (Authority and FRA 2012d), will avoid and/or minimize effects on wildlife movement corridors. In some instances, mitigation measures associated with special-status species and habitats of concern during the construction and Project periods may also directly or indirectly avoid and/or minimize impacts and effects on wildlife movement corridors.

As discussed in Chapter 2, Alternatives, of the Revised DEIR/Supplemental DEIS (Authority and FRA 2012d), wildlife crossing opportunities will be available through a variety of engineered structures, including dedicated wildlife crossing structures, elevated structures on viaducts, bridges over riparian corridors, road overcrossings and undercrossings, and drainage facilities (i.e., large-diameter [60- to 120-inch] culverts and paired 30-inch culverts). For a more detailed discussion of the crossing structures, including figures depicting the frequency and locations of these structures, refer to Section 5.6, Special-Status Wildlife Species, of the *Fresno to Bakersfield Section: Biological Resources and Wetlands Technical Report* (Authority and FRA 2012b). Additionally, the following mitigation measures, described in the Revised DEIR/Supplemental DEIS, are designed to reduce the direct, indirect, and cumulative impacts on wildlife movement corridors:

- BIO-MM#51. Install Wildlife Fencing.
- BIO-MM#52. Construction in Wildlife Movement Corridors.
- BIO-MM#65: Offsite Habitat Restoration, Enhancement, and Preservation.

In some instances, the mitigation measures associated with special-status species and habitats of concern during the construction period and/or Project operation may also avoid and/or minimize impacts and effects on wildlife movement corridors.

5.4 Other Environmental and Community Resources

This section discusses the other significant environmental and community resources that help to differentiate the alignment resources.

The existing conditions and mitigation measures for resources that differ for at least some of the alternatives are Section 4(f) resources; transportation and traffic; noise and vibration; agricultural lands; parks, recreation, and open space; aesthetics and visual resources; cultural resources; and community resources and environmental justice.

5.4.1 Section 4(f) Resources

Section 4(f) of the Department of Transportation Act (49 U.S.C. 303) provides special protection to publicly owned parks, recreational areas, wildlife or waterfowl refuges, and historic sites of national, state, or local significance. Section 4(f) properties may only be used in federal-funded transportation projects if there is no feasible and prudent alternative to such use and all possible use planning has been conducted to avoid the use of a Section 4(f) property or to minimize harm to any 4(f) property affected by the Project. Section 4(f) properties are located in the Fresno to Bakersfield Section.

A Section 4(f) evaluation is provided in Chapter 4, Section 4(f)/6(f) Evaluation, of the Revised DEIR/Supplemental DEIS (Authority and FRA 2012d) (Volume I). This evaluation provides details regarding the various potential Section 4(f) properties, by the categories defined in 49 U.S.C. 303: Parks, Recreation, Open Space, Wildlife and Waterfowl Refuges, and Cultural Resources. This chapter of the Revised DEIR/Supplemental DEIS provides a detailed applicability analysis, a preliminary Section 4(f) use assessment, avoidance alternatives, measures to minimize harm, and a preliminary Section 4(f) Least Harm Analysis. Section 1.6, Technical Updates since the Public Review of the Revised DEIR/Supplemental DEIS, in this Summary Report, provides an a summary of the updated alignment modifications and Section 6.1.2.1, Section 4(f) Resources, provides an updated preliminary Section 4(f) Least Harm Analysis for Hanford area Section 4(f) uses.

5.4.2 Transportation and Traffic

5.4.2.1 Affected Environment

Section 3.2.4, Affected Environment, of the Revised DEIR/Supplemental DEIS (Authority and FRA 2012d) describes the regulatory setting and affected environment for transportation and traffic and identifies the potential Project period impacts and associated mitigation measures for the Proposed Preferred Alternative and the Proposed Preliminary LEDPA.

The regional transportation system contains several state routes and regionally significant roadways that serve as connections to population centers outside of the Fresno to Bakersfield corridor. Section 3.2.4, Affected Environment, of the Revised DEIR/Supplemental DEIS (Authority and FRA 2012d) provides a detailed summary of information regarding airports in the area, rail service, and bus service (arranged by transportation mode or facility). The topics discussed include existing traffic volumes and operating conditions, transit facilities and services, air travel, non-motorized facilities, parking, and area freight and goods movement. Regional travel would be the same for all alternatives.

The primary study area for traffic analysis consists of the potentially affected intersections and roadways surrounding each of the proposed station sites, because the alternatives have the greatest potential to have long-term impacts on traffic at and near the proposed stations. The study area was defined for each of the station area sites in consultation with representatives at the public works and transportation planning agencies for Fresno, Kings, Tulare, and Kern counties; the cities of Fresno and Bakersfield; and Caltrans (District 6). The extent of each station study area was established by considering the potential for impacts on roadway segments and at intersections from new station-related traffic. Between stations, the HST corridor would cross most local roadways on separated grade or elevated tracks, allowing for continued passage of vehicles, bicycles, and pedestrians and avoiding or minimizing traffic impacts. For the instances where alterations to the road network are proposed, areas with local impacts on traffic were included in the study area.

5.4.2.2 Mitigation Measures for Direct, Indirect and Cumulative Impacts

Eleven Project design features would avoid or minimize impacts on the transportation system, as described in Section 3.2.6, Project Design Features, of the Revised DEIR/Supplemental DEIS (Authority and FRA 2012d). These Project design features are primarily aimed at avoiding or minimizing construction impacts. A summary of the mitigation measures designed to reduce transportation system impacts on road closures, intersections, and roadways for Proposed Preferred Alternative and the Proposed Preliminary LEDPA can be found in Section 3.2.7, Mitigation Measures, of the Revised DEIR/Supplemental DEIS (Authority and FRA 2012d). One mitigation measure (TR-MM#1) concerns potential road closures; this measure consists of maintaining access for property owners within the construction area to a level that maintains the viability of the property for its pre-Project use. Seven mitigation measures (TR-MM#2 through TR-MM#8) concern intersection and roadway impacts. These measures include modifying signal phasing, adding signals to an intersection to improve LOS/operation, restriping intersections, revising signal cycle length, widening approaches to intersections, adding exclusive lanes to intersections, and adding new lanes to roadways.

5.4.3 Noise and Vibration

5.4.3.1 Affected Environment

Section 3.4.4, Affected Environment, of the Revised DEIR/Supplemental DEIS (Authority and FRA 2012d) describes the regulatory setting and affected environment for noise and vibration and identifies the potential Project period impacts and associated mitigation measures for the Proposed Preferred Alternative and the Proposed Preliminary LEDPA.

The study area for noise encompasses sensitive receivers that are up to approximately 2,500 feet from the centerline of the proposed track, a distance that indicates whether any noise-sensitive receivers are near enough to the proposed alignment for a noise impact to be possible under typical conditions. The study area for vibration impacts to sensitive receivers extends 150 feet from the boundaries of each HST station, up to 275 feet from the edge of the rights-of-way of the HST or existing railroad alignment, and 50 feet from highway centerlines.

5.4.3.2 Mitigation Measures for Direct and Indirect Impacts

Section 3.4.6, Project Design Features, of the Revised DEIR/Supplemental DEIS (Authority and FRA 2012d) identifies that FTA and FRA have guidelines for minimizing noise and vibration impacts at sensitive receptors that will be followed during construction. For a detailed discussion of noise mitigation measures (N&V-MM#1 through N&V-MM#6) and vibration mitigation measure (N&V-MM#8) see Section 3.4.7.2, Project, of the Revised DEIR/Supplemental DEIS (Authority and FRA 2012d), where mitigation measures are identified, and the *Proposed California High-Speed Train Project Noise and Vibration Mitigation Guidelines* (Proposed Noise and Vibration Mitigation Guidelines) (see Appendix 3.4-A of the Revised DEIR/Supplemental DEIS). These mitigation measures include installing sound barriers; building sound insulation; acquiring easements on properties severely affected by noise; following maintenance requirements; and implementing considerations such as vehicle suspension and special track systems, a bidder's requirement to meet the federal noise regulations (40 CFR Part 201.12/13) at the time of procurement for locomotives, provision for special trackwork at crossovers and turnouts, and special design treatments for the HMF.

Also, the noise and vibration mitigation measure requiring coordination of construction activities (CUM-N&V-MM#1 in Section 3.19, Cumulative Impacts, of the Revised DEIR/Supplemental DEIS [Authority and FRA 2012d]) will minimize the potential cumulative effects of overlapping construction activities in the same area. HST construction activities would also be coordinated with other nearby, concurrent construction projects to the extent feasible to keep noise and vibration levels below the thresholds defined in Section 3.4.3, Methods for Evaluating Impacts, of the Revised DEIR/Supplemental DEIS (Authority and FRA 2012d).

5.4.4 Agricultural Lands

5.4.4.1 Affected Environment

Section 3.14, Agricultural Lands, of the Revised DEIR/Supplemental DEIS (Authority and FRA 2012d) describes the regulatory setting and affected environment for agricultural lands and identifies the potential construction period and Project period impacts on these lands and their associated mitigation measures for the Project.

The south San Joaquin Valley, the location of the Project, is California's—and the nation's—leading agricultural production region (CDFA 2010). In 2008, the cash farm receipts from Fresno, Kings, Tulare, and Kern counties (about $16.5 billion) represented 46% of the state's total agricultural revenues. Fresno, Kern, Tulare, and Kings counties rank first, second, third, and eighth, respectively, among California's top agricultural counties, as measured by the gross value of agricultural production (CDFA 2010). In addition to farmlands, California currently has 1,600 to 1,800 dairies; 80% of which are in the Central Valley. The total county land area in each county committed to agricultural production ranges from 38% in Tulare County to 77% in Kings County. Farming and related agricultural industries are major employers in these counties and are vital to their economies.

Construction of the Project would occur through areas with Important Farmland. Important Farmland is defined as Prime Farmland, Farmland of Statewide Importance, Unique Farmland, and Farmland of Local Importance (Figure 5-3, Sheets 1-6). The construction of the Project would permanently displace agricultural uses on these lands. The Project would also affect Grazing Land, but Grazing Land is not included in the acreage totals because it is not a type of Important Farmland.

The Project would also permanently affect agricultural land in Williamson Act contracts or Farmland Security Zone (FSZ) contracts. Under the California Land Conservation Act of 1965, landowners can voluntary enter agricultural and open space lands into a contract (a Williamson Act contract) under which they receive property tax incentives for restricting the land use to agricultural and open space for 10 years or more. FSZ contracts offer landowners greater property tax reductions and have a minimum initial term of 20 years. State policy is to avoid impacts on contracted agricultural lands, where possible.

A partial acquisition of land protected by a Williamson Act or FSZ contract could constrain the potential continued use of that land for farming because (1) the remaining land acreage might be too small to meet the minimum requirements under these programs, and (2) the resulting increase in property taxes on such land might affect the financial feasibility of continued farming. Although it could be possible to combine adjacent farmlands, this approach might not be feasible because of variations in topography and soils between adjacent farms. Thus, the Project could potentially result in the conversion of Important Farmland to nonagricultural uses. The Project would also affect confined animal facilities associated with dairies (Figure 5-4, Sheets 1-6).

The study area for effects on agricultural lands encompasses the entire potential area of disturbance associated with the Project construction footprint (for direct effects), plus 100 feet from the track centerline based on federal standards for evaluating livestock noise impacts. The construction footprint includes the proposed HST right-of-way and associated facilities and other construction areas, including laydown, storage, and similar areas. Parcels that the HST alignments could sever were part of the study area for direct and indirect effects.

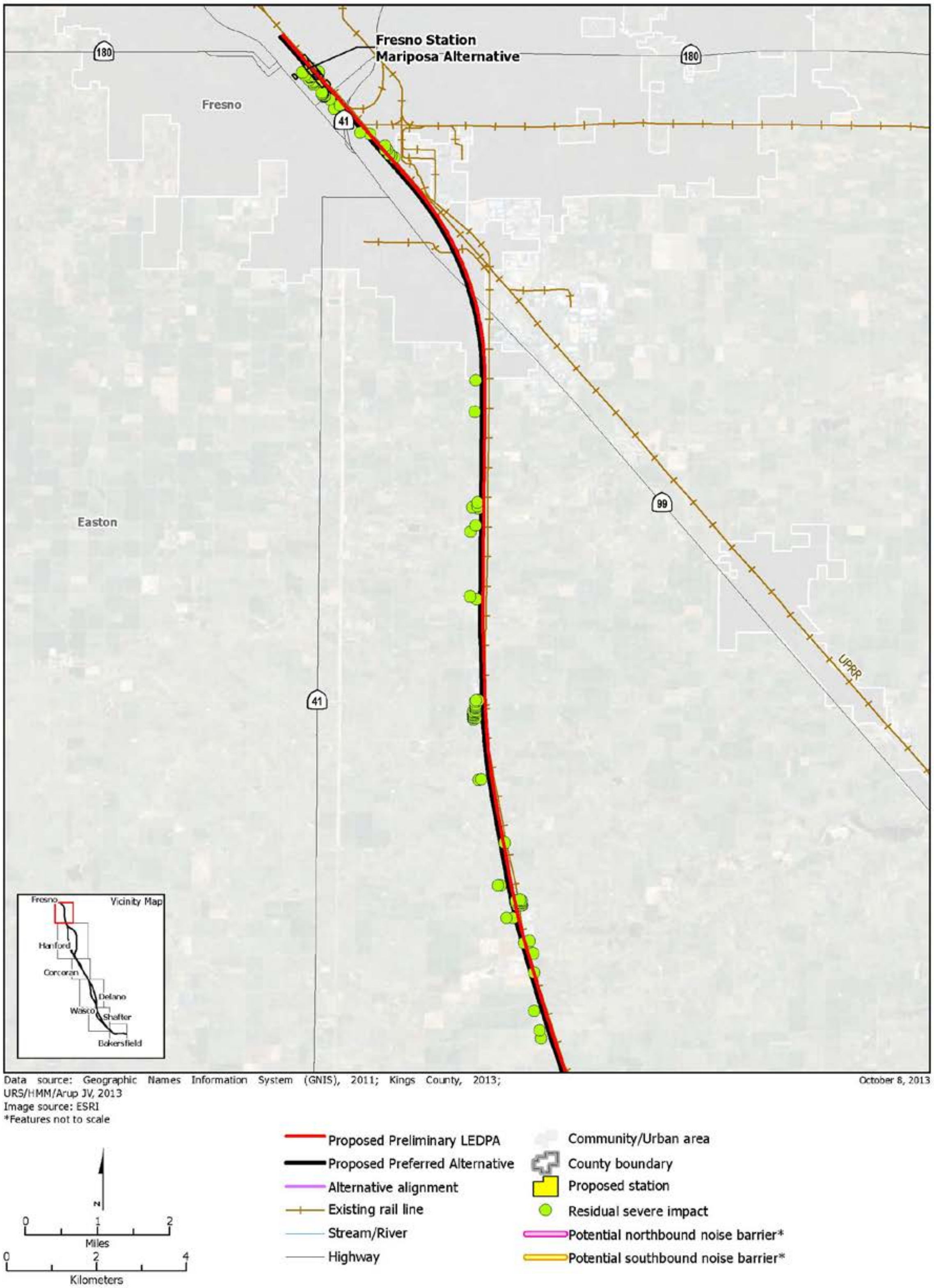


Figure 5-3
Important Farmland and grazing land (Sheet 1 of 6)

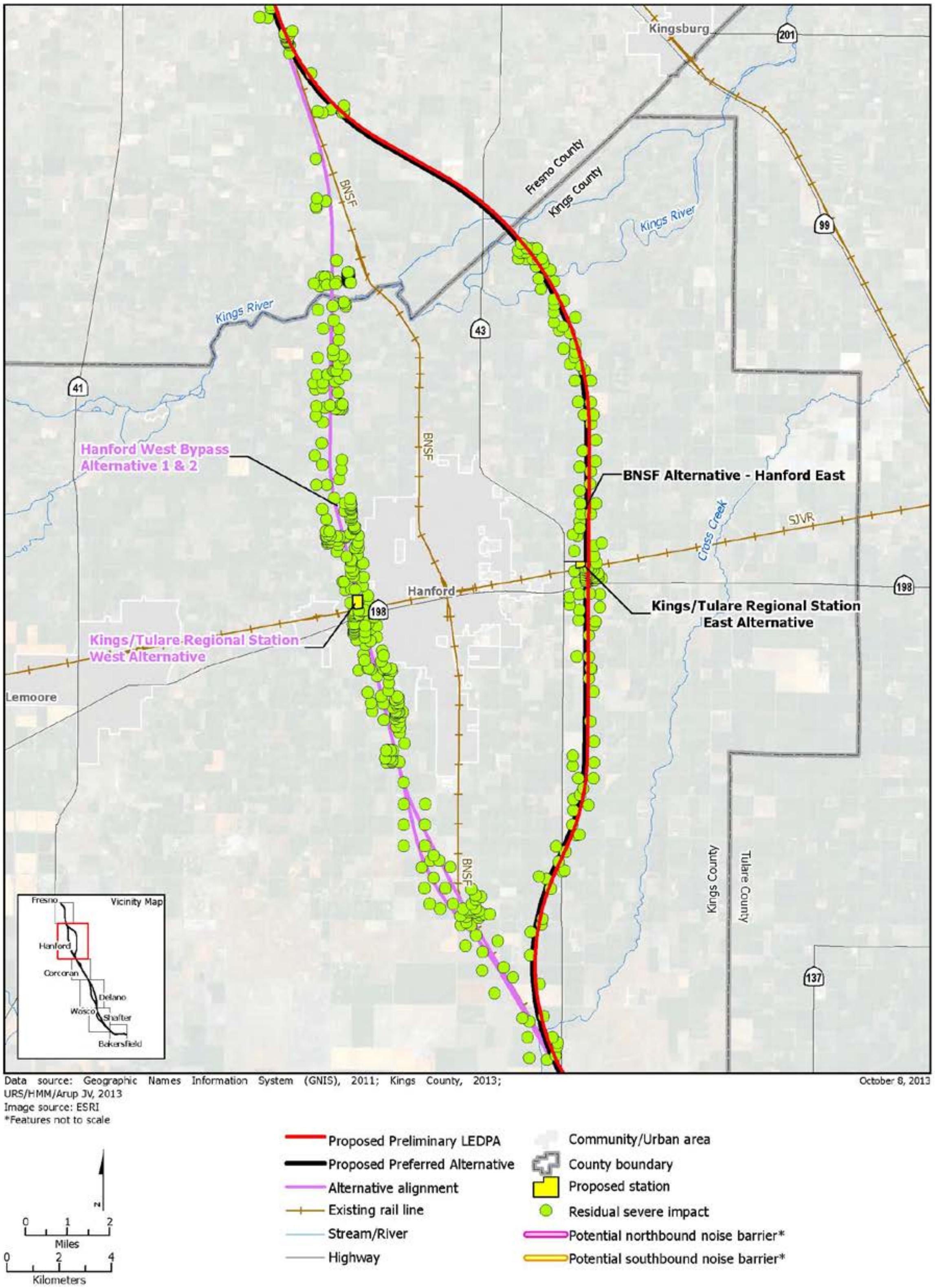


Figure 5-3
Important Farmland and grazing land (Sheet 2 of 6)

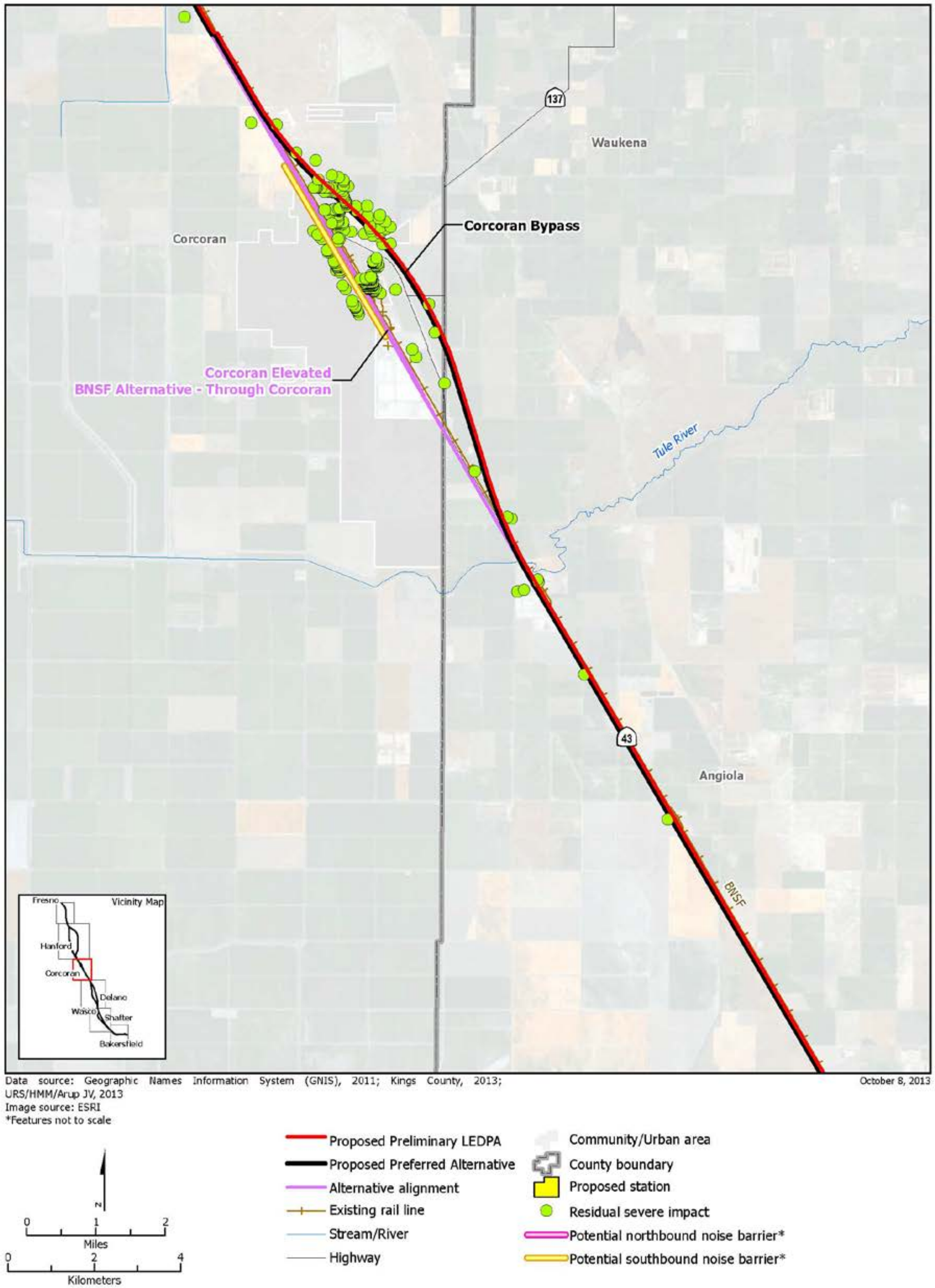


Figure 5-3
Important Farmland and grazing land (Sheet 3 of 6)

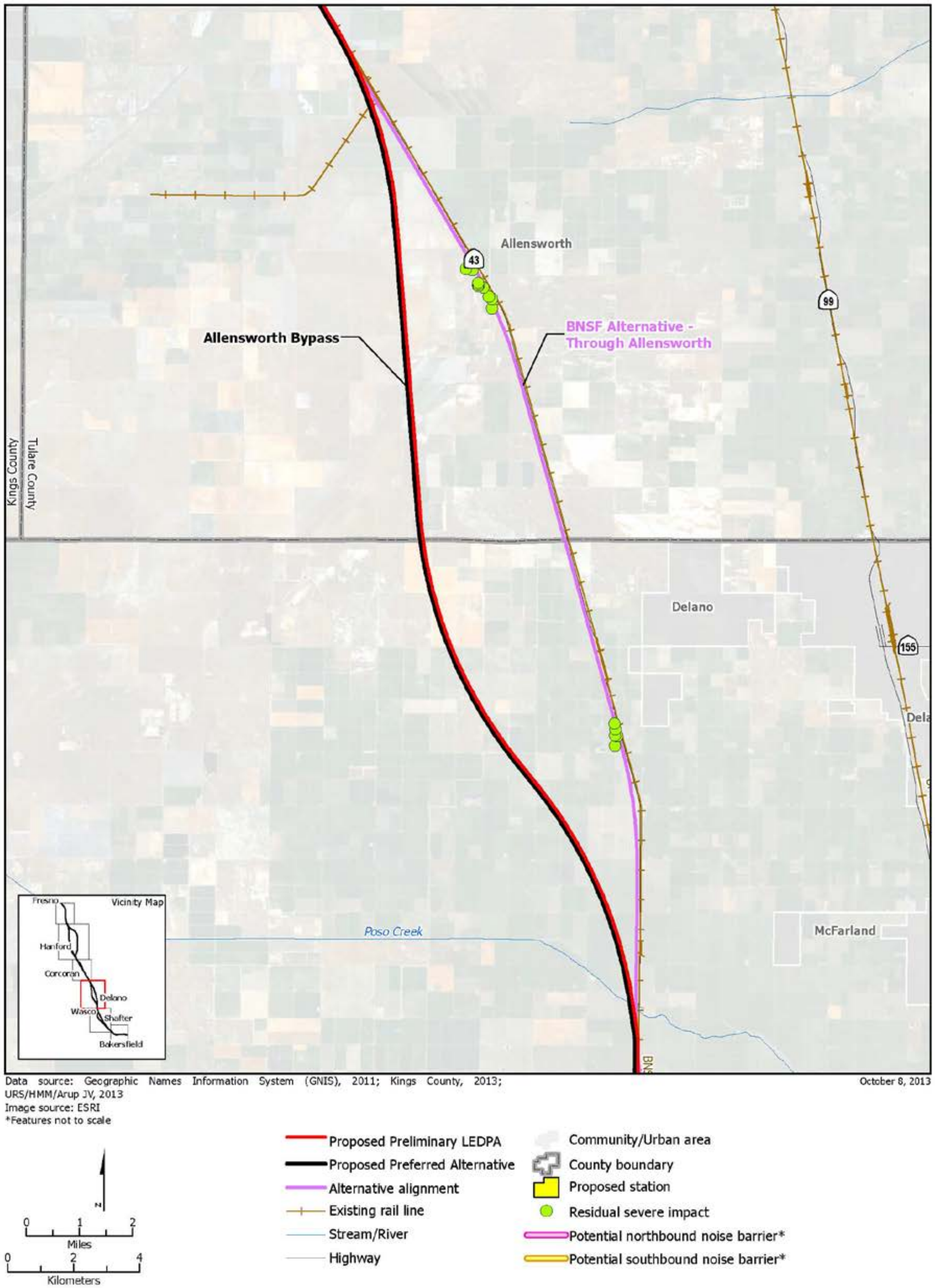


Figure 5-3
Important Farmland and grazing land (Sheet 4 of 6)

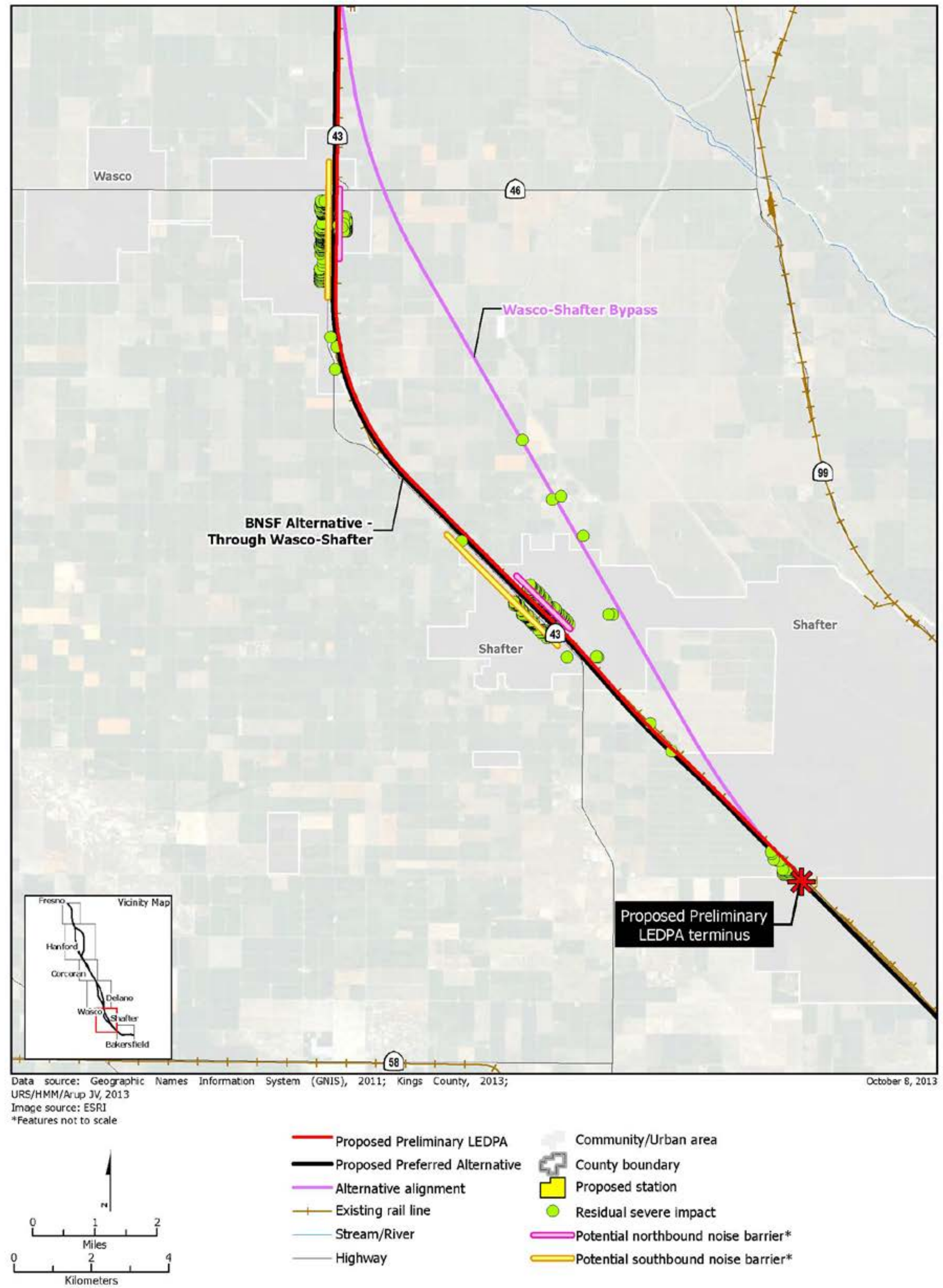
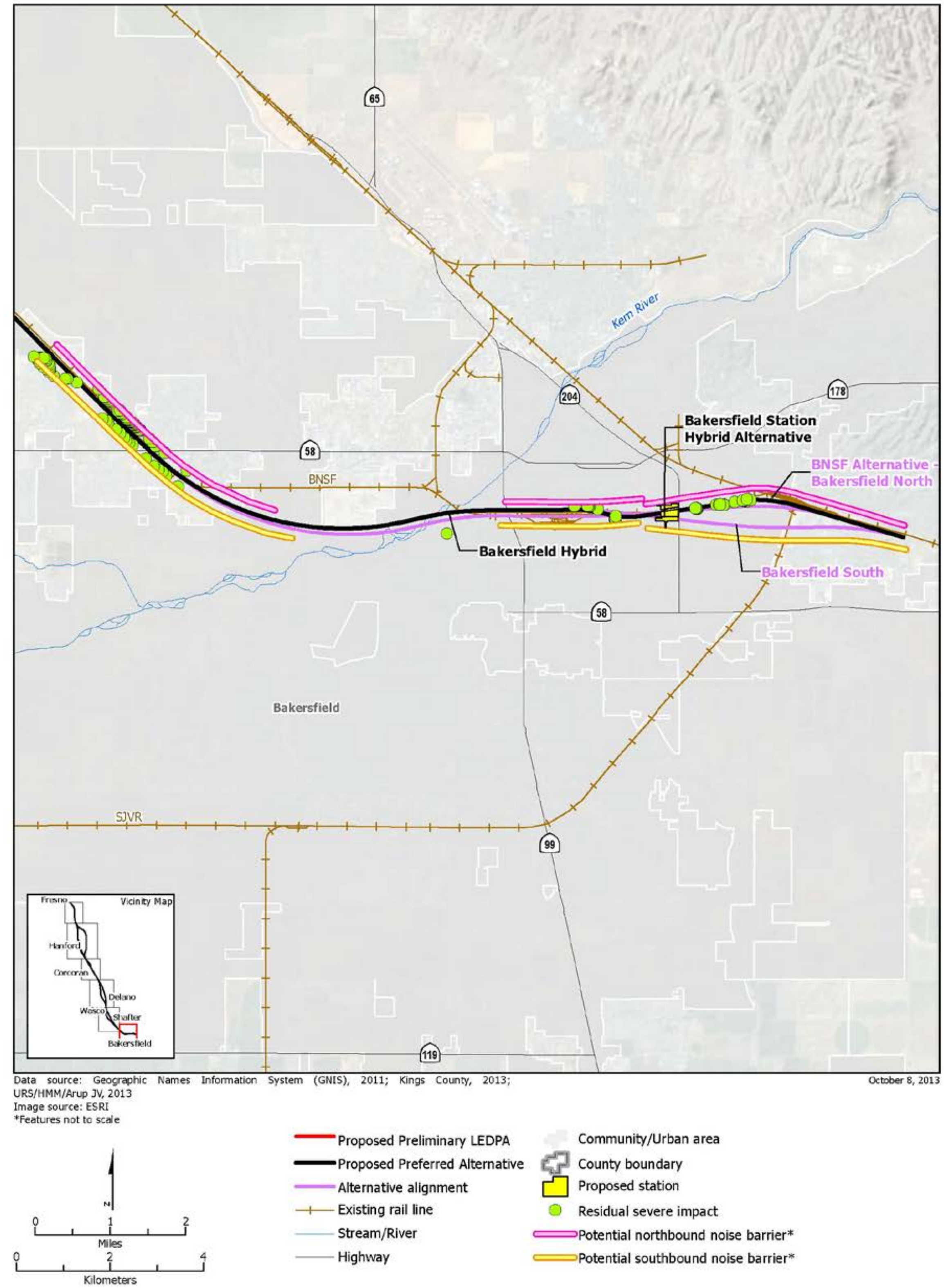


Figure 5-3
Important Farmland and grazing land (Sheet 5 of 6)



Data source: Geographic Names Information System (GNIS), 2011; Kings County, 2013; URS/HMM/Arup JV, 2013
Image source: ESRI
*Features not to scale

Figure 5-3
Important Farmland and grazing land (Sheet 6 of 6)

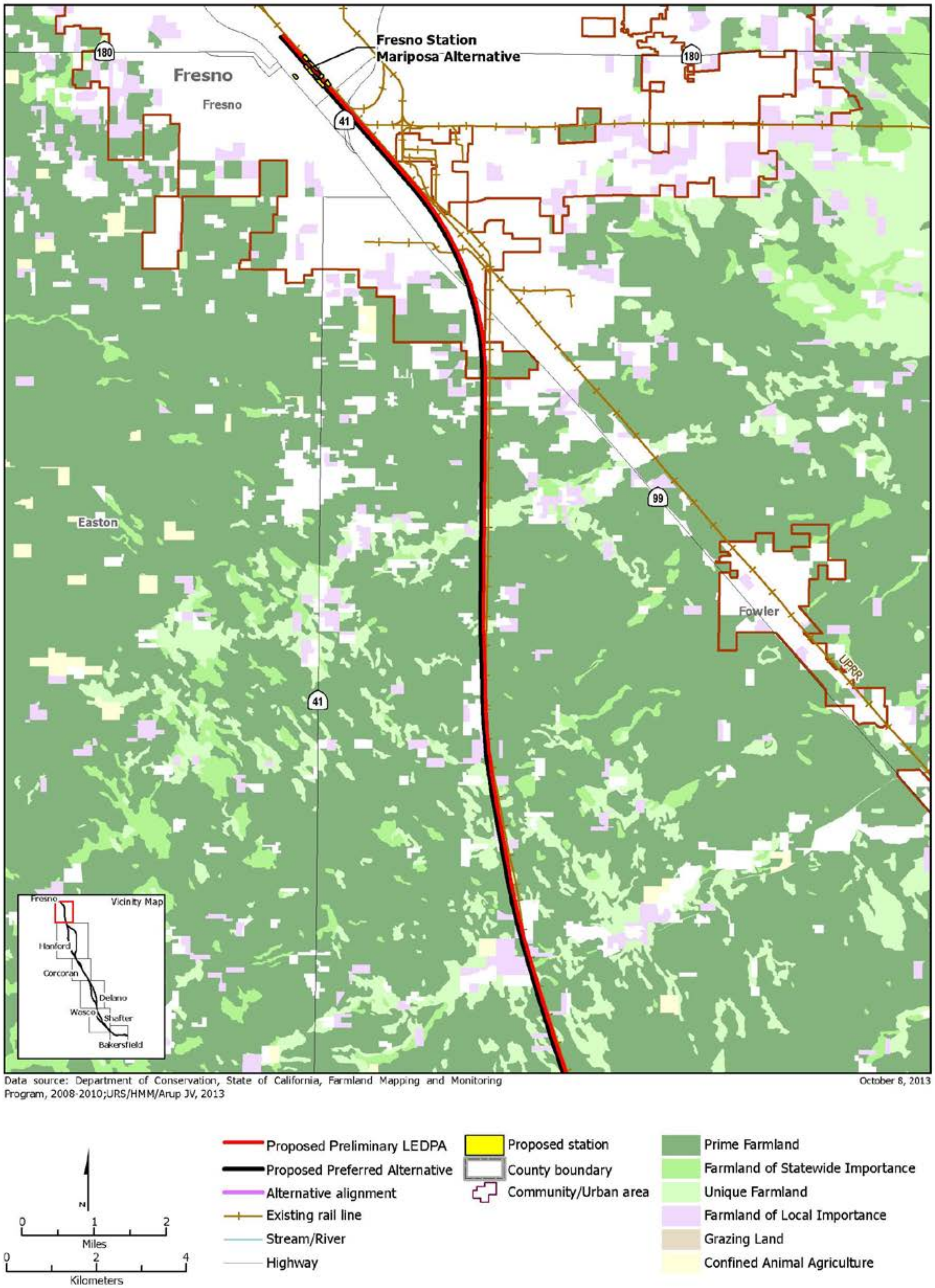


Figure 5-4
Confined Animal Facilities (Sheet 1 of 6)

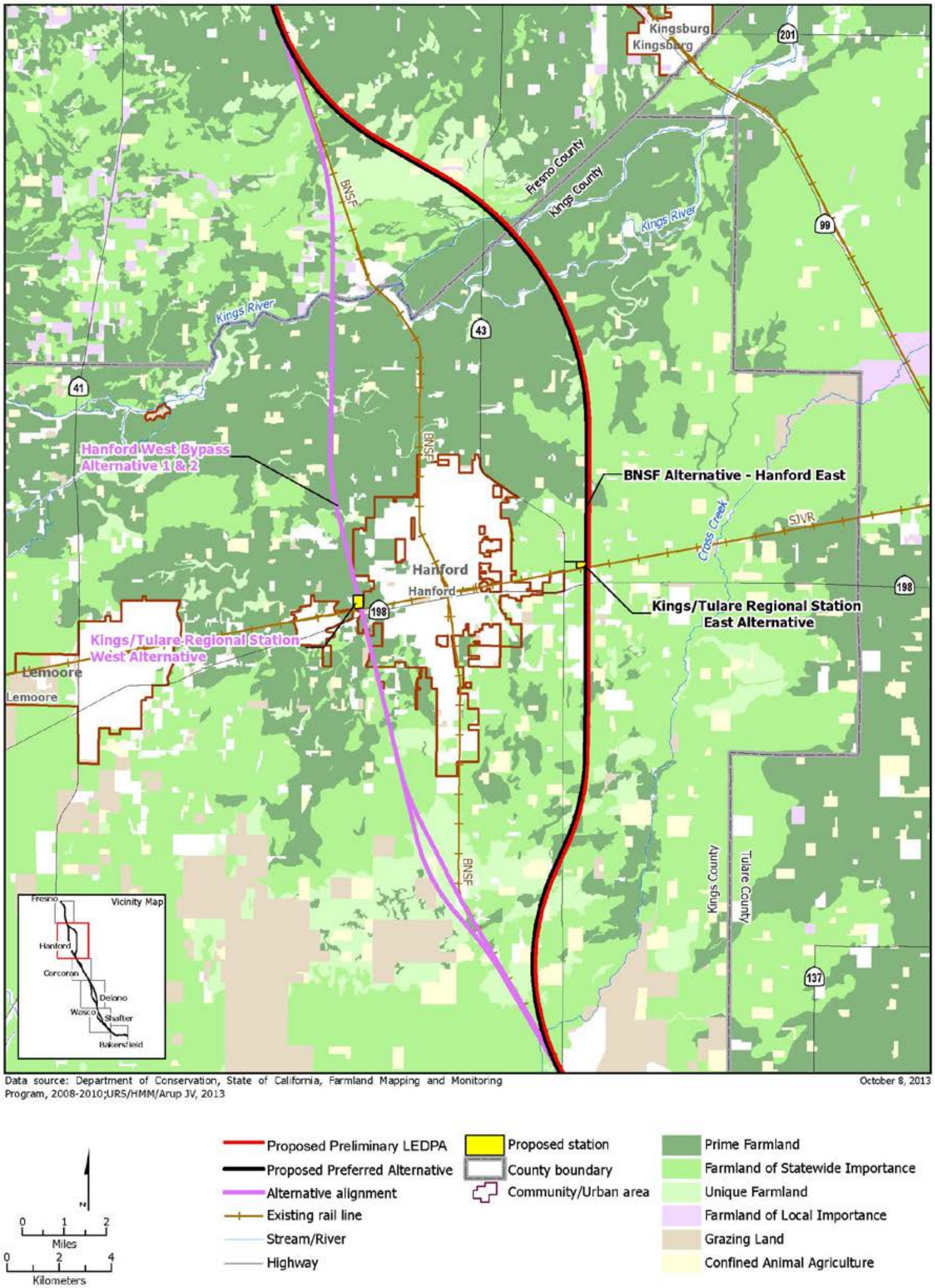


Figure 5-4
Confined Animal Facilities (Sheet 2 of 6)

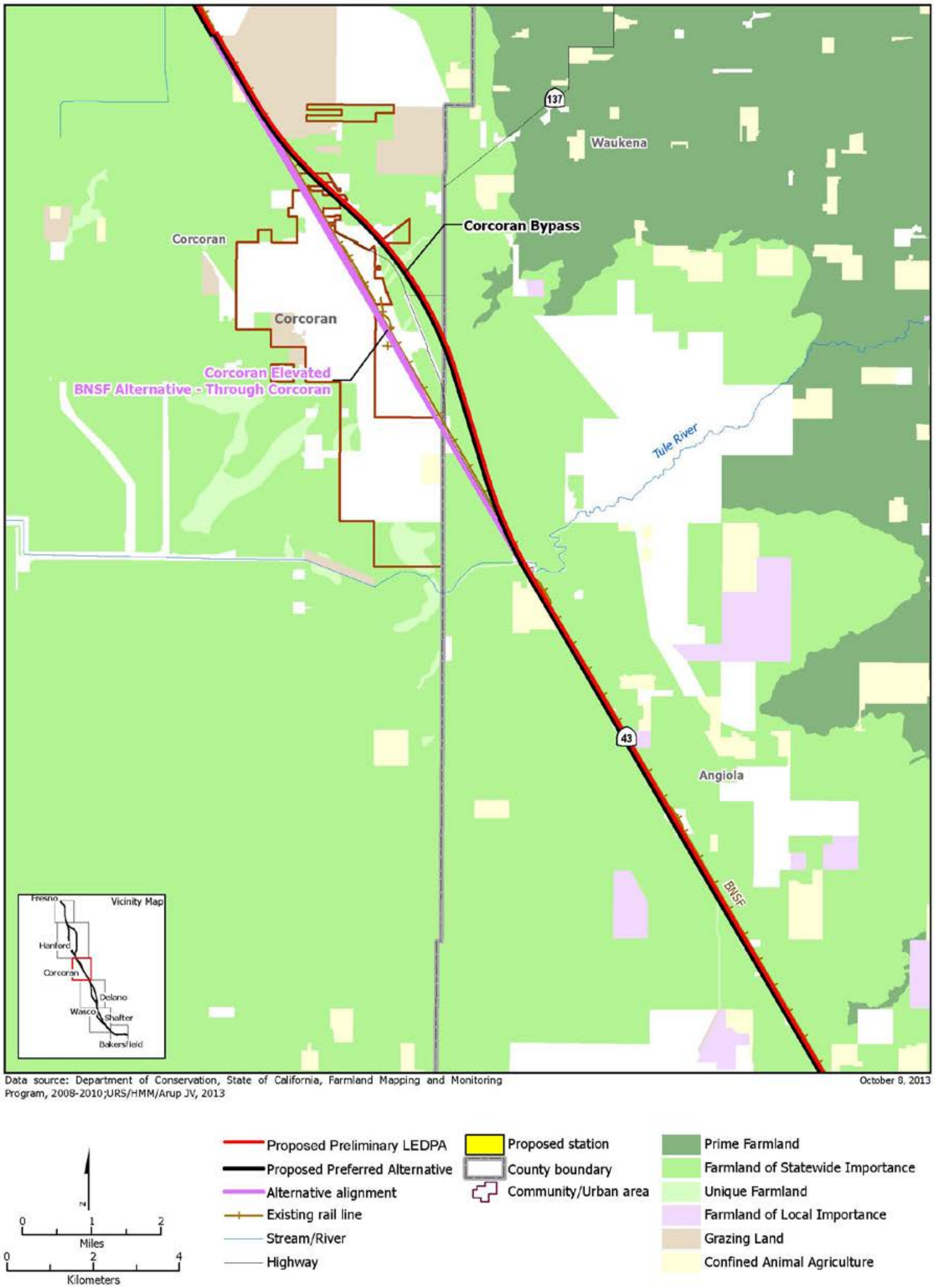


Figure 5-4
Confined Animal Facilities (Sheet 3 of 6)

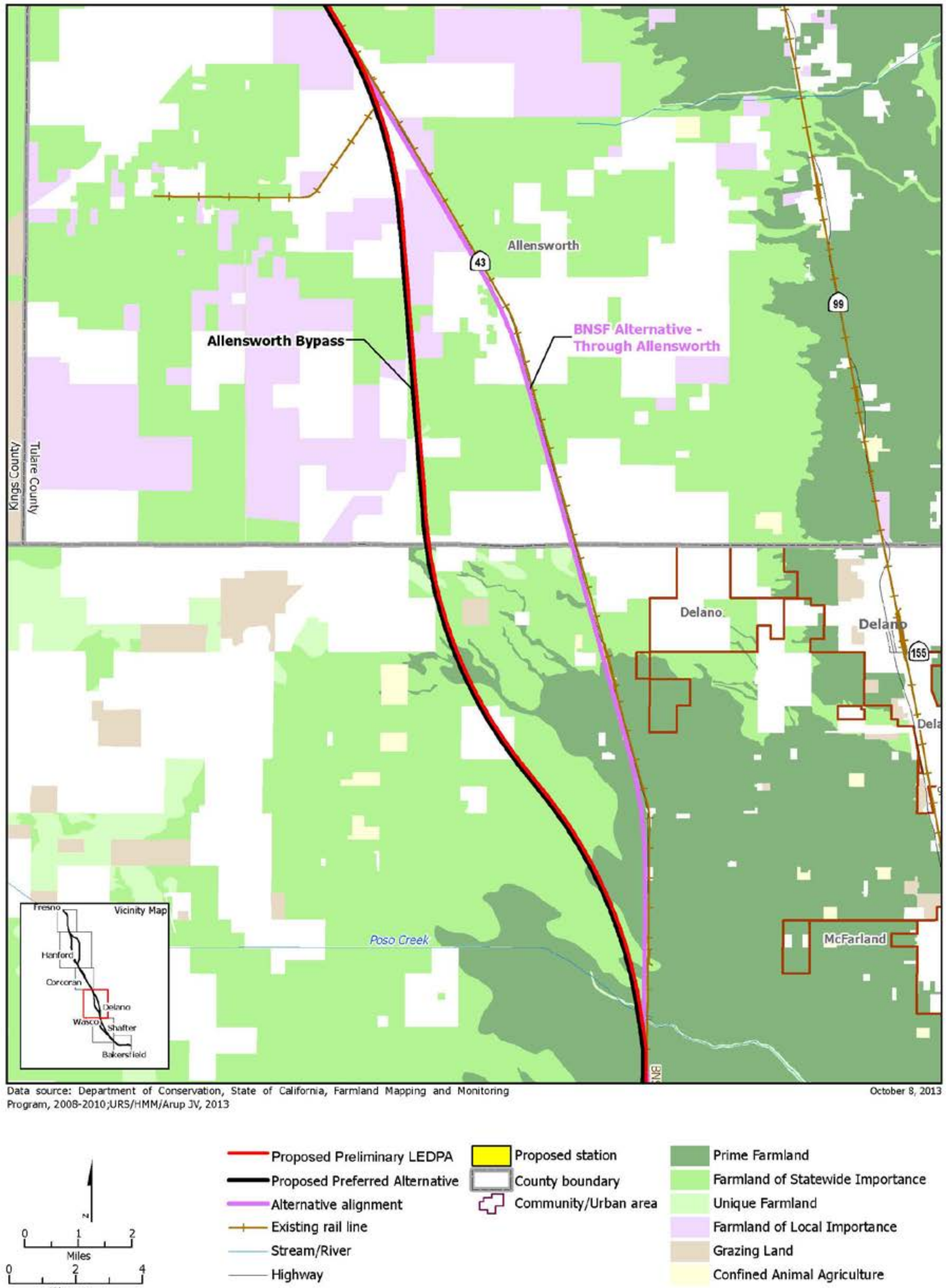


Figure 5-4
Confined Animal Facilities (Sheet 4 of 6)

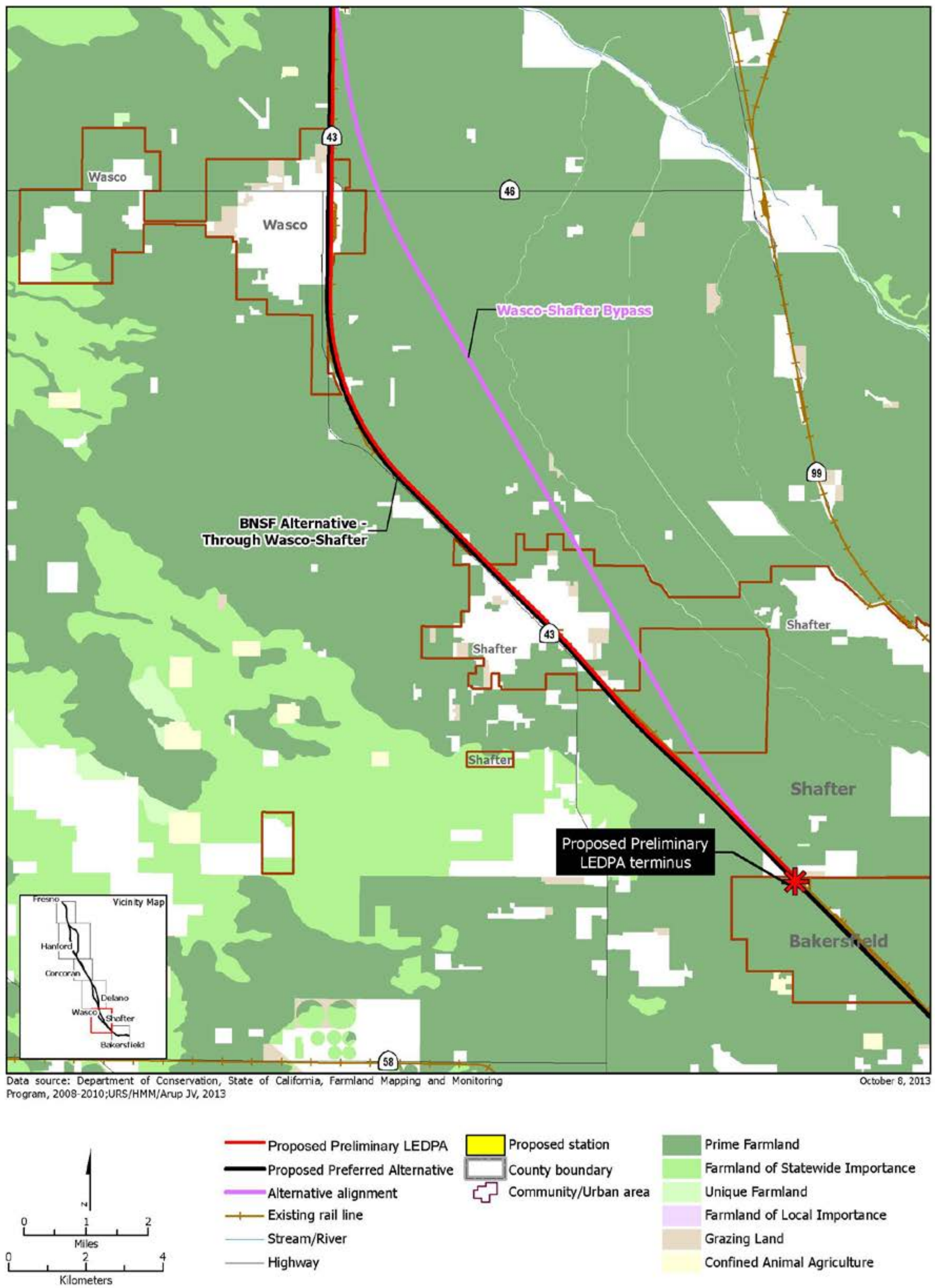


Figure 5-4
Confined Animal Facilities (Sheet 5 of 6)

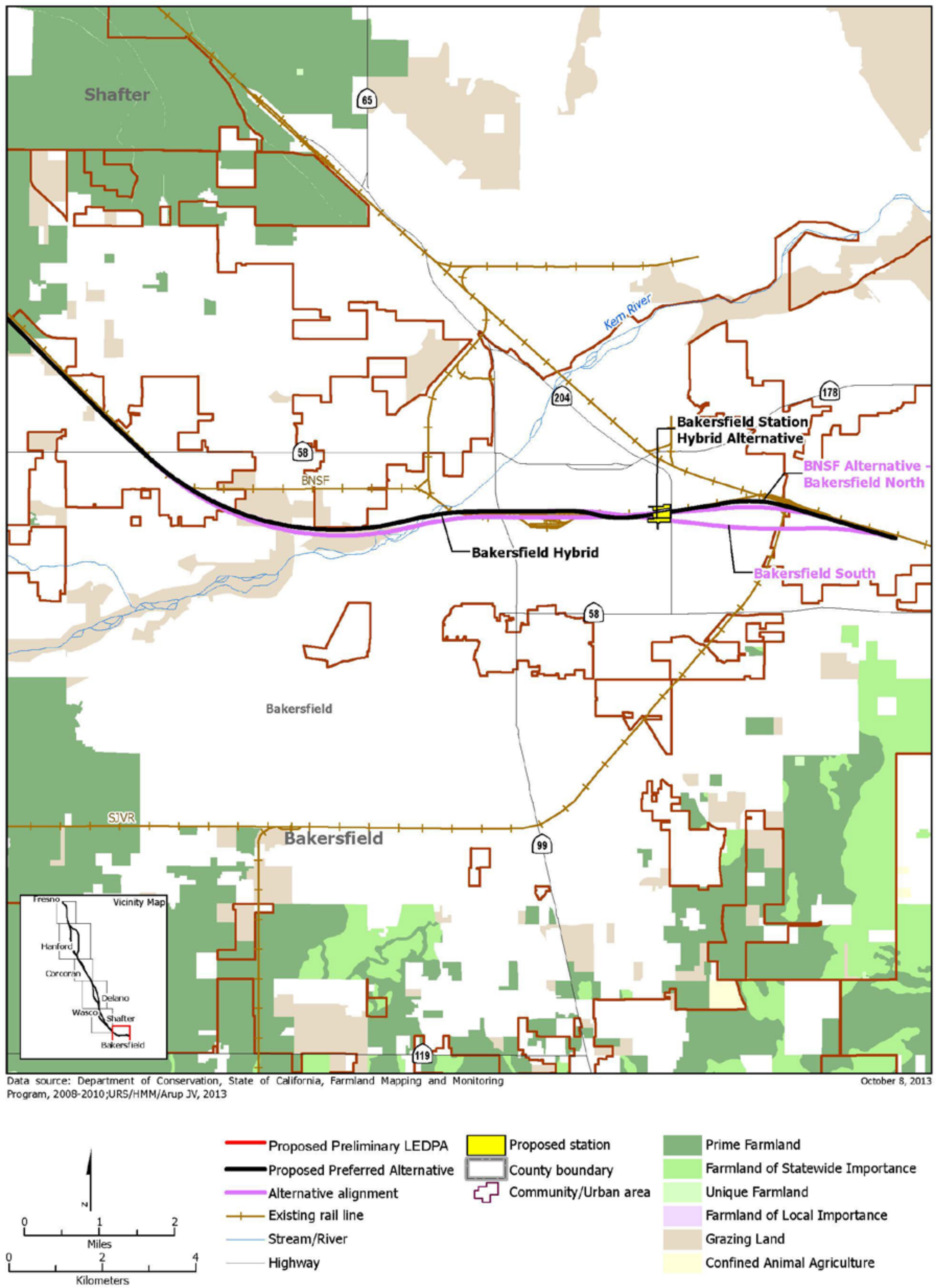


Figure 5-4
Confined Animal Facilities (Sheet 6 of 6)

5.4.4.2 Mitigation Measures for Direct, Indirect, and Cumulative Impacts

The avoidance and minimization measure for agricultural resources that is provided in Section 3.14.6, Project Design Features, of the Revised DEIR/Supplemental DEIS (Authority and FRA 2012d) would be implemented. This mitigation strategy requires the Authority to enter into an agreement with the Department of Conservation (DOC) California Farmland Conservancy Program to preserve farmland (AG-MM#1), as described in Section 3.14.7, Mitigation Measures, of the Revised DEIR/Supplemental DEIS (Authority and FRA 2012d). The Authority will fund the California Farmland Conservancy Program's work to identify suitable agricultural land for mitigation of impacts and fund the purchase of agricultural conservation easements from willing sellers. The performance standards for this measure will be to preserve Important Farmland in an amount commensurate with the quantity and quality of the converted farmlands, within the same agricultural regions where the impacts occur, at a preservation ratio of not less than 1:1. The California Farmland Conservancy Program will work with local, regional, or statewide entities whose purpose includes the acquisition and stewardship of agricultural conservation easements.

The Authority and California Farmland Conservancy Program will develop selection criteria under this agreement to guide the pursuit and purchase of conservation easements. These criteria will include, but not be limited to, provisions to ensure that the easements will conform to the requirements of Public Resources Code Section 10252 and provisions to prioritize the acquisition of willing-seller easements on lands that are adjacent to other protected agricultural lands or that will support the establishment of greenbelts and urban separators. This mitigation measure will be effective given the nationwide and local success of farmland preservation programs using agricultural conservation easements and the experience of the DOC California Farmland Conservancy Program. However, this mitigation measure will not result in the creation of new farmland (e.g., conversion of natural lands to agriculture); therefore, the impact will remain significant.

The Project design features specify that the Authority's right-of-way agents will work with each affected confined animal operator to address issues of concern. Agents will attempt to resolve conflicts (e.g., by reconfiguring facilities so that no net loss of operational capacity occurs). The Authority will establish and administer a farmland consolidation program to sell remnant parcels to neighboring landowners for consolidation with adjacent farmland properties. Also, on request, this program will assist the owners of remnant parcels in selling those remnants to adjacent landowners, and the Authority will assign a representative to act as a single point of contact to assist each confined animal facility owner with obtaining new or amended permits or other regulatory compliance necessary to the continued operation or relocation of the facility. The Authority will consider and may provide compensation when acquisition of a confined animal site would either require relocation of the facility or amendment of its existing regulatory permits. During the HST testing phase, the Authority will fund a program to undertake original research on the wind and noise effects of HST operations on agricultural activities. The agents might not be able to resolve all issues, but will offer compensation to landowners that demonstrate a hardship from loss of facilities.

In addition, one mitigation measure designed to further reduce agricultural impacts (Ag-MM #1: Preserve the Total Amount of Prime Farmland, Farmland of Statewide Importance, Farmland of Local Importance, and Unique Farmland), can be found in Section 3.14.7, Mitigation Measures, of the Revised DEIR/Supplemental DEIS (Authority and FRA 2012d).

5.4.5 Parks, Recreation, and Open Space

5.4.5.1 Affected Environment

Section 3.15, Parks, Recreation, and Open Space, of the Revised DEIR/Supplemental DEIS (Authority and FRA 2012d) describes the regulatory setting and affected environment for parks, recreation, and open space resources as well as the school district play areas and recreation facilities in the study areas of the HST alternatives and identifies potential Project period impacts and associated mitigation measures.

The study area for this resource encompasses parks, school district play areas, recreation facilities, and open space, all of which vary in size, type, and function. The study area for parks, recreational facilities, and open space is 1,000 feet on either side of an alignment and 0.5 mile around station areas and support facilities (e.g., power substations) for each HST alternative. In areas where an existing transportation corridor (e.g., SR 43, the BNSF right-of-way) separates parks, school facilities, recreational facilities, and open space from Project components, the 1,000-foot study area does not extend beyond these transportation rights-of-way because they provide a barrier to potential impacts on parks and recreational resources.

5.4.5.2 Mitigation Measures for Direct, Indirect, and Cumulative Impacts

As described in Section 3.15.6, Project Design Features, of the Revised DEIR/Supplemental DEIS [Authority and FRA 2012d]), the Authority and FRA have considered avoidance and minimization measures consistent with the 2005 Statewide Program EIR/EIS commitments. During Project design and construction, the Authority and FRA would implement measures to reduce impacts on parks and recreation resources. The design standards applicable to the Project are summarized in Section 3.3.8, Project Design Features, in Air Quality and Global Climate Change; Section 3.4.6, Project Design Features, in Noise and Vibration; and Section 3.16.6, Project Design Features, in Aesthetics and Visual Resources of the Revised DEIR/Supplemental DEIS [Authority and FRA 2012d]).

Mitigation for impacts on parks during construction is contained in Park Construction (PC)-MM#1: Compensation for Staging in and Temporary Closures of Park Property During Construction. Mitigation measures Park Project (PP)-MM#1 through –MM#3 provide for acquisition of replacement park property, minimizing right-of-way impacts in Colonel Allensworth State Historic Park, and collection of additional maintenance funds to address the impacts on the Bakersfield Amtrak Station Playground resulting from increased use and feature deterioration as a result of the Project. The Authority will consult with the City of Bakersfield and Amtrak to identify its share of funding to provide additional maintenance, labor, and repairs for the existing Bakersfield Amtrak Station Playground to remedy any potential degradation of existing facilities that may result from increased facility use. Before the opening of passenger service, the Authority will enter into an agreement with the city and Amtrak that establishes the funding share and describes the relative roles of the Authority, the City of Bakersfield, and Amtrak in providing continuous maintenance of the existing playground.

Many related impacts in other resource areas have mitigation measures that work to reduce further the likelihood for impacts on park resources. For example, Section 3.2.6, Project Design Features, of the Revised DEIR/Supplemental DEIS (Authority and FRA, 2012d) describes mitigation measures for impacts during construction for transportation and access; Section 3.3.6, Environmental Consequences, of the Revised DEIR/Supplemental DEIS describes measures for mitigating construction dust effects on air quality; Section 3.4.6, Project Design Features, of the Revised DEIR/Supplemental DEIS describes measures for mitigating noise and vibration effects; Section 3.16.6, Project Design Features, of the Revised DEIR/Supplemental DEIS describes shielding staging areas during construction and avoiding visual degradation through the use of decorative barriers, landscaping, or architectural lighting; Section 3.11.5, Environmental Consequences, of the Revised DEIR/Supplemental DEIS addresses safety and security fencing; and Section 3.18.6, Summary, of the Revised DEIR/Supplemental DEIS addresses incremental effects of growth. The mitigation measures pertaining to the elevated guideways in response to the degradation of the existing visual character and quality of the Kern River Parkway, the Mill Creek Linear Park, and the Bakersfield Amtrak Station Playground are AVR-MM#2a through AVR-MM#2f (from Section 3.16, Aesthetics and Visual Resources, of the Revised DEIR/Supplemental DEIS [Authority and FRA 2012d]).

Measures to mitigate the operational noise impacts of moderate intensity on the Kern River Parkway, the Mill Creek Linear Park, and the McMurtrey Aquatic Center are described in the Proposed Noise and Vibration Mitigation Guidelines (see Appendix 3.4-A of the Revised DEIR/Supplemental DEIS [Authority and FRA 2012f]; see also N&V-MM#3 in Section 3.4, Noise and Vibration, of the Revised DEIR/Supplemental DEIS). These measures will include installing sound barriers; working with communities to identify how the use and height of sound barriers would be determined using jointly developed performance criteria; installing building sound installation; and acquiring easements on properties severely affected by noise.

5.4.6 Aesthetics and Visual Resources

5.4.6.1 Affected Environment

Section 3.16, Aesthetics and Visual Resources, of the Revised DEIR/Supplemental DEIS (Authority and FRA 2012d) describes the regulatory setting and affected environment for aesthetics and visual resources and identifies the potential Project period impacts and associated mitigation measures for the Project.

The study area for this resource is the Project viewshed (i.e., the area that could potentially have views of Project features and the area that could potentially be viewed from the Project). The Project is on mostly flat terrain and consists of mostly agricultural and urbanized areas. Viewing distances toward the corridor vary throughout the study area. In agricultural and other open areas, the corridor is visible over extensive areas because of the general scarcity of buildings and tall vegetation that could block views. In these areas, the study area is considered to be all areas within 0.5 mile of the alignment centerline. In urbanized areas, views toward the corridor are often restricted by the presence of buildings and tall vegetation. Therefore, the study area in urbanized areas encompasses the distance zone within 0.25 mile of both sides of the centerline of the alignment.

Visual resources include designated scenic routes, views toward/within natural areas, parks, and urban areas that have been identified as having historical or cultural significance or include buildings of historical or cultural significance or landmark status. These visual resources have been identified in planning and policy documents, in cultural resource reports, or in evaluations of scenic quality and apparent public popularity during field work related to aesthetics and visual resources. The selection of representative key viewpoints for this analysis was based on these visual resources as seen by identified sensitive viewer groups.

The most significant visual resources in the Project vicinity are parks and historically significant sites in the central areas in the cities of Fresno and Bakersfield; historic town centers in Corcoran, Wasco, and Shafter; orchards and open field crops in rural San Joaquin Valley; the natural riparian character of Kings River Complex, Tule River, Deer Creek, Poso Creek, and Kern River, and views of the Sierra Nevada, Greenhorn, and Tehachapi mountains. Historically, the visual character of the study area has been transformed from open lands with prairie, marshes, and woodland areas to a primarily agricultural region with open fields and orchards.

The *Fresno to Bakersfield Section: Aesthetics and Visual Resources Technical Report* (Authority and FRA 2012h), prepared in conjunction with the Revised DEIR/Supplemental DEIS (Authority and FRA 2012d), includes present-day photographs and simulations of the Project for each key viewpoint, as well as other viewpoints used to characterize the existing landscape; this report also provides additional information on aesthetics and visual resources.

5.4.6.2 Mitigation Measures for Direct, Indirect, and Cumulative Impacts

As described in Section 3.16.6, Project Design Features, of the Revised DEIR/Supplemental DEIS [Authority and FRA 2012f]), the Authority has adopted design standards and design guidelines that are established to create a minimum aesthetic quality for a long-lasting infrastructure. Many of these elements are described in Table 3.16-2 in Section 3.16.5.3, High-Speed Train Alternatives, of the Revised DEIR/Supplemental DEIS [Authority and FRA 2012f]). In addition to the features described in Table 3.16-2, the Authority's Urban Design Guidelines for the California High Speed Train Project (Authority 2011b) briefly discusses the principles of context-sensitive solutions to guide the design of stations. This approach is equally applicable to elevated guideways and will be employed to mitigate visual impacts through context-sensitive design. Aesthetic Guidelines for Non-Station Structures (TM 200-06) (Authority 2011a) will also guide the design of the HST components. These standards and guidelines work to minimize and avoid aesthetic effects on the adjacent surroundings, where possible.

Mitigation measures (AVR-MM#1a and AVR-MM#1b, and AVR-MM#2a through AVR-MM#2h) can be found in Section 3.16.7, Mitigation Measures, of the Revised DEIR/Supplemental DEIS [Authority and FRA 2012f]). They include the following measures:

- Minimizing visual disruption and light disturbance during construction.
- Incorporation of design criteria for elevated and station elements that can adapt to local content; integration of elevated guideways into affected cities, parks, trails, and urban core designs; screening of at-grade and elevated guideways adjacent to residential areas.
- Replanting of unused portions of lands acquired for the Project or related supporting infrastructure.
- Provision of offsite landscape screening where appropriate; addition of landscape treatments along the Project overcrossings and retained fill elements of the HST.
- Provision for sound barrier treatments.

The mitigation measures address the reduced visual quality in the Rural/Agricultural Landscape Units caused by the at-grade and elevated structures, the high-speed trains, the road overcrossings, or other prominent Project features in the Corcoran area (AVR-MM#2c through AVR-MM#2g). They also address similar effects in the Rosedale, Kern River, Central Bakersfield, and/or East Bakersfield Landscape Units caused by elevated guideways and sound barriers (AVR-MM#2a through AVR-MM#2g). The mitigation measures also address screening of the traction power substations (AVR-MM#2h).

These mitigation measures also apply to cumulative Project period impacts. To minimize impacts on planned developments, cumulative mitigation measure CUM-VQ-MM#3 will be implemented. That measure will require the Authority to coordinate with local jurisdictions to provide information on plan development that could be adversely affected by the Project.

5.4.7 Cultural Resources

5.4.7.1 Affected Environment

Regulations implementing Section 106 of the National Historic Preservation Act require that an Area of Potential Effect (APE) for historic properties be established for all federal undertakings (36 CFR 800.4[a][1]). Under Section 106, "historic properties" refers to both types of cultural resources: archaeological and historic architectural properties. There are no archaeological differentiators associated with the Project alternatives; therefore, archaeology is not discussed further in this Summary Report.

The APE for historic architecture (also known as built environment) is 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 (36 CFR Section 800.13[d]). The APE allows the analysis to address potential effects on historic properties that could be caused by Project activities other than the area of direct physical impact of the undertaking, such as visual or vibration effects.

On June 28, 2010, in accordance with 36 CFR Section 800.4 and the Programmatic Agreement (PA), the State Historic Preservation Officer (SHPO) concurred that the Historic Architecture APE initially delineated for the Fresno to Bakersfield Section was appropriate. Since the SHPO concurred with the initial APE, the Project Footprint has been refined and revised by the engineering team as specific construction details have become better defined (see Chapter 2, Alternatives, of the Revised DEIR/Supplemental DEIS [Authority and FRA 2012f]). As a result, the APE was updated to reflect the current design. SHPO concurred with the revised APE and conclusions of the technical reports on February 6, 2012.

Further refinements to the alignment since October 2011 precipitated additional updates of the APE and the preparation of supplemental technical reports. SHPO concurred with the NRHP eligibility of Section 106 historic resources in the supplemental technical reports on April 2, 2013, and requested additional information regarding Salón Juárez associated with the Bakersfield Hybrid Alternative.

The current APE for historic architectural resources is described below. The APE for the Project begins at the terminus of the Merced to Fresno Section, south of the Fresno Station, near Los Angeles Street in Fresno and extends to Oswell Street in Bakersfield.

Section 3.17, Cultural and Paleontological Resources, of the Revised DEIR/Supplemental DEIS (Authority and FRA 2012d) describes the regulatory setting and affected environment for historic architecture and identifies potential construction and Project period impacts and associated mitigation measures. The surveys conducted for the Fresno to Bakersfield Section of the HST System identified a population of more than 400 resources; from that population, 62 properties that were evaluated and were 50 years of age or older at the time of the survey are considered historic properties or historical resources—that is, considered eligible for listing in the National Register of Historic Places (NRHP) (Authority and FRA 2011c, 2012f). Of the 62 resources, 35 were listed, have been determined eligible for listing, or appear to be eligible for listing in the NRHP.

The majority of the overall built-environment resources (both eligible and ineligible resources) date to the twentieth century. Roughly 308 of these historic properties/historical resources date to the twentieth century, with about 102 built between 1900 and 1919, and about 142 dating from between 1920 and 1961. Of the 62 identified historic properties/historical resources, about 14 were constructed between 1870 and 1899. The types of historic properties or historical resources within the APE include dwellings, industrial buildings, commercial buildings, downtown districts, farms, canals, rural landscapes, dams, bridges, roads, and other facilities.

5.4.7.2 Mitigation Measures for Direct, Indirect, and Cumulative Impacts

The following mitigation measures identified in Section 3.17.6.2, Historic Architectural Resources, of the Revised DEIR/Supplemental DEIS [Authority and FRA 2012f]) have been developed to address adverse effects and compensate for impacts on historic architectural resources that cannot be avoided:

- CUL-MM#6: Monitor adverse construction vibration effects to ensure that damaging vibration levels are avoided.
- CUL-MM#7: Develop protection and/or stabilization measures.
- CUL-MM#9: Minimize adverse effects through relocation of historic structures.
- CUL-MM#10: Minimize adverse operational noise effects (e.g., noise walls).
- CUL-MM#11: Prepare and submit Historic American Building Survey, Historic American Engineering Record, or Historic American Landscape Survey documentation.
- CUL-MM#12: Prepare historic structure reports.
- CUL-MM#13: Prepare interpretive exhibits.
- CUL-MM#14: Plan repair of inadvertent damage.

Cumulative impacts on cultural resources would be minimized by adhering to federal, state, and local regulations and by providing guidance on the treatment of significant properties (as defined in Section 106). Implementation of the mitigation measures for cultural resources described above will minimize impacts and develop protection measures, thereby reducing cumulative impacts.

5.4.8 Community Resources and Environmental Justice

5.4.8.1 Affected Environment

Section 3.12, Socioeconomics, Communities, and Environmental Justice, of the Revised DEIR/Supplemental DEIS (Authority and FRA 2012d) describes the regulatory setting and affected environment for community resources and environmental justice, and the *Fresno to Bakersfield Section: Community Impact Assessment Technical Report* (Authority and FRA 2012k) provides additional details.

The study area for direct and indirect impacts on communities and environmental justice is defined as the 0.5-mile radius from the centerline of all proposed Project alternatives and a 0.5-mile radius around all proposed station locations, or access points, and other support facilities. The 0.5-mile-radius study area includes portions of six cities (Fresno, Hanford, Corcoran, Wasco, Shafter, and Bakersfield), three communities (Laton, Grangeville, and Armona), and several smaller communities. Most of the residents, businesses, and community resources in the study area are in the largest two cities in the region, Fresno and Bakersfield.

Some of the Project alternatives pass through the cities of Fresno, Wasco, Shafter, and Bakersfield. The remainder of the study area consists mostly of rural agricultural land with few concentrations of residences, businesses, or services, and community facilities. The historical and continued dominance of agriculture in the region has created strong ties between agricultural communities throughout the region, even though those communities are dispersed throughout the area.

The region as a whole has a high percentage of minority and low-income individuals. For the environmental justice (EJ) analysis, minority persons were defined as individuals identified as non-White and Hispanic or Latino in the 2000 Census. According to the 2000 Census, 56.5% of the total regional population is minority, and 22.2% is living below the U.S. Census poverty threshold. Within the 0.5-mile EJ study area, these percentages are even higher in some locations, with minority and low-income individuals totaling 68.7% and 28.2% of the EJ study area population, respectively.

Overall, the census blocks in the EJ study area total 350.4 square miles, and 112.3 square miles (or 32.1%) of this area are identified as census blocks containing communities of concern (the reference community for the EJ analysis). The vast majority of these blocks with EJ populations are very large and rural, with low-density populations (102.8 of the 112.3 square miles). Only 9.5 square miles (or 8%) of the EJ study area blocks encompass more urbanized populations (U.S. Census Bureau 2000).

Hispanics are the predominant minority group in the EJ study area, accounting for 80% of the minority population (U.S. Census Bureau 2000). In the California Central Valley, a large majority of the farm workers have traditionally been from minority groups, so it is not surprising to find large concentrations of communities of concern in the region.

The region's cities—Fresno, Hanford, Corcoran, Wasco, Shafter, and Bakersfield—also have many communities of concern, defined as communities with high proportions of minority and low-income populations.

5.4.8.2 Mitigation Measures for Direct, Indirect, and Cumulative Impacts

As described in Section 3.15.6, Project Design Features, of the Revised DEIR/Supplemental DEIS (Authority and FRA 2012d), the Authority must comply with the Uniform Relocation Assistance and Real Property Acquisition Policies Act, as amended. The act requires that the owning agency provide notification to all affected property owners of the agency's intent to acquire an interest in their properties. This notification includes a written offer letter of just compensation.

A right-of-way specialist is assigned to assist each property owner through the acquisition process. The Uniform Relocation Assistance and Real Property Acquisition Policies Act also provides benefits to displaced individuals to assist them financially with advisory services related to relocating their residences or business operations. Benefits are available to both owner occupants and tenants of either residential or business properties.

The Authority will minimize the impacts on residential housing displacement by conducting special outreach to affected homeowners and residents to fully understand their individual relocation needs. The Authority will make every effort to locate suitable replacement properties that are comparable to those currently enjoyed by these residents, including constructing suitable replacement facilities, if necessary. In cases where residents wish to remain in the vicinity of their present homes, the Authority will take measures to purchase vacant land or buildings in the area and consult with local authorities over matters such as zoning, permits, the moving of homes, and the replacement of services and utilities, as appropriate.

The Authority will also conduct community workshops with those homeowners whose properties would not be acquired but whose community would be substantially altered by construction of HST facilities (e.g., the loss of many neighbors). The workshops will be held to obtain input about measures that could be taken to mitigate impacts on those who remain (including placement of sound walls and landscaping and the potential uses of remnant parcels in ways that could benefit the community in the long term).

Mitigation Measures SO-MM#1, SO-MM#2, and SO-MM#3 will provide mitigation for the division of existing communities in unincorporated areas east of Hanford, northeast of Corcoran and south of Shafter (e.g., Crome) and in the Northwest and Northeast districts in Bakersfield. The Authority will minimize the impacts resulting from disruption of key community facilities by consulting with these respective parties and conducting community workshops and other types of community outreach before land acquisition. This outreach effort will help the Authority assess potential opportunities to reconfigure land use and buildings and/or relocate affected facilities, as necessary, to minimize the disruption of facility activities and services, and to ensure relocation that allows the community currently served to continue to access these services. The Authority will be responsible for implementing the results of the community workshops through Project design and long-term management.

Because many of these community facilities are in Hispanic communities, the Authority will continue its comprehensive Spanish-language outreach program for these communities before land acquisition begins. This program will facilitate the identification of approaches that would maintain continuity of operation and allow space and access for the types of services currently provided and planned for these facilities. Also, to avoid disruption to these community amenities, the Authority will ensure that all reconfiguring of land uses or buildings or relocating of community facilities is completed before the demolition of any existing structures.

Mitigation Measure SO-MM#4 also identifies measures to reduce the impacts associated with the displacement of religious facilities. Two mitigation measures will reduce environmental justice impacts and mitigate for impacts on environmental resources and environmental impacts described in the Revised DEIR/Supplemental DEIS (Authority and FRA 2012d). SO-MM#6 will require the Authority to continue outreach to disproportionately and negatively impacted EJ communities of concern, and SO-MM#7 will require the development of measures to minimize the potential for physical deterioration in EJ communities.

The Uniform Relocation Assistance and Real Property Acquisition Policies Act, as amended, requires full compensation for any property acquisition, including housing of last resort. The Authority will coordinate with the City and County of Fresno and the Cities of Corcoran and Bakersfield to phase the timing of construction of the HST alternative to minimize cumulative construction period impacts on these communities. Also, Mitigation Measure CUM-SO-MM#1 requires coordination of overlapping construction activities within the same area, and Mitigation Measure CUM-SO-MM#2 requires the Authority to undertake targeted environmental justice outreach for areas with potential overlapping construction schedules.

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Chapter 6.0

Comparative Analysis of Impacts on Non-Aquatic Resources for All Project Alternatives

6.0 Comparative Analysis of Impacts on Non-Aquatic Resources for All Project Alternatives

This chapter provides comparative analyses of biological resources, including riparian areas, special-status plant species, and special-status wildlife species, and including wildlife corridors. It also includes comparative analyses of other, differentiating impacts related to non-biological resources, such as Section 4(f) uses, transportation and traffic; noise and vibration; agriculture; parks, recreation, and open space; aesthetics and visual resources; cultural resources; community resources; and the potential for uses of resources protected by Section 4(f). Impacts are described both in terms of direct and indirect impacts for non-aquatic biological resources and in terms of *construction period* and *project period* impacts for non-biological resources.

Construction period and project period impacts for non-biological resources are defined in the Revised DEIR/Supplemental DEIS as follows:

- *Construction Period Impacts* – Temporary (short-term and long-term) impacts associated with the construction of the selected HST alternative. The construction period includes testing of the HST System before passenger service begins.
- *Project Impacts* – Permanent impacts related to the project operation and maintenance of the HST System. Project operations include HST System operations and related project improvements, such as roadway modifications, maintenance of power supply components, and maintenance of the HST, including the HMF site operations. Some permanent impacts initially occur during construction, but because they are permanent, they are associated with the project impacts (e.g., conversion of agricultural lands to transportation uses).

C*onstruction period* effects and impacts associated with the following resources do not differ significantly by alternative and therefore are not discussed: transportation and traffic; air quality and global climate change; noise and vibration; parks, recreation, and open space; electromagnetic fields and electromagnetic interference (EMF/EMI); public utilities and energy; geology and soils; hazardous materials and wastes; safety and security; socioeconomics, community resources and environmental justice; station planning, land use, and development; agricultural lands; aesthetics and visual resources; archaeological and paleontological resources; regional growth; and cumulative impacts.

Project period effects and impacts associated with the following resources do not differ significantly by alternative and therefore are not discussed: air quality and global climate change; public utilities and energy; geology and soils; hazardous materials and wastes; safety and security; station planning, land use, and development; cultural and paleontological resources; regional growth; and cumulative impacts.

6.1 Hanford Area Alternatives

6.1.1 Biological Resources

6.1.1.1 Riparian Areas

Riparian areas are transitional communities that are located adjacent to aquatic resources, often found on the banks of rivers, above the ordinary high water mark. They are not regulated under Section 404 of the Clean Water Act, however they do receive protection by the state of California under Fish and Game Code Section 1600 et seq. (Lake and Streambed Alteration). Riparian areas provide important functions that contribute to the health and condition of adjacent aquatic ecosystems.

Affected Environment in Hanford Area

There are riparian areas associated with all Hanford area alternatives. All Hanford area alternatives cross the Kings River, which contains riparian vegetation. In addition, riparian areas are associated with Dutch John Cut, Cole Slough, and Guernsey Slough on the BNSF-Hanford East Alternative, and Murphy Slough and Lone Oak Slough on the Hanford West Bypass 1 and 2 alternatives. Cross Creek, just north of Corcoran does not support riparian vegetation.

Riparian areas are generally in relatively fair or good ecological condition based on assessments of the adjacent seasonal riverine areas and adjacent land uses. They are associated with waterways that have varying levels of hydrologic manipulation, provide fair to good biological resources for plants and wildlife, and due to existing land uses in the region, have been physically reduced and restricted to narrow strips along seasonal riverine features.

Direct and Indirect Impacts

All Hanford area alternatives would result in the removal of riparian areas associated with the construction of viaduct or bridge structures. Table 6.1-1 presents a comparison of the quantity of impacts on riparian areas by alternative, in acres. The Hanford West Bypass 1 and 2 alternatives would result in similar quantities of direct permanent, direct temporary, and indirect impacts on riparian areas. The BNSF-Hanford East Alternative would result in the most total direct and indirect impacts on riparian areas (approximately 4 acres more, most of which are associated with indirect impacts).

The BNSF-Hanford East would result in the fewest direct permanent and direct temporary impacts. The BNSF-Hanford East Alternative would result in at least 0.35 acres fewer direct permanent impacts than the Hanford West Bypass 1 and 2 alternatives.

When comparing the Hanford area alternatives with respect to the condition of the riparian areas, all alternatives would affect riparian areas in fair and good relative condition. The BNSF-Hanford East Alternative would result in 0.64 acres more direct permanent impacts on riparian areas in good condition than the Hanford West Bypass 1 and 2 alternatives.

The BNSF-Hanford East Alternative would result in a very small amount of direct temporary impacts, approximately 0.58-0.66 acres less than the Hanford West Bypass 1 and 2 alternatives. However, the direct temporary impacts on riparian areas can be restored following construction through implementation of the mitigation measures identified in Section 5.3.1.2, Mitigation Measures for Direct, Indirect, and Cumulative Impacts.

There are at least 5 acres more indirect impacts with the BNSF-Hanford East Alternative on the riparian area than the other Hanford area alternatives. All Hanford area alternatives cross the riparian areas associated with the Kings River Complex on a viaduct. In all cases, the indirect impacts would not likely result in significant degradation of the adjacent riparian areas.

6.1.1.2 Special-Status Plant Species

Affected Environment in Hanford Area

No special-status plant species surveys have been conducted in the construction and Project Footprints of the Hanford area alternatives. Unsurveyed habitats that have low potential to support special-status plant species are present. However, these unsurveyed areas are mostly small and largely agricultural; therefore, there is a low likelihood that special-status plant species would occur in the Hanford Area alternatives.

Suitable habitats for special-status plant species have been significantly diminished due to land use conversion in the Central Valley, and suitable habitats for and known occurrences of special-status plant species are rare in the Plant Study Area (PSA).

Table 6.1-1
Comparison of Quantity of Impacts on Riparian Areas in the Hanford Area (acres)

Wetlands and Other Waters (TYPE/HST water type)	Impact Type[a]	BNSF–Hanford East (Hanford Proposed Preferred Alternative)	Hanford West Bypass 1, At-Grade Option	Hanford West Bypass 1, Below-Grade Option	Hanford West Bypass 2, At-Grade Option	Hanford West Bypass 2, Below-Grade Option
TOTAL IMPACTS ON RIPARIAN AREAS[b]	Direct permanent	1.06	1.41	1.90	1.41	1.90
	Direct temporary	0.33	0.91	0.99	0.91	0.99
	Indirect	17.76	13.46	13.54	12.03	13.54
GRAND TOTAL		**19.15**	**15.78**	**16.44**	**14.35**	**16.44**

Notes:
= least-impact alternative
— = no impact or not applicable
[a] Indirect impacts are calculated within a 250-foot buffer of the Project Footprint (including areas of permanent and temporary impacts) and areas outside of vernal pools and swales intersected by the construction footprint.
[b] Calculations are based on raw, unrounded Geographic Information System (GIS) source data. As a result, the subtotals and totals may not match the rounded feature values because of the number of aquatic features. These minor discrepancies may result in small differences in the presentation of the acreage.
Impact calculations in this table include Project alternatives and station alternatives, but do not include heavy maintenance facility site alternatives.
All impacts were calculated based on the Final EIR/EIS 15% engineering design Project footprint.

Direct and Indirect Impacts

Table 6.1-2 lists the potential permanent and temporary impacts (in acres) on special-status plant species within the Project Footprint of each of the Hanford area alternatives.

No special-status plant species were observed in the PSA of the Hanford area alternatives. Unsurveyed habitats that have the potential to support special-status plant species were identified, but the potential for special-status plants to occur in these areas is low because the areas are fragmented, small, and surrounded by agricultural land uses. In addition, many of these areas have been previously disturbed and have reverted back to annual grasslands that exhibit some ruderal characteristics. Given the known range of the federally listed species along with their habitat preferences, there is low potential for federally listed species to occur within the Project Footprint of each of the Hanford area alternatives.

The BNSF-Hanford East Alternative and Hanford West Bypass 1 would result in the similar amounts of disturbance to unsurveyed potential suitable habitat that could support special-status plants species. These alternatives would result in approximately 8 acres fewer direct permanent impacts on lands that have a potential to support special-status plant species than the alternative with the third fewest direct permanent impacts.

Through implementation of the mitigation measures listed in Section 5.3.2.2, Mitigation Measures for Direct, Indirect, and Cumulative Impacts, impacts on special-status plants would be minimized through completion of floristic surveys that will identify locations where the salvage, relocation, and propagation plan will be implemented (avoidance and minimization of impacts) to offset the loss and disturbance of special-status plants species and through offsite mitigation that will preserve populations of the affected species. These measures would reduce impacts on special-status plant species and would result in minimal regional effects.

Table 6.1-2
Impacts on Special-Status Plant Species in the Hanford Area Alternatives (acres)

Special-Status Plants	Impact Type	BNSF–Hanford East (Hanford Proposed Preferred Alternative)	Hanford West Bypass 1 Alternative	Hanford West Bypass 1 Alternative Modified	Hanford West Bypass 2 Alternative	Hanford West Bypass 2 Alternative Modified
Unsurveyed potential suitable habitat that could support special-status plant species	Permanent	42.37	42.94	50.96	55.26	88.31
	Temporary	3.77	15.13	10.43	31.20	8.64

Notes:
▭ = least-impact alternative
— = no impact or not applicable
All impacts were calculated based on the FEIR/FEIS 15% engineering design Project footprint.

6.1.1.3 Special-Status Wildlife Species

Affected Environment in Hanford Area

The Hanford area alternatives are in a rural setting dominated by agricultural land uses. Suitable habitats for special-status amphibian, reptile, bird, and mammal species as well as native fauna species are present, although limited. Suitable habitats for special-status wildlife have been significantly reduced throughout the Central Valley, and natural areas that remain are largely disturbed and fragmented.

Impacts on terrestrial special-status wildlife species are the focus of this section. Impacts on aquatic resources are described in Section 4.2.2.2, Comparison of Direct and Indirect Impacts, and impacts on riparian areas are described above. Impacts on aquatic resources and riparian areas may also result in impacts on special-status wildlife species that use those areas, like special-status bird species, vernal pool branchiopods, or the valley elderberry longhorn beetle.

The majority of the habitats present in the Hanford Area Habitat Study Area (HSA) are agricultural lands, which provide little value for special-status species.

A small amount of suitable habitat (i.e., other seasonal wetlands, annual grasslands) for vernal pool fairy shrimp, vernal pool tadpole shrimp, western spadefoot toad, California tiger salamander, coast horned lizard, and western pond turtle is present in the Hanford Area HSA. Elderberry shrubs, the sole host plant of the valley elderberry longhorn beetle, could be present within the riparian areas associated with the Kings River Complex and other aquatic resources. Special-status fish species are not expected to occur within any of the Hanford area alternatives because the streams within these alternatives are inaccessible either because of extensive water diversions and in-stream obstructions to migratory movement or because they are outside the range of special-status fish species.

The Hanford Area contains suitable habitat (including both natural habitats and agricultural land uses) for breeding, foraging, dispersal, and migration of a variety of special-status bird and mammal species (e.g., Tipton kangaroo rat and the San Joaquin kit fox).

Direct and Indirect Impacts

The Hanford area alternatives would result in direct impacts on habitats that could support a number of special-status wildlife species. Table 6.1-3 presents a comparison of the quantity of impacts on habitats by alternative, in acres. Of the habitats present, annual grassland and pasture provide the best potential to host terrestrial special-status wildlife species.

When comparing the Hanford area alternatives, the BNSF-Hanford East Alternative impacts the smallest amount of annual grassland habitat, resulting in at least 18.04 acres fewer direct permanent impacts and at least 5.28 acres fewer direct temporary impacts. Impacts on pasture are slightly higher for the BNSF-Hanford East Alternative than for the Hanford West Bypass 2 Alternative (10.52 acres more direct permanent and 5.28 acres more direct temporary impacts). The BNSF-Hanford East would have the 1.89 fewer acres of direct permanent impacts on valley oak woodland.

Project activities associated with the Hanford area alternatives would result in similar impacts on barren, urban, and agricultural habitat types. The Hanford West Bypass 1 and 2 alternatives would result in the smallest impact on agricultural lands and urban habitats, while the BNSF-Hanford East Alternative would impact the least amount of barren habitats. Impacts on Agricultural Lands, as identified by biologists and as described in *A Guide to Wildlife Habitats of California* and the California Wildlife Habitat Relationship System (Mayer and Laudenslayer 1988; CDFG 2008), are discussed in this section, whereas impacts on Important Farmland, Williamson Act land, and Farmland Security Zone (FSZ) lands are presented in Section 6.1.1.3, Special-Status Wildlife Species.

To reduce additional impacts on suitable habitats to the greatest extent feasible, mitigation measures require avoidance of habitat, where possible, or reduction of impacts through pre-construction or protocol-level surveys before ground disturbance to identify locations where special-status species are present.

Minimization measures include, but are not limited to, the installation of fencing to exclude species from the Project area, establishment and monitoring of non-disturbance buffers, or species relocation. Mitigation also includes compensation for unavoidable adverse impacts, including loss of habitat. After mitigation, the impacts of all alternatives on special-status wildlife species are approximately equivalent.

Table 6.1-3
Impacts on Terrestrial Habitats in the Hanford Area Alternatives (acres)

Habitat Type		Impact Type[a]	BNSF–Hanford East (Hanford Proposed Preferred Alternative)	Hanford West Bypass 1 Alternative	Hanford West Bypass 1 Alternative Modified	Hanford West Bypass 2 Alternative	Hanford West Bypass 2 Alternative Modified
Terrestrial Communities	Barren	Permanent	2.35	1.94	1.72	7.80	9.06
		Temporary	86.98	0.08	0.26	—	—
	Urban	Permanent	220.48	216.49	214.49	213.80	217.60
		Temporary	56.32	31.42	33.38	34.70	36.89
	Agricultural Lands	Permanent	953.76	670.35	726.13	665.90	765.42
		Temporary	441.30	108.52	104.42	109.48	175.20
	Annual Grassland	Permanent	17.78	35.82	42.90	43.20	60.78
		Temporary	0.48	13.36	8.43	14.01	5.76
	Valley Oak Woodland	Permanent	—	1.89	1.89	1.89	1.89
		Temporary	—	—	—	—	—
	Pasture	Permanent	15.07	9.99	11.29	4.55	9.28
		Temporary	5.55	0.34	0.13	0.34	0.11

Notes:
= least-impact alternative
— = no impact or not applicable
[a] All impacts were calculated based on the Final EIR/EIS 15% engineering design Project footprint.

6.1.1.4 Wildlife Corridors

Affected Environment in Hanford Area

The Hanford area alternatives traverse the Kings River, St. John's River–Cross Creek, Tule River, and SR 43 / SR 155 habitat linkages (Figure 5-2).

Direct and Indirect Impacts

Impacts on wildlife movement corridors would be similar for all Hanford area alternatives. Generally, direct impacts include the obstruction of wildlife movement because of project infrastructure, security fencing, and construction fencing. Indirect impacts may occur as a result of noise, vibration, or visual or light pollution that could result in temporary shifts in use of corridors, foraging patterns, or territories; nursery or rookery abandonment; or increased predation.

On the BNSF-Hanford East and the Hanford West Bypass 1 and 2 alternatives, where the tracks would be constructed on elevated structures (such as over the King's River linkage), the Project would have negligible impacts on habitat linkages because the elevated portions of the rail would span several miles and allow for unimpeded wildlife passage. For portions of the all alternatives that are constructed at-grade, dedicated wildlife crossing structures along with other engineering design features (road overcrossings, culverts) are planned to provide important connectivity to habitat linkages that would lose function and to the remaining, degraded habitat linkages between existing natural habitat blocks.

6.1.2 Other Environmental Consequences

This section discusses the environmental consequences that have the potential to differentiate the Hanford area alternatives. These consequences include the following:

- Section 4(f) resources.
- Transportation and traffic (project period impacts).
- Noise and vibration (project period impacts).
- Agricultural lands (project period impacts).
- Cultural resources (construction period impacts).
- Community resources and environmental justice (project period impacts).

6.1.2.1 Section 4(f) Resources

This section describes the revised Section 4(f) analysis for the Hanford area alternatives (see Section 1.6, Technical Updates since the Public Review of the Revised DEIR/Supplemental DEIS, for a summary of the revisions). Note that this section also uses the updated nomenclature for the Hanford West Bypass alternatives associated with the modifications to the below-grade design options to avoid Section 106 historic properties.

All Hanford area alternatives would result in the use of Section 4(f) properties. Table 6.1-4 shows the Section 4(f) property that would incur a use as a result of the BNSF–Hanford East Alternative (Peoples Ditch), the Hanford West Bypass 1 and 2 alternatives (Last Chance Ditch and a farmstead at 9860 13th Avenue in rural Kings County), and the Hanford West Bypass 1 and 2 Modified alternatives (Last Chance Ditch). Table 6.1-4 also characterizes each alternative, using the seven least harm analysis factors. The Revised DEIR/Supplemental DEIS identified a Section 4(f) use to an historic structure at 11029 Kent Avenue under the Hanford West Bypass 1 Alternative. The Authority and FRA have determined that the structure at this property no longer exists and is thus not a Section 4(f) property. Additionally, the Revised DEIR/Supplemental DEIS identified a Section 4(f) use to an historic structure at 13148 Grangeville Boulevard under the Hanford West Bypass 1 and 2 alternatives. These alternatives have been modified to avoid this property; thus it would not incur a Section 4(f) use under any alternative.

Based on the seven factors used to conduct the least harm analysis pursuant to 23 CFR 774.3(c)(1), the FRA's preliminary Least Harm Determination is that a similar level of harm results from the BNSF–Hanford East Alternative and the Hanford West Bypass 2 Modified alternatives when considering all seven least harm analysis factors, as described below.

Table 6.1-4
Preliminary Least Harm Analysis for BNSF–Hanford East Alternative and Hanford West Bypass Alternatives

Least Harm Analysis Factor	BNSF–Hanford East	Hanford West Bypass 1	Hanford West Bypass 1, Modified	Hanford West Bypass 2	Hanford West Bypass 2, Modified
Section 4(f) property(ies) incurring a use	Use of one Section 4(f) property: • Peoples Ditch: Reroute ~1,000 ft of canal.	Use of two Section 4(f) properties: • Last Chance Ditch: Reroute ~ 1 mi of canal. • 9860 13th Avenue: Demolition of structure.	Use of one Section 4(f) property: • Last Chance Ditch: Reroute ~ 1 mi of canal.	Use of two Section 4(f) properties: • Last Chance Ditch: Reroute ~ 1 mi of canal. • 9860 13th Avenue: Demolition of structure.	Use of one Section 4(f) property: • Last Chance Ditch: Reroute ~ 1 mi of canal.
Factor 1: "The ability to mitigate adverse impacts on each Section 4(f) property (including any measures that result in benefits to the property)."	Canal impact would be mitigated in a similar manner under all alternatives; remaining canal segments would retain their integrity.	Canal impact would be mitigated in a similar manner under all alternatives; remaining canal segments would retain their integrity. Impacts cannot be mitigated for demolished structure.	Canal impact would be mitigated in a similar manner under all alternatives; remaining canal segments would retain their integrity.	Canal impact would be mitigated in a similar manner under all alternatives; remaining canal segments would retain their integrity. Impacts cannot be mitigated for demolished structure.	Canal impact would be mitigated in a similar manner under all alternatives; remaining canal segments would retain their integrity.
Factor 2: "The relative severity of the remaining harm, after mitigation, to the protected activities, attributes, or features that qualify each Section 4(f) property for protection."	Unaffected canal segments would retain their integrity. Would not result in a use of any additional historic structures.	Unaffected canal segments would retain their integrity. Mitigation would not reduce overall harm to the structure, as it would be demolished.	Unaffected canal segments would retain their integrity. Would not result in a use of any additional historic structures.	Unaffected canal segments would retain their integrity. Mitigation would not reduce overall harm to the structure, as it would be demolished.	Unaffected canal segments would retain their integrity. Would not result in a use of any additional historic structures.

Table 6.1-4
Preliminary Least Harm Analysis for BNSF–Hanford East Alternative and Hanford West Bypass Alternatives

Least Harm Analysis Factor	BNSF–Hanford East	Hanford West Bypass 1	Hanford West Bypass 1, Modified	Hanford West Bypass 2	Hanford West Bypass 2, Modified
Factor 3: "The relative significance of each Section 4(f) property."	Peoples Ditch: This property is significant due to its association with the agricultural settlement pattern in the Mussel Slough region circa 1870s as a result of local pioneering canal systems and its association with the Mussel Slough Tragedy in 1880. The significance of this property is similar to that of Last Chance Ditch, which is also significant for its association with these same events.	Last Chance Ditch: This property is significant due to its association with the agricultural settlement pattern in the Mussel Slough region circa 1870s as a result of local pioneering canal systems and its association with the Mussel Slough Tragedy in 1880. The significance of this property is similar to that of Peoples Ditch, which is also significant for its association with these same events. 9860 13th Ave: This historic property is significant because it is being recommended as eligible for inclusion on the NRHP for its association with settlement of the Mussel Slough area and as a significant local example of folk Queen Anne architecture.	Last Chance Ditch: This property is significant due to its association with the agricultural settlement pattern in the Mussel Slough region circa 1870s as a result of local pioneering canal systems and its association with the Mussel Slough Tragedy in 1880. The significance of this property is similar to that of Peoples Ditch, which is also significant for its association with these same events.	Last Chance Ditch: This property is significant due to its association with the agricultural settlement pattern in the Mussel Slough region circa 1870s as a result of local pioneering canal systems and its association with the Mussel Slough Tragedy in 1880. The significance of this property is similar to that of Peoples Ditch, which is also significant for its association with these same events. 9860 13th Ave: This historic property is significant due because it is being recommended as eligible for inclusion on the NRHP for its association with settlement of the Mussel Slough area and as a significant local example of folk Queen Anne architecture.	Last Chance Ditch: This property is significant due to its association with the agricultural settlement pattern in the Mussel Slough region circa 1870s as a result of local pioneering canal systems and its association with the Mussel Slough Tragedy in 1880. The significance of this property is similar to that of Last Chance Ditch, which is also significant for its association with these same events.

Table 6.1-4
Preliminary Least Harm Analysis for BNSF–Hanford East Alternative and Hanford West Bypass Alternatives

Least Harm Analysis Factor	BNSF–Hanford East	Hanford West Bypass 1	Hanford West Bypass 1, Modified	Hanford West Bypass 2	Hanford West Bypass 2, Modified
Factor 4: "The views of the official(s) with jurisdiction over each Section 4(f) property."	SHPO concurred with the NRHP eligibility of the canal on February 6, 2012. The effect on the canal pursuant to Section 106 of the NHPA is pending.	SHPO concurred with the NRHP eligibility of the canal on April 2, 2013. The effect to the canal pursuant to Section 106 of the NHPA is pending. SHPO concurred with the NRHP eligibility of the historic structure on April 2, 2013. The effect on the structure pursuant to Section 106 of the NHPA is pending.	SHPO concurred with the NRHP eligibility of the canal on April 2, 2013. The effect on the canal pursuant to Section 106 of the NHPA is pending.	SHPO concurred with the NRHP eligibility of the canal on April 2, 2013. The effect on the canal pursuant to Section 106 of the NHPA is pending. SHPO concurred with the NRHP eligibility of the historic structure on April 2, 2013. The effect on the structure pursuant to Section 106 of the NHPA is pending.	SHPO concurred with the NRHP eligibility of the canal on April 2, 2013. The effect on the canal pursuant to Section 106 of the NHPA is pending.
Factor 5: "The degree to which each alternative meets the purpose and need for the project."	Meets the project purpose and need. Highest travel time (8 minutes and 17 seconds).	Meets the project purpose and need. Lower travel time than BNSF-Hanford East Alternative, higher than HW2 (8 minutes and 2 seconds).	Meets the project purpose and need. A travel time for the modified HW1 has not been determined, but given its similarity to the alignment profile of modified HW2 and the unmodified HW1 and HW2, the travel time is assumed to fall within the range of the travel times for those alternatives. This range results in a travel time of between 8 minutes and 2 seconds and 7 minutes and 43 seconds. This alternative would not connect to the Proposed Preferred Alternative in Corcoran.	Meets the project purpose and need. Lowest travel time (7 minutes and 43 seconds).	Meets the project purpose and need. A travel time for the modified HW2 has not been determined, but given its similarity to the alignment profile of the modified HW1 and unmodified HW1 and HW2, the travel time is assumed to fall within the range of the travel times for those alternatives. This range results in a travel time of between 8 minutes and 2 seconds and 7 minutes and 43 seconds.

Table 6.1-4
Preliminary Least Harm Analysis for BNSF–Hanford East Alternative and Hanford West Bypass Alternatives

Least Harm Analysis Factor	BNSF–Hanford East	Hanford West Bypass 1	Hanford West Bypass 1, Modified	Hanford West Bypass 2	Hanford West Bypass 2, Modified
Factor 6: "After reasonable mitigation, the magnitude of any adverse impacts on resources not protected by Section 4(f)." [a]	• Impacts 1,057 acres of important agricultural land. • Modification of 5 confined animal facilities (dairies). • No impacts on wetlands. • Impacts 63.93 acres of waters of the U.S. and riparian areas. • Impacts 2.66 acres of sensitive species habitat (e.g., natural habitat). • Requires relocation of 62 residences. • Displaces 3 commercial/industrial businesses • Impacts on Lakeside Cemetery as a community facility. • Noise and vibration impacts on 178 receivers.	• Impacts 853 acres of important agricultural land. • Closure of one and modification of one confined animal facility (dairy). • Impacts on 1.06 acres of wetlands. • Impacts 52.92 acres of waters of the U.S and riparian areas. • Impacts 64.88 acres of sensitive species habitat (e.g., natural land). • Requires relocation of 52 residences. • Displaces 7 commercial/ industrial businesses • No impacts on community facilities. • Noise and vibration impacts on 231 receivers.	• Impacts approximately 853 acres of important agricultural land. • Closure of one and modification of one confined animal facility (dairy). • Impacts on approximately 1.06 acres of wetlands. • Impacts approximately 52.92 acres of waters of the U.S and riparian areas. • Impacts approximately 64.88 acres of sensitive species habitat (e.g., natural land). • Requires relocation of approximately 52 residences • Displaces 7 commercial/industrial businesses • No impacts on community facilities. • Noise and vibration impacts on approximately 231 receivers.	• Impacts 809 acres of important agricultural land. • Modification of one confined animal facility (dairy). • Impacts 1.37 acres of wetlands. • Impacts 61.17 acres of waters of the U.S and riparian areas. • Impacts 71.70 acres of sensitive species habitat (e.g., natural land). • Requires relocation of 50 residences. • Displaces 7 commercial/industrial businesses • No impacts on community facilities. • Noise and vibration impacts on approximately 287 receivers	• Impacts approximately 809 acres of important agricultural land. • Modification of one confined animal facility (dairy). • Impacts approximately 1.37 acres of wetlands. • Impacts approximately 61.17acres of waters of the U.S and riparian areas • Impacts approximately 71.70 acres of sensitive species habitat (e.g., natural land). • Requires relocation of approximately 50 residences. • Displaces 7 commercial/industrial businesses • No impacts on community facilities. • Noise and vibration impacts on approximately 287 receivers.

Table 6.1-4
Preliminary Least Harm Analysis for BNSF–Hanford East Alternative and Hanford West Bypass Alternatives

Least Harm Analysis Factor	BNSF–Hanford East	Hanford West Bypass 1	Hanford West Bypass 1, Modified	Hanford West Bypass 2	Hanford West Bypass 2, Modified
Factor 7: "Substantial differences in costs among the alternatives."	If the BNSF-Hanford East Alternative is used through Corcoran (i.e., at-grade on west side of BNSF Railway tracks), HW1 must be used around Hanford. In this scenario, the BNSF-Hanford East Alternative is estimated to cost $23M to $73M more than HW1. If the Corcoran Bypass Alternative is used, HW2 must be used. In this case, the BNSF-Hanford East Alternative is estimated to cost approximately $5M to $55M more than the Hanford West Bypass alternatives.	Estimated to cost $23M to $73M less than BNSF-Hanford East Alternative.	Given that the modified HW1 is most similar to the cost estimate for the unmodified HW1, it is assumed that the cost would be in a commensurate range (i.e., $23M to $73M less than the BNSF-Hanford East Alternative).	Estimated to cost $5M to $55M less than the BNSF -Hanford East Alternative.	Given that modified HW2 is most similar to the cost estimate for the unmodified HW2, it is assumed that the cost would be in a commensurate range (i.e., $5M to $73M less than the BNSF-Hanford East Alternative).

Acronyms and Abbreviations:

[a] Impacts on resources not protected by Section 4(f) have not yet been studied in detail for the Hanford West Bypass 1 and 2 Modified alternatives. For purposes of this preliminary analysis, the magnitude of these impacts is estimated to be similar to the Hanford West Bypass 1 and 2 alternatives due to the similarities of the four alternatives. FRA is currently evaluating impacts on these resources and will include this information in the Final Environmental Impact Report/Environmental Impact Statement.

~ = approximately
Ave = Avenue
FRA = Federal Railroad Administration
ft = foot or feet
HW1 = Hanford West Bypass 1 Alternative
HW2 = Hanford West Bypass 2 Alternative
M = million
mi = mile
NHPA = National Historic Preservation Act
NRHP = National Register of Historic Places
SHPO = State Historic Preservation Office(r)

Net Harm to Section 4(f) Property

The least harm analysis in Table 6.1-4 supports a preliminary determination that the Hanford West Bypass 1 and Hanford West Bypass 2 alternatives would likely have the greatest harm, when considering the seven least harm analysis factors. Both of these alternatives would affect canals with the same or a similar level of significance as all other alternatives; however, they would impact an additional historic structure, the structure at 9860 13th Avenue. This structure could be avoided by the BNSF–Hanford East Alternative and the Hanford West Bypass 1 and 2 Modified alternatives.

The preliminary determination is that the BNSF–Hanford East Alternative and the modified Hanford West Bypass 1 and 2, below-grade, alternatives result in a similar level of harm to Section 4(f) properties when considering the seven least harm analysis factors. Each alternative requires the rerouting of one canal segment; the canals have a similar historic association and level of significance, as described in Table 6.1-4 and presented in Section 4.5.2, Cultural Resources, of the Revised DEIR/Supplemental DEIS. The BNSF-Hanford East Alternative would impact the smallest segment of canal (i.e., approximately 1,000 feet compared to approximately 1 mile for the other alternatives). The State Historic Preservation Officer (SHPO) has concurred on the eligibility and significance of these canals, and both canals are significant for similar reasons, as discussed under Least Harm Analysis Factor 3 in Table 6.1-4.

Least Harm Analysis Factors 5, 6, and 7: Non-Section 4(f) Considerations in the Least Harm Analysis

Other least harm analysis factors among the alternatives beyond Section 4(f) are considered by Least Harm Analysis Factors 5, 6, and 7. The Hanford West Bypass 1 Alternative would not connect to the Proposed Preferred Alternative in Corcoran. Travel times for all Hanford area alternatives are within 30 seconds of each other. While an exact travel time has not yet been developed for the Hanford West Bypass 1 and 2 Modified alternatives, the travel times for these alternatives are assumed to fall within the range of the Hanford West Bypass 1 and 2 alternatives, as shown in Table 6.1-4.

The BNSF–Hanford East Alternative results in fewer impacts on wetlands, sensitive species habitat, industrial/commercial businesses, and sensitive noise receivers. It may result in effects on Lakeside Cemetery, and would have the greatest impact on agricultural lands, other waters of the U.S., and riparian areas. This alternative would also have the highest number of residential relocations and the highest costs and impacts on community facilities.

The Hanford West Bypass 1 and 2 Modified alternatives would have greater impacts on sensitive wetlands, species habitat (e.g., natural areas) areas, and on noise/vibration receivers than the BNSF–Hanford East Alternative. The Hanford West Bypass 1 and 2 Modified alternatives would result in fewer impacts on confined animal facilities (e.g., dairies), agricultural lands, other waters of the U.S., riparian areas, and community facilities, and these alternatives would require fewer residential relocations.

The FRA is currently taking into account public comments on the Revised DEIR/Supplemental DEIS and is evaluating the Hanford West Bypass 1 and 2 Modified alternatives in regard to items under Least Harm Analysis Factors 6 and 7 in Table 6.1-4. The FRA will make a final Least Harm Determination as part of the Final EIR/EIS.

6.1.2.2 Transportation and Traffic

This section focuses on Project period impacts, which differ by alternative for transportation and traffic. Construction period impacts do not differ substantially by alternative and are not discussed in this section.

Affected Environment in Hanford Area

The BNSF–Hanford East Alternative; the Hanford West Bypass 1 Alternative, at-grade and below-grade options; and the Hanford West Bypass 2 Alternative, at-grade and below-grade options, generally follow the HST corridor along the existing BNSF tracks, traversing unincorporated, rural agricultural lands while avoiding urban areas within the city of Hanford.

The BNSF–Hanford East Alternative would be served by the Kings/Tulare Regional Station–East Alternative, which would be located in rural agricultural lands 3 miles east of Hanford. The station would be adjacent to the San Joaquin Valley Railroad and northeast of (and would be accessed from) the SR 43 and SR 198 interchange.

The Hanford West Bypass 1 Alternative, at-grade and below-grade options; and the Hanford West Bypass 2 Alternative, at-grade and below-grade options, would be served by the Kings/Tulare Regional Station–West Alternative, which would be located in rural agricultural lands less than 0.5 mile west of Hanford. The station would be adjacent to the San Joaquin Valley Railroad and east of (and would be accessed from) Thirteenth Avenue.

Project Period Impacts

Each Hanford Area alternative would create changes in vehicle movements and flow on highways and roadways in the vicinity of the Kings/Tulare regional station alternatives. Local roadways and intersections would be affected by project-related traffic, either from the addition of station-generated traffic or from diverted traffic near proposed road closures. The Hanford West Bypass 2 Alternative, below-grade option; the Hanford West Bypass 1 Alternative, at-grade and below-grade options; and the Hanford West Bypass 2 Alternative, at-grade option, would each result in five permanent road closures affecting circulation patterns. The BNSF–Hanford East Alternative would result in six permanent road closures affecting circulation patterns.

In the rural areas, the roads proposed for closure have very low traffic volumes, and the necessary traffic diversions and mitigation measures can be implemented without significant adverse effects on travelers. After mitigation, the impacts of all alternatives on traffic and transportation are approximately equivalent.

6.1.2.3 Noise and Vibration

This section focuses on the Project period impacts, which differ by alternative for noise and vibration. Construction period impacts from noise and vibration do not differ substantially by alternative and are not discussed in this section.

Affected Environment in Hanford Area

As described in Section 3.4.5, Environmental Consequences, of the Revised DEIR/Supplemental DEIS (Authority and FRA 2012d), the measured ambient noise levels for the BNSF-Hanford East Alternative, where land uses are primarily agricultural, ranged from 47 to 63 dBA L_{dn}. These noise levels are consistent with a rural environment with some vehicular traffic. Both the Hanford West Bypass 1 Alternative and the Hanford West Bypass 2 Alternative deviate from the BNSF-Hanford East Alternative after crossing Elkhorn Avenue and head south along the western side of Hanford. The land use along these alternatives is primarily agricultural and residential. The measured ambient noise levels along the alternatives ranged from 48 dBA L_{dn} at the mid-end of the alternatives to 77 dBA L_{dn} at the southern end of these alternatives. These noise levels are to be expected for an agricultural environment where irregular farming activities take place.

Project Period Impacts

Under all of the Hanford area alternatives, the HST System would create long-term noise impacts and potential vibration impacts. The BNSF-Hanford East Alternative would result in 178 severely affected receivers. The Hanford West Bypass 2 Alternative, below-grade option, would result in 287 severely affected receivers. The Hanford West Bypass 1 Alternative, at-grade and below-grade options, would result in 232 and 231 severely affected receivers, respectively; and 252 severely affected receivers would result from the Hanford West Bypass 2 Alternative, at-grade option.

The Hanford West Bypass 2 Alternative would affect two fewer sensitive receivers with the at-grade station option, and four fewer receivers with the below-grade option, compared with the BNSF–Hanford East Alternative.

The BNSF-Hanford East Alternative results in long-term noise impacts on substantially fewer receivers than any of the Hanford West alternatives (53 fewer affected receivers than the alternative with the next-lowest effects). The effects on vibration are approximately equivalent for all Hanford area alternatives.

6.1.2.4 Agricultural Lands

This section focuses on Project period impacts, which differ by alternative. Construction period impacts do not differ substantially by alternative and are not discussed in this section. Although property acquisitions would occur before construction, the impacts would be permanent and are therefore discussed as Project period effects.

Affected Environment in Hanford Area

Land types affected by the Hanford area alternatives include Prime Farmland, Farmland of Statewide Importance, Unique Farmland, Farmland of Local Importance, and Grazing Land. Williamson Act land and FSZ lands are also affected. Confined animal facilities are present along the alignment in Kings County. No agricultural conservation easements have been identified within the footprints of these alternatives.

Project Period Impacts

The BNSF–Hanford East Alternative; the Hanford West Bypass 1 Alternative, at-grade option; and the Hanford West Bypass 1 Alternative, below-grade option, would permanently affect 1,057, 842, and 853 acres of agricultural land, respectively (including potential conversion from parcel severance). The Hanford West Bypass 2 Alternative, at-grade option, and the Hanford West Bypass 2 Alternative, below-grade option, would affect the least amount of agricultural lands. These two alternatives would permanently affect 798 and 809 acres of agricultural land, respectively (including potential conversion from parcel severance). Impacts on Important Farmland by alternative are presented in Table 6.1-5.

The BNSF–Hanford East Alternative would impact 600 acres of Williamson Act-prime land and 174 acres of FSZ land. The Hanford West Bypass 1, at-grade option; the Hanford West Bypass 1, below-grade option; the Hanford West Bypass 2, at-grade option, and the Hanford West Bypass 2, below-grade option, would result in conversion of 484, 486, 408, and 410 acres of Williamson Act-prime land, and 49, 48, 89, and 88 acres of FSZ land, respectively.

The Project would affect confined animal operations, and the effects would range in severity, from the potential for relocation of the entire operation or the need to relocate key facilities elsewhere on the operation (e.g., animal holding areas and wastewater treatment lagoons) to minor effects resulting from Project acquisition of non-facility land (i.e., land that does not contain any key facilities used in the operation)[1].The BNSF–Hanford East Alternative would have moderate effects (relocation of facilities at the current location, but operations are likely to continue) on 5 confined animal facilities and negligible effects (no facilities are affected and acquisition of non-facility land would not bisect the operation) on 10 facilities (see Figure 5-4). The Hanford West Bypass 1 Alternative, at-grade and below-grade options, would have severe effects (operations are unlikely to continue in same location) on one confined animal facility, moderate effects on an additional confined animal facility, and negligible effects on four such facilities. The Hanford West Bypass 2 Alternative, at-grade and below-grade options, would have moderate effects on one confined animal facility and negligible effects on three such facilities.

Table 6.1-5
Important Farmland Impacts by Hanford Area Alternative (acres)

Parameter	BNSF-Hanford East Alternative (Preferred Hanford Alternative)	Hanford West Bypass 1 Alternative, At-Grade Option	Hanford West Bypass 1 Alternative, Below-Grade Option	Hanford West Bypass 2 Alternative, At-Grade Option	Hanford West Bypass 2 Alternative, Below-Grade Option
Prime Farmland	390	372	378	364	373
Farmland of Statewide Importance	502	317	322	278	280
Unique Farmland	164	153	153	153	153
Farmland of Local Importance	0	3	3	3	3
Important Farmland Total[A]	**1,057**	**842**	**853**	**798**	**809**

[A] Important Farmland Total includes uneconomic remainder parcels that were not part of the Project Footprint.

For all of the Hanford area alternatives, the Authority will enter into an agreement with the Department of Conservation California Farmland Conservancy Program to preserve farmland. Also, the Project design features will specify that the Authority's right-of-way agents will work with each affected confined animal operator to address issues of concern.

6.1.2.5 Cultural Resources

Construction period impacts on historic architectural resources are the only cultural resources impacts that differentiate the alternatives, and therefore are the only cultural resource impacts discussed below. Construction period impacts for archaeological resources and Project period impacts for archaeological and historic architectural resources do not differ by alternative and therefore are not discussed in this section.

[1] The determination as to whether an operation is likely to continue in the same location and the general severity of the effect in terms of lost economic value and the need for site reconfiguration will be made during negotiations for right-of-way acquisition following the selection of a Preferred Alternative.

Affected Environment in Hanford Area

Surveys conducted in the Hanford area identified 52 built environment resources that were more than 50 years old at the time of survey but that did not meet the criteria for listing in the NRHP or the California Register of Historical Resources (CRHR) at the local, state, or national level. Six historic architectural resources were determined to be eligible for listing or appeared to be eligible for listing in the NRHP.

Construction Period Impacts

As listed in Table 6.1-6, the BNSF–Hanford East Alternative and the Hanford West Bypass 1 and 2 Modified alternatives, below-grade options, would have direct adverse effects on one Section 106 historic property and indirect adverse effects on one additional Section 106 property. The unmodified Hanford West Bypass 1 and 2 alternatives, at-grade options, would result in direct adverse effects on two Section 106 resources and indirect adverse effects on one additional Section 106 property. Since the publication of the Revised DEIR/Supplemental DEIS, the historic property at 11029 Kent Avenue has been demolished and is therefore no longer a Section 106 resource.

Table 6.1-6
Historic Architectural Resources Affected by the Hanford Area Alternatives

Section 106 Historic Resource	Direct Effect	Indirect Effect
BNSF–Hanford East Alternative (Preferred Hanford Alternative)		
Peoples Ditch, rural Kings County	Physical alteration, canal re-alignment, including partial demolition of canal property caused by HST and roadway structure	—
Lakeside Cemetery Kent Ave., rural Kings County	—	Visual effect on HST, roadway structure, radio towers, alteration to access
Hanford West Bypass 1 Alternative and Hanford West Bypass 2		
Last Chance Ditch, rural Kings County	Physical alteration; canal realignment; partial demolition of canal; caused by HST and roadway structure	—
Farmstead, 13148 Grangeville Blvd, Kings County	—	Visual effect of adjacent roadway structure and HST
Farmstead, 9860 13th Ave, rural Kings County	Physical alteration, demolition of buildings and parcel take, alteration of adjacent historic canal; adjacent roadway structure, etc.	
Hanford West Bypass 1 Modified Alternative and Hanford West Bypass 2 Alternative Modified		
Last Chance Ditch, rural Kings County	Physical alteration, canal realignment; partial demolition of canal property caused by HST and roadway structure	—
Farmstead, 9860 13th Ave, rural Kings County	—	Visual effect of below-grade HST and adjacent roadway structure
— = no impact or not applicable		

6.1.2.6 Community Resources and Environmental Justice

This section focuses on Project period impacts, which differ by alternative for community resources and environmental justice. Construction period impacts on community resources and environmental justice do not differ substantially by alternative. Therefore, construction period impacts are not discussed in this section.

Although property acquisitions would occur before construction, the impacts would be permanent and are therefore discussed as Project period effects.

Affected Environment in Hanford Area

Section 3.12, Socioeconomics, Communities, and Environmental Justice, of the Revised DEIR/Supplemental DEIS (Authority and FRA 2012d) describes the affected environment for community resources, and the *Fresno to Bakersfield Section: Community Impact Assessment Technical Report* (Authority and FRA 2012i) provides additional details.

The city of Hanford is the largest community in Kings County, with over 50,000 residents and 18,000 housing units. The occupational profile of the city is similar to that of Kings County and the region, with 15.4% of the workforce employed in agriculture-related jobs. The area northeast of the city contains several small unincorporated communities and clusters of rural residences. No key community facilities are in the study area.

Laton is a small rural town in the south-central portion of Fresno County, just north of the Kings River. Laton has approximately 1,200 residents and almost 400 housing units, and the local economy is based on agriculture.

Grangeville is a small rural town in Kings County, 1.9 miles north of the community of Armona and approximately 4.5 miles west of Downtown Hanford. Grangeville has approximately 650 residents and over 200 housing units. The community is surrounded by fruit and nut orchards; buildings in the study area include a church and Pioneer Union Elementary School.

The community of Armona is west of the city of Hanford on the SR 198 corridor; Armona has over 3,200 residents and 1,000 housing units. The local economy is based on agriculture, and the community is surrounded by fruit and nut orchards. The community includes one fire station, three public schools, eight churches, and one community park.

Hamblin and the Ponderosa Road neighborhoods are rural residential areas on the outskirts of Hanford, and both have between 20 and 50 residences each. The one community facility identified in the study area in the vicinity of Ponderosa is Kit Carson Elementary School.

The study area between the cities of Hanford and Corcoran is entirely within Kings County; it runs parallel to SR 43 through a rural agricultural area. The community of El Ranchero lies south of Lacey Boulevard about 1 mile east of Hanford; the estimated population of El Ranchero is 400 residents, and the community has 125 housing units.

Project Period Impacts

All of the Hanford area alternatives have the potential to result in both beneficial and adverse long-term effects on social conditions and the quality of life experienced by residents of the communities and neighborhoods in the study area. Adverse impacts for the Hanford area are described below.

Community Resources

The BNSF–Hanford East Alternative would displace 62 residential housing units. Under the Hanford West Bypass 1 Alternative, 53 housing units would be displaced with the at-grade option and 52 housing units would be displaced with the below-grade option. Under the Hanford West Bypass 2 Alternative, at-grade option, 51 housing units would be displaced, and 50 housing units would be displaced with the below-grade option.

All areas with residential displacements have vacant residences in excess of the estimated number of displacements, except in the Ponderosa area, where few comparable, vacant, developed rural residential homes would be available as replacement properties. Up to half of the existing homes would be displaced, and the remaining homes would be less than 200 feet from the HST guideway and would experience increased traffic, noise, and visual impacts. However, there are few suitable areas zoned for this type of replacement housing. As such, it may be necessary to construct housing, including rehabilitation of existing housing or relocation of disrupted residential areas to newly constructed housing elsewhere in the vicinity.

Two commercial and industrial units, neither of which is in Hanford, would be displaced and relocated under the BNSF–Hanford East Alternative. A third unit, Baker Commodities, is an animal carcass processing facility. Some structures within this facility would be displaced but can be relocated within the facility property. The wastewater ponds associated with this facility would not be displaced and would be reconnected to the relocated facilities.

Seven businesses would be displaced under the Hanford West Bypass 1 Alternative, at-grade and below-grade options. Seven commercial and industrial units would be displaced under the Hanford West Bypass 2 Alternative, at-grade option, and the Hanford West Bypass 2 Alternative, below-grade option. None of the displaced businesses are within Hanford.

The Uniform Relocation Assistance and Real Property Acquisition Policies Act, as amended, will apply to all alternatives in the Hanford area and will mitigate impacts on displaced properties. Baker Commodities will be reconfigured pursuant to Mitigation Measure SO-MM#4. Baker Commodities will be involved in the process for relocation of their affected buildings.

Environmental Justice

No minority or low-income communities were identified as being affected by the HST alternatives in the Hanford area. Therefore, the Hanford area alternatives would not result in any disproportionately high and adverse effects on minority and low-income populations.

6.2 Corcoran Area Alternatives

6.2.1 Biological Resources

<u>Riparian Areas Affected Environment in Corcoran Area</u>

Riparian areas are associated with the Tule River, near the southern terminus of the Corcoran area alternatives. The riparian area is limited to small, much restricted north and south banks of the Tule River where adjacent land uses have confined and restricted the riparian zone. The riparian areas associated with the Tule River are in fair ecological condition, as they are associated with a waterway that is manipulated for agricultural uses and that provides habitat for plants and wildlife. They are restricted to narrow strips along this seasonal riverine feature.

Direct and Indirect Impacts

Table 6.2-1 presents a comparison of the quantity of impacts on riparian areas in the Corcoran Area, in acres. All Corcoran area alternatives cross the Tule River riparian area in a similar location, resulting in similar direct and indirect impacts from all Corcoran Area alternatives. The Corcoran Bypass Alternative results in the smallest amount of total direct and indirect impacts on riparian areas, but only by approximately 0.76 acre, when compared to the Corcoran Elevated Alternative (the alternative with the most total impacts).

The Corcoran area alternatives would all result in a similar small amount of direct permanent impacts on riparian areas, with the alternatives separated in impacts by only 0.23 acres.

All Corcoran area alternatives would result in direct temporary impacts, and all have similar direct temporary impacts (0.05-0.12 acres). The direct temporary impacts on riparian areas can be restored following construction through implementation of the mitigation measures identified in Section 5.3.1.2, Mitigation Measures for Direct, Indirect, and Cumulative Impacts.

When comparing the Corcoran area alternatives with respect to condition of the riparian areas, there is no difference, as all direct and indirect impacts would occur to features in fair condition.

In comparing the Corcoran area alternatives, there is less than 1 acre difference in indirect impacts on the riparian area. The Corcoran Bypass project design across the riparian area includes a low viaduct, and the BNSF-Through Corcoran and Corcoran Elevated alternatives are designed as bridge crossings. In either case, the indirect impacts would not likely result in degradation of the adjacent riparian areas because the impact areas are close to other existing linear transportation corridors.

Table 6.2-1
Comparison of Quantity of Impacts on Riparian Areas in the Corcoran Area (acres)

Wetlands and Other Waters (TYPE/HST water type)	Impact Type[a]	Corcoran Bypass Alternative (Corcoran Proposed Preferred Alternative)	BNSF–Through Corcoran Alternative	Corcoran Elevated Alternative
TOTAL IMPACTS ON RIPARIAN AREAS[b]	Direct permanent	0.28	0.51	0.47
	Direct temporary	0.05	0.12	0.08
	Indirect [a]	1.28	1.61	1.83
GRAND TOTAL		**1.62**	**2.24**	**2.38**

Notes:
[shaded box] = least-impact alternative
— = no impact or not applicable
[a] Indirect impacts are calculated within a 250-foot buffer of the Project Footprint (including areas of permanent and temporary impacts) and areas outside of vernal pools and swales intersected by the construction footprint.
[b] Calculations are based on raw, unrounded Geographic Information System (GIS) source data. As a result, the subtotals and totals may not match the rounded feature values because of the number of aquatic features. These minor discrepancies may result in small differences in the presentation of the acreage.
Impact calculations in this table include Project alternatives and station alternatives, but do not include heavy maintenance facility alternatives.
All impacts were calculated based on 15% engineering design construction footprint.

6.2.1.1 Special-Status Plant Species

Affected Environment in Corcoran Area

In the areas where access was granted, a small population of heartscale was identified in the footprint of the Corcoran Bypass Alternative. However, unsurveyed habitats that have no to low potential to support special-status plant species are present, mainly in urban and agricultural lands for all Corcoran area alternatives.

Direct and Indirect Impacts

Table 6.2-2 lists the potential permanent and temporary direct impacts (in acres) on heartschale and unsurveyed habitat with no to low potential to support special-status plant species within the footprints of the Corcoran Area alternatives. The areas of potential habitat were identified through aerial photograph interpretation where access was not granted for survey efforts. The potential for special-status plants to occur in these areas is low.

The Corcoran Bypass Alternative would result in greater direct permanent impacts on this area than the BNSF–Through Corcoran and Corcoran Elevated alternatives because the area along the BNSF Railway corridor is highly developed.

Table 6.2-2
Impacts on Special-Status Plant Spec ies in the Corcoran Area Alternatives (acres)

Special-Status Plants	Impact Type	Corcoran Bypass Alternative (Corcoran Proposed Preferred Alternative)	BNSF–Through Corcoran Alternative	Corcoran Elevated Alternative
Heartscale *Atriplex cordulata*	Permanent	0.004	—	—
	Temporary	—	—	—
Unsurveyed potential suitable habitat that could support special-status plant species	Permanent	125.98	37.98	112.25
	Temporary	2.63	5.10	9.86

Notes:
[shaded] = least-impact alternative
— = no impact or not applicable
All impacts were calculated based on Final EIR/EIS 15% engineering design Project Footprint.

6.2.1.2 Special-Status Wildlife Species

Affected Environment in Corcoran Area

Suitable habitats for special-status amphibian, reptile, bird, and mammal species as well as native fauna species are present in the Corcoran area alternatives. Suitable habitats for special-status wildlife have been significantly reduced throughout the Central Valley, and natural areas that remain are largely disturbed and fragmented.

Impacts on terrestrial special-status wildlife species are the focus of this section. Impacts on aquatic resources are described in Section 4.2.2.2, Comparison of Direct and Indirect Impacts, and impacts on riparian areas are described above. Impacts on aquatic resources and riparian areas may also result in impacts on special-status wildlife species that utilize those areas, like special-status bird species, vernal pool branchiopods, or the valley elderberry longhorn beetle.

The majority of the habitats in the footprints of the Corcoran Area alternatives are on agricultural lands, which provide little value for special-status wildlife species.

A small amount of suitable habitat (i.e., other seasonal wetlands, annual grasslands) for vernal pool fairy shrimp, vernal pool tadpole shrimp, western spadefoot toad, California tiger salamander, coast horned lizard, and western pond turtle are present in the Corcoran Area HSA. Elderberry shrubs, the sole host plant of the valley elderberry longhorn beetle, have not been identified in the footprints of the Corcoran area alternatives. Special-status fish species are not expected to occur.

The Corcoran area alternatives contain suitable habitat (including both natural habitats and agricultural land) for breeding, foraging, dispersal, and migration of special-status bird and mammal species.

Direct and Indirect Impacts

Table 6.2-3 lists the impacts on terrestrial habitats in the Corcoran Area by alternative, in acres. The Corcoran Area alternatives would result in direct and indirect Project period impacts on a number of special-status wildlife species and their habitats; however, these habitats are mainly urban and agricultural lands, which have a low to moderate potential of supporting these species. Of the habitats present, annual grassland and pasture provide the best potential to host terrestrial special-status wildlife species.

Since the Corcoran Bypass Alternative occurs outside the urban area of Corcoran, it would have a greater direct permanent impact on annual grassland habitat compared with the other Corcoran Area Alternatives and may result in greater indirect impacts on special-status wildlife species (i.e., habitat fragmentation). Impacts on pastures are slightly higher for the Corcoran Bypass Alternative, as the BNSF-Through Corcoran and Corcoran Elevated Alternatives have minimal impacts on this habitat type.

Project activities associated with the Corcoran Elevated Alternative and the BNSF–Through Corcoran Alternative would affect more barren and urban areas than the Corcoran Bypass Alternative. The BNSF-Through Corcoran Alternative would result in the greatest direct permanent impact on agricultural habitats, and the Corcoran Elevated Alternative would result in the fewest. Impacts on Agricultural Lands, as identified by biologists and as described in *A Guide to Wildlife Habitats of California* and the California Wildlife Habitat Relationship System (Mayer and Laudenslayer 1988; CDFG 2008), are discussed in this section, whereas impacts on Important Farmland, Williamson Act-prime land, and FSZ are presented below in Section 6.2.2.3, Agricultural Lands.

To reduce additional impacts on suitable habitat to the greatest extent feasible, mitigation measures require avoidance of habitat, where possible, or reduction of impacts through pre-construction or protocol-level surveys before ground disturbance to identify locations where special-status species are present. Minimization measures include, but are not limited to, the installation of fencing to exclude species from the Project area, establishment and monitoring of non-disturbance buffers, or species relocation, and compensation for unavoidable adverse impacts, including loss of habitat. After mitigation, the impacts of all alternatives on special-status wildlife species are approximately equivalent.

Table 6.2-3
Impacts on Terrestrial Habitats in the Corcoran Area Alternatives (acres)[a]

Habitat Type		Impact Type[a]	Corcoran Bypass Alternative (Corcoran Proposed Preferred Alternative)	BNSF–Through Corcoran Alternative	Corcoran Elevated Alternative
Terrestrial Communities	Barren	Permanent	8.19	7.27	26.15
		Temporary	0.12	1.49	5.97
	Urban	Permanent	136.28	141.32	157.38
		Temporary	19.08	41.51	43.80
	Agricultural Lands	Permanent	204.69	237.47	151.65
		Temporary	345.44	320.72	328.06
	Annual Grassland	Permanent	102.96	26.46	75.73
		Temporary	1.28	1.44	2.62
	Pasture	Permanent	2.06	0.90	—
		Temporary	0.15	—	—

Notes:
[shaded box] = least-impact alternative
— = no impact or not applicable
[a] All impacts were calculated based on Final EIR/EIS 15% engineering design Project Footprint.

6.2.1.3 Wildlife Corridors

Affected Environment in Corcoran Area

The Corcoran area alternatives pass through the SR 43/SR 155 and Tule River habitat linkages (Figure 5-2).

Direct and Indirect Impacts

In general, impacts on wildlife movement corridors would be similar for all Corcoran area alternatives. However, because the Corcoran Elevated Alternative would be on an elevated structure through the city of Corcoran and therefore would allow wildlife passage, it would result in fewer impacts on wildlife movement corridors than the BNSF–Through Corcoran Alternative and the Corcoran Bypass Alternative.

6.2.2 Other Environmental Consequences

This section discusses the other environmental consequences that help to differentiate the Corcoran Area alternatives. The following resources are discussed:

- Transportation and traffic (Project period impacts).
- Noise and vibration (Project period impacts).
- Agricultural lands (Project period impacts).
- Parks, recreation, and open space (Project period impacts).
- Aesthetics and visual resources (Project period impacts).
- Community resources and environmental justice (Project period impacts).

6.2.2.1 Transportation and Traffic

This section focuses on Project period impacts, which differ by alternative for transportation and traffic. Construction period impacts on transportation and traffic do not differ substantially by alternative and are not discussed in this section.

Affected Environment in Corcoran Area

The BNSF–Through Corcoran Alternative, the Corcoran Elevated Alternative, and the Corcoran Bypass Alternative generally follow the HST corridor along the existing BNSF tracks and either pass through the city of Corcoran (BNSF–Through Corcoran Alternative and Corcoran Elevated Alternative) or avoid the urban areas by traversing through unincorporated, rural agricultural lands (Corcoran Bypass Alternative).

Project Period Impacts

Local roadways and intersections would be affected by project-related traffic from the diverted traffic near proposed road closures. Project-related traffic would reduce acceptable levels of service both for roadway segments and intersections. The alternatives would create minimal permanent road closures affecting circulation patterns: the Corcoran Bypass Alternative would result in four closures, the BNSF–Through Corcoran Alternative in two, and the Corcoran Elevated Alternative in one.

Traffic volumes on local roads are generally less than 500 vehicles per day. Because detours would be limited in rural areas and would affect few travelers, effects on traffic circulation would be minor. Because local traffic would be rerouted during construction, the construction would affect roads with very low traffic volumes, and road closures and detours would not be permanent, so the effects of the Corcoran Area alternatives on circulation would be negligible.

6.2.2.2 Noise and Vibration

This section focuses on Project period impacts, which differ by alternative for noise and vibration. Construction period impacts on noise and vibration do not differ substantially by alternative and are not discussed in this section.

Affected Environment in Corcoran Area

As described in Section 3.4.5, Environmental Consequences, of the Revised DEIR/Supplemental DEIS (Authority and FRA 2012d), noise measurements made along the BNSF-Through Corcoran and Corcoran Elevated alternatives through the city of Corcoran ranged from 64 to 81 dBA L_{dn} These noise levels are consistent with homes adjacent to commercial and industrial sites that are exposed to highway traffic and railroad operations. Around the eastern side of Corcoran, noise levels measured at homes away from SR 43 and other major roads ranged from 48 to 61 dBA L_{dn}. South of Nevada Avenue, the Corcoran Bypass Alternative curves toward the east to bypass Corcoran around the eastern side, where noise levels measured at homes away from SR 43 and other major roads ranged from 48 to 61 dBA L_{dn}. South of Corcoran, the Corcoran area alternatives rejoin between Avenue 144 and Avenue 136 and run along the western side of SR 43. The land use in the area is agricultural, with a mix of orchards, alfalfa, and dairy. The noise levels measured in this area (Pixley) ranged from 59 to 70 dBA L_{dn} . These noise levels are consistent with expectations for homes along a two-lane highway and an active rail line.

Project Period Impacts

Under all of the Corcoran Area alternatives, the project would create long-term noise impacts from the introduction of a new transportation system and potential vibration impacts. The

Corcoran Bypass Alternative would result in 111 severely affected receivers compared with 422 and 453 under the BNSF–Through Corcoran Alternative and the Corcoran Elevated Alternative, respectively. With mitigation, noise impacts under the BNSF–Through Corcoran Alternative and the Corcoran Elevated Alternative would be reduced to 79 and 27 affected receivers, respectively. Vibration effects would be noticeable and may exceed the FRA Ground-Borne Vibration and Ground-Borne Noise Impact Criteria (FRA 2005). Vibration effects would occur at 20 sensitive receivers under the Corcoran Bypass Alternative and at 11 sensitive receivers under the BNSF–Through Corcoran Alternative (none would occur under the Corcoran Elevated Alternative). Therefore, effects to receivers adjacent to the Corcoran Bypass Alternative and the BNSF–Through Corcoran Alternative would be significant.

6.2.2.3 Agricultural Lands

This section focuses on Project period impacts, which differ by alternative for impacts on agricultural lands. Construction period impacts do not differ substantially by alternative and are not discussed in this section. Although property acquisitions would occur before construction, the impacts would be permanent and are therefore discussed as Project period effects.

Affected Environment in Corcoran Area

Land types affected by the Corcoran Area alternatives include Prime Farmland, Farmland of Statewide Importance, Unique Farmland, and Grazing Land. The Corcoran Bypass Alternative, the BNSF–Through Corcoran Alternative, and the Corcoran Elevated Alternative pass through land under both Williamson Act-prime and FSZ contracts. No agricultural conservation easements have been identified within the footprints of these alternatives.

Project Period Impacts

The Corcoran Bypass Alternative would permanently affect 177 acres of Important Farmland in the Corcoran area (including potential conversion from parcel severance), compared with 260 acres of Important Farmland under the BNSF–Through Corcoran Alternative and 106 acres under the Corcoran Elevated Alternative, as shown in Table 6.2-4.

Table 6.2-4
Important Farmland Impacts by Corcoran Area Alternative (acres)

Parameter	Corcoran Bypass Alternative (Corcoran Proposed Preferred Alternative)	BNSF–Through Corcoran Alternative	Corcoran Elevated Alternative
Prime Farmland	0	4	0
Farmland of Statewide Importance	175	256	106
Unique Farmland	2	0	0
Farmland of Local Importance	0	0	0
Total Farmland Impact[A]	**177**	**260**	**106**
Total Lands Impacted[B]	**286**	**405**	**267**

[A] Total Farmland Impact includes uneconomic remainder parcels that were not part of the Project Footprint.

[B] Total Lands Impacted is the land within the Project Footprint, including single-family, multi-family, commercial, industrial, community facilities, agricultural, and other. In some cases, the Total Farmland Impact may be larger than the Total Lands Impacted because the uneconomic remainder parcels are not included in the Project Footprint.

The Corcoran Bypass Alternative would permanently convert 92 acres of Williamson Act-prime land and 40 acres of FSZ land, and the BNSF–Through Corcoran Alternative would permanently convert 249 acres of Williamson Act land and 4 acres of FSZ land. The Corcoran Elevated Alternative would permanently convert 89 acres of Williamson Act-prime land and 8 acres of FSZ land.

The Corcoran Bypass Alternative and the Corcoran Elevated Alternative would have moderate intensity effects on two confined animal facilities and negligible intensity effects on one additional facility, and the BNSF–Through Corcoran Alternative would have moderate intensity effects on three confined animal facilities.

In the context of the highly productive farmland in Corcoran, conversion of more than 50 acres of agricultural lands to a non-agricultural use would be a significant effect, even with mitigation.

6.2.2.4 Parks, Recreation, and Open Space

This section focuses on Project period impacts, which differ by alternative for impacts on parks, recreation, and open space. Construction period impacts do not differ substantially by alternative and are not discussed in this section.

Affected Environment in Corcoran Area

No parks, recreation, or open-space resources occur in the study area for the Corcoran Bypass Alternative. The BNSF–Through Corcoran Alternative and the Corcoran Elevated Alternative would generally follow the HST corridor along the BNSF tracks within Corcoran. Father Wyatt Park is in Corcoran, east of the BNSF–Through Corcoran Alternative and the Corcoran Elevated Alternative. Father Wyatt Park contains a playground area, a covered arbor, picnic tables, and benches; the park can currently be accessed from the street on all sides of the park.

Project Period Impacts

The Corcoran Bypass Alternative and the BNSF–Through Corcoran Alternative would have no Project period impacts on parks, recreation, and open space in the Corcoran area. The Corcoran Elevated Alternative would result in Project period effects on the existing visual character of Father Wyatt Park and its surroundings. In addition, the Corcoran Elevated Alternative would result in Project period activities that would increase noise levels in Father Wyatt Park. Implementation on mitigation measures from the Noise and Vibration section would reduce effects, and in the urbanized context of this park, the overall impact would not be significant.

6.2.2.5 Aesthetics and Visual Resources

This section focuses on Project period impacts, which differ by alternative for impacts on aesthetics and visual resources. Construction period impacts do not differ substantially by alternative and are not discussed in this section.

Affected Environment in Corcoran Area

All Corcoran Area alternatives except the Corcoran Bypass Alternative generally follow the HST corridor along the BNSF tracks. The Corcoran Bypass Alternative is east of SR 43, the BNSF tracks, and the city of Corcoran. Under both the BNSF–Through Corcoran Alternative and the Corcoran Elevated Alternative, the Project alignment passes through the downtown center of Corcoran, which includes a visually intact, historic town center within the visual foreground of the alternative as well as nearby parks and residential areas. Elements contributing to the visual quality of these towns include historic architecture, as well as street trees, median plantings, and other elements of main street development. The main sensitive viewer groups in Corcoran are residents, users of nearby local parks, and visitors to the town center. The Corcoran Bypass Alternative would avoid Downtown Corcoran and pass through rural residential development and sparsely populated portions of rural and agricultural lands in the San Joaquin Valley.

Project Period Impacts

Under all Corcoran Area alternatives, the HST System would result in permanent changes to areas adjacent to or within viewing range of the HST in both the urban and rural areas near Corcoran. These visual changes would occur through new features introduced into the environment, including the HST guideways (both elevated and non-elevated portions), the guideway support columns, the contact power system, bridges and roadway grade separations, and a variety of infrastructure for the HST System. These features would be incompatible and out of scale with the existing visual character in many locations where viewer sensitivity and exposure are high.

The Corcoran Bypass Alternative would avoid visual impacts on the city of Corcoran because the alternative would bypass this community. The at-grade and elevated structures, road overcrossings, or other prominent project features of this alternative would, conversely, degrade the existing visual character and quality of the rural landscape and its surroundings. The BNSF-Through Corcoran and Corcoran Elevated Alternatives would have visual impacts on the urban community of Corcoran, and would have fewer impacts on the rural landscape because less of these alternatives passes through rural areas.

6.2.2.6 Community Resources and Environmental Justice

This section focuses on Project period impacts, which differ by alternative for impacts on community resources and environmental justice. Construction period impacts do not differ substantially by alternative and are not discussed in this section.

Affected Environment in Corcoran Area

Section 3.12, Socioeconomics, Communities, and Environmental Justice, of the Revised DEIR/Supplemental DEIS (Authority and FRA 2012d) describes the regulatory setting and affected environment for community resources and environmental justice. The *Fresno to Bakersfield Section: Community Impact Assessment Technical Report* (Authority and FRA 2012i) provides additional details.

The city of Corcoran is surrounded by agricultural land. Corcoran's population is approximately 25,700 residents, with approximately 4,000 housing units, excluding the state prison facilities. Some clusters of rural residences are in the vicinity of Corcoran but outside the city limits.

Corcoran has three public buildings in the study area that serve the needs of the community: a building housing both the city administrative offices and the city hall, a library operated by Kings County, and a veterans' center. Public-safety facilities include Corcoran's two police stations, both of which are in the study area. Corcoran's one fire station and the Corcoran District Hospital are also in the study area, as are 10 religious facilities, 5 parks, and 3 of the city's 6 schools that are part of the Corcoran Unified School District. To the east, the study area includes a rural agricultural area with scattered residences, businesses, or community facilities and services.

The EJ study area for the Corcoran area encompasses several communities of concern within the Corcoran city limits, particularly to the west of SR 43 and Pickerell Avenue. Corcoran's minority population, which represented approximately 75% of all residents in 2000, increased to approximately 80% of all residents by 2006–2008 (U.S. Census Bureau 2008). East of Corcoran, the total population is smaller than in the city, with scattered communities of concern (U.S. Census Bureau 2000).

Project Period Impacts

Community Resources

The Corcoran Bypass Alternative is estimated to displace 31 residential housing units, while the BNSF–Through Corcoran Alternative and the Corcoran Elevated Alternative would displace 52 and 3 housing units, respectively. The Corcoran Bypass Alternative would not displace any commercial or industrial business units. The BNSF–Through Corcoran Alternative and the Corcoran Elevated Alternative would displace 16 commercial units and 1 industrial business unit.

The Corcoran Bypass Alternative would involve substantially fewer displacements in Corcoran than the BNSF–Through Corcoran Alternative, where displacements would be substantial on these small, rural residential communities. Displacements under the Corcoran Elevated Alternative would be minor. The Corcoran Bypass Alternative would not affect any community or religious facilities. The BNSF–Through Corcoran Alternative would affect three community facilities: King's Mobil Lodge & RV Park (partially displaced); Amtrak Station-Corcoran (displaced); and the California Department of Food and Agricultural Sampling Station–Corcoran (displaced). The Corcoran Elevated Alternative would also displace the California Department of Food and Agricultural Sampling Station–Corcoran. All of these facilities can be relocated.

The Corcoran Bypass Alternative may divide and affect the small, unincorporated rural residential community that lies immediately northeast of Corcoran, in the vicinity of Newark Avenue, between SR 43 and the irrigation canal, as well as the smaller enclave of rural residential homes approximately 1 mile to the southeast, in the vicinity of Fifth Avenue and Waukena Avenue. No other community division would occur under the Corcoran Bypass Alternative. Because of their proximity to the existing BNSF corridor, neither the BNSF-Through Corcoran nor the Corcoran Elevated alternatives would divide the Corcoran community. However both alternatives would contribute to the existing division within the city of Corcoran.

Under the BNSF–Through Corcoran Alternative, Mitigation Measure SO-MM#4 will minimize the impacts of that alternative by relocation of the Corcoran Amtrak station before demolition of the existing structure. No disruption to Amtrak service is anticipated. Under both the BNSF–Through Corcoran Alternative and the Corcoran Elevated Alternative, Mitigation Measure SO-MM#4 will minimize the impacts related to relocation of the California Department of Food and Agricultural Sampling Station. Relocation of these facilities will occur before the existing facilities are closed, or steps will be taken to ensure that sufficient capacity is available at other facilities so there is no interruption to the services provided. The Uniform Relocation Assistance and Real Property Acquisition Policies Act, as amended, would apply to all alternatives in the Corcoran area.

Environmental Justice

All Corcoran area alternatives are expected to result in disproportionately high and adverse impacts on EJ communities in the Corcoran area. The BNSF–Through Corcoran and the Corcoran Elevated alternatives were found to result in disproportionately high and adverse effects on minority and low-income populations. These alternatives would affect an area that passes through the EJ communities in Corcoran, where noise and vibration and visual impacts would be significant and unavoidable. The area outside Corcoran where the Corcoran Bypass Alternative would be constructed has a lower-density and much smaller identified EJ community than the corresponding portion of the BNSF–Through Corcoran Alternative or the Corcoran Elevated Alternative. However, only the Corcoran Bypass Alternative would divide the small, unincorporated, rural residential EJ community that lies in the vicinity of Newark Avenue (approximately 83% Hispanic). This alternative would displace about 40% of the homes there and leave some of the remaining homes very close to the HST tracks (within 50 to 150 feet). Two mitigation measures will reduce EJ impacts and mitigate impacts on environmental resources and environmental impacts described in the Revised DEIR/Supplemental DEIS (Authority and FRA 2012d). Mitigation Measure SO-MM#6 will require the Authority to continue outreach to disproportionately and negatively affected EJ communities of concern, and Mitigation Measure SO-MM#7 will require development of measures to minimize the potential for physical deterioration in EJ communities. The Uniform Relocation Assistance and Real Property Acquisition Policies Act, as amended, would apply to all alternatives in the Corcoran area.

6.3 Allensworth Area Alternatives

6.3.1 Biological Resources

6.3.1.1 Riparian Areas

Affected Environment in Allensworth Area

Two riparian areas are present within both of the Allensworth area alternatives. The first area is associated with Deer Creek near the northern extent of the Allensworth area alternatives; the second is associated with Poso Creek near the southern extent of the Allensworth area alternatives. Both the BNSF-Through Allensworth and the Allensworth Bypass alternatives cross these riparian areas in nearly the same location.

Riparian areas in the Allensworth area are generally in relatively fair ecological condition based on assessments of the adjacent seasonal riverine areas. They are associated with waterways that have varying levels of hydrologic manipulation, provide fair to good biological resources for plants and wildlife, and due to existing land uses in the region, have been physically reduced and restricted to narrow strips along seasonal riverine features.

Direct and Indirect Impacts

Table 6.3-1 provides a comparison of the quantity of impacts on riparian areas in the Allensworth Area, in acres. Both the Allensworth Bypass and the BNSF-Through Allensworth alternatives would result in a similar amount of direct and indirect impacts on riparian areas. The Allensworth Bypass Alternative would result in the fewest total direct and indirect impacts compared with the BNSF-Through Allensworth Alternative.

In addition, the Allensworth Bypass Alternative would result in fewer direct permanent and indirect impacts (0.66 and 1.69 acres less, respectively) compared with the BNSF-Through Allensworth Alternative. The Allensworth Bypass Alternative would result in slightly more direct temporary impacts on riparian areas than the BNSF-Through Allensworth Alternative. Direct temporary impacts can be restored following construction through implementation of the mitigation measures identified in Section 5.3.1.2, Mitigation Measures for Direct, Indirect, and Cumulative Impacts.

When comparing the Allensworth area alternatives with respect to the condition of the riparian areas, there is no difference, as all direct and indirect impacts would occur to features in fair condition.

Table 6.3-1
Comparison of Quantity of Impacts on Riparian Areas in the Allensworth Area (acres)

Wetlands and Other Waters (TYPE/HST water type)	Impact Type[a]	Allensworth Bypass Alternative (Allensworth Proposed Preferred Alternative)	BNSF–Through Allensworth Alternative
TOTAL IMPACTS ON RIPARIAN AREAS[b]	Direct permanent	0.47	1.13
	Direct temporary	0.02	0.26
	Indirect[a]	2.46	4.15
GRAND TOTAL		**2.94**	**5.54**

Notes:
▭ = least-impact alternative
— = no impact or not applicable
[a] Indirect impacts are calculated within a 250-foot buffer of the Project Footprint (including areas of permanent and temporary impacts) and areas outside of vernal pools and swales intersected by the construction footprint.
[b] Calculations are based on raw, unrounded Geographic Information System (GIS) source data. As a result, the subtotals and totals may not match the rounded feature values because of the number of aquatic features. These minor discrepancies may result in small differences in the presentation of the acreage.
Impact calculations in this table include Project alternatives and station alternatives, but do not include heavy maintenance facility site alternatives.
All impacts were calculated based on the 15% engineering design construction footprint.

6.3.1.2 Special-Status Plant Species

Affected Environment in Allensworth Area

Although no special-status plant species were identified in the PSA in the areas where access was granted in the Allensworth Bypass Alternative, heartscale and little mouse tail were observed within the footprint of the BNSF–Through Allensworth Alternative. Unsurveyed habitats that have the potential to support special-status plant species occur within the area of both alternatives.

Direct and Indirect Impacts

Table 6.3-2 lists the potential permanent and temporary direct impacts, in acres, on special-status plant species within the footprint of the Allensworth Area alternatives.

The Allensworth Bypass Alternative would decrease permanent direct impacts on known occurrences of heartscale and little mouse tail compared with the BNSF–Through Allensworth Alternative. Furthermore, the Allensworth Bypass Alternative would result in a smaller amount of direct permanent impacts on unsurveyed habitats that have the potential to support special-status plant species. The BNSF-Through Allensworth Alternative would result in smaller temporary direct impacts on unsurveyed habitat than the Allensworth Bypass Alternative. Indirect impacts on unsurveyed habitat would be greater in the Allensworth Bypass Alternative than the BNSF–Through Allensworth Alternative due to an increase in habitat fragmentation resulting from the construction of a new transportation alignment.

Both alternatives would occur in the natural lands in the vicinity of the Allensworth Ecological Reserve. However, the BNSF–Through Allensworth Alternative would occur partially within the Allensworth Ecological Reserve and adjacent to SR 43 and the BNSF right-of-way, whereas the Allensworth Bypass Alternative would affect agricultural lands and natural areas outside of the Allensworth Ecological Reserve and in fragmented natural lands.

Table 6.3-2
Impacts on Special-Status Plant Species in the Allensworth Area Alternatives (acres)

Special-Status Plants	Impact Type	Allensworth Bypass Alternative[a] (Allensworth Proposed Preferred Alternative)	BNSF–Through Allensworth Alternative
Heartscale *Atriplex cordulata*	Permanent	—	0.63
	Temporary	—	—
Little mouse tail *Myosurus minimus* ssp. *apus*	Permanent	—	0.21
	Temporary	—	—
Unsurveyed potential suitable habitat that could support special-status plant species[a]	Permanent	159.71	204.84
	Temporary	64.97	4.41

Notes:
[shaded box] = least impact alternative
— = no impact or not applicable
All impacts were calculated based on the 15% engineering design construction footprint.
[a] Calculations are based on raw, unrounded Geographic Information System (GIS) source data. As a result, the subtotals and totals may not match the rounded feature values because of the number of polygons. These minor discrepancies may result in small differences in the presentation of the acreage.

6.3.1.3 Special-Status Wildlife Species

Affected Environment in Allensworth Area

The Allensworth area alternatives are in agricultural and urban areas intermixed with natural habitats. Suitable habitats for special-status amphibian, reptile, bird, and mammal species as well as native fauna species are present. Suitable habitats for special-status wildlife have been significantly reduced throughout the Central Valley, and natural areas that remain are largely disturbed and fragmented.

Impacts on terrestrial special-status wildlife species are the focus of this section. Impacts on aquatic resources are described in Section 4.2.3.2, Comparison of Direct and Indirect Impacts. Impacts on aquatic resources may also result in impacts on special-status wildlife species that utilize those areas, like special-status bird species, vernal pool branchiopods, or the valley elderberry longhorn beetle.

The majority of the habitats present in the Allensworth area alternatives HSA are agricultural lands, which provide little value for special-status species. However, natural lands are present in greater quantities in the Allensworth Area than in any other area, and thus impacts on natural lands in this area have the greatest potential to cause direct and indirect impacts on special-status wildlife species.

Suitable habitat (e.g., vernal pools) for vernal pool fairy shrimp and vernal pool tadpole shrimp is also present in the area. Natural habitats for special-status wildlife species, including blunt-nosed leopard lizard, Tipton kangaroo rat, San Joaquin kit fox, coast horned lizard, and western spadefoot toad, and natural habitats for a number of special-status bird species are present in the HSA for the Allensworth Area. Special-status fish species are not expected to occur within any of the Allensworth area alternatives.

Direct and Indirect Impacts

The Allensworth area alternatives would result in direct and indirect Project period impacts on a number of special-status wildlife species and their habitats, as shown in Table 6.3-3. Of the habitats present, annual grassland, alkali desert scrub, and pasture habitats provide the best potential to host terrestrial special-status wildlife species.

The Allensworth Bypass Alternative would result in fewer permanent impacts on all natural habitat types, including annual grassland, alkali desert scrub, and pasture as well as the urban habitat areas due to the bypass of the city of Allensworth. The Allensworth Bypass Alternative would likely reduce potential direct and indirect impacts on terrestrial special-status wildlife species compared with the BNSF-Through Allensworth Alternative.

Impacts on Agricultural Lands are similar for the Allensworth Bypass and the BNSF-Through Allensworth alternatives. The BNSF-Through Allensworth Alternative would result in slightly smaller direct permanent and direct temporary impacts on Agricultural Land habitats, largely because more of the area is a natural habitat type. Impacts on Agricultural Lands, as identified by biologists and as described in *A Guide to Wildlife Habitats of California* and the California Wildlife Habitat Relationship System (Mayer and Laudenslayer 1988; CDFG 2008), are discussed in this section, whereas impacts on Important Farmland, Williamson Act land and FSZ lands are presented below in Section 6.3.2.4, Agricultural Lands.

To reduce additional impacts on suitable habitats to the greatest extent feasible, mitigation measures require avoidance of habitat, where possible, or reduction through pre-construction or protocol-level surveys before ground disturbance to identify locations where special-status species are present. Minimization measures (including but not limited to the installation of fencing to exclude species from the Project area, establishment and monitoring of non-disturbance buffers, or species relocation) and compensation for unavoidable adverse impacts, including loss of habitat, are also required. After mitigation, the impacts of all alternatives on special-status wildlife species are approximately equivalent.

Table 6.3-3
Impacts on Terrestrial Habitats in the Allensworth Area Alternatives (acres)

Habitat Type		Impact Type[a]	Allensworth Bypass Alternative (Allensworth Proposed Preferred Alternative)	BNSF–Through Allensworth Alternative
Terrestrial communities	Urban	Permanent	34.80	75.94
		Temporary	3.32	11.18
	Agricultural lands	Permanent	399.39	363.54
		Temporary	150.07	139.00
	Annual grassland	Permanent	109.93	147.57
		Temporary	3.84	2.66
	Alkali desert scrub	Permanent	7.68	41.34
		Temporary	0.0009	0.58
	Pasture	Permanent	0.07	4.11
		Temporary	—	—

Notes:
[shaded box] = least-impact alternative
— = no impact or not applicable
[a] All impacts were calculated based on the Final EIR/EIS 15% engineering design Project footprint.

6.3.1.4 Wildlife Corridors

Affected Environment in Allensworth Area

The Allensworth area alternatives pass through the SR 43 / SR 155 linkage, the Deer Creek–Sand Ridge linkage, and the Poso Creek linkage.

Direct and Indirect Impacts

Dedicated wildlife crossing structures would be provided throughout the Allensworth area alternatives in at-grade portions of the railroad embankment at approximately 0.3-mile intervals. Where bridges, elevated structures, and road crossings coincide with proposed dedicated wildlife crossing structures, such features would serve the function of, and supersede the need for, dedicated wildlife crossing structures. The existing barriers associated with the BNSF tracks and SR 43 would remain, and wildlife movement would continue as it does under the existing condition. The visibility through the dedicated wildlife movement structures for the Allensworth Bypass Alternative would be of agricultural and natural landscapes. Wildlife would not be faced with the disturbances associated with the BNSF tracks or SR 43.

The Allensworth Bypass Alternative would be less detrimental to wildlife movement than the BNSF–Through Allensworth Alternative because the Allensworth Bypass Alternative is outside of existing wildlife movement barriers. Currently, SR 43 and the BNSF tracks significantly reduce wildlife movement along the SR 43 / SR 155, Deer Creek–Sand Ridge, and Poso Creek habitat linkages. Construction of the BNSF–Through Allensworth Alternative would create an additional barrier, and it would compound the effects associated with the existing barriers. Even with the inclusion of dedicated wildlife movement structures, the potential for wildlife to successfully traverse the HST System, the BNSF tracks, and SR 43 would be very low, and implementation of the BNSF–Through Allensworth Alternative would adversely affect local and regional wildlife movement.

Although the Allensworth Bypass Alternative would establish a new wildlife movement barrier and further fragment the existing habitat linkages, the inclusion of dedicated wildlife movement structures would provide opportunities for wildlife to move across the HST System, and wildlife would not be faced with the compounding effects or hazards (risk of strikes with trains, cars) of crossing additional barriers (see Figure 5-7c of the *Fresno to Bakersfield Section: Biological Resources and Wetlands Technical Report* [Authority and FRA 2012b]).

6.3.2 Other Environmental Consequences

This section discusses the other environmental consequences that help to differentiate the Allensworth Area alternatives. The following resources are discussed:

- Section 4(f) resources.
- Transportation and traffic (Project period impacts).
- Noise and vibration (Project period impacts).
- Agricultural Lands (Project period impacts).
- Aesthetics and visual resources (Project period impacts).
- Cultural resources (construction period impacts).
- Community resources and environmental justice (Project period impacts).

6.3.2.1 Section 4(f) Resources

The Allensworth Bypass Alternative would not use Section 4(f) resources. The BNSF–Through Allensworth Alternative would result in the use of two Section 4(f) properties: the Allensworth

Historic District/Colonel Allensworth State Historic Park and the Allensworth Ecological Reserve. Transportation and Traffic

This section focuses on Project period impacts, which differ by alternative for impacts on transportation and traffic. Construction period impacts do not differ substantially by alternative and are not discussed in this section.

Affected Environment in Allensworth Area

The Allensworth Bypass Alternative and the BNSF–Through Allensworth Alternative would generally follow the HST corridor along the BNSF tracks and avoid the Allensworth urban area. The BNSF-Through Allensworth Alternative passes through the Allensworth Ecological Reserve and the Allensworth Historic District/Colonel Allensworth State Historic Park. The Allensworth Bypass Alternative passes west of the BNSF Alternative, avoiding the Allensworth Ecological Reserve and Colonel Allensworth State Historic Park.

Project Period Impacts

The Allensworth area alternatives would result in minimal permanent road closures that would affect circulation patterns: three closures under the Allensworth Bypass Alternative and two closures under the BNSF–Through Allensworth Alternative. Project-related traffic effects from both Allensworth area alternatives would reduce levels of service for roadway segments and intersections to unacceptable levels of service (LOS E or F) near these road closures. However, mitigation measures would reduce these impacts to an acceptable LOD (LOS D or better), and they would therefore not be significant.

Because detours would be limited in rural areas and would affect few travelers, effects to traffic circulation would be minor.

6.3.2.2 Noise and Vibration

This section focuses on Project period impacts, which differ by alternative for impacts on noise and vibration. Construction period impacts do not differ substantially by alternative and are not discussed in this section.

Affected Environment in Allensworth Area

As described in Section 3.4.5, Environmental Consequences, of the Revised DEIR/Supplemental DEIS (Authority and FRA 2012d), the measured noise levels for the homes near the BNSF-Through Allensworth Alternative right-of way ranged from 62 to 76 dBA L_{dn}. For homes farther from the tracks, the measured noise levels were from 47 to 63 dBA L_{dn} . These levels would be expected for a reasonably quiet neighborhood. For the homes near both SR 43 and the BNSF right-of-way, the measured noise levels ranged from 71 to 74 dBA L_{dn}. South of Avenue 84, the Allensworth Bypass Alternative curves to the south in order to go around Colonel Allensworth State Historic Park and the Pixley Wildlife Refuge to the west. The Allensworth Bypass Alternative rejoins the BNSF Alternative at Whisler Road.

Project Period Impacts

Under both Allensworth Area alternatives, the Project would create long-term noise impacts from the introduction of a new transportation system, including potential vibration impacts. The Allensworth Bypass Alternative would not result in any severely affected receivers; the BNSF–Through Allensworth Alternative would result in 14 severely affected receivers. Vibration effects would be noticeable to one receiver under both alternatives but are not anticipated to result in property damage that would be significant.

6.3.2.3 Agricultural Lands

This section focuses on Project period impacts, which differ by alternative for impacts on agricultural lands. Construction period impacts do not differ substantially by alternative and are not discussed in this section.

Land types affected under both the Allensworth Bypass Alternative and the BNSF–Through Allensworth Alternative include Prime Farmland, Farmland of Statewide Importance, Unique Farmlands, Farmland of Local Importance, and Grazing Land; the majority of the farmland in the vicinity of the alternatives in the Allensworth area is classified as Prime Farmland and Farmland of Statewide Importance. Both alternatives pass through lands under both Williamson Act-prime and FSZ contracts. No confined animal facilities are present along the alternatives, and no agricultural conservation easements have been identified within the footprints of these alternatives.

Project Period Impacts

Table 6.3-4 lists the Important Farmland impacts of the Allensworth Bypass Alternative, in acres. The Allensworth Bypass Alternative would permanently affect 386 acres of Important Farmland (including potential conversions from parcel severance), and the BNSF–Through Allensworth Alternative would permanently affect 467 acres of Important Farmland (including potential conversions from parcel severance).

The Allensworth Bypass Alternative would permanently convert 258 acres of Williamson Act-prime land and 9 acres of FSZ land; the BNSF–Through Allensworth Alternative would permanently convert 203 acres of Williamson Act-prime land and 20 acres of FSZ land. Neither of the Allensworth area alternatives would have impacts on confined animal facilities.

Table 6.3-4
Important Farmland Impacts by Allensworth Area Alternative (acres)

Parameter	Allensworth Bypass Alternative (Allensworth Proposed Preferred Alternative)	BNSF–Through Allensworth Alternative
Prime Farmland	74	219
Farmland of Statewide Importance	251	191
Unique Farmland	8	2
Farmland of Local Importance	53	55
Total Farmland Impact[A]	**386**	**467**
Total Lands Impacted[B]	**469**	**566**

Notes:
[A] Total Farmland Impact includes uneconomic remainder parcels that were not part of the Project Footprint.
[B] Total Lands Impacted is the land within the Project Footprint, including single-family, multi-family, commercial, industrial, community facilities, agricultural, and other. In some cases, the Total Farmland Impact may be larger than the Total Lands Impacted because the uneconomic remainder parcels are not included in the Project Footprint.

6.3.2.4 Parks, Recreation, and Open Space

This section focuses on Project period impacts, which differ by alternative for impacts on parks, recreation, and open space. Construction period impacts do not differ substantially by alternative and are not discussed in this section.

Affected Environment in Allensworth Area

The Allensworth Bypass Alternative would run to the west of and avoid the Colonel Allensworth State Historic Park and the Allensworth Ecological Reserve. The BNSF–Through Allensworth Alternative would generally follow the HST corridor along the BNSF tracks. Portions of the Colonel Allensworth State Historic Park are affected by the BNSF–Through Allensworth Alternative.

A portion (7.3 acres) of the nearly 6,000-acre Allensworth Ecological Reserve, which consists of several parcels and covers land in both Tulare and Kern counties, would be affected by the BNSF–Through Allensworth Alternative; only a portion of the area in the southeastern part of the reserve would fall in the study area. This area of the reserve is former farmland and does not contain any visitor resources. Wildlife viewing is the only activity permitted in the Allensworth Ecological Reserve.

Project Period Impacts

The Allensworth Bypass Alternative would have no Project period impacts on parks, recreation, and open space resources in the Allensworth area because this alternative would avoid all portions of the Colonel Allensworth State Historic Park and the Allensworth Ecological Reserve.

The BNSF–Through Allensworth Alternative would have substantial Project period effects on parks, recreation, and open space resources as a result of the required acquisition of land in the Colonel Allensworth State Historic Park. The BNSF–Through Allensworth Alternative would also introduce a modern feature to the Colonel Allensworth State Historic Park, a rural historic district listed in the National Register of Historic Places and a federally protected resource under Section 4(f) of the Department of Transportation Act. The impact on Colonel Allensworth State Historic Park caused by the BNSF-Through Allensworth Alternative would remain significant after implementation of mitigation measures. Although the BNSF-Through Allensworth Alternative would significantly impact the Allensworth Ecological Reserve through acquisition of approximately 7.3 acres of parkland, this impact would be less than significant through implementation of mitigation measures

6.3.2.5 Aesthetics and Visual Resources

This section focuses on Project period impacts, which differ by alternative for impacts on aesthetics and visual resources. Construction period impacts do not differ substantially by alternative and are not discussed in this section.

Affected Environment in Allensworth Area

Under the BNSF–Through Allensworth Alternative, the centerline of the alternative would be approximately 100 feet from the eastern boundary of the Colonel Allensworth State Historic Park. The intact landscape setting is a major component of the attraction of this historic district. The Allensworth Bypass Alternative would avoid the community of Allensworth, bypassing it to the west. The Allensworth Bypass Alternative would run approximately 1 mile from Colonel Allensworth State Historic Park.

Project Period Impacts

The Allensworth Bypass Alternative would avoid visual impacts on the Allensworth community and on Colonel Allensworth State Historic Park. However, the Allensworth Bypass Alternative would affect the existing visual character and quality of the rural landscape and its surroundings due to the at-grade and elevated structures, road overcrossings, and other prominent features associated with the Project. The BNSF–Through Allensworth Alternative would result in a strong decline in visual quality and be inconsistent with the early-twentieth-century character of Colonel Allensworth State Historic Park, a historic resource.

6.3.2.6 Cultural Resources

Construction period impacts on historic architectural resources are the only cultural resources impacts that differentiate the alternatives, and therefore are the only cultural resource impacts discussed below. Construction period impacts for archaeological resources and Project period impacts for archaeological and historic architectural resources do not differ substantially by alternative and therefore are not discussed in this section.

Affected Environment in Allensworth Area

Surveys conducted in the area affected by the Allensworth area alternatives identified one historic property, the Allensworth Historic District/Colonel Allensworth State Historic Park, which is listed in the NRHP and the CRHR, and one built environment resource that was more than 50 years old at the time of survey. That resource did not meet the criteria for listing in the NRHP or the CRHR at the local, state, or national level (Authority and FRA 2011c, 2012f).

Construction Period Impacts

The BNSF–Through Allensworth Alternative would result in direct adverse effects to one Section 106 historic property, the Allensworth Historic District/Colonel Allensworth State Historic Park (4129 Grant Drive, rural Tulare County). This alternative would also have direct effects on the historic district caused by the construction of the Project, Project infrastructure, and access roads. The Allensworth Bypass Alternative would not result in construction period impacts on historic properties.

6.3.2.7 Community Resources and Environmental Justice

This section focuses on Project period impacts, which differ by alternative for impacts on community resources and environmental justice. Construction period impacts do not differ substantially by alternative and are not discussed in this section. Construction period impacts to community resources and environmental justice would be permanent and are therefore discussed as project period effects.

Affected Environment in Allensworth Area

The community of Allensworth lies southeast of Corcoran and south of Allensworth State Historic Park. Allensworth has approximately 400 residents and 120 housing units, most of which are mobile homes. Allensworth is considered an EJ community. Community facilities in Allensworth include Allensworth Elementary School, a church, and a community center. Section 3.12, Socioeconomics, Communities, and Environmental Justice, of the Revised DEIR/Supplemental DEIS (Authority and FRA 2012d) describes the regulatory setting and affected environment for community resources and environmental justice. See also the *Fresno to Bakersfield Section: Community Impact Assessment Technical Report* (Authority and FRA 2012i) for details.

Project Period Impacts

Community Resources

The Allensworth Bypass Alternative would not displace any residential, commercial, or industrial business units. The BNSF–Through Allensworth Alternative would displace nine residential units, but no commercial or industrial business units. No key community facilities would be displaced under either alternative.

No community division impacts would be expected to occur in the Allensworth area, though both alternatives would introduce new visual and noise elements into this rural setting. The Allensworth Bypass Alternative would pass west of the community of Allensworth, farther away from the existing community than would the BNSF–Through Allensworth Alternative. Therefore, noise and other Project period impacts on the community would be less under the Allensworth Bypass Alternative than under the BNSF–Through Allensworth Alternative. Effects of moderate intensity from residential displacements in the context of rural agricultural areas would result in significant effects from the BNSF–Through Allensworth Alternative. Because neither alternative would result in the division of an existing community or changes in community character, effects resulting from noise and other Project period impacts on the community would be considered of moderate intensity, and impacts would not be significant.

Environmental Justice

The BNSF–Through Allensworth Alternative would have disproportionate effects on a minority population because of Colonel Allensworth State Historic Park's significance to African Americans, rather than through direct displacement or other physical effects on a discrete community. However, neither the BNSF-Through Allensworth nor the Allensworth Bypass Alternative would have disproportionately high and adverse effects on minority and low-income populations. The area outside of Allensworth has a lower-density population overall and fewer EJ communities than the corresponding portion of the BNSF-Through Allensworth Alternative, and therefore the EJ findings associated with the Allensworth Bypass Alternative would be less than those of the corresponding portion of the BNSF-Through Allensworth Alternative. This includes reduced or no impacts on parks and recreation facilities associated with Colonel Allensworth State Historic Park, noise and vibration impacts, and visual impacts.

Mitigation measures developed for these resources will minimize or avoid some EJ impacts, as will Mitigation Measures SO-6 and SO-7. Mitigation measures will reduce EJ impacts, but the BNSF–Through Allensworth Alternative would still have disproportionate effects on a minority population because of the state park's significance to African Americans, rather than through direct displacement or other physical effects on a discrete community.

6.4 Wasco-Shafter Area Alternatives

6.4.1 Biological Resources

6.4.1.1 Riparian Areas

Affected Environment in Wasco-Shafter Area

There are no riparian areas associated with the Wasco-Shafter alternatives.

Direct and Indirect Impacts

There are no direct or indirect impacts on riparian areas associated with either the BNSF-Through Wasco-Shafter Alternative or the Wasco-Shafter Bypass Alternative.

6.4.1.2 Special-Status Plant Species

Affected Environment in Wasco-Shafter Area

In the areas where access was granted, no special-status plant species were identified in the PSA of the Wasco-Shafter Area alternatives. Although unsurveyed habitats that have potential to support special-status plant species are present in the Wasco-Shafter area alternatives, suitable habitat for most special-status plant species is limited in the Wasco-Shafter Area by a number of factors, such as the conversion of natural lands to agricultural land uses.

Direct and Indirect Impacts

Table 6.4-1 lists the potential permanent and temporary impacts, in acres, on unsurveyed potential suitable habitat that could support special-status plant species within the footprints of the Wasco-Shafter area alternatives. Additional information is included specific to the area for which a Proposed Preliminary LEDPA is requested. Areas of unsurveyed potential habitat were identified through aerial photo interpretation of parcels where access was not granted for survey efforts.

The BNSF-Through Wasco-Shafter Alternative would have fewer permanent and temporary direct impacts on unsurveyed habitats that potentially have special-status plant species than the Wasco-Shafter Bypass Alternative. However, because the unsurveyed habitats in the footprints of both alternatives are largely disturbed, the potential for special-status plant species to occur is low for both alternatives.

Table 6.4-1
Impacts on Special-Status Plant Species in the Wasco-Shafter Area Alternatives (acres)

Special-Status Plants	Impact Type	BNSF–Through Wasco-Shafter Alternative (Wasco-Shafter Proposed Preferred Alternative)	*Portion of BNSF-Through Wasco-Shafter North of Seventh Standard Road*	*Portion of BNSF-Through Wasco-Shafter South of Seventh Standard Road*	Wasco-Shafter Bypass Alternative
Unsurveyed potential suitable habitat that could support special-status plant species	Permanent	22.49	8.39	14.11	32.48
	Temporary	10.63	10.02	0.61	24.95

Notes:
[shaded] = least-impact alternative
All impacts were calculated based on the Final EIR/EIS 15% engineering design Project footprint.

6.4.1.3 Special-Status Wildlife Species

Affected Environment in Wasco-Shafter Area

The Wasco-Shafter area alternatives are in agricultural and urban areas. Suitable habitats for special-status amphibian, reptile, bird, and mammal species as well as for native fauna species are present. Suitable habitats for special-status wildlife have been significantly reduced throughout the Central Valley, and natural areas that remain are largely disturbed and fragmented.

Impacts on terrestrial special-status wildlife species are the focus of this section. Impacts on aquatic resources are described in Section 4.2.4.2. Impacts on aquatic resources can be used as a proxy for estimating not only the loss of habitat and impact on that resource but on the loss of suitable habitat for special-status species that potentially utilize those areas.

Suitable habitats for special-status species, including vernal pool fairy shrimp and vernal pool tadpole shrimp, valley elderberry longhorn beetle, Kern lamprey, blunt-nosed leopard lizard, Tipton kangaroo rat, and San Joaquin kit fox, are very limited in the Wasco-Shafter Area HSA.

Direct and Indirect Impacts

Table 6.4-2 presents the Project impacts on the terrestrial habitats of special-status wildlife species in the Wasco-Shafter Area. The Wasco-Shafter area alternatives would result in direct and indirect Project period impacts on habitats that could support a number of terrestrial special-status wildlife species. Of the habitats present, annual grassland habitat provides the best potential to host terrestrial special-status wildlife species; because this area is highly fragmented, the potential for this habitat to support special-status wildlife species is limited.

The BNSF–Through Wasco-Shafter Alternative would have direct permanent impacts on annual grassland (approximately 31.11 acres) that are similar to those of the Wasco-Shafter Bypass Alternative (27.68 acres). When analyzing impacts on marginal habitats for terrestrial special-status wildlife species, the Wasco-Shafter Bypass Alternative would result in the smallest impacts on barren, agricultural land, and urban habitat types. Impacts on Agricultural Lands, as identified by biologists and as described in *A Guide to Wildlife Habitats of California* and the California Wildlife Habitat Relationship System (Mayer and Laudenslayer 1988; CDFG 2008), are discussed in this section, whereas impacts on Important Farmland, Williamson Act-prime land and FSZ lands are presented in Section 6.1.4.2.

To reduce additional impacts on suitable habitats to the greatest extent feasible, mitigation measures require avoidance of habitat, where possible, or reduction through pre-construction or protocol-level surveys before ground disturbance to identify locations where special-status species are present; minimization measures, including but not limited to the installation of fencing to exclude species from project area, establishment and monitoring of non-disturbance buffers, or species relocation; and compensation for unavoidable adverse impacts, including loss of habitat. After mitigation, the impacts of all alternatives on special-status wildlife species are approximately equivalent.

Table 6.4-2
Impacts on Terrestrial Habitats in the Wasco-Shafter Area Alternatives (acres)

Habitat Type		Impact Type[a]	BNSF-Through Wasco-Shafter North of Seventh Standard Road	*Portion of BNSF-Through Wasco-Shafter North of Seventh Standard Road*	*Portion of BNSF-Through Wasco-Shafter South of Seventh Standard Road*	Wasco-Shafter Bypass Alternative
Terrestrial communities	Barren	Permanent	9.44	9.44	—	—
		Temporary	1.07	1.07	—	—
	Urban	Permanent	334.56	277.76	56.80	156.45
		Temporary	118.81	113.91	4.91	63.37
	Agricultural lands	Permanent	612.89	498.19	114.70	549.80
		Temporary	525.72	521.57	4.14	324.22
	Annual grassland	Permanent	31.11	5.01	26.10	27.68
		Temporary	1.08	0.19	0.89	4.53

Notes:
[shaded] = least-impact alternative
— = no impact or not applicable
[a] All impacts were calculated based on the Final EIR/EIS 15% engineering design Project footprint.

6.4.1.4 Wildlife Corridors

Affected Environment in Wasco-Shafter Area

The Wasco-Shafter area alternatives do not affect any identified wildlife movement corridors.

Direct and Indirect Impacts

Neither the BNSF–Through Wasco-Shafter Alternative nor the Wasco-Shafter Bypass Alternative would directly or indirectly affect identified wildlife movement corridors; however, the construction of these alternatives may result in minor impacts on small-scale wildlife movement patterns (e.g., daily foraging activities). The impacts of the BNSF–Through Wasco-Shafter Alternative and Wasco-Shafter Bypass on wildlife movement would be minimal and would have little or no regional effect. These effects are expected to be minimal because there are only a few, highly fragmented natural habitat areas remaining in the region. Most of the Wasco-Shafter Area has been converted to agricultural and urban land uses, which provide limited potential for wildlife species to move through the area.

6.4.2 Other Environmental Consequences

This section discusses the other environmental consequences that help to differentiate the Wasco-Shafter Area alternatives. The following resources are discussed:

- Transportation and traffic (Project period impacts).
- Noise and vibration (Project period impacts).
- Agricultural lands (Project period impacts).
- Aesthetics and visual resources (Project period impacts).
- Cultural resources (construction period impacts).
- Community resources and environmental justice (Project period impacts).

6.4.2.1 Transportation and Traffic

This section focuses on Project period impacts, which differ by alternative for impacts on transportation and traffic. Construction period impacts do not differ substantially by alternative and are not discussed in this section.

Affected Environment in Wasco-Shafter Area

The BNSF–Through Wasco-Shafter Alternative would generally follow along the BNSF tracks and pass through the cities of Wasco and Shafter, whereas the Wasco-Shafter Bypass Alternative would go around the urban areas of Wasco and Shafter through largely rural agricultural areas without substantial amounts of traffic.

Project Period Impacts

The BNSF–Through Wasco-Shafter Alternative would result in five road closures, they would have minimal Project period impacts on transportation and traffic circulation and would not be perceptible to typical transportation system user in Wasco or Shafter because daily traffic volumes are very low, traffic patterns already accommodate existing rail lines and the HST would be elevated through these towns. Impacts of the BNSF-Through Wasco-Shafter Alternative on circulation would therefore not be significant. The Wasco-Shafter Bypass Alternative would result in 20 permanent road closures, which would affect circulation patterns. Under the Wasco-Shafter Bypass Alternative, the diverted traffic near road closures would affect local roadways and intersections. Because construction would affect roads with very low traffic volumes, and road closures and detours would not be permanent, the Wasco-Shafter Bypass Alternative would result in negligible effects. Incorporation of the mitigation measures in the Wasco-Shafter Bypass Alternative would further reduce these impacts.

6.4.2.2 Noise and Vibration

This section focuses on Project period impacts, which differ by alternative for impacts on noise and vibration. Construction period impacts do not differ substantially by alternative and are not discussed in this section.

Affected Environment in Wasco-Shafter Area

The BNSF-Through Wasco-Shafter Alternative goes through the downtown areas of the cities of Wasco and Shafter, following the BNSF right-of-way as much as is practicable. As described in Section 3.4.5 of the Revised DEIR/Supplemental DEIS (Authority and FRA 2012d), the noise levels measured along the BNSF-Through Wasco-Shafter Alternative through these cities generally ranged from 70 to 79 dBA L_{dn}. These levels reflect the proximity to an active freight rail line. The Wasco-Shafter Bypass Alternative curves to the southeast to avoid the cities of Wasco and Shafter, while going through agricultural land and through some of the least-populated areas along the Fresno to Bakersfield Section. Noise levels measured along this alternative ranged from 54 to 61 dBA L_{dn}, which are levels to be expected in a quiet, rural environment. For the homes next to the well-traveled roadways, the noise levels ranged from 67 to 71 dBA L_{dn}.

Project Period Impacts

Under both Wasco-Shafter alternatives, the project would create long-term noise impacts from the introduction of a new transportation system, including potential vibration impacts. After mitigation, severe noise effects would remain for 63 receivers under the Wasco-Shafter Bypass Alternative, and for 530 receivers under the BNSF–Through Wasco-Shafer Alternative. After the Wasco Housing Authority relocates the farm worker housing located east of the BNSF tracks, the 530 receivers would be reduced by 226 receivers to 305 receivers. Vibration effects would be noticeable to two receivers under the Wasco-Shafter Bypass Alternative and to five receivers under the BNSF–Through Wasco-Shafer Alternative, but are not anticipated to result in property damage that would be significant.

6.4.2.3 Agricultural Lands

This section focuses on Project period impacts, which differ by alternative for impacts on agricultural lands. Construction period impacts do not differ substantially by alternative and are not discussed in this section.

Affected Environment in Wasco-Shafter Area

Almost all of the land crossed by the Wasco-Shafter area alternatives is classified as Prime Farmland. North of Shafter, almost all of the land is under Williamson Act contract. No confined animal facilities are present along these Project alternatives, and no agricultural conservation easements have been identified within the Project Footprint of either alternative.

Project Period Impacts

Project period impacts for the Wasco-Shafter area alternatives would be similar. The BNSF–Through Wasco-Shafter Alternative would permanently affect 696 acres of Important Farmland, of which 675 acres are Prime Farmland and 1 acre is Farmland of Statewide Importance; the Wasco-Shafter Bypass Alternative would permanently affect 684 acres of agricultural land (including potential conversion from parcel severance), all of which is Prime Farmland. The Wasco-Shafter Bypass Alternative would split a total of 28 agricultural parcels, which is 5 more than the BNSF–Through Wasco-Shafter Alternative. Both alternatives would displace one agricultural facility.

The BNSF–Through Wasco-Shafter Alternative would permanently convert 229 acres of Williamson Act-Prime Land, and the Wasco-Shafter Bypass Alternative would permanently convert 247 acres of Williamson Act-Prime Land. No FSZ land would be converted and no confined animal facilities would be affected by either of the Wasco-Shafter Area Alternatives.

6.4.2.4 Aesthetics and Visual Resources

This section focuses on Project period impacts, which differ by alternative for impacts on aesthetics and visual resources. Construction period impacts do not differ substantially by alternative and are not discussed in this section.

Affected Environment in the Wasco-Shafter Area

Under the BNSF–Through Wasco-Shafter Alternative, the alignment would pass through the downtown centers of Wasco and of Shafter, which have visually intact, historic town centers within the visual foreground of the alternative as well as nearby parks and residential areas. The elements contributing to the visual quality of these towns include largely historic architecture and street trees, median plantings, and other elements of main street development. These features contribute to a prevailing intactness of character and unity of scale typical of historic main streets. Most areas within a narrow band immediately adjoining the existing BNSF Railway right-of-way are typified by railroad-related industrial uses, often with low visual quality. The Wasco-Shafter Bypass Alternative would avoid the urban areas of Wasco and Shafter and pass through rural residential development and the planned Orchard Park Specific Plan area northeast of the City Center.

Project Period Impacts

Under both of the Wasco-Shafter Area Alternatives, the HST System would result in permanent changes to areas adjacent to or within the viewing range of the HST System in both urban and rural areas. These visual changes would occur through the introduction of new features in the environment, the HST guideways (both elevated and non-elevated portions), guideway support columns, the contact power system, bridges and roadway grade separations, and a variety of HST infrastructure. These features would be incompatible and out of scale with the existing visual character in many locations where viewer sensitivity and exposure are high. These areas include the historic old town centers, which constitute the key sensitive viewpoints. Visual quality in these old town centers ranges from moderate to moderately high, with corresponding levels of vividness, intactness, and unity. In both downtowns and nearby parks, the concentration of potential viewers may also be relatively high, with broad visibility from multiple locations and extended exposure to views.

The BNSF–Through Wasco-Shafter Alternative would result in Project period impacts on the existing visual quality of the urban areas of Wasco and Shafter, but would have a reduced effect on the outlying rural areas affected by the Wasco-Shafter Bypass Alternative. The Wasco-Shafter Bypass Alternative would result in visual impacts to the planned Orchard Park Specific Plan area until landscape screening matures in 10 years or more.

6.4.2.5 Cultural Resources

Construction period impacts on historic architectural resources are the only cultural resources impacts that differentiate the alternatives, and therefore are the only cultural resource impacts discussed below. Construction period impacts for archaeological resources and Project period impacts for archaeological and historic architectural resources do not differ substantially by alternative and therefore are not discussed in this section.

Affected Environment in Wasco-Shafter Area

Surveys conducted in the area affected by the Wasco-Shafter alternatives identified 53 built environment resources that were more than 50 years old at the time of survey but did not meet the criteria for listing in the NRHP or the CRHR at the local, state, or national level. However, the surveys did identify three historic architectural resources that were listed, determined to be eligible for listing, or eligible for listing in the NRHP and/or CRHR (Authority and FRA 2011b, 2012f).

Construction Period Impacts

Neither the BNSF–Through Wasco-Shafter Alternative nor the Wasco-Shafter Bypass Alternative would result in construction period impacts on historic properties.

6.4.2.6 Community Resources and Environmental Justice Impacts

This section focuses on Project period impacts, which differ by alternative for community resources and environmental justice. Construction period impacts do not differ substantially by alternative and are not discussed in this section.

Affected Environment in Wasco-Shafter Area

Wasco's population is approximately 25,700 residents, with approximately 4,900 housing units. Agriculture has been the historical mainstay of Wasco's economy, but a state prison is now the city's biggest employer. Wasco has three public buildings in the study area: the city administrative offices and city hall, a library operated by Kern County, and the local historical society museum. Public-safety facilities include a single county sheriff's station and one fire station, both of which are in the study area. Wasco's one medical facility, an independent medical center, is also in the study area. The community has nine public and private schools; five of the schools are in the study area. Wasco has many places of worship. The City of Wasco Housing Authority Farm Labor Housing development, a large agricultural workers camp, is on the eastern side of the city. The City of Wasco is currently planning to relocate this development and integrate it with the northern portion of the city of Wasco.

The area between the cities of Wasco and Shafter is predominately rural agricultural land, with three small communities (Palmo, North Shafter Labor Camp, and Myricks Corner) interspersed between the cities. The University of California's Shafter Research and Extension Center is also in this portion of the study area.

The area within the Shafter city limits contains a substantial amount of farmland and open space. It can accommodate future growth, and certain portions have been planned for industrial development. The city limits extend eastward to SR 99 and southeast almost to the Bakersfield city limits. The city is bisected from northwest to southeast by both SR 43 and the BNSF railroad tracks so that most of the relatively small, urbanized area of the city falls within the study area boundaries. Shafter's population is approximately 16,200, with approximately 4,100 housing units. Agriculture and related industries constitute the largest occupational sector in Shafter. Shafter's city hall and two museums are within the study area. Across the BNSF grade crossing to the east on Seventh Standard Road are the Shafter International Trade and Transportation Center on the north side and another industrial complex on the south side.

The study area between the cities of Shafter and Bakersfield is predominately rural agricultural land. Crome is the one identified community in the study area between the cities of Shafter and Bakersfield. This community is unincorporated. It has an estimated population of about 75 and approximately 20 homes. The community has one church and no other businesses or key community facilities. The Shafter Cemetery is also in this portion of the study area, near the Central Valley Highway and the BNSF tracks southeast of Shafter in an area surrounded by agricultural land and open space.

The EJ study area for the Wasco-Shafter area alternatives includes small, scattered communities of concern (U.S. Census Bureau 2000). Wasco contains a number of communities of concern along the entire length of the EJ study area; these communities are, for the most part, west of SR 43, extending between SR 43 and Griffith Avenue, with the exception of a major farm-labor housing development (the agricultural workers camp) east of SR 43. Several small, scattered communities of concern lie to the east of Wasco (U.S. Census Bureau 2000); this area is a rural agricultural area with no concentrations of residences, businesses, or community facilities or services. Within Shafter, the existing BNSF railroad appears to be a dividing line through the city. The high school and newer, higher-income housing are to the northeast of the BNSF tracks, and the low-income neighborhoods and downtown area are to the southwest. A farm-labor housing development occurs along SR 43 north of the Shafter central business district.

Section 3.12, Socioeconomics, Communities, and Environmental Justice, of the Revised DEIR/Supplemental DEIS (Authority and FRA 2012f) describes the regulatory setting and affected environment for community resources and environmental justice. See also the *Fresno to Bakersfield Section: Community Impact Assessment Technical Report* (Authority and FRA 2012i) for details.

Project Period Impacts

Community Resources

The BNSF–Through Wasco-Shafter Alternative would displace 23 residential and a similar number of commercial and industrial business units, and the Wasco-Shafter Bypass Alternative would displace 18 residential and 4 commercial and industrial business units. The Wasco-Shafter Bypass Alterative would also pass through the planned Orchard Park Specific Plan area. The BNSF-Through Wasco-Shafter Alternative would result in adverse effects to Crome, displacing approximately one-third (8 to 10) of the homes in Crome (included in the 23 total displacements identified above) and the only non-residential use in the community—a church building that houses both the 7th Pentecostal Church of God and India Pentecostal Assembly. Even with implementation of mitigation measures, given the context of this small community and the relative magnitude of impacts, impacts would be significant. No other community division impacts are expected to occur in the Wasco-Shafter area under either alternative.

The principal industrial and commercial businesses affected by the BNSF–Through Wasco-Shafter Alternative are west of the BNSF Railway, from Gromer Avenue in the north to 8th Street in the south. There are 20 commercial and industrial units in this area; they include a biopesticide production facility, agricultural processing and storage facilities, welding shops, automotive shops, a recycling facility, and a gas distribution facility. It is possible that a few of these businesses could remain at their current locations because the BNSF–Through Wasco-Shafter Alternative would only take a small portion of the parcel that is not occupied by business facilities. However, no portion of these businesses' buildings would remain under the viaduct structure. Also, the Project would not alter access to the businesses, and those businesses that remain would not create a safety hazard to HST operations.

The businesses that could not remain at their current locations would need to be relocated. These include a Sunnygem nut-processing facility and the Thermo Trilogy Corporation (Certis) biopesticide facility. The City of Wasco has substantial land along the BNSF Railway and SR 43 that is zoned for heavy and light industry from Gromer Avenue south to Poso Drive and east to the city limits at Root Avenue (City of Wasco 2010). Assistance with the relocation of businesses to this planned industrial area is a component of the BNSF-Through Wasco-Shafter Alternative.

Environmental Justice

Through the U.S. Department of Agriculture (USDA) Farm Labor Housing program, the Wasco Housing Authority rents 199 units to non-migratory farm workers; the units are east of the BNSF tracks, very close to the BNSF–Through Wasco-Shafter Alternative. This minority and low-income population would experience significant impacts from the BNSF–Through Wasco-Shafter Alternative. However, the City of Wasco is planning to relocate all residents of this housing complex to a location to the west of and not near the BNSF tracks and to repurpose or demolish the existing complex. This plan is envisioned as a benefit to residents and the city, and would also eliminate the EJ impacts of the Project on this complex. In May of 2013, the Wasco City Council approved this plan, and land was acquired in June 2013 through a grant from the Department of Agriculture. The City is currently negotiating the terms of the relocation with the Wasco Housing Authority, which is in favor of this plan (Wasco Housing Authority 2013). The Authority will assist the City in the relocation process to ensure that the construction and operation of the train results in minimal conflicts with these planned land uses. The community division in Crome that would result from the BNSF–Through Wasco-Shafter Alternative would be a disproportionately high and adverse effect on this EJ community.

6.5 Bakersfield Area Alternatives

6.5.1 Biological Resources

6.5.1.1 Riparian Areas

Affected Environment in Bakersfield Area

The only riparian areas in the Bakersfield Area are associated with the Kern River. All Bakersfield area alternatives cross the Kern River in a similar location. The riparian areas associated with the Kern River provide good biological resources for plants and wildlife, and because of existing land uses in the region (parks, development), they have been physically reduced and restricted to narrow strips along the upper terrace of the Kern River.

Direct and Indirect Impacts

Table 6.5-1 presents a comparison of impacts on riparian areas in the Bakersfield Area. All Bakersfield area alternatives would result in impacts on riparian areas present on the banks of the Kern River that are in fair or good condition). Both the Bakersfield Hybrid and the Bakersfield South alternatives would have fewer total direct and indirect impacts on riparian areas than the BNSF-Bakersfield North Alternative.

The Bakersfield Hybrid and the Bakersfield South alternatives have the same alignment and profile in this area. As a result these alternatives would result in nearly identical direct permanent impacts, direct temporary impacts, and indirect impacts on riparian areas. However, the BNSF-Bakersfield North Alternative would result in slightly fewer direct permanent and direct temporary impacts, but would result in substantially more indirect impacts compared with the Bakersfield Hybrid and Bakersfield South alternatives.

When considering the impacts in terms of a feature's condition, the direct impacts would occur to features in good condition; however the indirect impacts would occur to riparian areas in both fair and good condition. Because the project design across the Kern River includes a viaduct, high above the banks of the river, indirect impacts would not likely result in degradation of the adjacent riparian areas.

Table 6.5-1
Comparison of Quantity of Impacts on Riparian Areas in the Bakersfield Area (acres)

Wetlands and Other Waters (Type/HST water type)	Impact Type[a]	Bakersfield Hybrid Alternative (Bakersfield Proposed Preferred Alternative)	BNSF-Bakersfield Alternative (BNSF–Bakersfield North Alternative)	Bakersfield South Alternative
RIPARIAN AREAS[b]	Direct permanent	0.70	0.21	0.70
	Direct temporary	0.30	0.10	0.30
	Indirect[a]	6.06	8.85	6.06
GRAND TOTAL		**7.06**	**9.16**	**7.06**

Notes:
= least-impact alternative
[a] Indirect impacts are calculated within a 250-foot buffer of the Project Footprint (including areas of permanent and temporary impacts) intersected by the construction footprint.
[b] Calculations are based on raw, unrounded Geographic Information System (GIS) source data. As a result, the subtotals and totals may not match the rounded feature values because of the number of aquatic features. These minor discrepancies may result in small differences in the presentation of the acreage.
All impacts were calculated based on the 15% engineering design construction footprint.

6.5.1.2 Special-Status Plant Species

Affected Environment in Bakersfield Area

In the areas where access was granted, no special-status plant species were identified within the PSA of the Bakersfield area alternatives. Unsurveyed habitats that have low potential to support special-status plant species are present. Although annual grassland is present in the Bakersfield Area alternatives, suitable habitat for most special-status plant species is limited by a number of factors, including fragmentation and disturbance due to development (urbanization), which encompasses residential, commercial, and industrial purposes.

Direct and Indirect Impacts

Table 6.5-2 lists the potential permanent and temporary impacts (in acres) on special-status plant species within the footprint of the Bakersfield Area alternatives. Areas of unsurveyed potential habitat were identified through aerial photo interpretation of parcels where access was not granted for survey efforts.

The Bakersfield area alternatives are in a highly urbanized portion of metropolitan Bakersfield. Although suitable habitat for special-status plant species is limited, special-status plant species have a moderate potential of being present in unsurveyed suitable habitats. All Bakersfield area alternatives would result in similar impacts on unsurveyed habitats that have the potential to support special-status plant species. If special-status plant species occur in these unsurveyed areas, the types of impacts on special-status plant species that may occur could include vegetation removal and disturbance, erosion, an increased risk of fire, habitat degradation and fragmentation, and the introduction of noxious plant species.

Table 6.5-2
Impacts on Special-Status Plant Species in the Bakersfield Area Alternatives

Special-Status Plants	Impact Type	Bakersfield Hybrid Alternative (Bakersfield Proposed Preferred Alternative)	BNSF-Bakersfield Alternative (BNSF–Bakersfield North Alternative)	Bakersfield South Alternative
Unsurveyed potential suitable habitat that could support special-status plant species	Permanent	39.64	30.95	42.65
	Temporary	205.05	208.73	202.03

Notes:
▭ = least-impact alternative
All impacts were calculated based on the 15% engineering design Project Footprint.

6.5.1.3 Special-Status Wildlife Species

Affected Environment in Bakersfield Area

The Bakersfield alternatives are in a highly urbanized portion of metropolitan Bakersfield. Suitable habitats for special-status reptile, bird, and mammal species as well as for native fauna species are present but limited.

Impacts on terrestrial special-status wildlife species are the focus of this section. Impacts on aquatic resources are described in Section 4.2.5.2, and impacts on riparian areas are described above. Impacts on aquatic resources and riparian areas may also result in impacts on special-status wildlife species that utilize those areas, like special-status bird species, vernal pool branchiopods, or the valley elderberry longhorn beetle.

No suitable habitat (e.g., vernal pools) for vernal pool fairy shrimp or vernal pool tadpole shrimp is present in the area. No elderberry shrubs, the sole host plant of the valley elderberry longhorn beetle, have been identified within the construction footprint and Project Footprint of the Bakersfield Area alternatives. However, this species would be affected, if present, in areas where construction activities occur in unsurveyed natural areas along the Kern River where the host plant could be found. A small amount of marginal habitat (i.e., riverine) for the Kern brook lamprey is present in the Friant-Kern Canal, which will be similarly affected by all Bakersfield area alternatives (a viaduct structure is to span the canal).

The Bakersfield area alternatives contain suitable, albeit limited, habitat (including both natural habitats and urban land uses) for breeding, foraging, dispersal, and migration of special-status bird and mammal species. The San Joaquin kit fox is known to occur within the urban areas of Bakersfield.

Direct and Indirect Impacts

The Bakersfield area alternatives would result in direct and indirect impacts on a number of special-status wildlife species and their habitats, as shown in Table 6.5-3.

The Bakersfield area alternatives would affect small areas of habitat that could support special-status wildlife species. The magnitude of these impacts would be similar for all three alternatives. The Bakersfield Hybrid Alternative would have slightly fewer direct permanent impacts on annual grassland and alkali desert scrub habitats compared with the BNSF–Bakersfield North Alternative. The Bakersfield Hybrid Alternative would have the same impacts on alkali desert scrub habitat as the Bakersfield South Alternative, but would slightly reduce the amount of impacts on annual grassland habitat. Direct permanent impacts on pasture and direct temporary impacts on annual grassland and alkali desert scrub and pasture habitats are relatively similar for all Bakersfield area alternatives.

The majority of the impacts on habitats for terrestrial special-status wildlife species are associated with urban habitats. All Bakersfield area alternatives have similar direct permanent and temporary impacts on urban habitats, and the potential for these habitats to support special-status wildlife species is low, with the exception of the San Joaquin kit fox.

To reduce additional impacts on suitable habitats to the greatest extent feasible, mitigation measures require avoidance of habitat, where possible, or reduction through pre-construction or protocol-level surveys before ground disturbance to identify locations where special-status species are present; require minimization measures, including but not limited to the installation of fencing to exclude species from project area, establishment and monitoring of non-disturbance buffers, or species relocation; and require compensation for unavoidable adverse impacts, including loss of habitat. After mitigation, the impacts of all alternatives on special-status wildlife species are approximately equivalent.

Table 6.5-3
Impacts on Terrestrial Habitats in the Bakersfield Area Alternatives (acres)

Habitat Type		Impact Type[a]	Bakersfield Hybrid Alternative (Bakersfield Proposed Preferred Alternative)	BNSF-Bakersfield Alternative (BNSF–Bakersfield North Alternative)	Bakersfield South Alternative
Terrestrial communities	Barren	Permanent	14.81	6.64	14.83
		Temporary	158.31	162.47	158.29
	Urban	Permanent	229.15	286.04	245.48
		Temporary	96.36	67.78	77.05
	Annual grassland	Permanent	2.64	4.55	5.62
		Temporary	36.25	36.53	33.25
	Alkali desert scrub	Permanent	11.70	12.88	11.70
		Temporary	2.68	2.54	2.68
	Pasture	Permanent	1.64	1.15	1.64
		Temporary	0.09	0.11	0.09

Notes:
= least-impact alternative
— = no impact or not applicable
[a] All impacts were calculated based on Final EIR/EIS 15% engineering design Project Footprint.

6.5.1.4 Wildlife Corridors

Affected Environment in Bakersfield Area

The Bakersfield area alternatives pass through the Kern River linkage. The Kern River linkage is primarily an east-west linkage that follows the Kern River riparian corridor (Penrod et al. 2001). This linkage, which is approximately 30 miles long, connects natural lands (e.g., the Carrizo Plain National Monument) identified in the *Recovery Plan for Upland Species of the San Joaquin Valley, California* (USFWS 1998) that support special-status species to Bakersfield and the Sierra Nevada foothills. The major habitat types in the linkage were identified as riparian and upland, and the major land-cover types were natural vegetation, agricultural land, and urban development. The most significant barriers to wildlife movement were identified as gaps in riparian habitat and water impoundments that potentially restrict the movement of terrestrial species across areas that formerly had only intermittent water flow (Penrod et al. 2001). The linkage is currently part of the plan described in *Recovery Plan for Upland Species of the San Joaquin Valley, California* (USFWS 1998).

Direct and Indirect Impacts

Impacts on the Kern River linkage would be similar for all Bakersfield Area alternatives. Generally, these direct impacts include the obstruction of wildlife movement because of Project infrastructure, security fencing, and construction fencing. Indirect impacts may occur as a result of noise, vibration, or visual or light pollution that could result in temporary shifts in the use of corridors, foraging patterns, or territories; nursery or rookery abandonment; or increased predation. Where the tracks would be built on elevated structures, the Project would have negligible impacts on habitat linkages because the elevated portions of the rail would span several miles and would allow unimpeded wildlife passage. For at-grade portions of the Project or where the Project will remain fenced following construction, habitat linkages would be at risk of losing their functionality, and Project construction and operations would further impair the remaining and degraded habitat linkages between existing natural habitat blocks.

6.5.2 Other Environmental Consequences

This section discusses the other environmental consequences that help to differentiate the Bakersfield Area alternatives. The following resources are discussed:

- Section 4(f) resources.
- Noise and vibration (Project period impacts only).
- Parks, recreation, and open space (Project period impacts only).
- Cultural resources (construction period impacts only).
- Community resources and environmental justice (Project period impacts only).

6.5.2.1 Section 4(f) Resources

The Bakersfield South Alternative would result in a use of the property at 2509 E. California Avenue in Bakersfield. Preliminarily, based upon initial research and dialogue with the SHPO, the FRA anticipates that the Project will not result in a use of the Salón Juárez or public recreation and open space facilities in Bakersfield under Section 4(f) of the Department of Transportation Act.

6.5.2.2 Noise and Vibration

Project period impacts are discussed below, as construction period noise and vibration impacts do not differ by alternative.

Affected Environment in Bakersfield Area

All the Bakersfield area alternatives generally follow the HST corridor along the BNSF tracks through suburban and urban areas of Bakersfield into Downtown Bakersfield. All the Bakersfield area alternatives would serve the proposed Bakersfield Station. The land uses transition from agricultural to residential, with several neighborhoods of single-family dwellings. Noise measurements were conducted in the rear yards of homes that back up to the existing BNSF right-of-way. As described in Section 3.4.5 of the Revised DEIR/Supplemental DEIS (Authority and FRA 2012f), the noise levels measured at these homes ranged from 65 to 77 dBA L_{dn}. These levels are reflective of homes directly adjacent to a busy railroad line. Beyond this point, the BNSF line and the project alternatives turn east toward the freight yard and station at Bakersfield. The land uses here are urban: roadways, freeways, and rail lines dominate the noise environment. The noise measurements conducted near the alignment alternatives and the proposed Downtown Bakersfield station alternatives in this area ranged from 59 to 70 dBA L_{dn}, measurements that are consistent with an urban environment.

Project Period Impacts

Under all of the Bakersfield Area alternatives, the HST System would create long-term noise impacts and potential vibration impacts from the introduction of a new transportation system. The Bakersfield Hybrid Alternative would result in 1,480 severely affected receivers compared with 2,616 severely affected receivers under the BNSF–Bakersfield North Alternative and 3,038 severely affected receivers under the Bakersfield South Alternative. With implementation and construction of sound walls, the number of residual severe noise receivers is dramatically reduced. The BNSF-Bakersfield North Alternative would result in the fewest residual severe noise receivers (10), while both the Bakersfield South and Bakersfield Hybrid alternatives would result in 61 residual severe noise receivers.

The magnitude of the noise increase from all the Bakersfield area alternatives would be substantial. Vibration effects would be noticeable for 34 sensitive receivers from the Bakersfield Hybrid Alternative and for 14 sensitive receivers for both the BNSF-Bakersfield North and Bakersfield South alternatives. While they are not anticipated to result in property damage that would be significant, impacts are still considered to be substantial.

6.5.2.3 Parks, Recreation, and Open Space

This section discusses Project period impacts on parks, recreation, and open space that, unlike construction period impacts, differ by alternative.

Affected Environment in Bakersfield Area

The Kern River Parkway is a 1,138-acre, 32-mile linear community park with bike paths, equestrian facilities, a fishing pond, a fitness par course, a horseshoe pit, a skate park, and picnic tables. The parking for the facility connects several city parks along the Kern River. The resource would be affected by all Bakersfield area alternatives.

The Mill Creek Linear Park is a 1.5-mile pedestrian pathway that runs along the banks of the Kern Island canal, between the BNSF right-of-way to California Avenue, and connects via sidewalk to the continuation of the Mill Creek Linear Park and Central Park to the north of the BNSF right-of-way. The resource would be affected by all Bakersfield area alternatives.

The Amtrak Station Playground contains a tot lot and a spray park, and would be indirectly affected by noise and visual effects under all Bakersfield area alternatives.

The McMurtrey Aquatics Center is located east of the Bakersfield Station study area, and would be affected by the Bakersfield South and the Bakersfield Hybrid Alternative.

Bakersfield High School contains sport fields, a gym, tennis courts, outdoor basketball courts, a grass quadrangle with tables and seating, and an auditorium. This facility would only be affected by the BNSF-Bakersfield North Alternative.

Project Period Impacts

All the Bakersfield area alternatives would substantially degrade the existing visual character of Kern River Parkway, Mill Creek Linear Park, and Bakersfield Amtrak station playground. The BNSF-Bakersfield North Alternative would degrade the existing visual setting and character of the recreation facilities associated with the Bakersfield High School. These impacts would remain significant after mitigation. As a result the BNSF-Bakersfield North would result in degradation of four parks, recreation, and open space resources, whereas both the Bakersfield South and Bakersfield Hybrid would result in the degradation of three such resources.

All the Bakersfield area alternatives would significantly increase noise exposure at Kern River Parkway, Mill Creek Linear Park, and Bakersfield Amtrak station playground. After mitigation, these impacts would remain significant. In contrast, the BNSF-Bakersfield North Alternative would increase noise exposure of the recreational facilities associated with the Bakersfield High School, and the Bakersfield South and Bakersfield Hybrid alternatives would increase exposure at McMurtrey Aquatic Center. However, with mitigation the noise expose to the recreation facilities associated with Bakersfield High School and the McMurtrey Aquatic Center would not be significant.

6.5.2.4 Cultural Resources

Construction period impacts on historic architectural resources are the only cultural resources impacts that differentiate the alternatives, and therefore are the only cultural resource impacts discussed below. Construction period impacts for archaeological resources and impacts for Project period archaeological and historic architectural resources do not differ substantially by alternative and therefore are not discussed in this section. Table 6.5-4 lists the historic architectural resources affected by the Bakersfield area alternatives.

Affected Environment in Bakersfield Area

Surveys conducted in the area affected by the Bakersfield alternatives identified 140 built environment resources that were more than 50 years old at the time of survey but did not meet the criteria for listing in the NRHP or the CRHR at the local, state, or national level. Eleven historic architectural resources were determined to be listed, eligible for listing, or appeared to be eligible for listing in the NRHP and/or CRHR (Authority and FRA 2011b, 2012h).

Construction Period Impacts

As listed in Table 6.5-4 below, the BNSF–Bakersfield North Alternative would not result in any direct adverse effects on Section 106 properties, but it would result in indirect adverse effects on two Section 106 properties. The Bakersfield South Alternative would result in direct adverse effects on one Section 106 property and in indirect adverse effects on one additional Section 106 property. The Bakersfield Hybrid Alternative would not result in any direct adverse effects on Section 106 properties, pending SHPO concurrence regarding effects on Salón Juárez as described in Section 1.6.6 above, but the alternative would result in indirect adverse effects on one Section 106 property.

Table 6.5-4
Historic Architectural Resources Affected by the Bakersfield Area Alternatives

Section 106 Historic Resource	Direct Effect	Indirect Effect
Bakersfield Hybrid Alternative (Proposed Preferred Alternative)		
Stark/Spencer Residence, 1321 N St., Bakersfield, Kern County	—	Visual effect from elevated HST
BNSF–Bakersfield North Alternative		
Harvey Auditorium, Bakersfield High School, 1241 G St., Bakersfield, Kern County	—	Visual effect from elevated HST
Residence, 1031 E 18th St., Bakersfield, Kern County	—	Visual effect from elevated HST
Bakersfield South Alternative		
Residence, 2509 E California Ave., Bakersfield, Kern County	Direct adverse effect	—
San Joaquin Cotton Oil, industrial complex, 1660 E. California Ave., Bakersfield, Kern County	—	Visual effect from elevated HST

6.5.2.5 Community Resources and Environmental Justice

This section addresses Project period impacts on community resources and environmental justice. Construction period impacts are substantially similar for all Bakersfield Area alternatives.

Affected Environment in Bakersfield Area

Bakersfield, the largest city and main commercial center in Kern County, is at the southern end of the San Joaquin Valley. Bakersfield's economy has historically been more diversified than the economy of other cities in the region, with both the oil and gas industry and agriculture playing major roles. However, public administration is the largest occupational sector in Bakersfield.

The population of Bakersfield is approximately 339,000, and the city has approximately 116,700 housing units. Section 3.12, Socioeconomics, Communities, and Environmental Justice, of the Revised DEIR/Supplemental DEIS (Authority and FRA 2012f) describes the regulatory setting and affected environment for community resources and environmental justice. See also the *Fresno to Bakersfield Section: Community Impact Assessment Technical Report* (Authority and FRA 2012i) for additional details.

Public facilities in the study area include libraries, museums, community centers, public safety facilities, schools, and government offices. Also, 61 religious facilities and 6 parks are in the study area. A community icon of particular note in the Northeast District of Bakersfield is the Mercado Latino Tianguis, a shopping complex that re-creates the feel of a Mexican village market. This facility is not a single business entity; rather, it rents stall space to approximately 118 small businesses and microbusinesses that cater to Kern County's Hispanic population. The Bakersfield High School campus is also in the study area because it is an important community resource.

Central Bakersfield contains a number of communities of concern, particularly south of Truxtun Avenue. The EJ study area in the Northeast District of Bakersfield also contains communities of concern, moving west to east from Central Bakersfield through Oswell Street (U.S. Census Bureau 2000).

Project Period Impacts

Community Resources

The BNSF–Bakersfield North Alternative and the Bakersfield South Alternative would result in 265 and 272 residential displacements, respectively, and the commercial and industrial business unit displacements would be 302 and 135 units, respectively. The Bakersfield Hybrid Alternative is estimated to displace 186 residential and 280 commercial and industrial business units. The difference in commercial displacements between the alternatives is primarily due to the displacement of 118 businesses in the Mercado Latino Tianguis under the Bakersfield Hybrid Alternative and the BNSF–Bakersfield North Alternative.

The BNSF–Bakersfield North Alternative is expected to affect eight key community and religious facilities, with six of the facilities to be fully displaced and two partially displaced. The Bakersfield High School’s Industrial Arts Building and the Mercado Latino Tianguis would be fully displaced. Both of these facilities could be relocated. Four churches would be fully displaced under this alternative (Christ First Ministries, Korean Presbyterian Church, Chinmaya Mission of Bakersfield, and Saints Memorial Church of God in Christ), and two churches would be partially displaced (Iglesia De Dios and St. George Greek Orthodox Church).

The Bakersfield South Alternative would affect nine key community and religious facilities (six fully displaced and three partially displaced), including a medical office building associated with Mercy Hospital and Bethel Christian School (which is affiliated with the First Free Will Baptist Church). Both the medical office building and Bethel Christian School would be fully displaced; however, they would be relocated. The City of Bakersfield’s Public Works Office and portions of the city’s corporation yard would be affected, and it may not be feasible to reconfigure the site to retain all services. Also, a portion of the Kern County Health and Human Services facility would be lost. Four churches would be fully displaced under this alternative (Korean Presbyterian Church, Baker Street Church of Christ, Full Gospel Lighthouse, and First Free Will Baptist Church), and the Chinmaya Mission of Bakersfield would be affected.

The Bakersfield Hybrid Alternative is expected to affect eight key community and religious facilities in Bakersfield: five of the facilities would be fully displaced and three would be partially displaced or affected. The fully displaced facilities include a medical office building associated with Mercy Hospital, the Kern County Mental Health Facility, the Mercado Latino Tianguis, the Bakersfield Homeless Shelter, and the Korean Presbyterian Church. All fully displaced facilities can be relocated. The affected or partially displaced facilities include the City of Bakersfield’s Public Works Office, Chinmaya Mission, and St. George Greek Orthodox Church. For both the Chinmaya Mission and St. George Greek Orthodox Church, no structures or parking lots would be affected, but small undeveloped portions of the parcels would be acquired.

The residential relocation effects associated with all the Bakersfield area alternatives would result in significant impacts on the communities in the Northwest District and Northeast District in Bakersfield. Similarly, commercial and industrial business displacements and required relocations would be significant. Given the context of the importance of these businesses to the local economy, the effects of the Bakersfield Area alternatives would result in significant impacts in the Central and Northeast districts of Bakersfield. Under the BNSF–Bakersfield North Alternative and the Bakersfield Hybrid Alternative, the displacement of the Mercado Latino Tianguis would result in significant impacts. Because portions of all the Bakersfield Area alternatives would not be located within an existing rail corridor, the HST in the Bakersfield Area would be a new linear element dividing an established community and result in a considerable number of residential property acquisitions in this neighborhood. The new linear element would divide the existing community in the Northwest and Northeast districts of Bakersfield. The substantial acquisition of right-of-way and redevelopment of properties required by all alternatives would divide established communities—particularly the formerly unincorporated Greenacres area of the Northwest District near Rosedale and the mixed-minority, residential Northeast District, which has large populations of Hispanic residents. However, the Bakersfield Hybrid Alternative would result in less disruption of the existing Northeast District residential communities than the BNSF–Bakersfield North and Bakersfield South alternatives. This effect would be substantial in Bakersfield's Northwest and Northeast districts where right-of-way acquisition would divide communities and disrupt community facilities. Even with implementation of the mitigation measures, impacts would be significant.

Environmental Justice

All three Bakersfield alternatives were found to result in disproportionately high and adverse effects on minority and low-income populations in Bakersfield. Elements that have disproportionate effects include air quality and global climate change; noise and vibration; socioeconomics, communities, and environmental justice; station planning, land use and development; parks, recreation, and open space; aesthetics and visual resources; cultural and paleontological resources; and cumulative resources. The Project includes mitigation measures that would minimize or avoid the impacts on the population, including communities of concern. The Authority will minimize impacts through a program of additional outreach to homeowners, residents, business owners, and community organizations in affected neighborhoods.

The same communities in the Central and Northeast districts would be divided. However, different homes, businesses, and community facilities, such as churches, would be displaced under each alternative. The Bakersfield South Alternative would affect fewer residences and businesses, but more churches than the corresponding portion of the BNSF-Bakersfield North Alternative. The Bakersfield Hybrid Alternative would affect fewer residences and fewer churches than the BNSF-Bakersfield North or Bakersfield South alternatives, fewer businesses than the BNSF-Bakersfield North Alternative, and more businesses than the Bakersfield South Alternative.

Cumulative Impacts for Biological and Cultural Resources

Suitable habitats for special-status plant species have been significantly diminished due to land use conversion in the Central Valley. Most of the communities observed in the special-status PSA do not represent high-quality occurrences of these communities because they have been disturbed through nonnative species invasion and fragmentation. Therefore, although these communities are rare on a regional scale, they do not represent the highest conservation priority because they are generally small and disturbed.

Special-status wildlife species would be subject to impacts of substantial intensity from the near- and long-term operation of the HST alternatives and other past, present, and foreseeable projects. Potential impacts on species include permanent habitat loss, habitat fragmentation, introduction of invasive species, and harassment due to increased noise and anthropogenic disturbance. Because of the large area that would be permanently occupied by HST facilities, this impact would have substantial intensity. In the context of the extensive loss of special-status wildlife species and their habitats as a result of agricultural and urban development in the Tulare Basin as well as the dependence of some special-status species on unique and easily disturbed habitats (e.g., vernal pools), the cumulative Project period impact would be significant.

Wildlife movement corridors may experience permanent impacts as a result of the operation of the Project and past, present, and reasonably foreseeable projects in the Tulare Basin. Past projects have significantly degraded the ability of wildlife to move freely across natural habitats, and wildlife movement would be further limited with the implementation of the Proposed Preferred Alternative and other present and reasonably foreseeable projects in the Tulare Basin. Impacts could include the permanent blockage of corridors and/or habitat linkages and disruption of wildlife due to increased lighting, noise, and motion.

In many places in California, fragmentation of the landscape has reduced much of the remaining habitat available to native wildlife species (Haas 2000). Studies have shown that habitat connectivity is important in biodiversity conservation, particularly because of the role it plays in maintaining gene flow (Beier and Noss 1998), maintaining ecological processes (Bennett 1999), and reducing species extinction risk (Crooks et al. 2011). Current impediments to habitat connectivity and wildlife movement in the region of the project include, but are not limited to, agricultural lands, urban development, SR 43, and the BNSF Railway right-of-way. Because the project would be linear, spanning the entire southern San Joaquin Valley, its impact on wildlife movement corridors would have substantial intensity.

Under the cumulative condition, cultural resources would continue to be affected in the Central Valley urban areas between 2010 and 2035 due to growth, changes in land use, and ground disturbance. Adverse effects on eligible resources could result in the neglect, abandonment, or removal of historic properties. A given project is not likely to be able to avoid or mitigate an impact to a less-than-significant level, especially in the case of a large-acreage project or a project that requires major ground disturbance (e.g., those projects listed in Appendix 3.19-A and Appendix 3.19-B). Development in the urban areas will likely result in further unearthing of sensitive archaeological resources, disturbance of traditional cultural properties, disturbance and possible damage to paleontological resources, and removal of or changes to the historic character and settings of historic resources. The significance of potential archaeological and paleontological resources cannot be determined at this time, and the cumulative impact on such resources cannot be determined. Therefore, due to the lack of information, under the cumulative condition, impacts on cultural resources are considered to be substantial under NEPA and significant under CEQA.

Potential cumulative impacts on archaeological and paleontological resources would be similar for all HST alternatives. Potential cumulative impacts on historic architectural resources would be greatest for the BNSF Alternative because the majority of the architectural resources are located in the city of Fresno and the BNSF Alternative is the only alternative in this area. The other HST alternatives would have generally similar cumulative historic architectural resource impacts.

6.5.3 Mitigation Measures for Cumulative Impacts

Cumulative impacts on biological resources would be minimized by adhering to federal, state, and local regulations and by implementing the mitigation measures for biological resources described in Chapter 5, which aim to avoid, minimize, restore, and compensate for the direct and indirect impacts, thereby reducing the Project’s contribution to the cumulative impacts.

Cumulative impacts on cultural resources would be minimized by adhering to federal, state, and local regulations and by providing guidance on the treatment of significant properties (as defined in Section 106). Implementation of the mitigation measures for aquatic and non-aquatic biological resources described in Chapter 5 will minimize impacts and develop protection measures, thereby reducing the cumulative impacts.

6.5.4 Significance of Cumulative Impacts

With the implementation of mitigation measures to avoid, minimize, and compensate for impacts on non-aquatic biological resources and cultural resources described above, the effects of the alternatives would not be cumulatively significant because potential Project impacts on riparian areas, special-status plant and wildlife species, or cultural resources would be mitigated.

However, even with the implementation of these mitigation measures, regardless of which alternatives are selected, the Project would continue to have a significant impact on wildlife movement corridors because the Project would create a partial barrier to wildlife movement across the Tulare Basin. In the context of future anticipated and continued degradation of wildlife movement corridors in the Tulare Basin, the cumulative impact of the Project would be significant.

6.6 Summary Comparison of Non-Aquatic Impacts for Project Alternatives

This section provides a summary comparative analysis of the Proposed Preliminary LEDPA to support the preliminary LEDPA determination.

6.6.1 Biological Resources

6.6.1.1 Riparian Areas

Potential direct and indirect impacts on riparian areas are presented in Table 6.7-1. The first acreage column in this table presents the potential impacts of the Proposed Preliminary LEDPA, and the second acreage column presents the impact for the Proposed Preferred Alternative. To compare the other project alternatives, the remaining columns represent Project potential alignment and station alternatives.

The Proposed Preferred Alternative and the Proposed Preliminary LEDPA would affect riparian areas associated with seasonal riverine features and other aquatic resources. In general most riparian area impacts are similar in quantity and location of the impact. The Project's alternatives cross the same major seasonal river features; in the case of Tule River, Deer Creek, Poso Creek, and the Kern River, the crossing locations are nearly identical.

As discussed in Section 4.2.2, the LEDPA evaluation must consider both the Hanford and Corcoran Area impacts on aquatic resources together. There are nine potential combinations of Hanford and Corcoran Area alternatives.

For the riparian areas associated with the Hanford and Corcoran Area alternative combinations, the King River, Kings River Complex and other aquatic resources, the Hanford and Corcoran area alternative combinations have different alignments, however, the impacts are relatively similar. The BNSF-Hanford East Alternative and Corcoran Bypass Alternative would result in fewest direct permanent and direct temporary impacts, but more indirect impacts on riparian areas than the other Hanford and Corcoran Area alternative combinations.

Table 6.7-1
Comparison of Impacts on Riparian Areas by Alternative

Impact Type on Riparian Areas	Proposed Preliminary LEDPA	Proposed Preferred Alternative	Common Components	High-Speed Train Alternatives															
				BNSF-Hanford East + Corcoran Bypass	BNSF-Hanford East + BNSF-Through Corcoran	BNSF-Hanford East + Corcoran Elevated	Hanford West Bypass 1+ BNSF-Through Corcoran	Hanford West Bypass 1 Modified + BNSF-Through Corcoran	Hanford West Bypass 2 + Corcoran Elevated	Hanford West Bypass 2 + Corcoran Bypass	Hanford West Bypass 2 Modified + Corcoran Elevated	Hanford West Bypass 2 Modified + Corcoran Bypass	BNSF-Through Allensworth	Allens-worth Bypass	BNSF-Through Wasco-Shafter	Wasco-Shafter Bypass	BNSF-Bakersfield North	Bakersfield South	Bakersfield Hybrid
	Impact Acreage on Riparian Areas*																		
Direct Permanent	1.81	2.52	—	1.34	1.57	1.53	1.91	2.41	1.88	1.69	2.37	2.19	1.13	0.47	—	—	0.21	0.70	0.70
Direct Temporary	0.40	0.70	—	0.38	0.45	0.41	1.03	1.11	1.00	0.97	1.07	1.04	0.26	0.02	—	—	0.10	0.30	0.30
Indirect	21.50	27.56	—	19.05	19.37	19.59	15.07	15.15	13.86	13.31	15.37	14.83	4.15	2.46	—	—	8.85	6.06	6.06
TOTAL	***23.71***	***30.78***	***—***	***20.77***	***21.38***	***21.53***	***18.02***	***18.67***	***16.73***	***15.97***	***18.82***	***18.06***	***5.54***	***2.94***	***—***	***—***	***9.16***	***7.06***	***7.06***

Notes:
*All impacts were calculated based on the Final EIR/EIS 15% engineering design construction footprint.
— = No impact or not applicable
+ = and

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6.6.1.2 Special-Status Plants

Potential impacts on special-status plant species and unsurveyed habitat with potential to support special-status plant species are presented in Table 6.7-2. The Proposed Preferred Alternative and the Proposed Preliminary LEDPA would affect two special-status plant species: heartscale and little mouse tail, both of which are California Native Plant Society Listed species, List 1 and List 3, respectively. These impacts occur in a common component (i.e., Pixley), which is a segment of the Fresno to Bakersfield Section that cannot be avoided and would be included in all potential end-to-end alternatives and the BNSF-Through Allensworth Alternative.

The Corcoran Bypass and BNSF-Through Allensworth alternatives are the only alternatives that would affect known special-status plant species. All HST alternatives would have impacts on unsurveyed habitat (where access was not granted) with potential to support special-status plant species (including federally listed species such as the Kern mallow).

6.6.1.3 Special-Status Wildlife Species

Potential impacts on special-status wildlife habitats are presented in Table 6.7-3. As shown in Table 6.7-3, the Proposed Preferred Alternative would have a smaller impact in some areas, but a larger impact in others. For example, impacts of the Allensworth Bypass Alternative on annual grassland habitat would be lower than the BNSF-Through Allensworth Alternative, but impacts of the BNSF-Hanford East and Corcoran Bypass Alternative combination would be greater for Annual Grassland habitat than some of the other Hanford and Corcoran area alternative combinations. For other natural habitats (i.e., alkali desert scrub) and aquatic habitats, the Proposed Preferred Alternative would generally result in fewer acres of impact compared with corresponding alternatives.

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Table 6.7-2
Comparison of Impacts on Special-Status Plant Species by Alternative

Special-Status Plant Species	Impact Type	Proposed Preliminary LEDPA	Proposed Preferred Alternative	Common Components	High-Speed Train Alternatives															
					BNSF-Hanford East + Corcoran Bypass	**BNSF-Hanford East + BNSF-Through Corcoran**	**BNSF-Hanford East + Corcoran Elevated**	**Hanford West Bypass 1+ BNSF-Through Corcoran**	**Hanford West Bypass 1 Modified + BNSF-Through Corcoran**	**Hanford West Bypass 2 + Corcoran Elevated**	**Hanford West Bypass 2 + Corcoran Bypass**	**Hanford West Bypass 2 Modified + Corcoran Elevated**	**Hanford West Bypass 2 Modified + Corcoran Bypass**	**BNSF-Through Allensworth**	**Allensworth Bypass**	**BNSF-Through Wasco-Shafter**	**Wasco-Shafter Bypass**	**BNSF-Bakersfield North**	**Bakersfield South**	**Bakersfield Hybrid**
		Impact Acreage*																		
Heartscale *Atriplex cordulata*	Permanent	0.04	0.04	0.04	0.004	—	—	—	—	—	0.004	—	0.004	0.63	—	—	—	—	—	—
	Temporary	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Little mouse tail *Myosurus minimus* ssp. *apus*	Permanent	0.27	0.27	0.27	—	—	—	—	—	—	—	—	—	0.21	—	—	—	—	—	—
	Temporary	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unsurveyed potential suitable habitat that could support special-status plant species	Permanent	399.12	452.86	62.67	168.36	80.35	154.62	80.92	88.94	167.50	181.24	200.56	214.30	204.84	159.71	22.49	32.48	30.95	42.65	39.64
	Temporary	*90.23*	*295.89*	*8.83*	*6.41*	*8.87*	*13.64*	*20.23*	*15.53*	*41.06*	*33.83*	*18.50*	*11.27*	*4.41*	*64.97*	*10.63*	*24.95*	*208.73*	*202.03*	*205.05*
Total Impacts	Permanent	**399.43**	**453.17**	**62.98**	**168.364**	**80.35**	**154.62**	**80.92**	**88.94**	**167.50**	**181.244**	**200.56**	**214.304**	**205.67**	**159.71**	**22.49**	**32.48**	**30.95**	**42.65**	**39.64**
	Temporary	***90.23***	***295.89***	***8.83***	***6.41***	***8.87***	***13.64***	***20.23***	***15.53***	***41.06***	***33.83***	***18.50***	***11.27***	***4.41***	***64.97***	***10.63***	***24.95***	***208.73***	***202.03***	***205.05***

Notes:
*Impact calculations in this table include Project alternatives and station alternatives, but do not include heavy maintenance facility alternatives.
All impacts were calculated based on the 15% engineering design construction footprint.
— = No impact or not applicable
+ = and

Table 6.7-3
Comparison of Impacts on Special-Status Wildlife Habitats by Alternative

Habitat Type		Impact Type	Proposed Preliminary LEDPA	Proposed Preferred Alternative	Common Components	High-Speed Train Alternatives															
						BNSF-Hanford East + Corcoran Bypass	BNSF-Hanford East + BNSF-Through Corcoran	BNSF-Hanford East + Corcoran Elevated	Hanford West Bypass 1+ BNSF-Through Corcoran	Hanford West Bypass 1 Modified + BNSF-Through Corcoran	Hanford West Bypass 2 + Corcoran Elevated	Hanford West Bypass 2 + Corcoran Bypass	Hanford West Bypass 2 Modified + Corcoran Elevated	Hanford West Bypass 2 Modified + Corcoran Bypass	BNSF-Through Allensworth	Allensworth Bypass	BNSF-Through Wasco-Shafter	Wasco-Shafter Bypass	BNSF-Bakersfield North	Bakersfield South	Bakersfield Hybrid
			Impact Acreage*																		
Terrestrial Communities	Barren	Permanent	44.75	59.55	24.77	10.54	9.62	28.50	9.20	8.98	33.94	15.99	35.21	17.25	—	—	9.44	—	6.64	14.83	14.81
		Temporary	*88.79*	*247.10*	*0.63*	*87.09*	*88.47*	*92.94*	*1.57*	*1.76*	*5.97*	*0.12*	*5.97*	*0.12*	—	—	*1.07*	—	*162.47*	*158.29*	*158.31*
	Urban	Permanent	1086.97	1372.91	417.65	356.76	361.79	377.86	357.81	355.80	371.18	350.08	374.98	353.88	75.94	34.80	334.56	156.45	286.04	245.48	229.15
		Temporary	*312.25*	*413.51*	*119.62*	*75.40*	*97.82*	*100.11*	*72.92*	*74.89*	*78.50*	*53.78*	*80.69*	*55.98*	*11.18*	3.32	118.81	63.37	67.78	77.05	96.36
	Agricultural Lands	Permanent	2609.44	2724.14	553.41	1158.45	1191.24	1105.41	907.83	963.61	817.54	870.58	917.07	970.11	363.54	399.39	612.89	549.80	—	—	—
		Temporary	*1490.07*	*1494.21*	*31.68*	*786.74*	*762.02*	*769.36*	*429.24*	*425.01*	*437.54*	*454.92*	*503.26*	*520.64*	*139.00*	*150.07*	*525.72*	*324.22*	—	—	—
	Annual Grassland	Permanent	286.57	315.31	50.90	120.73	44.24	93.51	62.28	69.36	118.93	146.16	136.51	163.74	147.57	109.93	31.11	27.68	4.55	5.62	2.64
		Temporary	*12.19*	*49.33*	*6.40*	*1.76*	*1.92*	*3.10*	*14.81*	*9.87*	*16.63*	*15.30*	*8.38*	*7.04*	*2.66*	*3.84*	*1.08*	*4.53*	*36.53*	*33.25*	*36.25*
	Alkali Desert Scrub	Permanent	7.68	19.38	—	—	—	—	—	—	—	—	—	—	41.34	7.68	—		12.88	11.70	11.70
		Temporary	*0.0009*	*2.68*	—	—	—	—	—	—	—	—	—	—	*0.58*	*0.0009*	—		*2.54*	*2.68*	*2.68*
	Valley Oak Woodland	Permanent	—	—	—	—	—	—	1.89	1.89	1.89	1.89	1.89	1.89	—	—	—	—	—	—	—
		Temporary	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	Pasture	Permanent	37.26	38.90	20.06	17.13	15.97	15.07	10.89	12.19	4.55	6.61	9.28	11.34	4.11	0.07	—	—	1.15	1.64	1.64
		Temporary	*5.72*	*5.81*	*0.03*	*5.69*	*5.55*	*5.55*	*0.34*	*0.13*	*0.34*	*0.49*	*0.11*	*0.25*	—	—	—	—	0.11	0.09	*0.09*

Notes:
*All impacts were calculated based on the 15% engineering design construction footprint.
— = No impact or not applicable
+ = and

6.6.1.4 Wildlife Movement Corridors

Because wildlife movement corridors generally extend east to west and the Project would cross these corridors perpendicularly, the potential impacts of most of the corresponding Project alternatives (e.g., the Wasco-Shafter Bypass and BNSF–Through Wasco-Shafter alternatives) would be similar.

The one instance where the Proposed Preferred Alternative would substantially reduce impacts on wildlife movement is in the Allensworth Area. The Allensworth Bypass Proposed Preferred Alternative would be less detrimental to wildlife movement because it is away from the existing wildlife movement barriers. Currently, SR 43 and the BNSF railroad significantly reduce wildlife movement along the SR 43/SR 155, Deer Creek–Sand Ridge, and Poso Creek habitat linkages. Construction of the BNSF-Through Allensworth Alternative would create an additional barrier and compound the effects associated with the existing barriers. Even with the inclusion of dedicated wildlife movement structures, the potential for wildlife to successfully transverse the HST, BNSF railroad, and SR 43 is very low. Thus, the implementation of the BNSF-Through Allensworth Alternative would adversely affect local and regional wildlife movement.

While the Allensworth Bypass Alternative would establish a new wildlife movement barrier and further fragment the existing habitat linkages, the inclusion of dedicated wildlife movement structures would provide opportunities for wildlife to move across the HST without facing the compounding effects or hazards (risk of strikes with trains, cars) of crossing additional barriers. The visibility through the Allensworth Bypass Alternative's dedicated wildlife movement structures would be of agricultural, and natural landscapes and wildlife would not be faced with the disturbances associated with the BNSF railroad or SR 43.

6.6.2 Other Environmental Resources

Taking into account all other environmental resources, the Proposed Preferred Alternative would result in a similar level of environmental impacts on local resources. In some instances these impacts are less, and in other instances these impacts are more than the corresponding area alternative(s).

To set the stage for the more-detailed sections that follow, Table 6.7-4 provides an aggregated summary of the environmental impacts on most other resources and receivers that would be caused by each alternative. Impacts associated with community resources are presented in Table 6.7-4 and are described in Sections 6.1.2.6, 6.2.2.6, 6.3.2.7, 6.4.2.6, and 6.5.2.5.

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Table 6.7-4
Potential Other Environmental Impacts on Local Resources and Receivers by Alternative

Resource	Measures	Proposed Preliminary LEDPA	Proposed Preferred Alternative	Common Compo-nents	High Speed Train Alternatives: BNSF-Hanford East + Corcoran Bypass	BNSF-Hanford East + BNSF-Through Corcoran	BNSF-Hanford East + Corcoran Elevated	Hanford West Bypass 1+ BNSF-Through Corcoran	Hanford West Bypass 1 Modified + BNSF-Through Corcoran	Hanford West Bypass 2 + Corcoran Elevated	Hanford West Bypass 2 + Corcoran Bypass	Hanford West Bypass 2 Modified + Corcoran Elevated	Hanford West Bypass 2 Modified + Corcoran Bypass	BNSF-Through Allensworth	Allensworth Bypass	BNSF-Through Wasco-Shafter	Wasco-Shafter Bypass	BNSF-Bakersfield North	Bakersfield South	Bakersfield Hybrid
					Impact (Number, or Acres)*															
Section 4(f)	Use of Properties	4	4	3	1	1	1	2	1	2	2	1	1	2	0	—	—	—	1	—
Transporta-tion	Number of permanent road closures affecting circulation patterns	54	65	34	13	8	8	7	7	7	12	7	12	3	3	5	20	5[c]	2[c]	10[c]
Noise	Number of severe project noise impacts on sensitive receivers, after mitigation	879	966	86	289	257	205	311	310	279	363	314	398	14	0	530	63	10	61	61
Vibration	Number of severe project vibration impacts on sensitive receivers, after mitigation	35	69	1	28	19	8	15	13	6	26	4	24	1	1	5	2	14	14	34
Agricultural Lands Acres of agricultural lands converted to non-agricultural use/acres and agricultural parcels split, creating parcels too small to farm.	Prime Farmlands	1,376	1,474	314	373	377	373	376	382	364	364	373	373	219	74	696	684	—	—	—
	Farmlands of Statewide Importance	1,146	1,146	218	677	758	608	573	578	384	453	386	455	191	251	0	0	—	—	—
	Unique Farmlands	218	218	44	166	164	164	153	153	153	155	153	155	2/	8	—	—	—	—	—
	Farmlands of Local Importance	118	118	65	0	0	0	3	3	3	3	3	3	55	53	—	—	0	0	0

Table 6.7-4
Potential Other Environmental Impacts on Local Resources and Receivers by Alternative

Resource	Measures	Proposed Preliminary LEDPA	Proposed Preferred Alternative	Common Compo-nents	High Speed Train Alternatives															
					BNSF-Hanford East + Corcoran Bypass	BNSF-Hanford East + BNSF-Through Corcoran	BNSF-Hanford East + Corcoran Elevated	Hanford West Bypass 1+ BNSF-Through Corcoran	Hanford West Bypass 1 Modified + BNSF-Through Corcoran	Hanford West Bypass 2 + Corcoran Elevated	Hanford West Bypass 2 + Corcoran Bypass	Hanford West Bypass 2 Modified + Corcoran Elevated	Hanford West Bypass 2 Modified + Corcoran Bypass	BNSF-Through Allensworth	Allensworth Bypass	BNSF-Through Wasco-Shafter	Wasco-Shafter Bypass	BNSF-Bakersfield North	Bakersfield South	Bakers field Hybrid
					Impact (Number, or Acres)*															
Confined Animal Facilities Affected	Severe, moderate, negligible impacts on confined animal facilities	—,7,12	—,7,12	—/—/1	0,7,11	0,8,10	0,7,11	1,4,4	1,4,4	0,3,4	0,3,4	0,3,4	0,3,4	—,—,—	—,—,—	—,—,—	—,—,—	—,—,—	—,—,—	—,—,—
Farmland Contracts	Williamson Act-Prime	1,319	1,319	195	692	843	689	727	729	497	500	499	502	258	203	229	247/+18	—	—	—
	Farmland Security Zone	267	267	43	214	178	182	53	52	97	129	96	128	20	9	—	—	—	—	
Parks, Recreation, and Open Space	Number of parks affected	1(0)	5(3)	0	—	—	1(0)	—	—	1(0)	—	1(0)	—	2(1)	0(0)	—	—	4(4)	4(3)	4(3)
Aesthetics and Visual	Visual Quality in Rural Areas	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	No	No	No
	Visual Quality in Urban Areas	Yes	Yes	No	No	Yes	Yes	Yes	Yes	Yes	No	Yes	No	Yes	No	Yes	No	Yes	Yes	Yes
Cultural Resources	Number of historic properties directly (indirectly) affected	4(4)	4(5)	3(3)	1(1)	1(1)	1(1)	2(1)	1(1)	2(1)	2(1)	1(1)	1(1)	1(0)	0(0)	0(0)	0(0)	0(2)	1(1)	0(1)
Community Facilities	Baker Commodities – Hanford	Yes	Yes	No	Yes	Yes	Yes	No	No	No	No	No	No	No	No	No	No	No/No	No/No	No
	Amtrak Station-Corcoran	No	No	No	No	Yes	No	Yes	Yes	No	No	No	No	No	No	No	No	No/No	No/No	No
	Displacement of religious facilities (parcel affected)	1(0)	2(2)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	1(0)	1(0)	4(2)	4(1)	1(2)
	Divides community of Ponderosa Road/Edna Way	Yes	Yes	No	Yes	Yes	Yes	No	No	No	No	No	No	No	No	No	No	No	No	No
	Divides community in Newark Ave. and 5th Ave./Waukena-Corcoran	Yes	Yes	No	Yes	No	No	No	No	No	Yes	No	Yes	No	No	No	No	No	No	No

Table 6.7-4
Potential Other Environmental Impacts on Local Resources and Receivers by Alternative

Resource	Measures	Proposed Preliminary LEDPA	Proposed Preferred Alternative	Common Compo-nents	High Speed Train Alternatives															
					BNSF-Hanford East + Corcoran Bypass	BNSF-Hanford East + BNSF-Through Corcoran	BNSF-Hanford East + Corcoran Elevated	Hanford West Bypass 1+ BNSF-Through Corcoran	Hanford West Bypass 1 Modified + BNSF-Through Corcoran	Hanford West Bypass 2 + Corcoran Elevated	Hanford West Bypass 2 + Corcoran Bypass	Hanford West Bypass 2 Modified + Corcoran Elevated	Hanford West Bypass 2 Modified + Corcoran Bypass	BNSF-Through Allensworth	Allensworth Bypass	BNSF-Through Wasco-Shafter	Wasco-Shafter Bypass	BNSF-Bakersfield North	Bakersfield South	Bakersfield Hybrid
					Impact (Number, or Acres)*															
Community Facilities (Cont'd.)	Divides community of Crome	Yes	Yes	No	No	No	No	No	No	No	No	No	No	No	No	Yes	No	No	No	No
	Disproportionate effects on EJ communities (n=noise effects, v=visual effects, c=cumulative effects, p=park and recreation effects)	Yes (n, v, c)	Yes (n, v, c)	Yes (n,v,c)	Yes (n, v)	Yes (n, v)	Yes (n, v)	Yes (n, v)	Yes (n, v)	Yes (n, v)	Yes (n, v)	Yes (n,v)	Yes (n, v)	Yes (p)	No	Yes (n, v)	No	Yes (n, v, c)	Yes (n, v, c)	Yes (n, v, c)
	Estimated number of commercial/industrial bus. displaced – P	77	357	51	3	19	4	23	23	8	7	8	7	0	0	23	4	302	135	280
	Estimated number of housing units displaced – P	156	342	40	93	114	65	105	104	54	82	53	81	9	0	23	18	265	272	186

Notes:
— = No Impact
* Impact calculations in this table include Project alternatives and station alternatives, but do not include the heavy maintenance facility site alternatives.
All impacts were calculated based on the Final EIR/EIS 15% engineering design Project footprint.

\+ = and

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6.6.2.1 Section 4(f) Uses

6.6.2.2 Section 4(f) Uses

Section 4(f) properties are located in Fresno, Hanford, Allensworth, and Bakersfield, as shown on Table 6.7-5. Preliminarily, the Proposed Preferred Alternative would result in the use of four Section 4(f) properties.

These properties are described in Sections 6.1.2.1, 6.3.2.1, and 6.5.2.1,

Table 6.7-5
Summary of Section 4(f) Uses by Alternative

Section 4(f) Use	Alternative
Washington Irrigated Colony Historic Rural Landscape, rural Fresno County	Common Components
Washington Colony Canal, rural Fresno County	Common Components
North Branch of the Oleander Canal, rural Fresno County	Common Components
People's Ditch, rural Kings County	BNSF-Hanford East (Proposed Preferred Alternative)
Last Chance Ditch, rural Kings County	Unmodified Hanford West Bypass 1 and 2 at-grade, Modified Hanford West Bypass 1 and 2, below-grade
Farmstead at 9860 13th Avenue, rural Kings County	Unmodified Hanford West Bypass 1 and 2, at-grade
Allensworth Historic District/Colonel Allensworth State Historic Park,	BNSF-Through Allensworth
Allensworth Ecological Reserve	BNSF-Through Allensworth
2509 East California Avenue	Bakersfield South

6.6.2.3 Transportation

All of the alternatives would result in transportation impacts. Impacts of substantial intensity are identified in Section 3.2.5, Environmental Consequences of the Revised DEIR/Supplemental DEIS (Authority and FRA 2012d). Many of the anticipated impacts are similar among the alternatives because they would occur in association with the Fresno, Kings/Tulare Regional, and Bakersfield station sites, which are common elements in the project alternatives. Impacts on roadways and intersections with substantial intensity are anticipated in the vicinity of the Fresno, Kings/Tulare Regional, and Bakersfield stations. Intersection impacts with substantial intensity specific to the BNSF–Through Corcoran Alternative have also been identified in the city of Corcoran.

All of these impacts would have substantial intensity because one or more of the analysis locations (e.g., intersections or roadway segments) would be affected by project-related traffic either because of the addition of station-generated traffic and/or because of diverted traffic near proposed road closures based on the threshold criteria identified in Section 3.2.3.4, Methods for Evaluating Impacts under NEPA, of the Revised DEIR/Supplemental DEIS (Authority and FRA

2012d). With the application of the mitigation measures discussed in Chapter 5, the project impacts would be considered impacts with moderate intensity.

Additional impacts are anticipated in conjunction with the local road closures that would be necessary as part of each project alternative. All of the road closures are expected to result in impacts with moderate intensity since the roads proposed for closure have very low traffic volumes and necessary traffic diversions can be accomplished without causing impacts with substantial intensity on travelers. These impacts are summarized in Sections 6.1.2.2, 6.2.2.1, 6.3.2.2, and 6.4.2.1 for the alternatives:

The Proposed Preferred Alternative would provide a benefit to the city of Fresno by providing new grade-separated roadway crossings over the existing BNSF railroad. The new crossings would span the BNSF right-of-way and HST, and would improve circulation for portions of the downtown community.

- In the Hanford Area, the Preferred Hanford East Alternative would require a similar number of modifications to the state highway system as the Hanford West alternatives. The BNSF–Through Corcoran and Corcoran Elevated alternatives have fewer closures than the Preferred Corcoran Alternative; however, these alternatives have more roadways in urbanized areas, which may result in higher community effects.
- Only eight road overcrossings or undercrossings would be required in the BNSF-Through Wasco-Shafter Alternative (Proposed Preferred Alternative) because of the use of elevated guideways. The BNSF-Through Wasco-Shafter Alternative Proposed Preferred Alternative) would require fewer local road closures than the Wasco-Shafter Bypass Alternative; however, the closures on the Wasco-Shafter Bypass Alternative would occur outside the urban cores of Wasco and Shafter. The road closures would mostly affect rural areas where there are other roadway options available to meet circulation demands and where there would be less possibility of congestion issues.
- In Bakersfield, the Proposed Preferred Alternative would have the most road closures.

For a numerical summary of impacts by alternative, see Table 6.7-4.

6.6.2.4 Noise and Vibration

Impacts from noise are expected to occur throughout the alignment, with both urban and rural residences expected to experience significant noise impacts. All alternatives would have slightly different levels of impacts on noise- and vibration-sensitive receivers.

The Proposed Preferred Alternative would affect 3,049 sensitive receivers (residences, churches, schools, parks, and historic properties) before mitigation. With the implementation of sound walls, the Proposed Preferred Alternative would severely affect 966 noise receivers After the Wasco Housing Authority relocates the farm worker housing east of the BNSF tracks, this number would be reduce by 226 receivers to 661 receivers.

The Proposed Preferred Alternative would have greater noise impacts than other corresponding alternatives in the Hanford, Corcoran, Wasco-Shafter, and Bakersfield areas, but would have impacts on 14 fewer receivers than the BNSF-Through Allensworth Alternative.

For more information, see Sections 6.1.2.3, 6.2.2.2, 6.3.2.3, 6.4.2.2, and 6.5.2.2. For a numerical summary of impacts by alternative, see Table 6.7-4.

6.6.2.5 Agriculture

The alternatives would have differing levels of impact on land designated as Important Farmland, Williamson Act lands, and FSZ.

While the BNSF-Hanford East Alternative would permanently displace more acres of Important Farmland, Williamson Act-prime land, and FSZ than all other Hanford alternatives, it would have the least effect on Prime Farmland. It would also affect a greater number of confined animal facilities. The Hanford West Bypass 2 Alternative affects the least amount of Important Farmland, followed by the Hanford West Bypass 1 Alternative.

The Corcoran Bypass Alternative would permanently affect more Important Farmland, Williamson Act-prime, and FSZ lands than the Corcoran Elevated Alternative, less Important Farmland and Williamson Act lands than the BNSF–Through Corcoran Alternative, and more FSZ land than the BNSF–Through Corcoran Alternative. The Corcoran Bypass Alternative would have an impact on 71 more acres of Important Farmland than the Corcoran Elevated Alternative, but would affect 83 fewer acres than the BNSF–Through Corcoran Alternative.

The Preferred Allensworth Alternative would have less impact on land designated Important Farmland; the Allensworth Bypass affects 81 acres less than the BNSF-Through Allensworth Alternative. The Allensworth Bypass Alternative would permanently displace fewer acres designated as Important Farmland, Williamson Act-prime land, and FSZ land than the BNSF-Through Allensworth Alternative. The Allensworth Bypass Proposed Preferred Alternative would require crossings that would potentially sever fewer farmlands and dairies than the BNSF-Through Allensworth Alternative.

The BNSF-Through Wasco-Shafter Alternative would have similar impacts on Important Farmland, and would permanently affect less Williamson Act land than the Wasco-Shafter Bypass Alternative; no FSZ lands are in the Wasco-Shafter area. In the Bakersfield area there are no lands designated as Important Farmland, Williamson Act-prime land, or FSZ land.

Each of the HST alternatives, except those in Bakersfield, would have direct adverse effects with substantial intensity on Important Farmland, Williamson Act lands, and FSZ lands.

For more information, see Sections 6.1.2.4, 6.2.2.3, 6.3.2.4, and 6.4.2.3. For a numerical summary of impacts by alternative, see Table 6.7-4.

6.6.2.6 Parks, Recreation, and Open Space

All alternatives would have temporary construction effects on parks, recreation, and open space, such as noise, dust, vibration, and visual degradation. The construction activities would be temporary, creating impacts for the duration of up to 4 years. With the implementation of mitigation measures, impacts from construction activities would not be significant.

The BNSF-Through Allensworth Alternative would affect two recreation areas: Colonel Allensworth State Historic Park (with parkland acquisition and with the introduction of a modern feature into the historic atmosphere of the park) and the Allensworth Ecological Reserve. However, the impacts on Allensworth Ecological Reserve would not be significant with mitigation. No other parks, recreation, or open space resources would be permanently affected by the Allensworth Bypass Proposed Preferred Alternative. The BNSF-Bakersfield North Alignment would affect a portion of the Bakersfield High School athletic fields and open space. For more information, see Sections 6.2.2.4, 6.3.2.5, and 6.5.2.5. For a numerical summary of impacts by alternative, see Table 6.7-4.

6.6.2.7 Aesthetics and Visual Resources

Visual resources, such as vistas and aesthetic corridors, exist in both urban and rural landscapes. Impacts on vistas and aesthetic corridors of substantial intensity are primarily expected to result from the vertical elements of the HST alternatives, particularly when elevated, because those vertical segments will block views of visual resources and change the landscape character. All alternatives could cause visual intrusion and potential blocking of views from the use of sound barriers where these are required, usually in urban areas.

The Proposed Preferred Hanford, Corcoran, and Allensworth alternatives would result in the least impact on the visual quality of aesthetic features and corridors in urban areas, while having more impact on rural areas.

For three landscape units, the Proposed Preferred Alternative would result in the most minimal impact on visual quality. These landscape units include the San Joaquin Rural/Agricultural (Allensworth Bypass), Small Towns (Corcoran Bypass and Allensworth Bypass), and Central Bakersfield (Bakersfield).

The Preferred BNSF-Through Wasco-Shafter and Bakersfield Hybrid alternatives would have impacts of substantial intensity on four landscape units: Small Towns (Wasco and Shafter), Rosedale (Greenacres), Kern River and East Bakersfield.

See Table 3.16-3 in Section 3.16, Aesthetics and Visual Resources, of the Revised DEIR/Supplemental DEIS and Sections 6.2.2.5, 6.3.2.6, and 6.4.2.4 above for additional information. For a numerical summary of impacts by alternative, see Table 6.7-4.

6.6.2.8 Cultural Resources

The Proposed Preferred Alternative would directly affect four and indirectly affect five Section 106 historic resources. The affected cultural resources, and the corresponding alternative(s) that affect them, are shown in Table 6.7-6. For more information, see Sections 6.1,2.5, 6.3.2.7, and 6.5.2.4. For a numerical summary of impacts by alternative, see Table 6.7-4.

Table 6.7-6
Summary of Section 106 Historic Resources Impacts by Alternative

Section 106 Historic Resource [Pending Salón Juárez FOE]	Direct Effect	Indirect Effect
South Van Ness Entrance Gate, 2208 S. Van Ness Avenue, Fresno		**Common Components**
Washington Irrigated Colony Rural Historic Landscape District, rural Fresno County	**Common Components**	**--**
Washington Colony Canal, district contributor, rural Fresno County	**Common Components**	**--**
North Branch Oleander Canal, district contributor, rural Fresno County	**Common Components**	**--**
Farmstead, 7870 S. Maple Avenue, district contributor, rural Fresno County	--	**Common Components**
Farmstead, 7887 S. Maple Avenue, district contributor, rural Fresno County		**Common Components**

Table 6.7-6
Summary of Section 106 Historic Resources Impacts by Alternative

Section 106 Historic Resource [Pending Salón Juárez FOE]	Direct Effect	Indirect Effect
Last Chance Ditch, rural Kings County	Hanford West Bypass 1 and 2 Modified alternatives, below-grade options; Unmodified Hanford West Bypass 1 and 2 alternatives, at-grade options	--
Peoples Ditch, rural Kings County	BNSF-Hanford East Alternative (**Proposed Preferred Alternative**)	--
Farmstead, 13148 Grangeville Blvd, Kings County	--	Unmodified Hanford West Bypass 1 and 2 alternatives, at-grade options
Farmstead, 9860 13th Avenue, rural Kings County	Unmodified Hanford West Bypass 1 and 2 alternatives, at-grade options	Hanford West Bypass 1 and 2 Modified alternatives, below-grade options
Lakeside Cemetery Kent Avenue, rural Kings County	--	BNSF-Hanford East Alternative (**Proposed Preferred Alternative**)
Allensworth Historic District, Colonel Allensworth State Historic Park, 4129 Grant Drive, rural Tulare County	BNSF-Through Allensworth Alternative	--
San Joaquin Cotton Oil, industrial complex, 1660 E. California Avenue, Bakersfield, Kern County	--	Bakersfield South Alternative
Residence, 2509 E. California Avenue, Bakersfield, Kern County	Bakersfield South Alternative	--
Harvey Auditorium, Bakersfield High School, 1241 G Street, Bakersfield, Kern County	--	BNSF-Bakersfield North Alternative
Residence, 1031 E. 18th Street, Bakersfield, Kern County	--	BNSF-Bakersfield North Alternative
Stark/Spencer Residence, 1321 N Street, Bakersfield, Kern	--	Bakersfield Hybrid Alternative (**Proposed Preferred Alternative**)

Notes:
-- = No impact
Bold indicates part of Proposed Preferred Alternative

6.6.2.9 Community Resources and Environmental Justice

Construction and operation of the HST would create disruption and division of existing communities; displace and relocate local residents and businesses; have economic effects on the local economies; and create effects on EJ communities. Division of communities near Hanford and Corcoran and in Bakersfield would occur under various alternatives. The BNSF-Hanford East Alternative (the Hanford East Proposed Preferred Alternative) would divide the community located at Ponderosa Avenue and Edna Way. The Corcoran Bypass Alternative (the Corcoran Proposed Preferred Alternative) would divide the Newark Avenue and 5th Avenue/Waukena communities in Corcoran. All alternatives in Bakersfield would divide two communities (the Northwestern District and the Northeastern District).

A total of 63 homes would be displaced under the BNSF-Hanford East Alternative, 9 to 12 more than other Hanford area alternatives. Three commercial/industrial businesses would be displaced under the BNSF-Hanford East Alternative, four fewer than the other Hanford area alternatives. A total of 31 homes would be displaced under the Corcoran Bypass Alternative; no commercial/industrial facilities would be displaced under this alternative. The BNSF-Through Corcoran Alternative would displace 52 residences and 16 commercial/industrial facilities, while the Corcoran Elevated Alternative would displace 3 residences and 1 commercial/industrial facility. The BNSF–Through Corcoran Alternative would displace the Amtrak Station and the California Department of Feed and Agriculture Sampling Station in Corcoran.

In Allensworth, the Allensworth Bypass Alternative would not displace any residences or commercial/industrial facilities, while the BNSF-Through Allensworth Alternative would displace nine residences. In the Wasco-Shafter Area, the BNSF-Through Wasco-Shafter Alternative would displace 23 residences and 23 commercial/industrial facilities, while the Wasco-Shafter Bypass Alternative would displace 18 residences and 4 commercial/industrial facilities. The BNSF–Through Corcoran Alternative would displace the Amtrak Station and the California Department of Feed and Agriculture Sampling Station in Corcoran.

A total of 186 residences and 280 commercial/industrial facilities would be displaced under the Bakersfield Hybrid Alternative, which would also displace 1 church and key community facilities, including the Mercado Latino Tianguis, the Bakersfield Homeless Shelter, and the Kern County Mental Health Building. The BNSF-Bakersfield North Alternative would displace 265 residences and 302 commercial/industrial facilities, the most displacements of all the Bakersfield area alternatives. Impacts on community facilities would be worse under this alternative, which would also affect the Bakersfield High School Industrial Arts Building and the Bethel Christian School. The Bakersfield South Alternative would displace 272 residences, which is also more than the Bakersfield Hybrid Alternative, and 135 commercial/industrial facilities, the fewest of all the Bakersfield area alternatives. Both the BNSF-Bakersfield North and Bakersfield South alternatives would displace four churches, and a number of key community facilities. Overall, the Bakersfield Hybrid Alternative (the Bakersfield Proposed Preferred Alternative) compares favorably to other potential alternatives that would have similar but more extensive adverse community effects.

All Corcoran area alternatives would affect EJ communities, as would the BNSF-Through Allensworth Alternative, the BNSF-Through Wasco-Shafter Alternative, and all Bakersfield area alternatives.

For more information, see Sections 6.1.2.6, 6.2.2.6, 6.3.2.8, 6.4.2.6, and 6.5.2.5, and for a numerical summary of impacts by alternative, see Table 6.7-4.

Chapter 7.0

Aquatic Resources, Environmental Impacts, and Practicability Analysis for Alternatives

7.0 Proposed Preferred Alternative and Proposed Preliminary Least Environmentally Damaging Practicable Alternative (LEDPA)

This chapter describes the Proposed Preferred Alternative between the stations in Downtown Fresno and Downtown Bakersfield and the basis for the identification of the Proposed Preliminary LEDPA from the station in Downtown Fresno to 7th Standard Road in Kern County. Chapters 4 and 6 summarize all environmental effects for the entire Proposed Preferred Alternative, including the Bakersfield Area alternatives. This chapter relies on the information presented in Chapters 2 and 6 to focus on the reasons for the selection of the Proposed Preliminary LEDPA (to 7th Standard Road).

7.1 No Fill Alternative

A No Fill Alternative is the alternative that would allow the project to be implemented without the discharge of fill into waters of the United States (waters of the U.S.). To conduct a robust evaluation of alternatives pursuant to the 404(b)(1) process, a No Fill Alternative is evaluated to determine whether the project can be practicably implemented without the discharge of fill. If a practicable No Fill Alternative is feasible, it is the LEDPA under Section 404(b)(1) of the Clean Water Act (CWA).

7.1.1 Practicability Considerations

An alternative is practicable "if it is available and capable of being done after taking into consideration cost, existing technology, and logistics in light of the overall project purposes" (40 Code of Federal Regulations [CFR] Section 230.10[a][2]). No discharge of dredged or fill material to a water of the U.S. shall be permitted if there is a practicable alternative to the proposed discharge that would have less adverse impact on the aquatic ecosystem, unless the practicable alternative that has the least impact on the aquatic ecosystem would have other significant adverse environmental consequences that would be avoided by another practicable alternative. 40 CFR Sections 230.10(a) and 230.12(a)(3)(i). The language of 40 CFR 230.10(a) thus directs the Corps to consider both effects on the aquatic environment, and other relevant environmental consequences. The 404(b)(1) guidelines contain additional direction to consider other environmental effects, including water quality and effluents (40 CFR 230.10[b][1] and [2]), endangered species (40 CFR 230.10[b][3]), and the potential degradation of waters (40 CFR 230.10[c]).

Similarly, no discharge of dredged or fill into a water of the U.S. shall be permitted if there is a practicable alternative to the proposed discharge that would have less adverse impact on the aquatic ecosystem, unless the practicable alternative that has the least impact on the aquatic ecosystem would cause or contribute to significant degradation of the waters of the U.S. that would be avoided by another practicable alternative. 40 CFR Sections 230.10(c) and 230.12(a)(3)(ii). Further, the decision whether to issue a permit for discharge of dredged or fill material is subject to a "public interest review" involving the evaluation of the probable impact, including cumulative effects, of a proposed activity/LEDPA on factors such as land use, energy resource development needs, considerations of property ownership, the local economic base, and the needs and welfare of the people affected by the proposal. 33 CFR Sections 320.4(a), (g), (j), (n) and (q).

Throughout the project development process, the Authority and FRA sought to balance the regulatory need to minimize and avoid the use of fill materials in waters of the U.S. with the project's purpose and need; design, engineering, cost, and other technological and logistical factors; relative impacts to non-aquatic environmental resources; impacts on the public interest;

and other criteria specified by the Section 404 Regulatory Program Regulations (33 CFR Parts 320 to 334) and the Section 404(b)(1) Guidelines (40 CFR Part 230). A rigorous alternatives screening and evaluation process failed to identify a practicable No-Fill Alternative. For the reasons that follow, construction of a No Fill alternative is impracticable.

7.1.1.1 Construction of a No Fill Alternative would be Logistically Complex

The design of a No Fill Alternative would require a more circuitous route or elevated structures, require identification and acquisition of additional rights-of-way, increase logistical complexity for project construction, and increase travel time. Each of these is inconsistent with the purpose of the project. Also, it may not be practicable to avoid crossing the Kings and Kern rivers by completely spanning these features.

The engineering design criteria for the design speeds for the HST System require track alignments that avoid curves and are mostly straight (tangent alignment) to assure safe operation of the train at high speeds. When required, a large curve radius of up to 5 miles can be used and still allow the train to safely achieve high speeds of up to 220 miles per hour (mph). The design of the track alignments cannot easily and frequently accommodate vertical or horizontal deviations to avoid specific resources. These engineering requirements result in the use of a rigid system to meet the design criteria for safe operations. A change in track alignment to avoid a particular water of the U.S. can therefore result in a shift in track alignment over a distance of up to 4 miles. Thus, any attempt to avoid all jurisdictional waters along the route would require elevation of greater portions of the track and would be expected to add billions of dollars to the cost of the project because elevated track at a typical height of 20 feet is more expensive per mile than at-grade design options. This cost projection is based on the 2012 Business Plan, which includes capital cost estimates (Authority 2012c).

In addition, the structural requirements of a conventional high-speed train elevated structure using reinforced-concrete columns and a deck include spacing of 120 to 150 feet between columns. A reinforced-concrete or balanced cantilever construction can be used to span waterways with support columns up to about 300 feet apart. To gain greater clear spans, it would be necessary to use a cable-stayed bridge, which would be significantly more expensive than a concrete elevated structure or steel-truss bridge.

7.1.1.2 Construction of a No Fill Alternative Would be Cost Prohibitive

All alignments between Fresno and Bakersfield that follow existing transportation or utility corridors to the maximum extent feasible cross waters of the U.S. To design a No Fill Alternative, portions of the Fresno to Bakersfield Section would need to follow a circuitous route or be built on elevated structures to avoid impacts to waters of the U.S. A longer, more circuitous route would be more costly to construct than other alternatives because of increased material costs and additional right-of-way acquisition.

An elevated structure is subject to cost variations related to the location and design demands of particular components of track; however, elevated sections cost substantially more than at-grade sections. For example, a 1-mile trackway built on a 20-foot elevated structure costs approximately $53 million, whereas a 1-mile trackway built at-grade with a 20-foot height typically costs $8.3 million (Authority 2012c). The spanning of large rivers (e.g., the Kings and Kern rivers) entirely without the placement of fill in waters of the U.S. may be technically feasible but is not practicable because of the significant increase in cost that would result.

Taken together, tax revenues and public monies (private investment is also anticipated) are the largest source of funding for the HST System, including the Fresno to Bakersfield Section. As a result, the HST System must meet the legal requirement to be “financially viable.” To meet this need, the Authority and FRA have maximized the use of at-grade construction except in locations where impacts to aquatic features are unavoidable, such as crossing larger features like the Kings River, or where system design guidelines (e.g., to meet public safety requirements) would require elevated structures.

7.1.2 Non-Aquatic Environmental Impacts

The 404(b)(1) Guidelines require the U.S. Army Corps of Engineers (USACE) to determine whether each project alternative, including a No Fill Alternative, would cause other significant adverse environmental impacts as compared with the potential Preferred Alternative (40 CFR Section 230.10[a]). A No Fill Alternative for this project is likely to result in more significant adverse impacts on several environmental resource areas, including traffic, air quality, noise, energy, aesthetics, cultural resources, 4(f) properties, and property acquisition, as described in the following paragraphs; because a circuitous no fill alternative that entirely avoided impacts would be much longer. As explained above, an entirely elevated train would be more costly by many orders of magnitude and thus is not discussed with respect to environmental impacts.

- **Traffic impacts**. An at-grade No Fill Alternative that results in a longer, more circuitous alignment would require more road crossings. Potential additional road closures where at-grade sections of the No Fill Alternative would cross existing roads could result in rerouting of traffic, adding time and distance to local roadway trips.

- **Air quality impacts**. A No Fill Alternative that results in a longer, more circuitous alignment would result in greater construction-related air quality impacts and use of more electricity from the regional power grid to operate, increasing pollutant and greenhouse gas emissions.

- **Noise impacts.** Noise impacts would occur during project construction and system operation regardless of whether the alternative is built at-grade or on an elevated structure. However, a longer and more circuitous route would affect more receivers with adverse construction and operational noise impacts. Although mitigation measures could be used to reduce noise impacts, the number of receivers for mitigation would be far greater.

- **Energy generation or consumption impacts.** A longer, more circuitous alignment would result in a slight increase in energy consumption needed to power the train and potentially more out-of-direction travel for vehicles.

- **Aesthetic impacts.** Aesthetic impacts from use of a longer, more circuitous, primarily at-grade structure would increase the amount of aesthetic impacts.

- **Cultural resources impacts.** A longer, more circuitous route would require a larger Area of Potential Effects (APE) for both architectural and archaeological resources, which would likely identify additional resources eligible for national register status under the National Historic Preservation Act. Consequently, both construction and operational adverse impacts on cultural and historical resources could increase.

- **Section 4(f) resource impacts.** A longer, more circuitous route would likely result in the identification of additional parks, refuges, and historical sites subject to protection under Section 4(f) of the Department of Transportation Act of 1966, which would be subject to adverse impacts from construction and operation of the HST System.

- **Property acquisition.** A longer, more circuitous route would likely require the acquisition of additional property to avoid aquatic resources. These considerations could substantially increase environmental impacts on local resources and receptors and right-of-way acquisition costs for the project.

7.2 Proposed Preferred Alternative and Proposed Preliminary LEDPA

The Authority and FRA have identified a Proposed Preferred Alternative for the entire length of the Project (see Figures 1-1 and 1-2 in Chapter 1). The Proposed Preferred Alternative extends from Fresno to Bakersfield and includes portions of the BNSF Alternative (the common components) in combination with the BNSF-Hanford East, Corcoran Bypass, Allensworth Bypass, BNSF-Through Wasco-Shafter and Bakersfield Hybrid alternatives. The Proposed Preferred Alternative includes two stations: the proposed Kings/Tulare Regional Station-East Alternative, and the Bakersfield Station-Hybrid Alternative. A preferred Fresno Station was identified as part of the Merced to Fresno Section.

The Proposed Preliminary Least Environmentally Damaging Practicable Alternative (Proposed Preliminary LEDPA) under Section 404(b)(1) of the Clean Water Act has been identified and proposed for USACE concurrence from a range of alternatives for the Project. The Proposed Preliminary LEDPA is based on the area of the Proposed Preferred Alternative for which construction funding is available, which extends from Santa Clara Street south of the Fresno station to 7th Standard Road in Kern County south of Shafter. The Proposed Preliminary LEDPA corresponds with the Proposed Preferred Alternative from Fresno to 7th Standard Road in Kern County south of Shafter; the Proposed Preliminary LEDPA does not include the Bakersfield portion of the Proposed Preferred Alternative or the Bakersfield station.

The Applicant requests concurrence with the Proposed Preliminary LEDPA, including the common components for the BNSF Alternative, BNSF-Hanford East, Corcoran Bypass, Allensworth Bypass, and the portion of the BNSF-Through Wasco-Shafter alternative to 7th Standard Road in Kern County south of Shafter. This Proposed Preliminary LEDPA is based on the following factors:

- Purpose and need for the Project.
- Relative aquatic resource impacts.
- Relative impacts on other non-aquatic environmental resources.
- Practicability.
- Relative impacts on local public interests as determined by outreach with stakeholders and local governments.

See Figures 1-1 and 1-2 in Chapter 1. One station corresponds to this Proposed Preliminary LEDPA: the Kings/Tulare Regional Station-East Alternative.

7.3 Aquatic Impacts of the Proposed Preliminary LEDPA

Chapter 4 compares the direct, indirect, and cumulative effects of the alternative alignments on aquatic resources. This section summarizes the comparison of aquatic resource effects for each alternative included in the Proposed Preliminary LEDPA. This discussion summarizes the total relative effect of each section of the Proposed Preferred Alternative on waters of the U.S. compared to other alternative alignments. This discussion in turn supports the analysis of alternatives in terms of fulfilling purpose and need, practicability, other non-aquatic environmental effects, and public interest impacts set forth in Section 7.4. Because Chapter 4 already compares the relative effects on waters of the United States in detail, this discussion summarizes the net effects in terms of quantity, and where relevant, quality of waters affected.

7.3.1 Summary of Aquatic Resource Impacts

7.3.1.1 Hanford and Corcoran Area Alternatives

Proposed Preliminary LEDPA: BNSF-Hanford East to Corcoran Bypass

Other Alternatives: Hanford West Bypass 1 or Bypass 1 Modified alternative with BNSF-Through Corcoran Alternative, and Hanford West Bypass 2 or Bypass 2 Modified alternative to either Corcoran Elevated or Corcoran Bypass alternative

For the purposes of identification of the Proposed Preliminary LEDPA it is important to note that the Hanford West Bypass 1 alternatives (at grade and below grade) do not connect to either the Corcoran Bypass or Corcoran Elevated alternatives. Only the BNSF-Hanford East alternative (Proposed Preliminary LEDPA) and Hanford West Bypass 2 or Bypass 2 Modified alternatives connect to the Proposed Corcoran Preliminary LEDPA (Corcoran Bypass). Therefore, the Hanford West Bypass 1 alternatives cannot be selected if the Corcoran Bypass is also selected. As described below, the Corcoran Bypass is the Proposed Preliminary LEDPA in the Corcoran area.

Section 4.2.2 compares the combined effects of alternative combinations in the Hanford and Corcoran area. The Hanford and Corcoran area alternative combination with the fewest total direct impacts on waters of the U.S is the BNSF-Hanford East and Corcoran Bypass alternative (46.40 acres). This combination represents the Proposed Preliminary LEDPA and has the smallest direct impact on waters of the U.S, 0.32 fewer acre than the alternative combination with the second fewest direct impacts (BNSF-Hanford East to BNSF-Through Corcoran). The Proposed Preferred Alternative avoids 4.22 acres of total direct impacts relative to the third best alternative which is Hanford West Bypass 1 to BNSF-Through Corcoran. All the other alternatives have substantially greater total direct impacts as described in Section 4.2.2.2.

Based on extrapolated CRAM data, the majority of the affected waters of the U.S across all Hanford and Corcoran Area alternatives are of poor or fair quality. The features in poor or fair quality are mostly constructed, and provide limited habitat for wildlife, perform limited functions and services, and thus do not substantially contribute to the overall function of the regional aquatic ecosystem.

7.3.1.2 Allensworth Area Alternatives

Proposed Preliminary LEDPA: Allensworth Bypass Alternative

Other Alternative: BNSF-Through Allensworth Alternative

The Allensworth Bypass alternative (Proposed Preliminary LEDPA) would directly affect 47.42 acres of waters of the U.S., while the BNSF-Through Allensworth would directly affect 57.54 acres. Both alternatives affect a higher proportion of good quality waters than the other regions (e.g., Hanford, Corcoran, and Wasco-Shafter). The Allensworth Bypass alternative would also result in fewer total direct effects on features in good and excellent condition; reducing direct impacts on good and excellent quality features by 8.11 acres.

7.3.1.3 Wasco-Shafter Area Alternatives[5]

Proposed Preliminary LEDPA: BNSF-Through Wasco-Shafter Alternative

Other Alternatives: Wasco-Shafter Bypass alternative

The BNSF-Through Wasco-Shafter Alternative would only result in 1.3 acres more direct effects than the Wasco-Shafter Bypass Alternative. Neither the Proposed Preliminary LEDPA nor the Wasco Shafter Bypass Alternative would affect wetlands.

The aquatic features affected by both alignments are uniformly poor in condition, consisting entirely of constructed lacustrine (e.g., retention and detention basins) and canals and ditches. Therefore, while the features affected by the Wasco-Shafter Area alternatives may properly be included in the wetland delineation based on the Authority's request for a Preliminary Jurisdictional Determination, the features are not waters that display physical, chemical, or biological characteristics or perform special functions integral to a functioning aquatic ecosystem. The lost capacity and surface area for these constructed features would be mitigated in full based on ratios determined by USACE, and can likely be reconfigured either within the project footprint or its immediate vicinity.

7.4 Other Environmental Effects of the Proposed Preliminary LEDPA

The Section 404(b)(1) guidelines emphasize that the determination of the LEDPA must be made based on the least aquatic ecosystem impacts "so long as the alternative does not have other significant adverse environmental consequences" (40 CFR 230.10[a]). This section summarizes the "other environmental consequences.

7.4.1 Hanford and Corcoran Area Alternatives

As described in Section 4.2.2, it is important to note that the Proposed LEDPA is evaluated for the combination of the Hanford and Corcoran Area alternatives. These two alternatives must be evaluated together because the selection of the Hanford alternative determines which alignments may be selected in Corcoran. The Hanford West Bypass 2, Hanford West Bypass 2 Modified, and BNSF-Hanford East only have connections with the Corcoran Elevated or Corcoran Bypass alternatives. Hanford West Bypass 1 and Hanford West Bypass 1 Modified only connect to the BNSF-Through Corcoran.

The Hanford West Bypass 2 and Bypass 2 Modified alternatives, combined with either the Corcoran Elevated or Corcoran Bypass alternatives adversely impact substantially more waters of the U.S. than the BNSF-Hanford East Alternative combined with the Corcoran Bypass or the Hanford West Bypass 1 and Bypass 1 Modified alternatives combined with the BNSF-Through Corcoran alternatives. In addition the Hanford West Bypass 2 alternatives do not avoid other significant environmental or community impacts. Consequently, none of the factors set forth in the Section 404(b)(1) Guidelines supports the selection of the Hanford West Bypass 2 alternatives as the LEDPA.

The BNSF-Hanford East Alternative in combination with the Corcoran Bypass Alternative has fewer environmental effects compared to the Hanford West Bypass 2 alternatives in conjunction

[5] Note, because construction funding is available at this time only through 7th Standard Road, the Proposed Preliminary LEDPA analysis only considers these alternatives to a terminus at 7th Standard Road, though the other chapters of this analysis, including Chapters 4 and 6 of this analysis, evaluate impacts through the terminus of the Fresno to Bakersfield Section at the Bakersfield station.

with the Corcoran Bypass. The BNSF-Hanford East and the Hanford West Bypass 1 and Bypass 1 Modified alternatives are roughly equivalent based on impacts to waters of the U.S, and affect aquatic resources in poor or fair quality.

The BNSF-Hanford East Alternative, in combination with the Corcoran Bypass Alternative, affects more farmland than the other Hanford and Corcoran Area alternatives, as described in Chapter 6, but the alignments together have adverse effects on 21 to 109 fewer noise receivers than all other Hanford-Corcoran alternative combinations except for the Hanford West Bypass 2 and Corcoran Elevated alternatives, where there would be 10 fewer affected noise receivers. The BNSF-Hanford East Alternative contains less habitat for special-status plant species, and would affect approximately 33.81 fewer acres of habitat for special status plant species than the next highest alternative, and fewer natural terrestrial communities (e.g., annual grassland) that could support special-status wildlife species (see Table 6.7-2 and Table 6.7-3 in Chapter 6).

The BNSF Hanford East Alternative would result in the use of only one resource protected by Section 4(f) of the federal Department of Transportation Act (49 US Code Section 303); the Hanford West Bypass 1 Alternative would result in the use of two 4(f) resources, while Hanford West Bypass 1 Modified Alternative would result in only one 4(f) use (see Table 6.1-4 in Chapter 6). Because FRA must avoid 4(f) resources wherever prudent and feasible, the alignments' effects on 4(f) resources are an important factor in the consideration of environmental effects. The Hanford West Bypass 1/BNSF-Through Corcoran and BNSF Hanford East/Corcoran Bypass alternatives have the fewest adverse effects on waters relative to all other possible alternative combinations in this region. In addition these two alternatives are also are distinguished by the number of 4(f) uses.

The other environmental effects vary among the Hanford and Corcoran Area alternatives but do not differ greatly in intensity or severity. For example, effects on agricultural lands are greater for the Corcoran Bypass Alternatives for some categories of agricultural land and fewer for others (see Section 6.7.2.4).

Because impacts on non-aquatic environmental resources are relatively equivalent in terms of intensity and severity for the Hanford and Corcoran Area alternatives, and because the Proposed Preferred Alternative has slightly less direct effects on waters, the BNSF-Hanford East Alternative combined with the Corcoran Bypass Alternative is identified as the Proposed Preliminary LEDPA because it will avoid 4(f) uses.

7.4.2 Allensworth Area Alternatives

The Allensworth Bypass Alternative would have the least direct adverse impact both on total waters of the U.S., and on waters of the U.S. that are of good quality. Further, the BNSF-Through Allensworth Alternative would have greater effects on riparian resources, greater permanent effects on special status plant species habitat, great effects on natural terrestrial communities (e.g. alkali desert scrub and annual grassland) that could support special-status wildlife species, and greater effects on Important Farmland than the Allensworth Bypass Alternative (Proposed Preliminary LEDPA). The Allensworth Bypass also avoids impacts on the Colonel Allensworth State Historic Park and the Allensworth Ecological Reserve. Therefore, consideration of both aquatic and non-aquatic environmental impacts associated with the Allensworth alternatives warrants the selection of the Allensworth Bypass Alternative as the Proposed Preliminary LEDPA.

7.4.3 Wasco-Shafter Area Alternatives

The BNSF-Through Wasco Shafter Alternative would result in slightly more total direct effects on more waters of the U.S. than the Wasco Shafter Bypass Alternative, but the affected waters of the U.S. are all constructed in nature, of extremely low quality, and exhibit limited characteristics or functions associated with aquatic ecosystem resources. There are no riparian features affected by either Wasco Shafter Area alternative. The Wasco-Shafter Bypass would affect more special status plant species habitat (see Table 6.7-2). The effects on natural terrestrial communities that could support special-status wildlife and agricultural land are roughly equivalent, with the Wasco-Shafter Bypass affecting 18 more acres of Important Farmland. The other non-aquatic environmental effects for the BNSF-Through Wasco Shafter Alternative and the Wasco Shafter Bypass Alternative vary by effect, but do not differ greatly in intensity or severity, and all impacts to non-aquatic resources would be mitigated as set forth in the Revised DEIR/Supplemental DEIS. Because adverse impacts to non-aquatic environmental resources are relatively equivalent in terms of intensity and severity, the significance of impacts to such resources associated with the BNSF-Through Wasco Shafter Alternative does not preclude its selection as the Proposed Preliminary LEDPA. For discussion and comparison of other practicability and public interest factors related to the Wasco-Shafter alternatives, please see Section 7.5.

7.5 Basis for the Selection of the LEDPA for Each Alternative

7.5.1 Hanford and Corcoran Area Alternatives

As described above, the Proposed Preliminary LEDPA for the Hanford and Corcoran area (BNSF-Hanford East and Corcoran Bypass alternatives) would result in the least total direct effect on waters of the United States; when compared to other Hanford and Corcoran area alternatives. These two alternative alignments must be considered together because the alignment for Hanford dictates which alignment may be used in Corcoran. Thus because the Proposed Preferred Alternative in the Hanford and Corcoran Area has the least total direct effect on waters, and because it avoids 4(f) properties compared to the next best alternative with respect to aquatic impacts, it is also the Proposed Preliminary LEDPA.

The relative quality of the waters affected by each alternative does not significantly distinguish the alternatives. In addition, other environmental effects are roughly proportional across the alternatives. For these reasons the BNSF-Hanford East and Corcoran Bypass alternatives are the Proposed Preliminary LEDPA.

7.5.2 Allensworth Area Alternatives

As described above, the Allensworth Bypass Alternative has the least total direct effects on waters of the U.S., and other non-aquatic environmental effects associated with the Allensworth Bypass Alternative do not warrant selection of the BNSF-Through Allensworth Alternative with greater aquatic effects. Therefore, the Allensworth Bypass Alternative warrants selection as the Proposed Preliminary LEDPA.

7.5.3 Wasco-Shafter Area Alternatives

The Proposed Preliminary LEDPA terminating at 7th Standard Road would directly affect approximately 1.3 more acres of waters of the U.S of low quality, constructed waters of the U.S. than the Wasco-Shafter Bypass Alternative terminating at 7th Standard Road.

Both Wasco-Shafter Area alternatives would affect extremely low quality waters for the entire length of the alternative alignment, including the portion carried forward for LEDPA analysis. Based on extrapolation of CRAM data, as indicated in Table 4-9 of Chapter 4, no good or fair quality waters are affected by any alternative in this region. Accordingly, these waters of the U.S do not contribute functions or values to the aquatic ecosystem that are prioritized for protection under the 404(b) (1) guidelines.

The water features found in the Wasco-Shafter region and within the watershed are limited to canals and ditches and lacustrine features (e.g., man-made retention/detention basins). None of the affected waters of the U.S are naturally occurring aquatic resources. The primary function of canals and ditches would remain through construction of the project design features, which will continue to allow and facilitate the movement and transportation of water across the region in support of agricultural operations, and this function would remain after construction of the Project. The man-made retention and detention basins will be reconfigured or relocated in connection with the Project to provide the same water storage functions as they currently provide. The Proposed Preliminary LEDPA would not result in increased impacts on high quality waters, but instead only an increase in acreage of impacts on constructed irrigation and agricultural retention/detention basins. The Proposed Preliminary LEDPA terminating at 7th Standard Road would affect approximately 11 more acres of waters of the U.S of low quality, constructed waters of the U.S. than would the Wasco-Shafter Bypass Alternative terminating at 7th Standard Road.

Each Wasco-Shafter Area alternative would have other significant non-aquatic environmental effects. The significance of these effects varies by type of effect, and some of these effects are greater under each alternative. The relative significance of other environmental effects associated with the two Wasco-Shafter Area alternatives does not favor either alternative to the extent that other environmental effects would warrant the determination that one of the alternatives is the Preliminary LEDPA on the basis of such effects.

Based on evaluation and comparison of the alternatives with respect to purpose and need, practicability, and public interest factors, the Wasco-Shafter Bypass Alternative is not practicable. The purpose and need, practicability, and public interest factors evaluated and discussed below include:

- The degree to which existing transportation corridors and rights of way are utilized, and community and regional concerns, which must be considered in connection with the Project's purposes as reflected in enabling legislation for the Project.
- As evidenced by the majority of comment letters received from the region, the potential for impacts associated with the Wasco-Shafter Bypass on: property ownership (to the extent a larger number of remnant parcels is created), adopted local land use and zoning designations, the local economic base and economic development programs, energy resource development, and the needs and welfare of people in the region affected by the Project.
- Substantial cost uncertainties created by the Wasco-Shafter Bypass's location in a unique, rapidly developing oil field.

7.5.3.1 Practicability and Public Interest Analysis

<u>Consistency with Implementing Legislation, Local Preferences, and Patterns of Land Use</u>

The Section 404(b)(1) guidelines emphasize that alternatives are only practicable if they are available and capable of construction, considering project purposes (40 CFR §§230.3(q); 230.10(a)(2)). Practicability considerations thus begin with the Project's purpose and need. Overall, the BNSF-Through Wasco-Shafter Alternative is preferred because the state legislature recognized that following the existing right of way and transportation corridors would, as a general matter, ensure that the Project's impacts on existing communities and planned uses would be minimized. The enabling legislation for the High-Speed Train states:

> The high-speed train system to be constructed pursuant to this chapter shall have the following characteristics:
>
> In order to reduce impacts on communities and the environment, the alignment for the high-speed train system shall follow existing transportation or utility corridors to the extent possible.[6]

The project's purpose and need should be considered in light of the implementing legislation that frames the overall goal and mandate for the Project. As such, the component of the Project's purpose and need requiring the Authority to maximize the use of existing transportation corridors and right-of-way, to the extent feasible, should therefore be considered through the lens of both the preference for existing transportation corridors as well as regional and community preferences and impacts. For this reason, there is a presumption in favor of existing transit rights-of-way such as the BNSF right-of-way through Wasco and Shafter.

Federal guidance for USACE review of permit applications also emphasizes consideration of the public interest, including local land use and local economics (33 CFR 320.4[a][1]). This guidance directs USACE to these factors according to their importance to each project. The guidance also identifies the importance of both local and state land use decisions, indicating that local and state land use decisions should typically be afforded deference, unless there are significant issues of national importance (33 CFR 320.4[j][2]). This guidance thus directs USACE to consider local land use preferences and adopted policies as well as local economic effects in evaluating permits.

Community preferences, and existing and foreseeable patterns of land use in Wasco and Shafter, favor the use of the BNSF right-of-way (BNSF-Through Wasco-Shafter Alternative). As the following discussion of comments by community members and organizations demonstrates, construction in existing transportation corridors would avoid many of the Project's local community and land use impacts. For these reasons, the use of the Wasco-Shafter Bypass Alternative in this region is impracticable because it is inconsistent with the purpose and need of the project. This discussion first examines the relatively fewer comments that urge the use of a Wasco-Shafter Bypass; these comments are then placed in the context of the larger community preference for the use of the BNSF right-of-way.

Three individual commenters expressed a preference for the Wasco-Shafter Bypass Alternative. These commenters included the Center on Race, Poverty, and the Environment (October 18, 2011); Certis USA (September 13, 2012); and a resident who cites impacts to the Poso Apartment complex (Hoffman August 15, 2011). The Poso Apartment complex is located on the opposite side of SR43 from the proposed alignment; the air quality and noise effects of the Project have been addressed in the Revised DEIR/Supplemental DEIS; the complex is more than 700 feet from the BNSF-Through Wasco-Shafter Alternative footprint—noise barriers would be used to attenuate noise impacts on this and other noise receivers. The Certis US facility will be relocated; thus minimizing impacts on their operation. While the Center on Race, Poverty, and the Environment letter cited a preference for the Wasco-Shafter Bypass Alternative because fewer people live near this alignment, the letter does not necessarily consider the net balance of all potential environmental and social effects and regional preferences.

A group of respondents expressed concern about impacts that the BNSF-Through Wasco Shafter Alternative would have on SunnyGem LLC in Wasco by potentially displacing this agricultural processing facility. The Authority has developed and will implement a plan for reconfiguring SunnyGem LLC to avoid displacement.

[6] CAL. STS. & HIGH. CODE, § 2704.09(g).

The following parties and entities expressed strong preferences for the BNSF and/or a desire to avoid the impacts associated with the use of the Wasco Shafter Bypass Alternative.

City of Shafter

John Guinn, the Shafter City Manager, informed the Authority that the Shafter City Council had adopted a resolution to oppose the Wasco-Shafter Bypass Alternative (March 7, 2013). The City of Shafter expressed concerns in their March 7, 2013 letter, identifying potential impacts associated with the use of a bypass alternative. The City of Shafter indicated that the Wasco-Shafter Bypass Alternative would result in irreparable damage to the California Integrated Logistics Center, (located just north of 7th Standard Road, and in the path of the Wasco-Shafter Bypass Alternative), which would also result in significant economic impacts to the City of Shafter. This is an area of substantial planned industrial growth, as provided by the following policies set forth in the City of Shafter General Plan (2005):

“Provide for the construction of large-scale distribution and industrial facilities east of the BNSF rail line between the Orange Street and 7th Standard Road, compatible with the quality of development within the ITTC [International Trade and Transportation Center].” City of Shafter General Plan, page 2-5.

“Facilitate the development of rail served industrial and warehouse uses by working with the UP and BNSF rail lines to extend service, and through development of an inter-modal cargo facility.” City of Shafter General Plan, page 2-8.

The City of Shafter states that approximately 5,000 people are currently employed at the California Integrated Logistics Center, and future expansions will increase employment to 20,000 workers. In addition, this facility is the only intermodal connection between rail and other transit modes in the Southern San Joaquin Valley. This facility thus serves as an “inland port,” by providing connectivity among different modes of freight transportation, and also provides an important tax revenue to local jurisdictions and employment opportunities in an otherwise economically challenged region. This facility thus serves an important economic development initiative. The City of Shafter estimates that the Wasco-Shafter Bypass Alternative would affect 2,500 acres of this facility, resulting in a projected loss of approximately $250 million in revenue over the next 20 years. The effects would result from the potential loss of rail access and bisecting of industrially zoned land uses where future expansion would occur.

As depicted in Figure 7-1, the Wasco-Shafter Bypass Alternative would traverse the northwestern segment of the land use designated for future development of the inland port. Construction of the Wasco-Shafter Bypass Alternative could interfere with several rail spurs that are needed to serve the planned and existing intermodal cargo facilities (also referred to as the inland port).

The BNSF-Through Wasco-Shafter Alternative avoids these impacts by following the existing BNSF route and reducing adopted land use conflicts with existing and proposed industrial uses, and thus reducing impacts to existing planned local economic drivers and development opportunities. The Wasco-Shafter Bypass Alternative is inconsistent with existing and adopted future land uses in the city of Shafter, and would create severe economic effects, and effects on existing economic development initiatives related to the creation of an inland port. The Proposed Preliminary LEDPA (BNSF-Through-Wasco-Shafter Alternative) avoids these effects and would be consistent with the City of Shafter’s policies and interests.

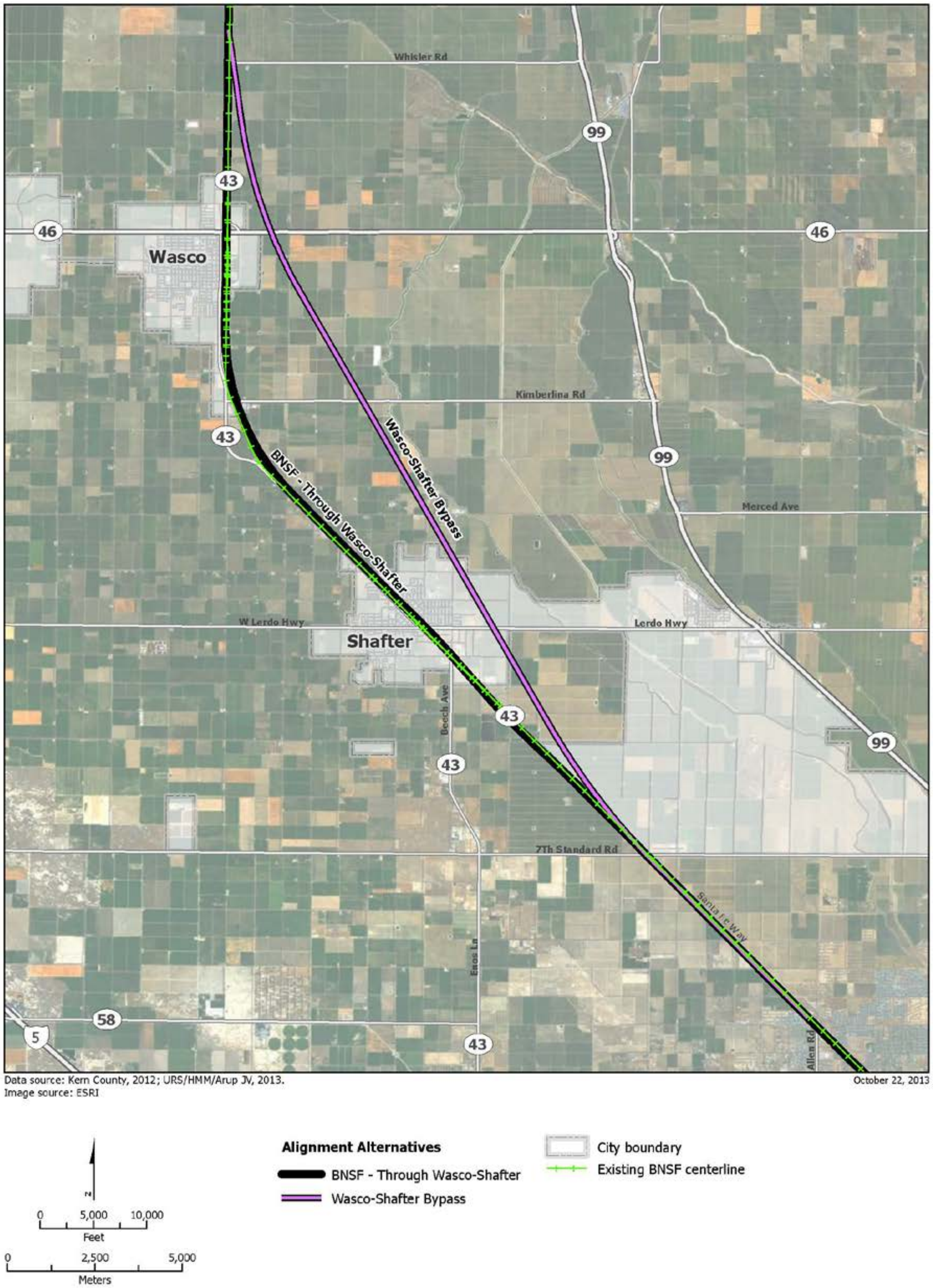

Figure 7-1
Wasco-Shafter Area alternatives
Existing transportation corridor and agricultural lands

Wasco Housing Authority

The City of Wasco Housing Authority is currently planning to relocate this community to a parcel acquired with funding from the U.S. Department of Agriculture (City of Wasco Housing Authority 2013). The planned relocation, which would be assisted by the BNSF-Through Wasco-Shafter Alternative, would integrate this community with the northern portion of the City of Wasco and separate sensitive receptors from the effects of existing freight traffic on the BNSF right-of-way. After relocation of the Wasco Housing Authority farm worker housing that lies east of the BNSF tracks, the number of residual severe noise receptors would be reduced by 226 receivers.

The Authority is working with the city to accommodate other feasible elements of the City of Wasco Housing Authority's residential relocation program as a design feature of the BNSF-Through Wasco-Shafter Alternative. The selection of the BNSF-Through Wasco-Shafter Alternative would thus expedite implementation of the City's program for community integration, residential relocation, and reduction of existing land use conflicts between sensitive receptors and conventional rail.

Local Agriculture, Businesses, and Other Comments

Local agricultural interests in the Wasco-Shafter area have expressed support for the BNSF-Through Wasco-Shafter Alternative, including the mitigation approach and associated use of the BNSF right-of-way in the City of Wasco. Figure 7-2 depicts the location of each alignment and its relationship to existing transportation routes and agricultural lands.

The Wasco Shafter Ag Group is an entity consisting of 124 agricultural production and service-related businesses in the Wasco and Shafter area. The Ag Group previously submitted comments on the Revised DEIR/Supplemental DEIS indicating that the use of the Wasco-Shafter Bypass Alternative will result in greater effects on farmland (comment submitted on the Revised DEIR/Supplemental DEIS October 19, 2012). This assertion is consistent with the greater effects of a Wasco-Shafter Bypass Alternative on Prime Farmland (the best combination of physical and chemical features able to sustain long-term agricultural production) identified in Section 6.4.2.3 above.

The Wasco-Shafter Agricultural Group submitted a letter of support for the BNSF-Through Wasco-Shafter Alternative to the Authority on November 5, 2013, further detailing the concerns expressed in its comments on the Revised DEIR/Supplemental DEIS. With respect to impacts on agriculture, the Ag Group states that "[f]ewer acres of Important Farmland will be converted on the BNSF Alignment than the Bypass Alternative, contrary to that reflected in the [Draft EIR/EIS calculation of farmland conversion]." This conclusion is based on several factors, including the likelihood that 70 acres of farmland along the BNSF-Through-Wasco-Shafter Alternative would not in fact be converted, contrary to the calculation in the Revised DEIR/Supplemental DEIS. The letter further states that the Bypass Alternative will create additional small remnant parcels that cannot be farmed, increasing the amount of farmland that will be potentially converted or otherwise lost. The Ag Group letter also addresses farmland acreage that would be required for turnarounds, or the area required for equipment to turn around at the end of the row. Because the Bypass Alternative would affect many fields, the letter states that additional uncounted acreage would be converted for new turnarounds. Other impacts of the Bypass Alternative on agriculture, including increased costs imposed by the need to revise irrigation systems, are also discussed.

With respect to effects on the aquatic ecosystem, the Ag Group letter includes an analysis prepared by David Hartesveldt of Live Oak Associates, discussing the difference in the acreages of the water features affected by the two alternatives. The report states that there is no appreciable difference in the effects of those alternatives on the aquatic ecosystem, because the water features along either alignment (with the exception of one agricultural basin on the Bypass alignment) provide little or no ecological functions or human values of the sort typically associated with aquatic ecosystems.

The Ag Group letter states that its support is based on "evaluation of a wide range of interests and factors, including that alignment's consistency with the project purpose, its furtherance of the public interest, and its relative effects on the environment compared to other alternatives." The support from such a large segment of the local community strongly supports selection of the BNSF-Through Wasco-Shafter Alternative.

Wilson Ag submitted a comment on the Revised DEIR/Supplemental DEIS stating that the splitting of parcels will actually lead to loss of agricultural lands and greater property ownership impacts (Wilson Ag August 15, 2012). This assertion is also consistent with the greater splitting of parcels associated with the Wasco-Shafter Bypass Alternative identified in Section 6.4.2.3, above.

The Wasco-Shafter Investment Company indicated a preference for a through-town alternative (BNSF-Through Wasco-Shafter Alternative), citing consistency with implementing legislation and avoidance of impacts on agricultural patterns of land use to the east, as well as the developing oil fields in the Shafter region (letter received October 13, 2011).

Neuhouse Farms indicated that the Wasco Shafter Bypass would affect 500 acres of their operations by interrupting irrigation systems, electrical distribution systems, and water storage reservoirs (September 16, 2012, Neuhouse 2012).

Semitropic Water Storage District indicated that the Wasco-Shafter Bypass Alternative would interrupt their water distribution system as well as operations for numerous agricultural land owners to the east of Wasco (comment submitted October 3, 2012, Semitropic Water Storage District, 2012).

The Kern Council of Governments, a regional transportation planning agency, expressed a preference for the BNSF-Through Wasco-Shafter Alternative because of the reduced impacts on transportation/circulation compared to the Wasco-Shafter Bypass Alternative (October 13, 2011). The Wasco-Shafter Bypass Alternative would close 16 roads in comparison to the BNSF-Through Wasco-Shafter Alternative, which only closes two.

Paramount Farms confirmed the substantial cost to the California Integrated Logistics Center, indicating lost revenues and costs in excess of $100 million and loss of approximately 500 acres of the facility (February 21, 2013). While the Paramount Farms estimate varies with the impacts estimated by the City of Shafter, both emphasize the severity of the potential impacts.

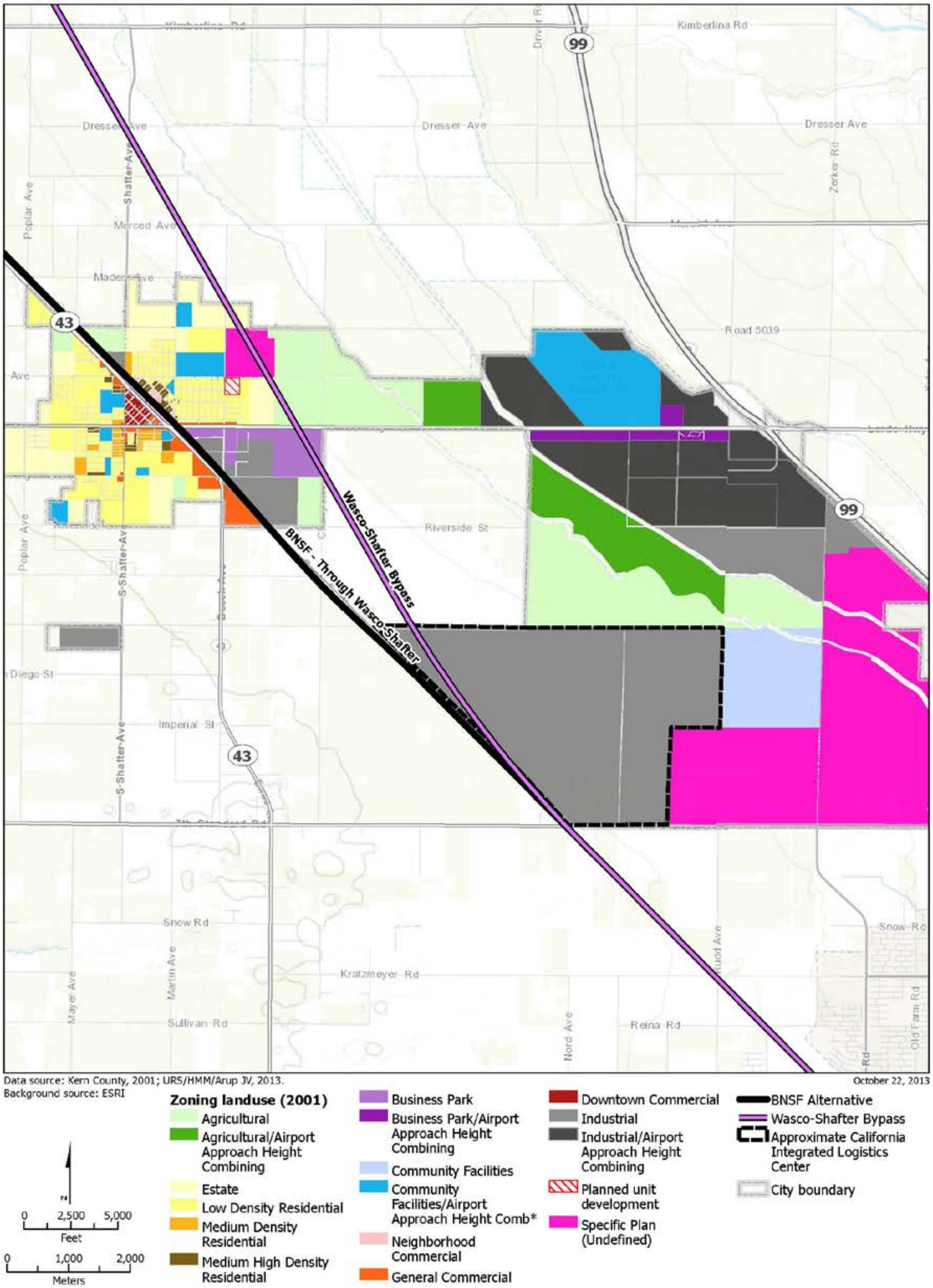

Figure 7-2
City of Shafter
Zoning Land use and California Integrative Logistics Center

As discussed above, the implementing legislation for the HST System indicates a preference for existing transportation right-of-way such as the BNSF corridor, "in order to reduce impacts on communities and the environment" (Sts. & Hy. Code § 2704.09[g]). This mandate requires consideration of the community concerns and preferences expressed in the Wasco-Shafter region, including the predicted loss of $250 million in revenue that the Wasco-Shafter Bypass Alternative would create for the City of Shafter in the near term. In addition, concerns expressed by the local agricultural community regarding the Wasco Shafter Bypass, and their strong preference for use of the BNSF-Through Wasco-Shafter Alternative must be considered because such comments identify severe disruptions to agricultural land uses and property ownerships along the Wasco-Shafter Bypass.

Potential impacts on local land uses and the economic base of the region warrant selection of the BNSF-Through Wasco-Shafter Alternative as the Proposed Preliminary LEDPA because the alternative best complies with project purpose as established by the Project's enabling legislation, and best provides for the needs and welfare of the local community. In addition, because local land use and economic interests are part of USACE's public interest review,(33 CFR 320.4[a][1]), and because local land use decisions are afforded deference (33 CFR 320.4[g][5]) the land use and economic effects of the bypass alternative weigh strongly in favor of the BNSF-Through Wasco-Shafter Alternative.

Deviating from existing transportation corridors has been necessary in some communities and regions to avoid community disruption and to achieve consistency with other important elements and purposes for the Project, as established in the Project's implementing legislation. In Wasco and Shafter, however, local and regional community preferences, and impacts on the local communities affected by the Wasco-Shafter Bypass Alternative, favor the selection of the BNSF-Through Wasco-Shafter Alternative. The Project's purpose, as established by the implementing legislation, supports the BNSF-Through Wasco-Shafter Alternative as the Proposed Preliminary LEDPA.

Conflicts with the North Shafter Oil Field and Cost Uncertainty

National, state, and local interests in supporting energy resource development also favor selection of the BNSF-Through Wasco-Shafter Alternative as the Proposed Preliminary LEDPA. Construction of the Wasco-Shafter Bypass Alternative would involve substantial costs to avoid damaging the unique, rapidly developing oil field known as the North Shafter Oil Field. As discussed below, the unknown nature of these costs, which could be many times larger than budgeted contingencies, support the finding that the Wasco-Shafter Bypass Alternative is not practicable.

The Section 404(b)(1) guidelines emphasize that alternatives are only practicable if they are available and capable of being used, considering cost (40 CFR 230.3[q]). Federal guidance on USACE review of permits also emphasizes that USACE should consider the compatibility of a project with local activities (33 CFR 320.4[g][5]). This same guidance identifies energy resources as an important national objective 33 CFR 320.4[n]). Each of these regulatory directives is considered in turn.

The capital costs identified by the Revised DEIR/Supplemental DEIS indicate that the BNSF-Through Wasco-Shafter Alternative would cost $293 million more than the Wasco-Shafter Bypass Alternative (Revised DEIR/Supplemental DEIS, page 5-7). This cost is based on 15% design. As the Revised DEIR/Supplemental DEIS observes, these costs will necessarily have to be revised as additional information about costs becomes available (Revised DEIR/Supplemental DEIS, page 5-2).

One important factor that affects the cost analysis, and therefore the practicability of the BNSF-Through Wasco-Shafter and Wasco-Shafter Bypass alternatives, is the unique nature of the oilfield through which the Wasco-Shafter Bypass Alternative would be constructed. While other alternatives in other Project area will be constructed in areas with oil wells, there is no other area that resembles the relatively newly developed and rapidly developing North Shafter Oil Field. The output and number of wells in this area has risen by more than 50% since 2010, even while California's total oil production has declined slightly. ("Fracking Tests Ties Between California 'Oil and Ag' Interests", *The New York Times,* June 1, 2013). Advances in drilling technology, high oil prices, and national policies favoring cleaner energy and less foreign oil dependency are encouraging oil company investment in the rural Wasco-Shafter area. The area is part of the geologically rich Monterey Shale formation, which makes up 2/3 of the United States' shale oil reserves. A recent *New York Times* article described the oil development potential of the area as possibly creating "the kind of oil boom seen in North Dakota and Texas, and could even transform California into the nation's top oil-producing state." (*Id.*)

The Wasco-Shafter Bypass Alternative would cut through the heart of this emerging energy resource development. Three Occidental Petroleum subsidiaries that operate in the North Shafter Oil Field (Vintage Petroleum LLC, Vintage Production LLC, and OXY USA Inc.), have estimated that the effect of the Wasco-Shafter Bypass Alternative would require compensation or mitigation that would cost in excess of $530 million. According to this estimate, the cost scenarios for mitigation for damage to wells and other facilities range from $268 million to $945 million. (Letter from Alan E. White, Vintage Production California LLC., to California High Speed Rail Authority, Feb. 21, 2013.) In contrast, the BNSF-Through Wasco Shafter route would have minimal impacts on oil resources and energy development in the area. (Id.)

This estimate includes the cost of purchasing mineral rights and exceeds preliminary cost estimates assumed by the Authority, which were based solely on the cost of capping and relocating wells. The extent (if any) to which mineral rights would need to be acquired is currently unclear, and the Occidental Petroleum letter may represent a high-end estimate of costs. However, it provides an expert perspective on costs that are very difficult to calculate with certainty at this stage of Project design.

Consequently, the risk of exceedingly high costs for the Wasco-Shafter Bypass Route must be considered in the context of the contingencies planned for the Project. As explained in the Revised DEIR/Supplemental DEIS, "At this stage of design, many project features have not been fully developed; therefore, early cost estimates include contingencies to account for changes in material costs and changes during project design. Currently, allocated contingencies (money reserves assigned to each cost category to cover risks associated with design uncertainty) are assumed to be between 10% and 25% of the estimated construction and right-of-way acquisition costs, and unallocated contingency (project reserves intended to cover unknown risks) is estimated at 5% of the construction and right-of-way acquisition costs." (Revised DEIR/Supplemental DEIS, page 5-3.). Even the lowest end of the estimate of costs associated with mitigation in the North Shafter Oil Field ($268 million) exceeds the contingency allocated for the Wasco-Shafter Bypass Alternative, which is $254 million (Revised DEIR/Supplemental DEIS, page 5-7).

The HST is a publicly financed capital project. Because the California legislature must approve funding, minimizing cost uncertainty for the project is imperative. In addition, any cost uncertainty associated with individual sections of the project accrues to the unavoidable cost uncertainty associated with the entire system. For these reasons, the Authority may not commit to an alternative that generates the range of cost uncertainty associated with the Wasco-Shafter Bypass Alternative. The Waco-Shafter Bypass Alternative is therefore impracticable on the basis of logistics and cost.

7.6 Environmental Effects of the Proposed Preferred Alternative for Bakersfield

The Bakersfield Hybrid Alternative has been identified as the Proposed Preferred Alternative among the three Bakersfield alternatives. No LEDPA concurrence is requested for the Bakersfield area alternatives at this time. Based on the analysis of aquatic impacts in Chapter 4, the total direct impacts of the Bakersfield Hybrid Alternative are approximately equivalent to the direct impacts of the Bakersfield South Alternative. The Bakersfield Hybrid alternative would directly affect 0.54 acre more than Bakersfield South and 1.95 acres more than Bakersfield North would. Permanent direct impacts would be 0.6 acre more than Bakersfield South and 2.65 acres more than Bakersfield North. With respect to impacts on resources in good condition, Bakersfield Hybrid and Bakersfield South have total direct effects that are 0.62 acre less than Bakersfield North (0.53 acre less when only permanent impacts are considered). Efforts will continue to reduce impacts on aquatic resources wherever possible. As described above, the relatively greater direct effects of the Bakersfield Hybrid and Bakersfield South alternatives are largely associated with artificial canals and ditches; thus these effects do not significantly contribute to adverse effects on the aquatic ecosystem.

The Bakersfield Hybrid Alternative was developed in response to numerous comments submitted during the public and agency review of the Revised DEIR/Supplemental DEIS (Authority and FRA 2012d, page 2-29). The Bakersfield Hybrid Alternative avoids the following major environmental effects:

- Bifurcation of East Bakersfield (the Bakersfield Hybrid more closely follows existing major transportation corridors such as East Truxtun Avenue and the Edison Highway),
- Associated displacement of substantial numbers of businesses and residences and religious facilities,
- Greater total direct effects on aquatic resources in good condition relative to Bakersfield North, and;
- Avoidance of more than 2 acres of direct and indirect effects on riparian resources that would occur with the Bakersfield North Alternative that are spatially associated with aquatic features in good condition, thus reducing adverse effects on the aquatic ecosystem.

Because the Bakersfield Hybrid alternative reduces effects on important features within the aquatic ecosystem and also reduces other substantial environmental effects, it is part of the Proposed Preferred Alternative. Design refinements will continue, to reduce direct effects on constructed waterbodies where possible.

Chapter 8.0

Factual Determinations Regarding Impacts of the Proposed Preliminary LEDPA (40 CFR Section 230.11 and Subparts C, D, E, and F)

8.0 Factual Determinations Regarding Impacts of the Proposed Preliminary LEDPA (40 CFR Section 230.11 and Subparts C, D, E, and F)

This chapter describes compliance of the Proposed Preliminary LEDPA with Section 404(b)(1) Guidelines and discusses factual determinations, findings of compliance with the discharge restrictions, potential impacts on biological characteristics of the aquatic ecosystem, potential effects on human use characteristics, and other environmental resource impacts. This chapter includes a summary of the anticipated changes to parks, national and historical monuments, and national natural landmarks.

For a detailed comparison of the Proposed Preliminary LEDPA to other potentially practicable alternatives, please see Chapters 4, 6, and 7. These chapters summarize and describe relative effects on aquatic resources, relative effects on other environmental resources, and the practicability analysis of the Project alternatives that supports the Proposed Preliminary LEDPA.

8.1 Anticipated Changes Resulting from the Proposed Preliminary LEDPA to the Physical/Chemical Characteristics of the Aquatic Environment (40 CFR Section 230.20—40 CFR 230.25)

This section provides the factual determinations required in 40 CFR 230.11, as further described in 40 CFR 230.20 through 40 CFR 230.25.

8.1.1 Physical Substrate Determinations (40 CFR Sections 230.11[a], 230.20)

8.1.1.1 Direct Impacts (Fill-Related Impacts), Mitigation Measures, and Significance with Mitigation

The major types of aquatic features within the Project Footprint include seasonal wetlands, seasonal riverine waterways, irrigation canals and ditches, and man-made lacustrine. These features are described in Chapter 3, Aquatic Resources: Existing Conditions and Mitigation Measures for All Alignments.

A number of jurisdictional waters have been identified from these features, including wetlands and other waters of the U.S. Identified wetland features include seasonal wetlands, wetlands, vernal pools, and vernal swales. Other waters of the U.S. identified in the Project Footprint are seasonal riverine, man-made lacustrine, canals, and ditches. The Wetland Study Area (WSA) for analysis is defined in Section 3.7, Biological Resources and Wetlands, of the Fresno to Bakersfield Section: Revised Draft Environmental Impact Report/Supplemental Draft Environmental Impact Statement (Revised DEIR/Supplemental DEIS; Authority and FRA 2012d), and includes the Project Footprint plus a 250-foot buffer.

Many of the jurisdictional waters in the Project Footprint have been leveled, drained, and/or leveed for flood prevention or for agricultural purposes. Physical and biological characteristics of the substrate are largely dictated by whether the feature is natural or manipulated. Manipulated features include rivers and creeks, canals and ditches, constructed basins, and seasonal wetlands. These manipulated features contain substrates that have been altered through excavation, filling, dredging, and accretion of sediments. These substrates typically range from sandy and coarse-loamy, to fine-silty, fine-loamy, and fines, depending on location in the Proposed Preliminary LEDPA. Gravel and rocky substrates are atypical.

Project construction would require the use of heavy machinery to re-contour the landscape and place permanent fill materials (such as imported well-graded soils, sub-ballast, ballast, slab or precast reinforced concrete, piles or concrete girders) in both man-made waters (e.g., lacustrine, canals/ditches) and natural features (e.g., vernal pools and swales and seasonal riverine features). Construction materials that may be placed in waters of the U.S. include imported well-graded soils, sub-ballast (coarse-grained material), ballast (crushed stone), and slab (concrete). Culverts placed in aquatic resources would be constructed of precast reinforced concrete pipe or concrete box culverts. At bridges and elevated structures, cast-in-place or precast reinforced concrete girders or piles may be placed in waters of the U.S. Fill material would be suitable for construction purposes and free from toxic amounts of pollutants in accordance with Section 307 of the Clean Water Act.

Fill materials may change elevations and/or bottom contours in areas where placed. Permanent structures would extend above high-water elevations. Quarry stone, cobblestone, or other erosion control materials may be placed near concrete structures at stream crossings and may also change substrate elevations and bottom contours.

The contouring and placement of fill in waters of the U.S. would result in a direct, permanent loss of jurisdictional waters and irreversible changes to the physical, chemical, and biological characteristics of the aquatic substrates at the location of the fill. Environmental values of the substrate would be fully eliminated for resources smaller than the impact area. For resources whose size is larger than that of the impact area (e.g., bridge structures over watercourses), environmental values of the substrate could be diminished or reduced at the affected site but not entirely lost.

Jurisdictional waters within the Project Footprint for the Proposed Preliminary LEDPA could potentially be affected by fill activities. Permanent fill materials could impact up to 135.71 acres of jurisdictional waters. Temporary fill used during construction could impact up to 15.02 acres of jurisdictional waters. The following discussion goes into detail regarding specific types of affected aquatic resources.

Seasonal Riverine

Major seasonal riverine waterways crossed by the Proposed Preliminary LEDPA include Kings River Complex (Dutch John Cut, Cole Slough, and the Kings River), Cross Creek, Tule River, Deer Creek, and Poso Creek. The Proposed Preliminary LEDPA also crosses one small seasonal riverine feature, Guernsey Slough.

Banks and floodplains of these seasonal riverine waterways have often been channelized, and extensive adjacent riparian vegetation has been removed or confined by surrounding land use. Typically, these features are seasonally dry and have streambeds that are unvegetated and composed of sandy or gravelly substrate. Seasonal riverine features are in fair to good ecological condition because the landscape positions have connectivity upstream and downstream. They function with altered and natural hydrological regimes and provide some biological resources to plants and wildlife, but are physically altered, which reduces their natural characteristics.

Several types of temporary and permanent structures and materials used in the construction of elevated track, bridges, and road overcrossings would be placed in waterways or on banks that would change the nature of the substrate at the location of the fill. (Engineered structures are described in Chapter 2, Alternatives, of the Revised DEIR/Supplemental DEIS). The fill would largely be in the form of concrete structures and aggregate rock. Permanent structures and materials include support piers in water channels, bridge abutments on banks, and quarry stone, cobblestone, or the equivalent for erosion control along seasonal riverine features. Construction-related structures and equipment placed in seasonal riverine features would include cofferdams used for the diversion of stream flow during in-stream work and equipment temporarily placed within or near stream channels. Construction of support structures may also require excavation.

The environmental value of existing substrates can vary and often is dependent on the conditions at the crossing. Stream crossings would occur near existing structures at Cross Creek, Tule River, and Deer Creek where substrate is already disturbed. Poso Creek does not have an existing structure immediately adjacent to the crossing location; however, SR 43 and the existing BNSF Railway are 1,000 feet upstream of the Poso Creek crossing. These crossing locations may have reduced environmental value for aquatic organisms as a result of scour or accretion at the hydraulic constriction. The Kings River Complex is relatively undisturbed at the crossing location, although significant hydrological modifications associated with water use and upstream diversions have significantly affected the system.

For all seasonal riverine features, the existing substrates at the crossings have reduced environmental value because functions and services associated with flow connectivity have already been diminished.

Project design features would be implemented to reduce the potential for adverse impacts at seasonal riverine crossings (e.g., best management practices (BMPs) identified in Section 3.8.6, Project Design Features, of the Revised DEIR/Supplemental DEIS. One of the measures requires that the stream crossings be nearly perpendicular to the channel, where feasible, to minimize bridge length and the number of support structures within channels. This measure would minimize the amount of fill in channels at stream crossings. Because many of the stream crossings are at areas with previously disturbed substrates and because Project design features would be implemented to minimize impacts at stream crossings, direct impacts on substrates would have moderate intensity and would not be significant. The Proposed Preliminary LEDPA crosses numerous canals, ditches, and retention/detention basins, and one reservoir south of Deer Creek.

Canals, Ditches, and Man-Made Lacustrine

Construction of the Proposed Preliminary LEDPA would result in direct impacts on canals, ditches, and man-made lacustrine features from the placement of fill materials, such as imported well-graded soils, sub-ballast, ballast, and slab. These man-made water features have previously disturbed soil with reduced environmental value for aquatic organisms. For example, canals, ditches, and man-made lacustrine features typically are in relatively poor ecological condition from poor landscape positions and disturbed environmental settings, have highly manipulated hydrological regimes offer few biological resources to plants and wildlife, and are physically engineered to the extent that they are devoid of natural characteristics. In some cases, substrate characteristics are influenced by the uplands that were excavated to create canals, ditches, or man-made lacustrine features. Because these man-made features are in previously altered areas and the environmental value of the disturbed substrate is minimal, direct impacts on substrates at these sites would have negligible intensity and, in the context of the resource, would not be significant.

Seasonal Wetlands, Vernal Pools, and Vernal Swales

The Proposed Preliminary LEDPA crosses seasonal wetlands near Tule River and Deer Creek. Seasonal wetlands have been found in disturbed habitats, including fallow agricultural areas, drainage ditches along existing linear rights-of-way and on the margins of retention/detention basins, active agricultural fields, and roadside ditches. In general, seasonal wetlands are in relatively fair ecological condition, function with altered and natural hydrological regimes, and provide some biological resources to plants and wildlife, but they are physically altered, which reduces their natural characteristics.

The Proposed Preliminary LEDPA crosses vernal pools and vernal swales between Deer Creek and Poso Creek. The vernal pool and vernal swale features in natural landscapes provide a number of aquatic and biological functions and services. In general, these features are in good ecological condition because they are in natural landscapes away from developed land uses; function within a natural hydrological regime, though some features are affected by a number of hydrological barriers (e.g., BNSF right-of-way and SR 43); provide considerable biological resources to plants and wildlife; and have an unaltered, natural physical structure.

The Proposed Preliminary LEDPA would be subject to mitigation measures in compliance with applicable federal and state laws and regulations. A range of strategies will address impacts on wetlands and other waters of the U.S., as well as effects on endangered or threatened plant and wildlife species and other biological resources that may be affected by the Project. These strategies are based on the April 2008 Final Mitigation Rule developed by the U.S. Army Corps of Engineers (USACE) and the U.S. Environmental Protection Agency (EPA) to govern compensatory mitigation for authorized impacts on wetlands, streams, and other waters of the U.S. (Federal Register, Vol. 73, No. 70, 2008). Major mitigation strategies are detailed in the Revised DEIR/Supplemental DEIS and include development and implementation of a compensatory mitigation plan commensurate with the impacts on waters of the U.S. and the loss of environmental conditions. Because the loss of environmental conditions (functions and services) will be mitigated and because seasonal wetlands in the Project Footprint (and some vernal pools and vernal swales) are located in previously disturbed habitat, direct impacts on substrates at these sites would have moderate intensity and would not be significant.

8.1.1.2 Indirect Impacts, Mitigation Measures, and Significance after Mitigation

The placement of fill materials has the potential to increase erosion and sediment transport into adjacent aquatic areas. The placement of fill material could result in erosion or movement of streambed materials and in a change in substrate elevations or bottom contours outside the Project Footprint. Erosion could adversely affect substrate in downstream areas by changing or destroying habitat. However, these indirect effects on constructed aquatic resources are not expected to result in significant loss or degradation of the physical substrate. Indirect effects on seasonal wetlands, vernal pools, and swales are addressed in this section because indirect effects may result in degradation or loss of the physical substrate of these resources.

The placement of fill material in seasonal wetlands and vernal pools and swales could indirectly cause change in substrate composition and contours outside of the Project Footprint. These changes could result in degradation, adverse modification, or loss of the feature. This is particularly the case with vernal pool and swale features that would experience indirect-bisected impacts (those features intersected by the footprint).

As such, additional mitigation considerations were given to indirect-bisected vernal pools. Where an indirect-bisected impact occurs to a vernal pool and swales feature, mitigation is proposed for the entirety of that vernal pool feature (even portions that extend into and beyond the WSA). Mitigation is proposed for all loss of waters of the U.S,, including features within 250 feet from direct permanent impacts for vernal swale features. Because most of the vernal pools have small drainage basins, indirect impacts to these features are expected to be less than significant. Stream crossings would maintain stream channel flow capacity through such measures as perpendicular crossings (where practicable), adequate stream bank freeboard, and measures to protect against stream bank and channel scour. Project design features would be used to reduce or prevent erosion at stream crossings. These measures are identified in Section 3.8.6, Project Design Features, of the Revised DEIR/Supplemental DEIS and include the following:

- Engineering analyses of channel scour depths at each crossing would be conducted to evaluate the depth for burying the bridge piers and abutments.

- Quarry stone and cobblestone, or their equivalents, would be used for erosion control along rivers and streams, complemented with native riparian plantings or other natural stabilization alternatives that would restore and maintain a natural riparian corridor.
- Bedding materials would be placed under stone protection at locations where the underlying soils require stabilization as a result of stream-flow velocity.

Culverts and other portions of the at-grade track would also have design measures used to protect against soil erosion. Culverts would include head walls, wing walls, flared outlets, flared inlets, and BMPs (such as riprap) at new culvert locations to provide protection against erosive forces and minimize erosion. Fill used for construction of at-grade track (e.g., compacted soil) would also be engineered and protected by BMPs (such as the use of rock), so that the potential for erosion of this fill material would be minor.

Because of Project design features used to ensure adequate flow capacity at channels and to provide protection from erosion, the indirect impacts on substrates outside of areas with fill would have moderate intensity and would not be significant.

8.1.1.3 Cumulative Impacts, Mitigation Measures, and Significance with Mitigation

The Proposed Preliminary LEDPA, in conjunction with reasonably foreseeable projects, could contribute to potential cumulative impacts on substrates of aquatic resources. For example, improvements are planned at existing railroads near the proposed alternative, including improvements at stream crossings. Additional fill could occur on the banks, in the streambed, or in wetlands so that existing substrate would be replaced with fill (e.g., concrete or aggregate). Improvements to existing infrastructure would occur in areas with disturbed substrate. Other reasonably foreseeable future projects include additional plans for residential, commercial, and industrial growth permitted under general plan updates. This development could include loss of wetlands or hydrological changes to wetlands or other waters of the U.S. Because all projects are subject to environmental regulations that protect wetlands and regulate stream crossings, cumulative impacts would have negligible intensity and, in the context of the resource, would not be significant. The construction of the Project would be subject to mitigation, and this mitigation would reduce the impacts of the Project on aquatic resources and the contribution of the Project to the cumulative condition.

8.1.2 Current Patterns and Water Circulation, Fluctuation, and Salinity Determinations (40 CFR Sections 230.11[b], 230.23)

8.1.2.1 Direct Impacts (Fill-Related Impacts), Mitigation Measures, and Significance with Mitigation

Fill materials can modify flow patterns by obstructing flow, by changing the direction or velocity of water circulation, or by changing the dimensions of a water body. By redirecting flow patterns and circulation, adverse changes could occur in substrate erosion and deposition rates; in the rate and extent of mixing of dissolved and suspended components of the water body; and in the location, structure, and dynamics of aquatic communities. Changes in flow patterns and circulation could potentially affect water chemistry, including salinity, color, odor, taste, temperature, and nutrients. The Project occurs in a freshwater environment, so there would be no effect on salinity.

Direct impacts on jurisdictional waters (i.e., natural and man-made features) from changes in flow patterns would occur from modification of local drainage patterns and possible redirection of flow within some jurisdictional waters. The potential for adverse impacts on drainage patterns as a result of Project construction and post-development operation is addressed in Section 3.8, Hydrology and Water Resources, of the Revised DEIR/Supplemental DEIS. Potential changes to surface water runoff and drainage patterns are also addressed below in Section 5.1.5. Stormwater management design features are addressed in the *Stormwater Quality Management Report* (Authority 2012a).

Construction activities associated with the Proposed Preliminary LEDPA would involve storing, hauling, and placing fill; possible pile driving; construction of stations, parking lots, aerial structures, and bridges; and construction of concrete or ballast track bed. Construction of an at-grade embankment would require excavating, leveling, and raising the ground surface, which could impede overland flow at swale crossings and would require the permanent rerouting of overland flow toward new or existing ditches, culverts, or channels. As part of the Project Design, a Stormwater Pollution Prevention Plan (SWPPP) would be prepared and implemented for construction activities, and stormwater would be infiltrated on site and/or existing discharge locations would be maintained, to the extent practicable. The SWPPP, to be prepared before construction, would describe temporary drainage patterns within the construction site and indicate stormwater discharge locations from the construction site. Temporary changes to stormwater drainage patterns and runoff would be minimal and have an effect with negligible intensity because of these measures, and the impacts would not be significant.

Temporary diversion of stream flow may be necessary during the installation of support piers and bridge abutments in stream channels. In some cases, stream flow may be temporarily re-routed around construction areas located within the channel. This could temporarily reduce channel capacity, potentially cause erosion or sedimentation, and could temporarily increase flood risk. Conventional construction techniques, such as cofferdams, would be used for in-stream work. Cofferdams would be designed to minimize increases in water surface elevations during the design event and as required by state or local agencies. Cofferdams would also be designed in compliance with the SWPPP, which would specify measures to reduce erosion and sedimentation. Temporary changes to stream flow patterns would be minimal and would have an effect with negligible intensity because of these Project Design features, and the impacts would not be significant.

The potential for adverse impacts on local drainage patterns and flow conveyance, as a result of post-development operation, is addressed in Section 3.8, Hydrology and Water Resources, of the Revised DEIR/Supplemental DEIS. Permanent drainage patterns are largely unaltered by the Project, except immediately adjacent to the HST embankment where overland flow is passed through the embankment via culverts. This alteration could result in obstructing, redirecting, and changing the local velocity of existing runoff over limited reaches at the HST alignment. These new culverts would generally be adjacent to those already in existence, but other additional culverts may be placed to improve cross-embankment conveyance. Existing connectivity and design-flood capacity of streams and regional irrigation canals would be maintained. With incorporation of the design measures for stormwater management and flood protection, impacts on the capacity and connectivity of surface water and drainage would have negligible intensity, and the impacts would not be significant.

At the Kings River Complex, there are federal levees on each side of Cole Slough and on the north bank of Dutch John Cut that were constructed by the USACE in the 1970s. The Project will coordinate with the USACE regarding Section 408 minor impacts on federal levees associated with the Kings River Complex.

The crossing of the three Kings River Complex channels will be constructed so as not to affect the federal levees or the river banks. The bridge pier and abutment foundations will have 15 feet of horizontal setback from the toe of the levee. The minimum vertical clearance from the top of the levee to the bridge soffit is 18 feet.

Based on model results, the proposed crossing of the Kings River Complex channels will cause less than a 0.1-foot rise in the water surface elevation within levees at Cole Slough and Dutch John Cut under the USACE operations and maintenance flows. Under the FEMA 100-year peak flow, the proposed crossing will cause less than 0.1-foot rise in the water surface elevation of the floodplain.

8.1.2.2 Indirect Impacts (Non-Fill-Related Impacts), Mitigation Measures, and Significance with Mitigation

Despite minor adjustments to existing drainage patterns, flow conveyance capacity would be maintained, connectivity of natural watercourses would be maintained, stormwater discharges would be managed, and the Proposed Preliminary LEDPA would not increase the potential for erosion or sedimentation. For example, stormwater would be redirected and managed on site or discharged to existing offsite stormwater conveyance facilities, where approved. Therefore, downstream impacts from changes in local drainage patterns would have negligible intensity, and these impacts would not be significant.

Vernal pools and swales that are intersected by the Project Footprint (i.e., those that have indirect-bisected impacts) could experience a change in drainage patterns, and connectivity to natural swales could be reduced or eliminated. Furthermore, due to the alkaline nature of these features, the discharge of imported fill materials could result in the change in soil or water chemistry affecting the overall health of the plants and organisms currently associated with these unique and sensitive features. Because these effects would be moderate in intensity and the impacts would be significant, additional mitigation considerations were given to indirect-bisected vernal pools. Where an indirect-bisected impact occurs on a vernal pool and swales feature, mitigation is proposed for the entirety of that vernal pool feature (even portions that extend into and beyond the WSA). Mitigation is proposed for all loss of waters of the U.S., including vernal pools and swales within 250 feet from direct permanent impacts for vernal swale features. Because most of the vernal pools have small drainage basins, indirect impacts on these features are expected to be less than significant.

8.1.2.3 Cumulative Impacts, Mitigation Measures, and Significance with Mitigation

Foreseeable cumulative impacts on the aquatic environment include loss of waters associated with existing trends in land use. These trends include urbanization that would accommodate the population increase forecast for 2035, which would result in the conversion of an estimated 173,000 acres of agricultural land for additional development and land use changes, including increases in housing, commercial, office, transportation, parks, and schools (see Section 3.19, Cumulative Impacts, of the Revised DEIR/Supplemental DEIS). The reasonably foreseeable projects would result in changes to existing onsite drainage patterns and could result in increased stormwater runoff because of an increase in impervious surface area. However, new developments would comply with stormwater control ordinances, thus minimizing the impact of the runoff and effect on existing patterns of water circulation.

On a much smaller scale, similar impacts would result from operation of the Project because of the increase in impervious surface area caused by structures and parking facilities associated with the Proposed Preliminary LEDPA stations. Guideway construction materials and soil compaction below the guideway would also redirect local infiltration. The Proposed Preliminary LEDPA would implement the measures for hydrology and water resources described in Section 3.8.6, Project Design Features, of the Revised DEIR/Supplemental DEIS to minimize impacts. These measures would minimize impacts on existing circulation patterns and hydrology by replacing lost hydraulic capacity, managing storm runoff, and minimizing the contribution of the Project to the regional effects of erosion and non-point-source runoff through erosion and runoff control. For these reasons, the contribution from Proposed Preliminary LEDPA would be minor;

cumulative impacts on drainage patterns and hydrology, within the regional context, would have negligible intensity and would not be significant.

8.1.3 Suspended Particulates or Turbidity (40 CFR Sections 230.11[c], 230.21)

8.1.3.1 Direct Impacts (Fill-Related Impacts), Mitigation Measures, and Significance with Mitigation

Suspended particulates in the aquatic ecosystem consist of fine-grained mineral particles and organic particles. Suspended particulates may enter water bodies as a result of runoff, flooding, vegetative and planktonic breakdown, re-suspension of bottom sediments, and activities such as dredging and filling. The discharge of fill material could result in elevated levels of suspended particulates in the water column. Suspended particles could reduce light penetration, lower the rate of photosynthesis and the primary productivity of an aquatic area, and reduce feeding ability in sight-dependent species. The biological and the chemical components of the suspended material may react with dissolved oxygen in water, which could result in oxygen depletion. Toxic metals and organics, pathogens, and viruses absorbed or adhered to fine-grained particulates may become biologically available to organisms. Considerable increases in suspended particulate levels could create turbid plumes that are highly visible and aesthetically displeasing.

The potential for adverse impacts on surface waters from suspended particles as a result of Project construction is addressed in the Water Quality subsection of Section 3.8.5.3, High-Speed Train Alternatives, of the Revised DEIR/Supplemental DEIS. The potential for erosion and sediment transport from the placement of fill materials is discussed in Section 5.1.1.

Stream crossings would be particularly vulnerable to degraded water quality because construction would occur in the stream channel and contaminants may have a direct path to surface water. Bridge supports may require excavation in the stream channel and dewatering of the work area. The proximity of flowing water to active construction could provide a direct path for sediments to reach surface water. In some cases, flowing streams may be temporarily re-routed around construction areas in the channel. This action could temporarily reduce channel capacity and/or cause erosion or sedimentation. Construction BMPs, such as cofferdams, would be used to minimize or avoid discharge of sediment from the construction site and would comply with standards described in Section 3.8.6, Project Design Features, of the Revised DEIR/Supplemental DEIS.

Construction of at-grade sections of the track would require excavating or leveling the ground surface. The construction of new frontage roads and road bridges would expose soils susceptible to erosion during construction near sensitive environmental areas such as wetlands and other waters of the U.S.

The State of California's Construction Stormwater General Permit requires preparation and implementation of an SWPPP, which would provide BMPs to minimize potential short-term increases in sediment transport from construction. BMPs include requirements for erosion control, stormwater management, and channel dewatering. The SWPPP would identify pollutant sources that could affect water quality, and specify, implement, and maintain BMPs to reduce pollutant discharges, particularly sediment, from construction site runoff. The SWPPP would include measures to address the following:

- Practices to reduce erosion of exposed soil (e.g., soil stabilization, watering for dust control, perimeter silt fences, placement of rice straw bales, and sediment basins).

- Practices to minimize sedimentation (e.g., silt fences, stabilized construction entrances, grass buffer strips, ponding areas, organic mulch layers, inlet protection, and Baker tanks and sediment traps).
- Use of diversion ditches to intercept offsite surface runoff.
- Where feasible, avoidance of areas that may have substantial erosion risk, including areas with erosive soils and steep slopes.
- Where feasible, limits on construction in dry periods when flows in water bodies are low or absent.

With the implementation of these standard minimization and avoidance measures, direct effects on water bodies from suspended particles during Project construction would have moderate intensity, and the impacts would not be significant.

8.1.3.2 Indirect Impacts, Mitigation Measures, and Significance with Mitigation

The potential for adverse impacts on suspended particles as a result of post-development operation is addressed in the Water Quality subsection of Section 3.8.5.3, High-Speed Train Alternatives, of the Revised DEIR/ Supplemental DEIS. During Project operations, pollutant-generating Project surfaces, such as roads and train stations, could produce sediment that would reach water bodies and degrade water quality. To avoid or minimize these potential impacts, new bridges would be designed to maintain the existing conveyance capacity and hydraulic conditions of the water body being crossed, as described in Section 3.8.6, Project Design Features, of the Revised DEIR/ Supplemental DEIS. Therefore, changes in stream sedimentation characteristics (e.g., sediment deposition or channel erosion) at the crossings would be minimal. As detailed below in Section 5.1.4, stormwater would be treated for pollutant-generating areas of the Project. As a result, impacts on water quality from sediment or turbidity would be reduced or eliminated.

The Project would avoid increasing existing peak stormwater flows from the Project site as described in Section 3.8.6, Project Design Features, of the Revised DEIR/Supplemental DEIS (Authority and FRA 2012d) and in the Stormwater Quality Management Report (Authority 2012a). This would be accomplished by emphasizing onsite retention of stormwater runoff using measures such as flow dispersion, infiltration, and evaporation, supplemented by detention where required. Additional flow control measures would be implemented where local regulations or drainage requirements dictate.

Because of the implementation of these Project design features, effects on suspended particle levels in waters of the U.S. would have moderate intensity, and the impacts would not be significant.

8.1.3.3 Cumulative Impacts, Mitigation Measures, and Significance with Mitigation

Construction of the Proposed Preliminary LEDPA, in conjunction with construction activities associated with other past, present, and reasonably foreseeable projects, could alter existing drainage patterns and redirect stormwater runoff, resulting in increased sedimentation and turbidity. As stated previously, new urbanization that would accommodate the population increase forecast for 2035 would result in an estimated conversion of 173,000 acres of agricultural land for additional development and land use changes, including increases in housing, commercial, office, transportation, parks, and schools. This urbanization would increase impervious surface area, increase stormwater runoff, and potentially increase sedimentation and turbidity in streams or other water bodies. Some of the foreseeable projects identified for the study area (e.g., dairy expansion, new urban development) could create new sources of polluted runoff under the cumulative condition.

However, like the Proposed Preliminary LEDPA, other projects would be subject to regulations and permits required by the State Water Resources Control Board (SWRCB) and the Central Valley Regional Water Quality Control Board (CVRWQCB) to minimize impacts on water quality (e.g., the statewide Construction General Permit and the statewide Industrial General Permit). These regulations are in place to make sure that new developments and infrastructure projects do not result in violations of water quality standards. The Proposed Preliminary LEDPA would also implement hydromodification measures described in Section 3.8.6, Project Design Features, of the Revised DEIR/Supplemental DEIS (Authority and FRA 2012d) to minimize impacts. Therefore, potential cumulative impacts would be reduced; cumulative impacts on water bodies resulting from suspended particles or turbidity would have negligible intensity, and the impacts would not be significant.

8.1.4 Water Quality: Temperature, Salinity Patterns, and Receiving Water Quality Standards for Contaminants of Concern (40 CFR Sections 230.11[d]), 230.22, 230.25)

8.1.4.1 Direct Impacts (Fill-Related Impacts), Mitigation Measures, and Significance with Mitigation

The discharge of dredged or fill material could change the chemistry and physical characteristics of the receiving water through changes in substrate elevations or bottom contours and the introduction of chemical constituents in suspended or dissolved form. Changes in substrate elevations or bottom contours could increase water temperatures and change salinity patterns in saline or brackish areas. The addition of contaminants could reduce or eliminate the suitability of the water body for populations of aquatic organisms and for human consumption, recreation, and aesthetics.

Bridges with piers and abutments would be constructed at stream crossings. Although a potential for local scour or erosion around piers or abutments is present, erosion control materials, such as quarry stone or cobblestone, would be used to minimize scour. Substrate elevations and bottom contours would not be changed from erosion of streambed materials, and therefore piers and bridge abutments would not cause changes to downstream bathymetry or river morphology associated with downstream settling and runoff of scoured material. Changes in temperature would not result from changes in bathymetry.

The seasonal riverine waterways crossed by the Proposed Preliminary LEDPA consist of freshwater, and therefore changes in salinity patterns are not applicable.

The potential for adverse impacts on water quality as a result of Project construction is addressed in the Water Quality subsection of Section 3.8.5.3, High-Speed Train Alternatives, of the Revised DEIR/Supplemental DEIS. Construction activities associated with the potential proposed Project would involve handling, storing, hauling, and placing fill; possible pile driving; construction of train stations, parking lots, aerial structures, and bridges; and construction of ballast or concrete track bed. With respect to direct impacts, the fill and construction of the Project may introduce the following pollutants to receiving waters: floating material, detergents, oil and greases, sediment, settable material, and petrochemical fuels. Salinity is not expected to be an issue. Stream crossings would be particularly vulnerable to degraded water quality because construction would occur in the stream channel and contaminants would have a direct path to surface water. Bridge supports in areas of high groundwater or in surface water may require excavation in the stream channel and dewatering of the work area, potentially resulting in harmful discharges to surface waters.

The following waters are on the State of California's 303d List of water-quality-impaired waters: Lower Kings River between Pine Flat Reservoir and Island Weir (chlorpyrifos and unknown toxicity), Lower Kings River between Island Weir to Stinson and Empire Weirs (electrical conductivity, molybdenum, and toxaphene), Cross Creek (unknown toxicity), and Deer Creek (high pH and unknown toxicity). The Project would not substantially add to or affect the levels of these contaminants because the proposed fills consist of durable, non-soluble material free of toxic materials in toxic amounts, including toxic quantities of these chemicals.

The risk of polluted runoff will be minimized through implementation of various control and design measures that are summarized in Section 3.8.6, Project Design Features, of the Revised DEIR/ Supplemental DEIS and that will be detailed in the SWPPP prepared before and implemented during Project construction. These procedures identify pollutant sources that could affect water quality, and identify, implement, and maintain BMPs to reduce pollutants and non-stormwater discharges in construction site runoff. The Construction SWPPP will include measures to address the following:

- Practices to minimize the contact of construction materials, equipment, and maintenance supplies with stormwater.
- Limitations on fueling and other activities using hazardous materials to areas distant from surface water, provision of drip pans under equipment, and daily checks for vehicle condition.
- Practices to capture and provide proper offsite disposal of concrete washwater, including isolation of runoff from fresh concrete during curing to prevent it from reaching the local drainage system, and possible treatment to reduce the alkaline character of the runoff (high pH) that can result from new concrete.
- Development of a spill prevention and emergency response plan to handle potential fuel or other spills.

With the implementation of these standard minimization and avoidance measures, effects from construction on surface water quality would have negligible intensity, and the impacts would not be significant.

8.1.4.2 Indirect Impacts, Mitigation Measures, and Significance with Mitigation

The technology proposed for the HST System does not require large amounts of lubricants or hazardous materials for operation. The electric trains would use a regenerative braking technology, resulting in reduced physical braking and associated wear. The at-grade tracks and the elevated guideways are therefore not significant pollutant-generating surfaces because the operation of the train will not generate substantial quantities of pollutants that enter waterways. However, the stations, the new frontage roads, and the new road overpasses would create new sources of potentially contaminated runoff during HST operation.

The Proposed Preliminary LEDPA would construct new grade-separated roads at a number of Project rail crossings. These new sources of road runoff from new crossings, relocated highways, or new frontage roads could negatively affect water quality. However, water quality design measures will be implemented to reduce the potential for adverse impacts as described in Section 3.8.6, Project Design Features, of the Revised DEIR/Supplemental DEIS and in the *Stormwater Quality Management Report* (Authority 2012a).

To protect water quality, the Project will design and construct onsite stormwater management facilities to capture runoff and provide pre-discharge treatment for the following pollutant-generating surfaces: station parking areas, access roads, new road overpasses and underpasses, reconstructed interchanges, and new or relocated roads and highways. Low-impact development

(LID) techniques will be employed to retain runoff on site and to reduce offsite runoff, to the extent practicable. Stormwater treatment will be accomplished through the use of biofiltration and bioretention systems, wet ponds, constructed wetland systems, organic mulch layers, planting soil beds, and/or vegetated systems (biofilters) such as vegetated swales and grass filter strips. With these design features for stormwater management and treatment, water quality impacts during operation would have negligible intensity, and the impacts would not be significant.

8.1.4.3 Cumulative Impacts, Mitigation Measures, and Significance with Mitigation

The new urbanization that would accommodate the population increase forecast for 2035 would result in additional development and land use changes to accommodate housing, commercial, office, transportation, park, and school uses (see Section 3.19, Cumulative Impacts, of the Revised DEIR/Supplemental DEIS). Some of the foreseeable projects identified for the study area (e.g., dairy expansion, new urban development) would potentially create new sources of runoff pollution that would contribute to the cumulative condition. Construction of the HST alternatives, in conjunction with construction activities associated with other past, present, and reasonably foreseeable projects, could alter existing drainage patterns and redirect stormwater runoff, potentially resulting in increased discharge of pollutants of concern.

Like the Proposed Preliminary LEDPA, other projects would be subject to regulations and permits required by the SWRCB and CVRWQCB to minimize impacts on water quality. Therefore, potential cumulative impacts would be reduced. These regulations are in place to make sure that new developments and infrastructure projects do not result in water quality standard violations, and all new projects would be required to meet water quality standards. The Proposed Preliminary LEDPA would implement measures for hydrology and water resources described in Section 3.8.6, Project Design Features, of the Revised DEIR/Supplemental DEIS to minimize impacts. Therefore, potential cumulative impacts would be reduced, the cumulative impacts on water quality would have negligible intensity, and the impacts would not be significant.

8.1.5 Normal and Flood-Control Functions and Fluctuations in Water Level (40 CFR Section 230.24)

8.1.5.1 Direct Impacts (Fill-Related Impacts), Mitigation Measures, and Significance with Mitigation

Flood fluctuations occur in natural aquatic systems, and the biological and physical components of the system are either attuned to or characterized by these periodic water fluctuations. The discharge of dredged or fill material could alter flood patterns; increase erosion or sedimentation rates; modify habitat; restrict movement of aquatic animals; alter communities and populations of aquatic animals and vegetation; or otherwise change adjacent, upstream, or downstream areas.

Flood fluctuations and flood-control functions are related to stormwater runoff patterns and flood flow conveyance within the floodplain. Storm events could cause fluctuations in water levels in natural aquatic systems, and changes to stormwater runoff patterns could affect the magnitude of these fluctuations. Changes in flood conveyance patterns could also affect flood fluctuations and flood-control functions during large storm events.

The potential for adverse impacts on stormwater runoff patterns and flood flow conveyance as a result of Project construction is addressed in Section 3.8, Hydrology and Water Resources, of the Revised DEIR/Supplemental DEIS (Authority and FRA 2012d). Construction of the HST alternatives would result in temporary impacts on existing runoff pathways, natural watercourses, and irrigation distribution systems.

Overland flow could be temporarily redirected locally by staging and construction materials, and most natural and larger man-made crossings would require in-water work during the construction of bridge piers. This could potentially cause erosion or sedimentation, temporarily reduce channel capacity, temporarily increase flood risk, and could temporarily change water level fluctuations during storm events. Conventional construction techniques, such as cofferdams, would be used during construction. Construction BMPs, designated in the SWPPP, would be used to reduce erosion and sedimentation and to maintain stream conveyance. With implementation of these control measures, temporary changes to flood fluctuations and flood-control functions would have an effect with negligible intensity, given the small size of the impact area relative to the floodplain and the temporary nature of the potential impacts, and the impacts would not be significant.

At the Kings River Complex, there are federal levees on each side of Cole Slough and on the north bank of Dutch John Cut that were constructed by the USACE in the 1970s. The Project will coordinate with the USACE regarding Section 408 minor impacts on federal levees associated with the Kings River Complex.

The crossing of the three Kings River Complex channels will be constructed so as not to affect the federal levees or the river banks. The bridge pier and abutment foundations will have 15 feet of horizontal setback from the toe of the levee. The minimum vertical clearance from the top of the levee to the bridge soffit is 18 feet.

Based on model results, the proposed crossing of the Kings River Complex channels will cause less than a 0.1-foot rise in the water surface elevation within levees at Cole Slough and Dutch John Cut under the USACE operations and maintenance flows. Under the FEMA 100-year peak flow, the proposed crossing will cause less than 0.1-foot rise in the water surface elevation of the floodplain.

8.1.5.2 Indirect Impacts, Mitigation Measures, and Significance with Mitigation

Section 3.8, Hydrology and Water Resources, of the Revised DEIR/Supplemental DEIS addresses the potential for adverse impacts on stormwater runoff patterns and flood-flow conveyance as a result of post-development operation. These impacts are related to flood-control functions and flood fluctuations, as discussed above. Flood-related features include natural water bodies, such as rivers, streams and sloughs, and man-made water bodies, such as canals and ditches, and floodplains. Stream flows depend on precipitation and snowmelt runoff; regulated releases from reservoirs, diversions, stormwater facilities, and canals; and irrigation return flow and other point- and non-point-source discharges. Major seasonal riverine waterways are shown on Figure 3.8-2 of the Revised DEIR/Supplemental DEIS. The number of major natural and man-made waterways crossed by the Proposed Preliminary LEDPA is summarized in Table 8-1. Unnamed irrigation canals and distribution pipelines are also crossed by the Proposed Preliminary LEDPA (but not included below).

Table 8-1
Major Waterway Crossings for the Proposed Preliminary LEDPA

Segment	Seasonal Riverine Waterways	Canals and Ditches	Total
BNSF–Fresno, Monmouth	0	9	9
BNSF-Hanford East	5	11	16
Corcoran Bypass	1	3	4

Table 8-1
Major Waterway Crossings for the Proposed Preliminary LEDPA

Segment	Seasonal Riverine Waterways	Canals and Ditches	Total
BNSF–Pixley	0	2	2
Allensworth Bypass	2	0	2
BNSF-Through Wasco-Shafter*	0	0	0
Total for the Proposed Preliminary LEDPA (to Seventh Standard Road south of Shafter)	8	25	33

Notes:
* = Includes only the portion of the BNSF-Through Wasco Shafter to Seventh Standard Road

Much of the region is in floodplains that have relatively flat gradients toward the west or southwest. When channels overflow, most of the floodplain is characterized by shallow, 1- to 3-foot-deep overland flooding. This flooding can pond against linear obstacles, such as canal levees and road and railroad embankments lying perpendicular to the land gradient. If these facilities lack sufficient culverts or other means of cross drainage, the overland flows can be diverted for long distances before finally overflowing the linear obstacles and continuing west. Floodplains are shown on Figures 3.8-2 to 3.8-5 of the Revised DEIR/Supplemental DEIS.

The Federal Emergency Management Agency (FEMA) has identified special flood-hazard areas (SFHAs) to designate the land area covered by the base flood to which the FEMA floodplain management regulations apply. FEMA's SFHAs correspond to the 100-year (1% annual probability of occurrence) floodplain. State and local governments use this designation for administering floodplain management programs, enforcing building codes and mitigating flooding losses. Table 8-2 summarizes the number of acres of floodplain crossed by the Proposed Preliminary LEDPA in SFHAs. The SFHAs crossed by the Proposed Preliminary LEDPA include flood zones A, AE, AH, and AO, which are defined in Table 8-2.

Floodplains are generally crossed at-grade or by sections of elevated track. One exception is a trenched section of track near downtown Fresno that crosses an area of localized flooding that is not associated with a water body with concentrated flow.

Elevated portions of track would provide flood flow conveyance and stream connectivity. Flow patterns would be slightly redirected locally by support structures that would be placed in floodplains and by piers that would be placed in channels. Piers or support structures could be placed in FEMA- or Central Valley Flood Protection Board (CVFPB)-designated floodways. Piers would be designed to minimize the potential for erosion and scour in channels (see Section 3.8.6, Project Design Features, of the Revised DEIR/Supplemental DEIS for Project design features; Authority and FRA 2012d). Impacts on flood-control functions and flood fluctuations as a result of the elevated portions of the track would have negligible intensity, and the impacts would not be significant.

Table 8-2
Special Flood Hazard Areas Crossed by the Proposed Preliminary LEDPA

Segment	FEMA Flood Zone (acres)			
	A	AE	AH	AO
BNSF–Fresno, Monmouth	0	4	23	0
BNSF-Hanford East	100	20	0	0
Corcoran Bypass	73	5	0	0
BNSF–Pixley	16	0	42	0
Allensworth Bypass	37	0	0	85
BNSF-Through Wasco Shafter*	60	0	6	6
Proposed Preliminary LEDPA (to Seventh Standard Road south of Shafter)	286	29	71	91

Notes:

* = Includes only the portion of the BNSF-Through Wasco-Shafter to Seventh Standard Road

Definitions:

FEMA = Federal Emergency Management Agency

Zone A = Areas with a 1% annual chance of flooding. Because detailed analyses are not performed for such areas, no depths or base flood elevations are shown within these zones.

Zone AE = Areas with a 1% annual chance of flooding. FEMA flood maps provide base flood elevations.

Zone AH = Areas with a 1% annual chance of shallow flooding, usually in the form of a pond, with an average depth ranging from 1 to 3 feet. Base flood elevations derived from detailed analyses are shown at selected intervals within these zones.

Zone AO = River or stream flood hazard areas and areas with a 1%, or greater, chance of shallow flooding each year, usually in the form of sheet flow, with an average depth ranging from 1 to 3 feet. Average flood depths derived from detailed analyses are shown within these zones.

Impacts from at-grade sections of track, for the design flood event, would be largely avoided by maintaining existing hydraulic capacity at water crossings and connectivity across the floodplain via spaced culverts. Culverts would be adequately spaced in the floodplain to allow for flood flow conveyance. Stream crossings would require bridge abutments on banks and/or placement of piers in channels. Design of these crossings would include measures to address adverse effects of piers and abutments (see Section 3.8.6, Project Design Features, of the Revised DEIR/Supplemental DEIS for Project design features). In all cases, the design would maintain the crossing's existing flow conveyance capacity. Hydrologic modeling would be necessary to demonstrate that proposed Project design features, such as minor enlargement of the channel cross section, would maintain existing channel capacity within regulatory thresholds (zero rise within the FEMA floodway up to 1.0-foot rise within FEMA floodplains outside of floodways, and as required by agencies within CVFPB-designated floodways and USACE-regulated flood-control projects). With implementation of Project design features, permanent impacts on flood conveyance capacity and stream connectivity would have negligible intensity, and the impacts would not be significant.

Project facilities could redirect shallow flooding and result in some changes to existing drainage patterns or routes as well as increase runoff from the Project's impervious surfaces. With design features for stormwater management and flood protection (see Section 3.8.6, Project Design

Features, of the Revised DEIR/Supplemental DEIS; Authority and FRA 2012d and the Hydrology and Water Resources Technical Report; Authority and FRA 2012c), impacts on existing drainage patterns would have negligible intensity, and the impacts would not be significant.

8.1.5.3 Cumulative Impacts, Mitigation Measures, and Significance with Mitigation

The new urbanization that would accommodate the population increase forecast for 2035 would result in an estimated 173,000 acres of agricultural land conversion to accommodate development and land use changes for housing, commercial, office, transportation, park, and school uses (see Section 3.19, Cumulative Impacts, of the Revised DEIR/Supplemental DEIS; Authority and FRA 2012d). These changes would affect surface water hydrology. Reasonably foreseeable projects would result in impacts on flooding if the projects are within a SFHA near the proposed location of the Project. However, potential cumulative impacts would be reduced because all projects in SFHAs are subject to project-level environmental analysis, standards, and permits (prepared by project proponents). Project-level analyses would identify and analyze, and avoid, minimize, or mitigate potential impacts on floodplains, to the extent feasible. Although cumulative hydrology and water resources impacts would be negligible in most cases, the Proposed Preliminary LEDPA will implement the measures for hydrology and water resources provided in Section 3.8.6, Project Design Features, of the Revised DEIR/Supplemental DEIS, to minimize impacts. These measures would contribute to keeping cumulative floodplain impacts to negligible intensity, and the impacts would not be significant.

8.1.6 Hydrology, Hydromodification, and Erosion and Accretion Patterns (40 CFR Section 230.23[b])

8.1.6.1 Direct Impacts (Fill-Related Impacts), Mitigation Measures, and Significance with Mitigation

The hydrology of the Tulare Lake Basin has been modified by man-made impoundments, water diversions, levees, and channel realignments to regulate stream flows on the valley floor. Natural streams and creeks were modified to convey irrigation water, and flow pathways were often re-routed along property lines or road rights-of-way, or obliterated completely. Due to storage and upstream diversions, the downstream reaches of the major seasonal riverine waterways in the Tulare Lake Basin are often dry.

Hydromodification is a change in the rate, volume, and/or timing of stormwater runoff. This can be the result of activities that reduce stormwater infiltration rates, increase peak flows from runoff, or shorten the time for runoff to occur. These changes can increase channel erosion, affect downstream erosion and accretion patterns, and change stream morphology over many years. Design measures used to reduce hydromodification provide long-term protection of receiving waters, are effective during Project operations, and are generally not applicable to the construction time frame.

Project construction would require the use of heavy machinery to re-contour the landscape and place permanent fill materials in waters of the U.S. The potential for adverse impacts associated with erosion, as a result of Project construction, is addressed in the Water Quality subsection of Section 3.8.5.3, High-Speed Train Alternatives, of the Revised DEIR/Supplemental DEIS. The Proposed Preliminary LEDPA would cross eight major seasonal riverine features. This could result in hydrologic and hydraulic effects to these water bodies from channel disturbance and from changes in local drainage and stormwater runoff patterns. Construction activities, such as grading and establishing construction staging areas, could alter existing drainage patterns and redirect stormwater runoff. In addition, the amount of stormwater runoff would increase if construction resulted in the removal of natural vegetation or other barriers to runoff. Temporary diversion of stream flow may be necessary during the installation of support piers and bridge abutments in stream channels. This could temporarily reduce channel capacity and cause erosion or sedimentation and degrade water quality.

The Construction SWPPP would include the following measures to address erosion:

- Use of diversion ditches to intercept surface runoff.
- Where feasible, avoidance of areas that may have substantial erosion risk, including areas with erosive soils and steep slopes.
- Where feasible, limit construction to dry periods when flows in water bodies are low or absent.

With the implementation of the control measures designated in the SWPPP, effects from construction on hydrology, hydromodification, and erosion rates would have negligible intensity, and the impacts would not be significant.

8.1.6.2 Indirect Impacts, Mitigation Measures, and Significance with Mitigation

The potential for adverse impacts on streams from hydromodification to increase erosion rates and change stream erosion and accretion patterns as a result of post-development operation is addressed in Section 3.8.5.3, High-Speed Train Alternatives, of the Revised DEIR/Supplemental DEIS. The hydrology of vernal pools and other wetlands could result from indirect to indirect-bisected impacts.

Because of the sensitive nature of wetlands, but especially for vernal pools and swales, changes in the hydrology could result from the discharge in adjacent aquatic environments that would have a negative indirect impact on these features. These impacts could result in an increase or decrease in hydroperiod, and where excavation is necessary, could puncture a confining layer that would diminish or eliminate the ability of the feature to retain water and subsequently result in other adverse modifications. Thus, additional mitigation considerations were given to indirect-bisected vernal pools. Where an indirect-bisected impact occurs to a vernal pool and swales feature, mitigation is proposed for the entirety of that vernal pool feature (even portions that extend into and beyond the WSA). Mitigation is proposed out to 250 feet from direct permanent impacts for vernal swale features. Most of the vernal pools have small drainage basins, and therefore indirect impacts on these features are expected to be less than significant.

As stated above, the Proposed Preliminary LEDPA would cross eight major seasonal riverine features, each of which could require support structures or bridge abutments on banks, piers in the water channel, and/or box culverts at the crossing. Without implementation of appropriate design measures, bridge components could obstruct the ability of the water body to convey peak flows by reducing its channel capacity, increase stream bank and channel erosion, and affect downstream erosion and accretion patterns. CVFPB regulates specific river, creek, and slough crossings for flood protection in the study area. These crossings must meet the provisions of Title 23 of the CCR. Title 23 requires that new crossings maintain hydraulic capacity through such measures as in-line piers, adequate stream bank height (freeboard), and measures to protect against stream bank and channel erosion. Section 208.10 requires that crossings be constructed in a manner that does not reduce the channel’s capacity or functionality. Therefore, new bridges would be designed to maintain the existing conveyance capacity and hydraulic conditions of the water body being crossed. Final design would minimize the number of piers on banks and in channels, to the extent possible. Culverts would be designed, at a minimum, to maintain the hydraulic conveyance capacity of the existing canal, ditch, or adjacent culvert.

Hydromodification could increase peak flows from Project stormwater runoff. Features of the Project that could contribute to hydromodification include parking lots and facilities at the stations and HMF, roadway overpasses, new paved access or frontage roads and, to a lesser extent, the HST tracks. Stormwater from stations would be conveyed to the local stormwater drainage system in urban areas or to infiltration/detention basins via swales in rural areas. Runoff from station parking lots would be treated, where required, before being directed to infiltration basins or stormwater drainage systems. Stormwater runoff from road overpasses, road underpasses, paved access roads, and frontage roads would be conveyed to municipal drainage systems, detention basins, or in rural areas would run off into unlined roadside ditches and typically infiltrate. Stormwater from the track would be conveyed by swales or other stormwater conveyances, and in areas with infiltrative soils, runoff would likely infiltrate within the right-of-way.

The Project would seek to minimize increases in existing peak stormwater flows from the Project Footprint. This would be accomplished by emphasizing onsite retention of stormwater runoff using measures such as LID, flow dispersion, and infiltration, supplemented by detention where required. During the detailed design phase, each receiving stormwater system's capacity to accommodate Project runoff would be evaluated. As necessary, onsite stormwater management measures, such as detention or selected upgrades to the receiving system, would be designed to provide adequate capacity.

With the implementation of the Project design features discussed above, the Project would have operational impacts on hydrology, hydromodification, and erosion and accretion patterns of negligible intensity, and the impacts would not be significant.

8.1.6.3 Cumulative Impacts, Mitigation Measures, and Significance with Mitigation

The new urbanization that would accommodate the population increase forecast for 2035 would result in an estimated 173,000 acres of agricultural land conversion to accommodate additional development and land use changes for housing, commercial, office, transportation, park, and school uses (see Section 3.19, Cumulative Impacts, of the Revised DEIR/Supplemental DEIS). The reasonably foreseeable projects would result in changes to existing drainage patterns and could result in increased stormwater runoff from an increase in impervious surface area. However, new developments will comply with stormwater control ordinances, thus reducing the impact of the runoff.

On a much smaller scale, similar impacts would result from operation of the Proposed Preliminary LEDPA because of the increase in impervious surface area caused by structures and parking facilities at the Proposed Preliminary LEDPA stations. Guideway construction materials and soil compaction below the guideway would also redirect infiltration. The Proposed Preliminary LEDPA will implement the measures for hydrology and water resources provided in Section 3.8.6, Project Design Features, of the Revised DEIR/Supplemental DEIS to minimize impacts. The contribution from the Proposed Preliminary LEDPA would be minor; cumulative impacts on drainage patterns and hydrology, within the regional context, would have negligible intensity; and impacts would not be significant.

8.1.7 Assessment of Proposed Disposal Site

As discussed in Section 5.1.1, Physical Substrate Determinations, the Proposed Preliminary LEDPA would place fill materials in wetlands and other waters of the U.S. No dredging of aquatic resources or disposal of dredged material in waters of the U.S. would occur as a result of the Project. Consequently, an assessment of the proposed disposal site, and the associated aquatic mixing zone is not applicable to this Project.

8.2 Anticipated Changes Resulting from the Proposed Preliminary LEDPA to the Aquatic Ecosystem (40 CFR Section 230.11[e])

Aquatic ecosystems provide physical, chemical, and biological support for food web services, including nutrient cycling, and food production and availability for a variety of organisms. The discharge of dredged or fill material in aquatic ecosystems may damage, destroy, or adversely affect the biological productivity of aquatic ecosystems by altering the ground elevation, flow of water, or the period of water movement. Physical alteration of aquatic ecosystems may remove wetland vegetation and result in advancing succession to upland vegetation species or alteration of current water patterns and velocities. This alteration may degrade water quality by obstructing hydrological patterns that flush large expanses of wetland ecosystems, by interfering with the filtration function of wetlands, or by changing the aquifer recharge capability of a wetland. Due to their dependency on wetlands and limited distribution, the botanical and wildlife species that occur in wetlands are frequently listed as threatened or endangered species.

8.2.1 Special Aquatic Sites: Wetlands, Mudflats, Coral Reefs, Pool and Riffle Areas, Vegetated Shallows, Sanctuaries, and Refuges (40 CFR 230.40-45)

Special aquatic sites in the Proposed Preliminary LEDPA include vernal pools and vernal swales and other seasonal wetlands.

Mudflats, coral reefs, and vegetated shallows do not occur in the Proposed Preliminary LEDPA.

Sanctuaries and refuges consisting of areas designated under state and federal laws or local ordinances to be managed principally for the preservation and use of fish and wildlife resources do not occur within the Proposed Preliminary LEDPA.

8.2.1.1 Wetlands

Wetland features in the Proposed Preliminary LEDPA include vernal pools and vernal swales and other seasonal wetlands. These features are discussed in Section 2.2.1.

Direct and Indirect Impacts on Special Aquatic Sites: Wetlands

As discussed in Section 4.3.2, Aquatic Resources, the Proposed Preliminary LEDPA will directly impact vernal pools and vernal swales and other seasonal wetlands due to placement of fill material. Construction-related indirect and indirect-bisect impacts on vernal pools and other seasonal wetlands may include erosion, siltation, and runoff into natural and constructed watercourses; soil and water contamination from construction equipment leaks; and construction-related dust that reduces photosynthetic capability (especially during flowering periods).

The conservative assumption is that at-grade segments of all vernal pools and swales and other seasonal wetlands within the Project Footprint would experience direct permanent impacts. For elevated segments, direct permanent impacts are assumed to potentially occur on all vernal pools and swales and other seasonal wetlands within a drip line of the elevated structure (nominally 60 feet wide). This conservative assumption represents the area within which design refinement may result in location of features that would actually fill waters of the U.S. Direct temporary impacts would occur within the 20 feet to either side of the direct permanent impact area, except in areas of vernal pools and swales. Because of their sensitivity to disturbance, vernal pools and swales are difficult to restore to pre-project conditions after being affected by temporary impacts. Therefore, all impacts on these features are considered permanent.

Likewise, it is conservatively assumed that aquatic resources will be at risk of loss or degraded through indirect impacts. Vernal pools and swales may be lost or experience degradation associated with indirect-bisected impacts (e.g., those vernal pools and swales intersected by the Project Footprint). Indirect impacts will occur on all vernal pools and swales (located entirely outside of the Project Footprint, but within 250 feet) and other seasonal wetlands within 250 feet of the Project Footprint. Those aquatic resources will be at risk to experience some level of degradation, but are not expected to be lost.

Based on these conservative assumptions, construction of the Proposed Preliminary LEDPA would result in impacts on special aquatic sites. Table 8-3 illustrates the total impact on special aquatic sites in acreage by type.

Construction-related impacts on vernal pool and vernal swales and other seasonal wetland habitats would include erosion, siltation, and runoff into natural and constructed water courses and soil and water contamination from construction equipment leaks. The resource values that exist would be permanently removed from the area.

The implementation of the Proposed Preliminary LEDPA will have direct temporary impacts on seasonal wetlands as a result of fill activities (see Table 8-3).

Table 8-3
Impacts of the Proposed Preliminary LEDPA on Jurisdictional Waters (acres)

Jurisdictional Waters Type	Direct Impacts		Indirect Impacts[a]	
	Permanent	Temporary	—	Bisected[b]
Seasonal wetlands	2.85	0.58	20.82	—
Vernal pools and vernal swales	5.64	—	11.23	11.54
Wetlands subtotal [c]	8.39	0.58	32.05	11.54

Notes:

[a] Indirect impacts are calculated within 250-foot buffer of the Project Footprint (including areas of permanent and temporary impacts) and areas outside of vernal pools and swales intersected by the Project Footprint.
[b] The subcategory "Bisected" quantifies impacts on features that are bisected by the boundary of the Project Footprint (i.e., where a vernal pool or swale straddles the boundary of the Project Footprint). This category presents the acreage for the portion of these features that lies outside the Project Footprint but within the 250-foot buffer.

[c] Calculations are based on raw, unrounded Geographic Information System (GIS) source data. As a result, the subtotals and totals may not match the rounded feature values because of the number of aquatic features. These minor discrepancies may result in small differences in the presentation of the acreage.

— = No impact or not applicable

Mitigation Measures to Reduce Impacts on Special Aquatic Sites: Wetlands

The mitigation measures in this section identify avoidance, minimization, and compensation measures to minimize potential impacts and effects on biological resources and special aquatic sites. Many of these mitigation measures have multiple benefits that avoid, protect, or compensate for the impacts and effects on various biological resources.

The mitigation measures described in Section 3.4 of this report were designed to address these potential impacts. Furthermore, Project design features would be implemented to minimize impacts on water resources hydrology and reduce the potential for adverse impacts at seasonal riverine crossings (e.g., BMPs are identified in Section 3.8.6, Project Design Features, of the Revised DEIR/Supplemental DEIS).

Significance of Direct and Indirect Impacts on Special Aquatic Sites: Wetlands

The direct and indirect impacts of the Proposed Preliminary LEDPA on aquatic resources would be of substantial intensity. With implementation of mitigation measures that would monitor construction activities (reduce or avoid impacts), restore temporary impacts (rectify), and compensate for the unavoidable loss of aquatic resources in accordance with the USACE's no net loss of wetlands policy, the direct and indirect impacts of the Proposed Preliminary LEDPA on aquatic resources would not be significant.

Cumulative Impacts on Special Aquatic Sites: Wetlands

As discussed in Section 4.3.2, Aquatic Resources, the Proposed Preliminary LEDPA impacts on wetlands would be of substantial intensity and result from the near- and long-term operation of the HST alternatives and other past, present, and foreseeable projects. Potential impacts on aquatic resources include the permanent placement of fill or increased erosion, siltation, and runoff in jurisdictional waters and the degradation or conversion of aquatic resources. Because a large area would be permanently occupied by HST facilities, these impacts would have substantial intensity.

Mitigation Measures for Cumulative Impacts

Implementation of general Mitigation Measures BIO-MM#1 through BIO-MM#15 and aquatic resource specific mitigation measures would reduce cumulative impacts and effects on wetlands (also see Section 3.7.7 of the Revised DEIR/Supplemental DEIS for a complete description of the mitigation measures):

- BIO-MM#18. Conduct Preconstruction Sampling and Assessment for Vernal Pool Fauna
- BIO-MM#19. Seasonal Vernal Pool Work Restriction.
- BIO-MM#20. Implement and Monitor Vernal Pool Protection.
- BIO-MM#47. Restore Temporary Riparian Impacts.
- BIO-MM#48. Restore Temporary Impacts on Jurisdictional Waters.
- BIO-MM#49. Monitor Construction Activities within Jurisdictional Waters.
- BIO-MM#61. Compensate for Permanent Riparian Impacts.
- BIO-MM#62. Prepare and Implement a Habitat Mitigation and Monitoring Plan.
- BIO-MM#63. Compensate for Permanent and Temporary Impacts on Jurisdictional Waters.
- BIO-MM#65. Offsite Habitat Restoration, Enhancement and Preservation.

Significance of Cumulative Impacts

With implementation of mitigation measures, the cumulative construction and Project impacts of the Proposed Preliminary LEDPA on aquatic resources would not be significant.

8.2.1.2 Other Special Aquatic Sites Not Affected

No other special aquatic sites (e.g., mudflats, coral reefs, pool and riffle areas, vegetated shallows, sanctuaries and refuges) are present within the Proposed Preliminary LEDPA. As such no direct, indirect, or cumulative impacts would occur; therefore, mitigation measures are not required.

8.2.2 Habitat for Fish and Other Aquatic Wildlife and Organisms (40 CFR Sections 230.31, 230.75)

The Proposed Preliminary LEDPA has limited habitat to support finfish, crustaceans, mollusks, insects, annelids, and planktonic organisms, and the plants and animals on which they feed and depend upon for their needs. Due to land use patterns in the San Joaquin Valley that have converted natural riverine waterways into diversion canals for agricultural purposes, many of the riverine habitats do not exhibit natural flow regimes and may be dry throughout much of the year. The floodplains next to the rivers have also been extensively transformed and modified for agricultural use. The Kings River Complex (Cole Slough, Dutch John Slough, and Kings River), Deer Creek, Tule River, and Poso Creek are the riverine waters that are most likely to support habitat for fish and other aquatic wildlife.

Impacts on aquatic wildlife (vernal pool fairy shrimp and vernal tadpole fairy shrimp) whose habitat is terrestrial wetlands (vernal pools, seasonal wetlands) would have the same impacts as those discussed in Section 8.2.1 of this report. Federally managed fish species covered by the Magnuson-Stevens Fisheries Conservation and Management Act have the potential to occur in the footprint of the Proposed Preliminary LEDPA. The FRA and Authority have coordinated with the National Marine Fisheries Service and determined that the Project would not affect special-status fish species protected under Section 7 of the Endangered Species Act.

8.2.2.1 Fish, Crustaceans, Mollusks, and Other Aquatic Organisms in the Food Web

During the design-build phase, the Authority, in partnership with the Design-Build Team, will conduct a hydraulics/hydrology analysis with appropriate modeling tools and incorporate site-specific data, including the needed geotechnical investigations, to ensure that design, sizing, location, and construction techniques are compatible with the habitat conditions that support fish and aquatic organisms in the area affected by the proposed HST crossing.

8.2.2.2 Direct and Indirect Impacts on Fish, Crustaceans, Mollusks, and Other Aquatic Organisms in the Food Web

Direct and indirect impacts on habitat for fish and other aquatic wildlife could include the following:

- An effect on the populations of fish, crustaceans, mollusks, and other food web organisms through the release of contaminants that adversely affect adults, juveniles, larvae, or eggs, or result in the establishment or proliferation of an undesirable competitive species of plant or animal at the expense of the desired resident species.
- Suspended particulates settling on attached or buried eggs, resulting in smothering the eggs by limiting or sealing off their exposure to oxygenated water.
- The debilitation or death of sedentary organisms by smothering, exposure to chemical contaminants in dissolved or suspended form, exposure to high levels of suspended particulates, reduction in food supply, or alteration of the substrate upon which they are dependent.
- Modification (redirection, delay, or cessation) of the reproductive and feeding movements of some species of fish and crustacea, thus preventing their aggregation in accustomed places, such as spawning or nursery grounds, and potentially leading to reduced populations.
- Reduction of detrital feeding species or other representatives of lower trophic levels resulting in impairment of the flow of energy from primary consumers to higher trophic levels. This, in

turn, could lead to the reduction or potential elimination of food chain organism populations, decreasing the overall productivity and nutrient export capability of the ecosystem.

Avoidance, Minimization, and Mitigation Measures to Reduce Impacts on Fish, Crustaceans, Mollusks, and Other Aquatic Organisms in the Food Web

Mitigation measures and Project design features that address these potential impacts include the following (see also Section 3.7.7, Mitigation Measures, and Section 3.8.6, Project Design Features, of the Revised DEIR/Supplemental DEIS for a complete description of the mitigation measures):

- BIO-MM#3. Prepare and implement a worker environmental awareness program.
- BIO-MM#5. Prepare and implement a biological resources management plan.
- BIO-MM#7. Delineate environmentally sensitive areas and environmentally restricted areas (on plans and in the field).
- BIO-MM#9. Designate equipment staging areas.
- BIO-MM#11. Restrict vehicle traffic.
- BIO-MM#15. Prepare post-construction compliance reports.BIO-MM#61. Compensate for direct permanent riparian impacts.
- BIO-MM#62. Prepare and implement a Habitat Mitigation and Monitoring Plan.
- BIO-MM#63. Compensate for direct permanent impacts on jurisdictional waters. Prepare and implement a Construction SWPPP.
- Implement CVRWQCB, Order No. 5-00-175, Waste Discharge Requirements General Order for Dewatering and Other Low Threat Discharges to Surface Waters.

Significance of Direct and Indirect Impacts on Fish, Crustaceans, Mollusks, and Other Aquatic Organisms in the Food Web

With the mitigation measures described above, this impact would be of moderate intensity. In the context of the resource, the impacts would not be significant.

8.2.2.3 Cumulative Impacts on Fish, Crustaceans, Mollusks, and Other Aquatic Organisms in the Food Web

Fish, crustaceans, mollusks, and other food web organisms would be subject to impacts of substantial intensity from the near- and long-term operation of the HST alternatives and other past, present, and foreseeable projects. Potential impacts on species include permanent habitat loss, habitat fragmentation, introduction of invasive species, and harassment due to increased noise and human disturbance. Because of the large area that would be permanently occupied by HST facilities, this impact would have substantial intensity. In the context of the loss of fish, crustaceans, mollusks, and other food web organisms from past, present, and reasonably foreseeable agricultural and urban development in the Tulare Basin, the Project impact would be significant.

Mitigation Measures to Reduce Cumulative Impacts on Fish, Crustaceans, Mollusks, and Other Aquatic Organisms in the Food Web

Implementation of Mitigation Measures BIO-MM#1 through BIO-MM#46 and BIO-MM#54 through BIO-MM#60 would reduce cumulative impacts and effects on fish, crustaceans, mollusks and other food web organisms. (See Section 3.7.7 of the Revised DEIR/Supplemental DEIS for a complete description of the mitigation measures; Authority and FRA 2012d.)

Significance of Cumulative Impacts on Fish, Crustaceans, Mollusks, and Other Aquatic Organisms in the Food Web

The effect of the Proposed Preliminary LEDPA on fish, crustaceans, mollusks, and other food web organisms would not be significant because potential Project impacts would be mitigated.

8.2.3 Other Wildlife Associated with Aquatic Ecosystems, Including Resident and Transient Mammals, Birds, Reptiles, and Amphibians

8.2.3.1 Direct and Indirect Impacts on Other Wildlife Associated with Aquatic Ecosystems, Including Resident and Transient Mammals, Birds, Reptiles, and Amphibians

Mammals, birds, reptiles, and amphibians present within the footprint of the Proposed Preliminary LEDPA would be permanently removed and directly affected by implementation of the Project. However, adjacent vegetation requiring removal to accommodate construction operations (i.e., access and laydown areas) would be restored after construction activities are completed. Potential direct and indirect impacts include the following:

- The loss or change of breeding and nesting areas, escape cover, travel corridors, and preferred food sources for resident and transient wildlife species associated with the aquatic ecosystem resulting from changes in water levels, water flow and circulation, salinity, chemical content, and substrate characteristics and elevation.
- Increased water turbidity, which can adversely affect wildlife species that rely upon sight to feed and which can disrupt the respiration and feeding of certain aquatic wildlife and food chain organisms.
- The availability of contaminants from the discharge of dredged or fill material, which may lead to the bioaccumulation of such contaminants in wildlife.
- Changes in physical and chemical factors in the environment that may favor the introduction of undesirable plant and animal species at the expense of resident species and communities.
- The lowering of plant and animal species diversity, which may disrupt the normal functions of the ecosystem and lead to reductions in overall biological productivity.

Avoidance, Minimization, and Mitigation Measures to Reduce Impacts on Other Wildlife Associated with Aquatic Ecosystems, Including Resident and Transient Mammals, Birds, Reptiles, and Amphibians

- Mitigation measures and Project design features that address these potential impacts include the following (see also Section 3.7.7, Mitigation Measures, and Section 3.3.8 of the Revised DEIR/Supplemental DEIS for a complete description of the mitigation measures):BIO-MM#3. Prepare and implement a worker environmental awareness program.
- BIO-MM#5. Prepare and implement a biological resources management plan.
- BIO-MM#7. Delineate environmentally sensitive areas and environmentally restricted areas (on plans and in the field).
- BIO-MM#9. Designate equipment staging areas.
- BIO-MM#11. Control vehicle traffic.
- BIO-MM#13. Implement work stoppage.
- BIO-MM#14. Conduct “take” notification and reporting.
- BIO-MM#15. Prepare post-construction compliance reports.

- BIO-MM#29. Conduct pre-construction surveys and delineate active nest exclusion areas for other breeding birds.
- BIO-MM#30 Conduct pre-construction surveys and monitoring for raptors.
- BIO-MM#31. Provide for bird and raptor protection on power lines.
- Implement SJVAPCD 8011: General Requirements - Fugitive Dust Control Measures

Significance of Direct and Indirect Impacts on Other Wildlife Associated with Aquatic Ecosystems, Including Resident and Transient Mammals, Birds, Reptiles, and Amphibians

With implementation of the mitigation measures described above, this impact would be of moderate intensity. In the context of the resource, the impacts would not be significant.

8.2.3.2 Cumulative Impacts on Other Wildlife Associated with Aquatic Ecosystems, Including Resident and Transient Mammals, Birds, Reptiles, and Amphibians

Resident and transient mammals, birds, reptiles, and amphibians would be subject to impacts of substantial intensity from the near- and long-term operation of the HST alternatives and other past, present, and foreseeable projects. Potential impacts on species include permanent habitat loss, habitat fragmentation, introduction of invasive species, and harassment from increased noise and human disturbance. Because of the large area that would be permanently occupied by HST facilities, this impact would have substantial intensity. In the context of the loss of resident and transient mammals, birds, reptiles, and amphibians from past, present, and reasonably foreseeable agricultural and urban development in the Tulare Basin, the impact of the Project would be significant.

Mitigation Measures to Reduce Cumulative Impacts on Other Wildlife Associated with Aquatic Ecosystems, Including Resident and Transient Mammals, Birds, Reptiles, and Amphibians

Implementation of Mitigation Measures BIO-MM#1 through BIO-MM#46 and BIO-MM#54 through BIO-MM#60 will reduce cumulative impacts and effects on resident and transient mammals, birds, reptiles, and amphibians. (See Section 3.7.7 of the Revised DEIR/Supplemental DEIS for a complete description of the mitigation measures; Authority and FRA 2012d.)

Significance of Cumulative Impacts on Other Wildlife Associated with Aquatic Ecosystems, Including Resident and Transient Mammals, Birds, Reptiles, and Amphibians

The effect of the Proposed Preliminary LEDPA on resident and transient mammals, birds, reptiles, and amphibians would not be significant because potential Project impacts would be mitigated.

8.2.4 Endangered or Threatened Species

All impacts on endangered or threatened plant and wildlife species were determined using a habitat-focused approach where the presence of a species is inferred in areas that contain suitable habitat within the range of the species in question. Impact calculations for federally and state-listed plant and wildlife species are based on the acreage of suitable habitats found within the Project Footprint and in the surrounding study area buffers that are located in the range of the species as defined in Section 3.7.3, Methods for Evaluating Impacts, of the Revised DEIR/Supplemental DEIS (Authority and FRA 2012d).

8.2.4.1 Endangered or Threatened Plant Species

Special-status plant species that are considered potentially affected by the Proposed Preliminary LEDPA include the California jewel-flower, Hoover's spurge, Kern mallow, and San Joaquin woolly-threads.

Direct and Indirect Impacts on Endangered or Threatened Plant Species

Any endangered or threatened plant species present within the footprint of the Proposed Preliminary LEDPA would be permanently removed and directly affected by implementation of the Project. However, adjacent vegetation requiring removal to accommodate construction operations (i.e., access and laydown areas) will be restored after construction activities are completed. Potential indirect impacts on endangered or threatened plant species include erosion, siltation, and runoff into natural and constructed watercourses; soil and water contamination from construction equipment leaks; construction-related dust affecting plants by reducing their photosynthetic capability; and an increased risk of fire (e.g., construction equipment use and smoking by construction workers) in adjacent open spaces.

In areas where protocol-level plant surveys were not conducted, it is inferred that endangered or threatened plant species may occur in suitable habitats within the Plant Study Area (PSA) which includes the Project Footprint and a 100-foot buffer.

Eleven federally listed plant species were evaluated as having potential to occur within the Project Footprint. Seven species were ruled out because of the lack of suitable habitat, extensive areas converted by human development, extensive water diversions, local or regional extirpations, and/or because the Proposed Preliminary LEDPA lies outside of the known and extant geographic or elevation range of these species. None of the federally designated critical habitat units for plant species occurs within the Project Footprint.

Ten state-listed plant species were initially evaluated as having potential to occur within the Proposed Preliminary LEDPA. However, the presence of all the state plant species was ruled out in the Project Footprint because of the lack of suitable habitat, extensive areas converted by human development, extensive water diversions, local or regional extirpations, and/or because the Proposed Preliminary LEDPA lies outside of the known and extant geographic or elevation range of these species.

Unsurveyed area that is potential habitat for special-status plant species is located within the Proposed Preliminary LEDPA. Implementation of the Proposed Preliminary LEDPA would permanently impact and temporarily impact unsurveyed areas that are potential habitat for special-status plant species. No endangered or threatened plant species have been detected in protocol-level surveys in the Project Footprint.

Avoidance, Minimization, and Mitigation Measures to Reduce Impacts on Endangered and Threatened Plant Species

The mitigation measures discussed in Section 5.3 of this report for special-status plant species include weed-control measures, avoidance of adjacent habitat that could potentially support special-status plant species, and compensatory mitigation for the loss of special-status plant species. A detailed description of mitigation measures for potential Project-related impacts on special-status plants is provided in Section 3.7.7 of the Revised DEIR/Supplemental DEIS.

Significance of Indirect and Direct Impacts on Endangered and Threatened Plant Species

Special-status plant species and potentially suitable habitats occur within the Project Footprint, and would be affected by construction activities associated with the Project. However, through the implementation of the mitigation measures described above, effects on special-status plant species would be avoided, where possible, or would be reduced and result in minimal regional effects. Therefore, the effects of the Project on special-status plant species would not be significant.

Cumulative Impacts on Endangered or Threatened Plant Species

Special-status plant species would be subject to impacts of substantial intensity resulting from the near- and long-term operation of the HST alternatives and other past, present, and foreseeable projects. Potential impacts on species include permanent habitat loss, habitat fragmentation, introduction of invasive species, and harassment from increased human disturbance. Because a large area would be permanently occupied by HST facilities, these impacts would have substantial intensity. In the context of the loss of special-status plant species from past, present, and reasonably foreseeable agricultural and urban development in the Tulare Basin, the impact of the Project would be significant.

Mitigation Measures to Reduce Cumulative Impacts on Endangered and Threatened Plant Species

Implementation of Mitigation Measures BIO-MM#1 though BIO-MM#15 (discussed in Section 5.3 of this report), BIO-MM#16, BIO-MM#17, and BIO-MM#53 would reduce cumulative impacts and effects on special-status plant species. (See Section 3.7.7 of the Revised DEIR/Supplemental DEIS (Authority and FRA 2012d) for a complete description of the mitigation measures.)

Significance of Cumulative Impacts on Endangered and Threatened Plant Species

The effect of the Proposed Preliminary LEDPA on special-status plant species would not be significant because potential Project impacts would be mitigated.

8.2.4.2 Endangered and Threatened Wildlife Species

Special-status wildlife species that are considered likely to be adversely affected by the Proposed Preliminary LEDPA include the vernal pool fairy shrimp, vernal pool tadpole shrimp, valley elderberry longhorn beetle, California tiger salamander, blunt-nose leopard lizard, Swainson's hawk, Nelson's (San Joaquin) antelope squirrel, Tipton kangaroo rat, and the San Joaquin kit fox.

Direct and Indirect Impacts on Endangered and Threatened Wildlife Species

Endangered or threatened wildlife species and their habitats that are present within the Project Footprint of the Proposed Preliminary LEDPA may be directly affected by implementation of the Project. Potential indirect effects on endangered or threatened wildlife species are similar to those described for plant species. Outside of the Project Footprint, wildlife species may be considered to be indirectly affected.

Any aquatic feature that provides suitable aquatic habitat for species typically associated with vernal pools, such as the vernal pool fairy shrimp and California tiger salamander, is considered directly affected if any portion of the wetland feature lies within the Project Footprint. Suitable upland habitat for species typically associated with vernal pools within 250 feet of the Project Footprint would be considered indirectly affected by implementation of the Project. Therefore, the direct habitat impact acreage for species associated with vernal pools, shown in Table 8-3, may be greater than the vernal pool impact acreage discussed previously under impacts on wetlands and other waters of the U.S (in Chapter 4 of this report). Indirect impacts on the San Joaquin kit fox may occur where suitable habitat is present within 1,000 feet of the footprint of the Proposed Preliminary LEDPA.

Avoidance, Minimization, and Mitigation Measures to Reduce Impacts on Endangered and Threatened Wildlife Species

Mitigation Measures BIO-MM#18 through BIO-MM#46; BIO-MM#54 through BIO-MM#60 for special-status wildlife species; and BIO-MM#51, BIO-MM#52, and BIO-MM#65 for wildlife corridors (discussed in Section 5.3 of this report) combined with the Project design features for special-status wildlife species and their associated wildlife corridors would avoid, minimize (reduce), and compensate for potential direct, and indirect impacts on special-status wildlife species. For a detailed description of mitigation measures for potential Project-related impacts on special-status wildlife, see Section 3.7.7 of the Revised DEIR/Supplemental DEIS.

Significance of Indirect and Direct Impacts on Endangered and Threatened Wildlife Species

Special-status wildlife species and potentially suitable habitats occur within the Project Footprint, and would be affected by construction activities associated with the Project. However, through implementation of the mitigation measures described above, effects on special-status wildlife species would be avoided where possible or would be reduced, and would result in minimal regional effects. Therefore, the effects of the Project on special-status wildlife species would not be significant.

Cumulative Impacts on Endangered or Threatened Wildlife Species

Special-status wildlife species would be subject to impacts of substantial intensity from the near- and long-term operation of the HST alternatives and other past, present, and foreseeable projects. Potential impacts on species include permanent habitat loss, habitat fragmentation, introduction of invasive species, and harassment from increased noise and human disturbance. Because of the large area that would be permanently occupied by HST facilities, this impact would have substantial intensity. In the context of the loss of special-status wildlife species from past, present, and reasonably foreseeable agricultural and urban development in the Tulare Basin, the cumulative impact of the Project on special-status wildlife species would be significant.

Mitigation Measures to Reduce Cumulative Impacts on Endangered and Threatened Wildlife Species

Implementation of Mitigation Measures BIO-MM#1 through BIO-MM#46 and BIO-MM#54 through BIO-MM#60 of the Revised DEIR/Supplemental DEIS will reduce cumulative impacts and effects on special-status wildlife species. Chapter 3.7.7 of the Revised DEIR/Supplemental DEIS provides a complete description of the mitigation measures.

Significance of Cumulative Impacts on Endangered and Threatened Wildlife Species

The effect of the Proposed Preliminary LEDPA on special-status wildlife species would not be significant because potential impacts would be mitigated to less-than-significant levels for these resources.

8.2.5 Municipal and Private Water Supplies, Including Aquifer Recharge (40 CFR Sections 230.50, 230.76)

8.2.5.1 Direct and Indirect Impacts on Municipal and Private Water Supplies, Including Aquifer Discharge

Construction activities would use water to prepare concrete, to increase the water content of soil for optimizing soil compaction, to control dust, and to re-seed disturbed areas, as described in Chapter 2, Alternatives, of the Revised DEIR/Supplemental DEIS. The average annual water use over the construction period would be less than existing demand and could be supplied from existing sources (Table 8-4). For this reason, HST construction would require neither construction nor expansion of a water treatment facility and would also not require new or expanded entitlements. Impacts resulting from water demand would be negligible.

The HST alternatives would not use substantial quantities of water in their operations. As described in Section 3.6, Public Utilities and Energy, in the Revised DEIR/Supplemental DEIS, current water use on the Project Footprint for the Proposed Preliminary LEDPA is 11,188 acre-feet per year. Water use would decline to zero along the Project Footprint, and therefore all HST alternatives would have a beneficial impact on groundwater quality.

Operational water supply at HST stations would be required for a variety of uses, including drinking fountains and restrooms in HST stations, irrigation for landscaping, and wash water for HSTs and facility maintenance. HST station water use estimates are based on a daily consumption factor of 5 gallons per passenger and 30 gallons per employee. Landscaping developed in conjunction with local communities would use native and drought-tolerant plants (Table 8-4).

Table 8-4
Water Use Summary

Combined Water Use for Track Alignment, HMF, and Stations	Annual Water Use (acre-feet)
Existing Water Use	12,048
Construction Water Use	788
Estimated Water Use–2035 at 100% Build-Out	204

Note:
Construction water is annualized for a 5-year construction period.
HMF = heavy maintenance facility

Mitigation Measures to Reduce Impacts on Municipal and Private Water Supplies, Including Aquifer Discharge

Overall annual operational water requirements are anticipated to be approximately 2% of the existing water usage in the entire study area that would be replaced by HST facilities. The Project is not expected to require or result in the construction of new water treatment facilities or in the expansion of existing facilities, nor to require new or expanded entitlements to supply water to the Project. Therefore, the impact of the Project on water supplies would be negligible.

Significance of Direct and Indirect Impacts on Municipal and Private Water Supplies, Including Aquifer Discharge

Operation of the HST System would result in an annual water requirement of approximately 2% of existing water usage in the Project Footprint, and demand for the station alternatives would be less than 0.01% of the total projected water demands of the municipalities that would serve the sites. There would be insignificant increases in the use of potable and non-potable water from the proposed HST stations and HMF. For the HST System as a whole, the effects of the extension of infrastructure and provision of water and wastewater services would have negligible intensity, and the impacts would not be significant.

8.2.5.2 Cumulative Impacts on Municipal and Private Water Supplies, Including Aquifer Discharge

Mitigation Measures to Reduce Cumulative Impacts on Municipal and Private Water Supplies, Including Aquifer Discharge

As noted in Section 3.19, Cumulative Impacts, of the Revised DEIR/Supplemental DEIS (Authority and FRA 2012d), the addition of 578,000 households under the cumulative condition of the No Project Alternative would require 7.3 billion gallons of potable water per year, assuming 127,400 gallons per household annually (American Water Works Association 2010). Commercial and industrial development would also generate increased water demand, which would be projected by water providers and approved through a permitting process. As with many communities throughout California, more conservation measures would be required to reduce water demand during multiple years of drought. Construction and operation of the HST System and other reasonably foreseeable projects near the Proposed Preliminary LEDPA are not expected to contribute to substantial or cumulatively considerable water resource impacts.

Significance of Cumulative Impacts on Municipal and Private Water Supplies, Including Aquifer Discharge

As described in the 2005 Statewide Program EIR/EIS and the 2008 Bay Area to Central Valley Program EIR/EIS, the extension of facilities and provision of water services for the entire HST System would not result in significant impacts and would not contribute to a significant impact on water demand or to a significant impact related to provision of water infrastructure (Authority 2010; Authority and FRA 2005, 2008).

8.2.6 Recreational or Commercial Fisheries (40 CFR Section 230.51)

8.2.6.1 Direct and Indirect Impacts on Recreational or Commercial Fisheries

No commercial fisheries exist within or near areas where the Proposed Preliminary LEDPA would cross the waters identified in Table 8-5. While there may be some informal recreational fishing that takes place within these waters, no formalized recreational fishing facilities exist within the potential proposed Project area. The nearest formal fishing facility to the Proposed Preliminary LEDPA is at Roeding Park (located upstream and outside the Project limits at the intersection of SR 180 and SR 99, west of Fresno; see Figure 8-1).

Source: www.takemefishing.org, accessed August 2, 2012.

Figure 8-1
Commercial fishing area in the vicinity of the Proposed Preliminary LEDPA

Table 8-5
Major Water Body Crossings

Water Body	Alternative	Type
Kings River Complex	BNSF-Hanford East	Intermittent
Cross Creek	BNSF-Hanford East	Intermittent
Tule River	Corcoran Bypass	Intermittent
Deer Creek	Allensworth Bypass	Intermittent
Poso Creek	Allensworth Bypass	Intermittent

The closest CDFW fish hatcheries are located well outside and upstream of the Proposed Preliminary LEDPA. Therefore, the Proposed Preliminary LEDPA would not cause any direct impacts on recreational or commercial fisheries. In addition, because the proposed Project is located substantially downstream from the hatcheries and location of fish planting, the proposed Project also would not have any indirect effects on recreational or commercial fisheries and would not contribute to any cumulative impacts related to fisheries. No federally managed fish species covered by the Magnuson-Stevens Fisheries Conservation and Management Act have the potential to occur in the Habitat Study Area.

Mitigation Measures to Reduce Impacts on Recreational or Commercial Fisheries

The Proposed Preliminary LEDPA would not directly or indirectly impact recreational or commercial fisheries. Therefore, mitigation measures are not required.

Significance of Direct and Indirect Impacts on Recreational or Commercial Fisheries

The Proposed Preliminary LEDPA would have no effect on recreational or commercial fisheries.

8.2.6.2 Cumulative Impacts on Recreational or Commercial Fisheries

Implementation of the Proposed Preliminary LEDPA would not impact recreational or commercial fisheries. Therefore, there would be no cumulative impacts on recreational or commercial fisheries.

Mitigation Measures to Reduce Cumulative Impacts on Recreational or Commercial Fisheries

The Proposed Preliminary LEDPA would not directly or indirectly impact recreational or commercial fisheries. Therefore, mitigation measures are not required.

Significance of Cumulative Impacts on Recreational or Commercial Fisheries

The Proposed Preliminary LEDPA would not result in cumulative impacts on recreational or commercial fisheries.

8.2.7 Other Water-Related Recreation (40 CFR Section 230.52)

8.2.7.1 Direct, Indirect, and Cumulative Impacts on Other Water-Related Recreation

As discussed in Section 3.8.2, Laws, Regulations, and Orders, of the Revised DEIR/Supplemental DEIS, the CVRWQCB Basin Plan identified water contact recreation and non-contact water recreation as two of the beneficial uses for natural surface waters in the Tulare Lake Basin. Other beneficial uses identified in the Tulare Lake Basin that may be connected to water-related recreation are warm freshwater habitat, cold freshwater habitat, and wildlife habitat (CVRWQCB 2004). The CVRWQCB has not identified beneficial uses for the canals in the area; however, canals that are connected to natural surface waters generally have the same designations as the natural feature. Although none of the natural streams in Tulare Lake Basin are designated for navigational use by the CVRWQCB, Kern River is listed as a "navigable-in-fact" by the USACE.

The Proposed Preliminary LEDPA is consistent with the CVRWQCB Basin Plan if control measures are in compliance with permitting requirements and properly implemented. There are no boating or waterway facilities recognized by the California Department of Boating and Waterways in the Proposed Preliminary LEDPA (Figure 8-2). Therefore, the Proposed Preliminary LEDPA would not cause any direct or indirect impacts on other water-related recreation.

Source: www.takemefishing.org, accessed August 2, 2012.

Figure 8-2
Boating and waterways in the vicinity of the Proposed Preliminary LEDPA

Mitigation Measures to Reduce Impacts on Other Water-Related Recreation

The Proposed Preliminary LEDPA would not directly or indirectly impact other water-related recreation. Therefore, mitigation measures are not required.

Significance of Direct and Indirect Impacts on Other Water-Related Recreation

The Proposed Preliminary LEDPA would result in no impact on other water-related recreation.

8.2.7.2 Cumulative Impacts on Recreational or Commercial Fisheries

As discussed above, the Project is consistent with the CVRWQCB Basin Plan if control measures are in compliance with permitting requirements and properly implemented. There are no boating or waterway facilities recognized by the California Department of Boating and Waterways in the Proposed Preliminary LEDPA (Figure 8-2). Therefore, the Proposed Preliminary LEDPA would not cause any cumulative impacts on other water-related recreation.

Mitigation Measures to Reduce Cumulative Impacts on Other Water-Related Recreation

The Proposed Preliminary LEDPA would not directly or indirectly impact other water-related recreation. Therefore, mitigation measures are not required.

Significance of Cumulative Impacts on Other Water-Related Recreation

The Proposed Preliminary LEDPA would result in no cumulative impact on other water-related recreation.

8.2.8 Aesthetics of the Aquatic Ecosystem (40 CFR Section 230.53)

Aesthetics of the aquatic ecosystem relates to the perception of the beauty of the ecosystem and to the quality of life enjoyed by the general public and property owners. As discussed in Section 3.16, Aesthetics and Visual Resources, of the Revised DEIR/Supplemental DEIS, the Proposed Preliminary LEDPA would require the crossing of several streams and aquatic ecosystems, which generally have a high aesthetic value. The narrow bands of riparian tree canopy associated with the Kings River Complex, Tule River, Cross Creek, and Poso Creek crossings are distinct habitats in the San Joaquin Valley landscape. They are among the few natural features providing vertical form within the level valley terrain and given their moderately high vividness, intactness, and unity, they typically have moderately high visual quality where they are visible to the public.

There are no formally designated scenic vistas or vista points identified in the WSA.

8.2.8.1 Direct, Indirect, and Cumulative Impacts on the Aesthetics of the Aquatic Ecosystem

As described in the 2005 Statewide Program EIR/EIS (Authority and FRA 2005) and Section 3.16, Aesthetics and Visual Resources, of the Revised DEIR/Supplemental DEIS, the HST System would create construction-related, short-term aesthetic impacts. Although the Proposed Preliminary LEDPA would result in long-term aesthetic impacts from the introduction of a new transportation system, the aesthetic impacts on the Kings River Complex, Tule River, Cross Creek, and Poso Creek crossings are expected to be limited because the construction features would not permanently change the character of the landscape or lower the existing visual quality.

The Kings River is the most prominent river crossing the rural valley in the Fresno to Bakersfield Section, and is identified as an important regional scenic resource in the Kings County General Plan (Kings County Planning Department 2010). However, the Kings River crossing would be in a setting dominated by fruit tree orchards, which would screen visibility of the HST from all nearby public viewpoints. Consequently, no simulated view of the Project is depicted. Effects of the river crossing on viewers on the nearest major roadway, SR 43, would be minor and limited to a momentary elevated view from a short overcrossing of SR 43 above the HST right-of-way.

The HST would thus slightly reduce the overall visual quality of views from SR 43.

Avoidance, Minimization, and Mitigation Measures to Reduce Impacts on Aesthetics of the Aquatic Ecosystem

Mitigation measures to minimize impacts on the vista of the Kings River, Tule River, Cross Creek, and Poso Creek crossings include limiting pre-construction clearing and night-time work (Mitigation Measures AVR-MM#1a and b, and AVR-MM#2 a, b, d, e, and f). A detailed description of mitigation measures for potential Project-related impacts on aesthetics and visual resources is provided in Section 3.16, Aesthetics and Visual Resources, of the Revised DEIR/Supplemental DEIS for the Fresno to Bakersfield Section.

Significance of Direct and Indirect Impact on Aesthetics of the Aquatic Ecosystem

The proposed Project could require bridge piles or other structures for crossing creeks, rivers, and waterways. To minimize dredge and fill activities, bridge structures will be located as far away from the stream bank as feasible. Therefore, aesthetic impacts from construction activities for the proposed Project are considered temporary, and impacts would be of negligible intensity. In the context of the resource, impacts would not be significant.

Effects of the river crossings and on viewers on the nearest major roadway, SR 43, would be minor and limited to a momentary elevated view from a short overcrossing of SR 43 above the HST right-of-way. Because this effect would be of limited severity and momentary in character, the resulting change in visual quality of the setting would be negligible. This impact would be of negligible intensity and would not be significant.

8.2.8.2 Cumulative Impacts on Aesthetics of the Aquatic Ecosystem

Development of cumulative projects in the vicinity of the Proposed Preliminary LEDPA would result in construction activities that would create temporary visual changes from demolition, vegetation removal, construction staging areas, construction lighting, and general construction activities.

Significance of Cumulative Impacts on Aesthetics of the Aquatic Ecosystem

Although construction of the Proposed Preliminary LEDPA in conjunction with construction activities associated with other past, present, and reasonably foreseeable projects could impact the aesthetics of the aquatic ecosystem, these impacts would result in temporary visual changes from demolition, vegetation removal, construction staging areas, construction lighting, and general construction activities. The cumulative impact on the aesthetics of the aquatic ecosystem would not be significant.

8.3 Anticipated Changes Resulting from the Proposed Preliminary LEDPA to Other Resources (40 CFR Section 230.54)

8.3.1 Parks, National and Historic Monuments, National Seashores, Wild and Scenic Rivers, Wilderness Areas, Research Sites (40 CFR 230.54)

Section 3.15, Parks, Recreation, and Open Space, of the Revised DEIR/Supplemental DEIS for the Fresno to Bakersfield Section and Section 4.3.5.5 of this report provide more information on the affected environment and the size of the study area.

Construction Period Impacts

In downtown Fresno, construction of the Proposed Preliminary LEDPA would not require temporary use of Chukchansi Park property and would not create any direct impacts. Chukchansi Park is approximately 800 feet from the centerline of the BNSF right-of-way and 70 feet from the footprint of a roadway grade separation required for the Proposed Preliminary LEDPA. Indirect impacts would include noise, dust, and visual change, which could affect the stadium and users.

The Proposed Preliminary LEDPA would be to the west of Colonel Allensworth State Historic Park; only a portion of the area in the southwestern part of the park would be within the study area. This area of the park is former farmland and does not contain any visitor resources. The Project Footprint of the Proposed Preliminary LEDPA would have no impacts on park resources in the Hanford, Corcoran, or Allensworth areas (parks are more than 300 feet from the Proposed Preliminary LEDPA).

Construction Period Mitigation Measures

Since publication of the Statewide Program EIR/EIS (Authority and FRA 2005) and the Bay Area to Central Valley Program EIR/EIS (Authority 2010; Authority and FRA 2008), planning refinements have minimized potential impacts on park and recreational resources. Many related impacts in other resource areas have mitigation measures that work to further reduce the likelihood for impacts on parks, national and historic monuments, national seashores, wild and scenic rivers, wilderness areas, and research sites. Mitigation measures also include those outlined Section 3.4, Noise and Vibration: N&V-MM#1 and N&V-MM#2 and in Section 3.16, Aesthetics and Visual Resources: AVR-MM#1a and AVR-MM#1b of the Revised DEIR/Supplemental DEIS (Authority and FRA 2012d).

Mitigation Measure PC-MM#1, described in Section 5.4.5 of this report, will be implemented during the construction phase to address impacts on parks, national and historic monuments, national seashores, wild and scenic rivers, wilderness areas, and research sites.

Significance of Construction Period Impacts

Incorporation of the mitigation measures listed above would reduce construction impacts to moderate and negligible intensities (see Section 3.15.5 of the Revised DEIR/Supplemental DEIS for additional information regarding impacts on parks, national and historic monuments, national seashores, wild and scenic rivers, wilderness areas, and research sites during construction). Because impacts would be temporary, and in the context of the park, resources would remain available for use during the temporary park closures, the overall impact would not be significant.

Project Period Impacts

Project impacts, such as noise, degradation of existing facilities, and visual degradation, are anticipated for the Proposed Preliminary LEDPA and detailed in Section 4.3.5.5 of this report.

The Proposed Preliminary LEDPA would have no Project period impacts on park resources in the Hanford, Corcoran, Allensworth, or Wasco-Shafter areas. Although three parks are within the Proposed Preliminary LEDPA study area for Wasco-Shafter, these parks would not be impacted.

Project Period Mitigation Measures

Since publication of the Statewide Program EIR/EIS (Authority and FRA 2005) and the Bay Area to Central Valley Program EIR/EIS (Authority 2010; Authority and FRA 2008), planning refinements have minimized potential impacts on park and recreational resources. Many related impacts in other resource areas have mitigation measures that work to further reduce the likelihood for impacts on parks, national and historic monuments, national seashores, wild and scenic rivers, wilderness areas, and research sites.

Mitigation measures include those outlined in Section 3.4, Noise and Vibration: N&V-MM#3, and in Section 3.16, Aesthetics and Visual Resources: AVR-MM#2a-#2f of the Revised DEIR/Supplemental DEIS.

Significance of Project Period Impacts

With the implementation of the mitigation measures listed above, the Project period impacts would be reduced to negligible intensity (see Section 3.15.5 of the Revised DEIR/Supplemental DEIS for additional information regarding impacts on parks, national and historic monuments, national seashores, wild and scenic rivers, wilderness areas, and research sites during construction). In the context of the park resources, the overall impact would not be significant.

Cumulative Construction Period Impacts

Construction of the HST alternatives and other past, present, and reasonably foreseeable future projects in the study area could result in cumulative impacts on parks and recreation areas. Cumulatively, Project construction near parks could generate noise, changes to visual character, and temporary park closures.

Cumulative Construction Period Mitigation Measures

No cumulative mitigation measures are necessary for construction of the Fresno to Bakersfield Section.

Significance of Cumulative Construction Period Impacts

Because construction noise and visual effects would be temporary and intermittent, these effects would not be significant.

Cumulative Project Period Impacts

Under the cumulative condition, demand for and use of parks and recreation facilities are projected to continue to increase in proportion to the population growth in the study area.

Cumulative Project Period Mitigation Measures

No cumulative mitigation measures are necessary for the Project period of the Fresno to Bakersfield Section.

Significance of Cumulative Project Period Impacts

The Project is projected to increase population by 2% to 3% above current projections for the region. To maintain the current quality of life, all of the communities will need to increase parkland to serve the growth in population forecast for 2035. Based on the National Recreation and Park Association standards (Lancaster 1990), approximately 17,900 acres of new parkland would be required to accommodate the 2035 population increase of 1.79 million people in the four-county region.

Under the cumulative condition, demand for and use of parks and recreation facilities are projected to continue to increase in proportion to the population growth in the study area. Because developers of new residential projects would be required to donate parkland as a condition of the entitlement process, the impact of increased demand on parks and recreation facilities would not be significant.

8.3.2 National Natural Landmarks Program (40 CFR 230.54)

No national natural landmarks are in the Proposed Preliminary LEDPA study area.

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Chapter 9.0
Public Involvement

9.0 Public Involvement

This chapter summarizes the comments received from the public on the Draft EIR/EIS and the Revised DEIR/Supplemental DEIS and the Authority's outreach to local stakeholders.

9.1 Summary of Public Comments Received on the Draft EIR/EIS and the Revised DEIR/Supplemental DEIS

The following is a general timeline for the publication of the Draft EIR/EIS for the Fresno to Bakersfield Section and the opportunity for public comment:

- The Draft EIR/EIS was posted on the Authority's and FRA's websites for public review on August 9, 2011.
- By August 12, 2011, hard copies of the Draft EIR/EIS were available for public review at 13 public repositories (primarily libraries along the project corridor).
- Formal notice was published in the Federal Register (FR) on August 12, 2011, which triggered a 45-day public review and comment period, which ended on September 28, 2011.
- The Draft EIR/EIS was formally made available to California state agencies by the State Clearinghouse beginning August 10, 2011.
- On September 8, 2011, FRA published a notice in the FR and the Authority provided notice advising the public that the comment period would be extended until October 13, 2011. This initial public review and comment period ended a full 60 days after the August 9, 2011, notice was published regarding the availability of the Draft EIR/EIS for public review and comment.
- The Authority and FRA held several formal hearings in the project area. Written and verbal comments were accepted from the public on September 20, 21, and 22, 2011.

The following is a general timeline for the publication of the Revised DEIR/Supplemental DEIS for the Fresno to Bakersfield Section and the opportunity for public comment:

- The Revised DEIR/Supplemental DEIS was posted on the Authority's and FRA's websites for public review on July 20, 2012.
- By July 20, 2012, hard copies of the Revised DEIR/Supplemental DEIS were available for public review at 50 public repositories (primarily libraries and community centers along the project corridor).
- Formal notice was published in the FR on July 20, 2012, which triggered a 60-day public review and comment period, which ended on September 20, 2012.
- The Revised DEIR/Supplemental DEIS was formally made available to California state agencies by the State Clearinghouse beginning July 20, 2012.
- On September 14, 2012, FRA published a notice in the FR and the Authority provided notice advising the public that the comment period would be extended until October 19, 2012. This initial public review and comment period ended a full 90 days after the notice was published regarding the availability of the Revised DEIR/Supplemental DEIS for public review and comment.

- The Authority and FRA held several formal hearings in the project area. Written and verbal comments were accepted from the public on August 27, 28, and 29, 2012.

During the comment period, there were 1,472 submissions and 3,177 comments on the Draft EIR/EIS for the Fresno to Bakersfield Section and 781 submissions and 4,695 comments on the Revised DEIR/Supplemental DEIS for that section. The comments covered a wide range of issues and represented viewpoints from government agencies, organizations, business groups, businesses, residents, and property owners.

Most comments came from individuals in the general public who live, work, or have property interests in the project study area and local government jurisdictions in Kings and Kern counties. Of the 2,253 submissions, approximately 124 generally supported and 630 were generally opposed to the project. The City of Fresno is in favor of the alternative through Fresno adjacent to the UPRR tracks, and the city government is working with the Authority and FRA on appropriate modifications to the city's roadway networks to accommodate the HST project. Comments received from the general public and local officials in Kings County strongly opposed any alternative through Kings County. The City of Wasco would prefer an alternative that goes through town on the east side of the BNSF Railway (BNSF) tracks and is opposed to the alternative that goes through town on the west side of the BNSF tracks due to the resulting impacts on commercial and industrial activities in the city. Comments from farmers in the Wasco-Shafter area indicated that they prefer the BNSF–Through Wasco-Shafter Alternative to the Wasco-Shafter Bypass Alternative even though they own property along both alignments. They preferred the BNSF–Through Wasco-Shafter Alternative because the boundaries to their fields and orchards have already been established by BNSF in the case of the BNSF–Through Wasco-Shafter Alternative, whereas the Wasco-Shafter Bypass Alternative would cut across many fields and orchards and in their opinion would significantly interfere with existing agricultural operations. The City of Shafter supports the BNSF–Through Wasco-Shafter Alternative because it more closely fits with the city's long-term planning vision. There was not a majority of opinion for either of the alternatives in the Corcoran or the Allensworth areas. The commenters in both of these areas provided both pros and cons for each alternative. Comments received from the general public and local officials in Kern County rejected all alternatives with a station in Downtown Bakersfield. This position is the opposite of the preference for a downtown station near the existing Amtrak station that the City of Bakersfield, Kern County, and the Kern Council of Governments voiced in 2003 during the preparation of the Statewide Programmatic EIR/EIS. The majority of individual and government official comments from 2011 and 2012 preferred an alternative that would bypass Bakersfield and locate a station on the outskirts of the city. After the close of the public comment period on the Revised DEIR/Supplemental DEIS, the Bakersfield Downtown Business Association voiced support for a high-speed train station in Downtown Bakersfield.

Among the comments received from the general public, effects on agricultural and private property were the top concerns about the project. Also, comments expressed concern over funding availability (including whether any money should be spent on this type of project in light of state and federal budget deficits) and the accuracy of the ridership projections. Other common environmental concerns included noise and vibration, ecosystem effects, neighborhood impacts, and safety.

Many submissions suggested changing the HST alternatives for the Fresno to Bakersfield Section. Most common among these comments was the suggestion to consider an alignment adjacent to Interstate 5 (I-5) that would bypass the Fresno to Bakersfield Section corridor altogether or locate the alignment along State Route (SR) 99. Other comments suggested a preference for the State of California to use HST funding for other infrastructure improvements. Many of these comments contended that residents of the San Joaquin Valley did not need and would not use an HST System for travel.

In evaluating alternatives in the Wasco-Shafter area, some commenters asserted that the local communities have reached consensus that the HST project should follow the BNSF–Through Wasco-Shafter Alternative through the cities of Wasco and Shafter. A combined total of 18 comments and letters on this subject were submitted to the Authority during the environmental review process from Wasco or Shafter residents, businesses, and other organizations. Of this total, only three entities supported the bypass: the Center on Race, Poverty, and the Environment; Certis USA; and a resident who referred to impacts on the Poso Apartment complex, which houses retirees and seniors. The remaining 14 comments were either against the bypass or in support of the BNSF–Through Wasco-Shafter Alternative. These comments included those of the City of Shafter, the Wasco-Shafter Ag Group (a group of local farmers with property on the alignment of the Wasco-Shafter Bypass Alternative), and the Kern Council of Governments. The City of Wasco preferred the through-town option, but on the east side of the BNSF Railroad instead of on the west side. Most of these comments argued against the Wasco-Shafter Bypass, but didn't specifically cite the BNSF–Through Wasco-Shafter Alternative as the commenters' preference.

9.1.1 California Elected Officials

U.S. Representatives Jim Costa, Devin Nunes, Jeff Denham, and Kevin McCarthy, State Senator Michael Rubio, and State Assembly member David Valadao requested a time extension on the public review period for the Draft EIR/EIS. State Assembly member David Valadao also requested a time extension on the public review period for the Revised DEIR/Supplemental DEIS. State Senator Michael Rubio expressed support for the Project in the Central Valley; however, he requested that a decision on an alignment through Downtown Bakersfield be postponed and an alternative alignment south of Bakersfield be considered.

9.1.2 Project Area Local Governments

The City of Fresno supported the alignment through Fresno, including the Mariposa Street Station Alternative (FRA 2012). Kings County and the City of Hanford did not support an HST alignment in Kings County and would prefer the Project to follow SR 99 or I-5. At a Hanford City Council meeting on October 12, 2012, the city council did not identify a preference for any of the alternatives through Hanford. The City of Corcoran did not endorse any of the three alternatives in or around that city, but indicated that the alternatives that cross through the town would have more severe impacts than the Corcoran Bypass Alternative. The City of Visalia supported the BNSF–Hanford East Alternative and its corresponding HST station. The City of Wasco stated that an alternative through the city must be on the east side of the BNSF Railway tracks to avoid major impacts on Wasco's economy. The City of Shafter preferred the BNSF–Through Wasco-Shafter Alternative. The City of Shafter has stated that the Wasco-Shafter Bypass Alternative would result in substantial impacts on agricultural operations that are important to Shafter's economy and that it would also result in a substantial impact on the Paramount Logistics Park north of Seventh Standard Road, thus causing financial hardship to the city. Mr. Mick Gleason, Supervisor from the Kern County First District, provided a letter to the Authority Board indicating a preference for the BNSF–Through Wasco-Shafter Alternative over the Wasco-Shafter Bypass Alternative. The City of Bakersfield, Kern County, and the Kern Council of Governments did not support an HST alignment through Downtown Bakersfield with a downtown station which is a reversal of their position in 2003. They wish to see an alignment that bypasses Downtown Bakersfield with a station on the outskirts of the city.

9.1.3 Federal Agencies and Tribes

The U.S. Environmental Protection Agency (EPA) did not express support for a particular alternative, but was concerned with minimizing potential project impacts on wetlands, aquatic resources, air quality, and induced growth. The U.S. Army Corps of Engineers (USACE) did not support a particular alternative. Amtrak provided detailed comments related to different alternatives and project description information, but did not express support for a specific alternative. The U.S. Department of Interior, Office of Environmental Policy and Compliance, sent letters stating that it did not have any comments on the EIR/EIS. The Federal Highway Administration provided comments concerning the interface between the Project and federal highways. The U.S. Fish and Wildlife Service (USFWS) did not submit a comment letter on the Draft EIR/EIS or the Revised DEIR/Supplemental DEIS.

9.1.4 State Agencies

The following state agencies commented on the Draft EIR/EIS and/or the Revised DEIR/Supplemental DEIS: the Department of Conservation; Department of Fish and Wildlife; Department of Toxic Substances Control; Division of Oil, Gas, and Geothermal Resources; State Lands Commission; Department of Resources Recycling and Recovery; Department of Transportation; Public Utilities Commission; Department of Housing and Development; State Water Resources Control Board; California State University, Bakersfield; and California State University, Fresno. None of the agencies indicated a preference for any alternative. Comments from state agencies primarily provided additional baseline information in their areas of expertise on questions regarding environmental impacts and clarified their regulatory responsibilities relative to the HST project.

9.1.5 Regional and Other Public Agencies

The 40 regional and public agencies that submitted comments, most of which were water districts, school districts, and irrigation districts, did not state a preference for a specific alternative.

9.1.6 Businesses

Comments were received from 132 different businesses. Most of the comments focused on impacts on their property and/or their business. Businesses whose properties would be affected by the project typically stated a preference for the alternative that would avoid their property.

Several businesses were concerned about the loss of jobs if they were acquired and could not be relocated and the resulting impacts on the economy due to the loss of jobs, businesses, and tax revenue for the local jurisdictions. Some businesses expressed concerns about impacts on them during construction and operation, such as loss of access, noise, dust, and visual changes.

Forty-four farms or ranches expressed concern about impacts on agriculture and farmlands, such as their ability to comply with Water Quality Control Board regulations and state pesticide and drift regulations with the project; the cost of changes to agricultural infrastructure, including irrigation systems and waste disposal systems and permitting the same; the increased cost of accessing property split by the HST alignment; the cost of relocating livestock; and the impacts of noise, vibration, dust, and stray voltage on livestock.

Among the businesses in the Fresno to Bakersfield Section, the BNSF Railway (BNSF) and the Union Pacific Railroad (UPRR) are unique in that all alternatives would have some adjacency with these railroad corridors. The BNSF did not comment on the Draft EIR/EIS or the Revised DEIR/Supplemental DEIS. The UPRR provided comments primarily related to their right-of-way and the uses proposed in and adjacent to it. UPRR stated that its entire right-of-way must be preserved and that the project should not be located within that right-of-way.

9.1.7 Organizations

Comments were received from 50 special interest or community organizations, including groups representing environmental interests or farming interests, groups organized in response to this project, and groups representing other organized stakeholder groups. Organizations supporting farming interests included the California Farm Bureau Federation, the Farm Bureaus for Fresno and Kings counties, associations for growers and producers, and farmland trusts. These organizations generally felt the analysis of impacts on farmland was inadequate and suggested an HST alternative that followed I-5 or SR 99 to minimize impacts on farmland. Organizations formed in response to the Project generally opposed the project and either did not express a preference for an alternative or requested that the Project follow I-5 or SR 99 or an alignment that bypassed Kings County and/or Bakersfield.

9.1.8 Individuals

The majority of comments from individuals came from residents of Kings and Kern counties. These individuals voiced many of the same concerns as the local governments of these counties. Most of the comments provided by individuals of Kings County did not want the Project to cross their county, preferring an alternative on either I-5 or SR 99. Most comments from individuals in Kern County were from residents of metropolitan Bakersfield who preferred an alternative that bypasses Downtown Bakersfield with a station on the outskirts of the city.

9.2 Summary of Outreach to Stakeholders

Public involvement is an essential part of the project. The Authority has proactively sought to initiate meaningful dialogue with stakeholders, including resource agencies, landowners, community leaders, the agricultural community, and any interested member of the general public, going above and beyond what is required for outreach activities for the California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA) to ensure the broadest possible participation.

A Notice of Preparation (NOP) was issued in February 2009 for preparation of a Draft EIR/EIS for the Merced to Bakersfield section of the HST System. The NOP triggered a series of five public scoping meetings and other outreach efforts. As the Project progressed through the environmental review stages, there were several opportunities for public participation.

Leading up to the release of the Preliminary Alternatives Analysis Report (June 2010), the Authority conducted the following outreach activities:

- Three public information meetings were held:
  - April 27, 2010 – Hanford public information meeting
  - May 4, 2010 – Wasco/Shafter public information meeting
  - May 5, 2010 – Corcoran public information meeting

In conjunction with the release of the Supplemental Alternatives Analysis Report (May 2011) the following outreach was conducted:

- Four public information meetings were held before the release of the report:
  - May 16, 2011 – Corcoran public information meeting
  - May 17, 2011 – Fresno public information meeting
  - May 18, 2011 – Hanford public information meeting
  - May 19, 2011 – Bakersfield public information meeting

- Three public information meetings were held after the release of the report:
  - June 21, 2011 Allensworth public information meeting
  - June 22, 2011 Rosedale public information meeting
  - June 23, 2011 Chinatown public information meeting

In total, more than 1,000 stakeholder meetings have been held in the last 3 years in the Fresno to Bakersfield Section, including:

- Six public hearings (for the Draft EIR/EIS and the Revised DEIR/Supplemental DEIS).
- Eight public workshops (for the Draft EIR/EIS and the Revised DEIR/Supplemental DEIS).
- Twenty-two technical working group meetings.
- Thirty-five Environmental Justice meetings.
- Hundreds of individual meetings with stakeholders and organizations.

Over the course of the Project, the Authority's Central Valley Regional Director, Authority staff, the Program Management Team, and the Regional Consultant have had multiple opportunities to meet with the staff and elected officials of the Cities of Fresno, Hanford, Visalia, Corcoran, Wasco, Shafter, and Bakersfield as well as business owners and representatives and residents within those communities. Agency and public meetings were held as part of the Authority's outreach efforts during and after scoping and during preparation of the EIR/EIS for the Fresno to Bakersfield Section. Since publication of the Draft EIR/EIS, meetings have been held with the following entities:

- City of Fresno (27 meetings).
- City of Hanford (10 meetings).
- City of Corcoran (10 meetings).
- City of Wasco (10 meetings).
- City of Shafter (7 meetings).
- City of Visalia (4 meetings).
- City of Bakersfield (10 meetings).
- Fresno County (27 meetings).
- Tulare County (4 meetings).
- Kings County (11 meetings).
- Kern County (10 meetings).
- Greater Bakersfield Separation of Grade District.
- Twenty-three water and irrigation districts.
- Three flood control districts.
- Four school districts.
- Central California Hispanic Chamber of Commerce.
- Allensworth Community Council.
- Kern Council of Governments.
- Merced County Farm Bureau.
- Kings County Farm Bureau.
- Chinatown Revitalization Organization.
- Mercy Hospital of Bakersfield.
- Kern High School District.
- California Department of Transportation.
- Wasco Housing Authority.

Community outreach has been an ongoing effort. Several meetings and communications with stakeholders have occurred since the close of the public comment periods for the Draft EIR/EIS and Revised DEIR/Supplemental DEIS. These meetings and communications have reflected additional information than that expressed in the comments on the environmental documents. The feedback provided in these meetings and communications is summarized below.

City of Fresno: In Fresno, the Authority and stakeholders have reached agreement on a single alignment and a station on Mariposa Street, as reflected in the Final EIR/EIS for the Merced to Fresno Section (Authority and FRA 2012p). The Notice of Determination for the Merced-Fresno project documents the decision as to the station location and associated alignment of Mariposa Street (Authority 2012b).

Hanford Area Alternatives: The City of Visalia prefers the BNSF–Hanford East Alternative and a station along that alignment, between Hanford and Visalia. Representatives for the City of Visalia have expressed support for this alternative because they believe it would lead to economic development opportunities for both the city and the county (per a meeting between the City of Visalia and the Authority on June 4, 2013). The City of Hanford opposes alignments that do not use existing transportation corridors because these alignments would conflict with the City's land use planning (City of Hanford 2012a). Hanford envisions strong commercial development on the eastern edge of the city. In 2012, the city issued a Notice of Preparation/Initial Study to amend the Hanford General Plan for a 58-acre site in the northwest quadrant of the SR 43/SR 198 interchange to facilitate the ultimate development of about 500,000 square feet of commercial buildings and up to 200 apartment units (City of Hanford 2012b). Costco plans to build a 150,000-square-foot store in this area that will anchor the commercial development. The EIR for this new store was released in October 2013. An HST station close to the northeast quadrant of the SR 43/SR 198 interchange would enhance connectivity and encourage growth where Hanford is planning for it.

City of Wasco Alignments: The City of Wasco does not want to lose businesses and is worried about the future of its Amtrak Station. The long-term role of Amtrak is a key concern along the alignments. In a letter to the Authority dated September 11, 2013, the City of Wasco outlined 11 mitigation measures it deemed necessary if the BNSF–Through Wasco Shafter Alternative were to be selected as part of the Proposed Preferred Alternative (City of Wasco 2013). These mitigation measures are specific to roadway improvements and a commitment to re-configure the Sunny Gem, Certis, and Wasco Housing Authority facilities within the city boundaries. No opinions in support of or against this alignment were expressed in the letter. As of May 21, 2013, the Wasco Housing Authority has city council support to move forward on relocating its facility to a site within the city to the west of the BNSF right-of-way.

City of Shafter Alignments: In a letter to the Authority dated March 7, 2013, from John Guinn, Shafter City Manager, the Authority was informed that the Shafter City Council had adopted a resolution to oppose the Wasco-Shafter Bypass Alternative. The city contends that this alternative would result in irreparable damage to Paramount Logistics Park (also known as California Integrated Logistics Center), which is just north of Seventh Standard Road and in the path of the Wasco-Shafter Bypass Alternative, and this damage would result in significant economic impacts on the city.

Oil Well Issues: Authority representatives met with representatives of the California Department of Conservation, Division of Oil, Gas, and Geothermal Resources (DOGGR), Region 4, and were told that the North Shafter Field is not only active but is expanding in scope, with a number of new drilling operations either under way or permitted for future construction (meeting with Authority on March 26, 2013). DOGGR officials submitted comments on the Draft EIR/EIS for Fresno to Bakersfield Section that acknowledged the feasibility of building over abandoned oil and gas wells, but recommended against the practice (DOGGR 2011).

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Chapter 10.0
Compliance with Federal and State Laws

10.0 Compliance with Federal and State Laws

The NEPA/Section 404 Integration Memorandum of Understanding (MOU) includes a request to provide a status of the FRA and Authority's compliance with applicable federal and state laws, regulations and executive orders, including, but not limited to:

- Sections 404, 401, and 402 of the Clean Water Act (CWA)
- Section 4(f) of the U.S. Transportation Act of 1966
- Section 106 of the National Historic Preservation Act (NHPA)
- Section 307 (c) General Conformity Determination of the Clean Air Act
- Section 7 of the Endangered Species Act (ESA)
- Fish and Wildlife Coordination Act
- Executive Order 12898 (Environmental Justice)
- Section 2081(b) of the California Endangered Species Act (CESA)

Table 10-1 provides a status update for the permitting efforts required under the applicable federal and state environmental laws. The Authority and FRA have completed fieldwork, and have initiated coordination and preparation of various permitting documents in accordance to the agreements including the NEPA/404 MOU and the Section 106 Programmatic Agreement established with environmental resource agencies to facilitate the environmental permitting required during final design and construction. Consultation with the relevant federal and state agencies as part of NEPA and the associated permitting processes would also meet the Fish and Wildlife Coordination Act requirements.

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Table 10-1
Status of Permitting for Federal and State Environmental Laws and Regulations

Agency	Permits/Regulations/Executive Orders	Status	Next Steps
Federal			
U.S. Army Corps of Engineers (USACE)	Section 404 of the Clean Water Act Permit for Discharge of Dredge or Fill Materials into Waters of the U.S., including wetlands	USACE issued a Preliminary Jurisdictional Determination on February 5, 2013. USACE comments were received on a draft Compensatory Mitigation Plan.	Prepare updated 404 Permit packet, based on LEDPA and preferred alternative. Packet will include updated impact numbers for the final EIR/EIS.
Federal Railroad Administration (FRA) U.S. Department of the Interior	Section 4(f) of the U.S. Transportation Act of 1966	The Section 4(f) chapter (Chapter 4) of the Revised Draft EIR/Supplemental Draft EIS was available for review during the public and agency comment period. FRA is currently reviewing a potential use to a Section 106 property identified after release of the Revised Draft EIR/Supplemental Draft EIS known as Salón Juárez.	Coordinate with agencies with jurisdiction over Section 4(f) properties on Use determinations. Make Least Harm determinations in Final EIR/EIS.
Federal Railroad Administration (FRA) U.S. Advisory Council on Historic Preservation via the California State Historic Preservation Office (SHPO)	Section 106 of the National Historic Preservation Act of 1966	Per the Programmatic Agreement, the technical reports (Historic Architectural Survey Report, Historic Property Survey Report, and Archaeological Survey Report) were submitted to the State Historic Preservation Officer (SHPO). SHPO concurred with the above reports in February 2012. Supplemental reports (Authority and FRA 2012e, 2012f, and 2012g) have been prepared and submitted to the Authority and SHPO for review. SHPO's responses to the Supplemental reports are being addressed and a second round of Supplemental reports are currently being prepared based on changes to the project Preferred Alternative.	Prepare the Findings of Effect and MOAs based on historic properties effected by the preferred alternative for submittal to Authority/FRA and SHPO. Submit second round of supplemental reports to SHPO for review and concurrence. Elicit input from consulting parties (e.g., City governments and concerned organizations and Native American tribes) on the contents of the FOE and MOAs. Re-submit FOE and MOAs to FRA for approval and then to SHPO for final concurrence and signature.
Federal Railroad Administration (FRA) U.S. Environmental Protection Agency (EPA)	General Conformity Determination (Clean Air Act), which includes the six major air pollutants under National Ambient Air Quality Standards	General Conformity Determination: The construction equipment and schedule data is being refined. The San Joaquin Valley Air Pollution Control District (SJVAPCD) and the Authority are coordinating regarding use of the construction model. Continued coordination with the EPA and other concerned agencies. EPA comments upon Environmental Justice conclusions as part of the EIS review process.	Respond to comments in Final EIR/EIS. Continued outreach to Environmental Justice populations.
National Marine Fisheries Service (NMFS)	Section 7 Consultation (Endangered Species Act)	Technical assistance and informal consultation conducted with NMFS from March 2011 until August 2011.	In June 2011, the Authority and FRA made a No Effect Determination for the project's potential to adversely affect species listed under the jurisdiction of NMFS.
U.S. Fish and Wildlife Service (USFWS)	Section 7 Consultation and Biological Opinion (Endangered Species Act)	Technical assistance and informal consultation conducted with USFWS from November 2010 until June 2012. Formal consultation was initiated with the submittal of a Biological Assessment on July 9, 2012. A USFWS-issued Biological Opinion was published on February 28, 2013.	A Supplemental Biological Assessment and a request to amend the Biological Opinion were submitted to USFWS on October 8, 2013 to disclose minor modifications in the project description. An amendment to the Biological Opinion is anticipated in February 2014.
State			
California Department of Fish and Wildlife (CDFW)	Section 2081(b) Incidental Take Permit (California Endangered Species Act) Section 1602 Lake and Streambed Alteration Agreement Permit	Regularly scheduled meetings occurring to coordinate permitting with CDFW. A draft 2081 permit application was submitted for CDFW review July 2012. An updated draft application is anticipated to be submitted in February 2014. The draft Section 1602 permit application is under preparation.	Continue coordination with CDFW. Submittal of a final 2081 permit application to CDFW is expected in April 2014. Submittal of the draft Section 1602 permit application to CDFW is expected in January 2014.
State Water Resources Control Board (SWRCB)	Clean Water Act (CWA) Section 401 Water Quality Certification CWA Section 402 National Pollution Discharge Elimination System Water Discharge Permit	Regularly scheduled meetings occurring to coordinate permitting with SWRCB. A draft Section 401 permit application is under preparation.	Continue coordination with SWRCB to support Section 401 and 402 permit consultation. Prepare and submit Section 401 permit application. Submittal of Section 401 permit application expected to occur in January 2013. Preparation of the statewide Section 402 permit application to be determined by the High-Speed Rail Authority. Issuance of a NPDES permit is expected to coincide with the post-construction phase in 2017.

Table 10-1
Status of Permitting for Federal and State Environmental Laws and Regulations

Agency	Permits/Regulations/Executive Orders	Status	Next Steps
Regional			
Central Valley Flood Protection Board (CVFPB)	Encroachment Permits subject to Section 208.10 and subject to a screening-level ruling on a Section 408 Permit (state-federal flood-control projects).	Coordinate with CVFPB and USACE on acceptable approach to hydrology and hydraulics for the CVFPB jurisdictional crossings. Prepare a preliminary draft Encroachment Permit to support a ruling on a Minor 408 Permit.	Submittal of an application for a Minor 408 permit is expected to be completed by the Design-Build Contractor after more detailed engineering designs are completed.
San Joaquin Valley Air Pollution Control District (SJVAPCD)	Rule 2201 New and Modified Stationary Source Review. Rule 2280 Portable Equipment Registration. Rule 2303 Mobile Source Emission Reduction Credits. Rule 4201 and Rule 4202 Particulate Matter Concentration and Emission Rates. Rule 4301 Fuel Burning Equipment. Rule 8011 General Requirements – Fugitive Dust Emission Sources. Rule 9510 Indirect Source Review.	Adherence to these rules will be included in the specifications in the design-build contract. Rule 9510 states that any applicant subject to this rule shall submit an Air Impact Assessment (AIA) application no later than applying for a final discretionary approval with the public agency. Discretionary approval means: A decision by a public agency that requires the exercise of judgment or deliberation when the public agency or body decides to approve or disapprove a particular development project, as distinguished from situations where the public agency merely has to determine whether there has been conformity with applicable statutes, ordinances, or regulations.	Control measures listed in the Final EIR/EIS would meet rule requirements. The Authority and SJVAPCD will enter into a Voluntary Emissions Reduction Agreement (VERA). Authority and Air District working on MOU which commits to mitigating for the whole Air Basin. Individual VERA's will be negotiated and executed based on construction packages.

Chapter 11.0

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11.0 References

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Chapter 12.0

List of Preparers and Reviewers

12.0 List of Preparers and Reviewers

12.1 California High Speed Rail Authority and Federal Railroad Administration

Project Role	Name, Registration	Years of Experience, Qualifications
California High Speed Rail Authority; Chief Executive Officer	Jeff Morales	30 years of experience. B.S., Biology, George Washington University, Washington D.C.
Federal Railroad Administration; Environmental Protection Specialist, Southwest Region	Stephanie B. Perez, P.G.	22 years of experience. Licensed Professional Geologist, VA; B.S., Geology, Virginia Tech, Blacksburg, VA
California High Speed Rail Authority; Deputy Director, Environmental Planning	Mark McLoughlin	29 years of experience. B.S., Ornamental Horticulture, Landscape Construction, California Polytechnic State University, San Luis Obispo

12.2 List of Consultants

Project Role	Name, Registration	Years of Experience, Qualifications
PROGRAM MANAGEMENT Parsons Brinckerhoff and Cordoba Corporation		
Deputy Environmental Manager	Lynne Marie Whately, A.I.C.P.	18 years of experience. B.S., Planning and Public Administration, University of Southern California; M.S., Urban and Regional Planning, Florida State University
Environmental Specialist	W. Andrew Bayne	13 years of experience. B.A., Health and Human Performance, Brigham Young University
Permit and Mitigation Specialist	Mike Aviña	17 years of experience. B.A., University of California Davis, Anthropology, J.D. University of California Davis, State Bar of California
REGIONAL CONSULTANT ENVIRONMENTAL TEAM URS/Hatch Mott MacDonald/Arup Joint Venture		
Environmental Manager	Thomas Baily	40 years of experience. B.S., Plant Ecology, University of Michigan, M.S., Plant Ecology, University of Michigan
Aquatic and Non-Aquatic Biological Resource Section Lead: Document Co-Manager	Justin Whitfield	12 years of experience. B.S., Biological Sciences, Florida State University

Project Role	Name, Registration	Years of Experience, Qualifications
Other Environmental Resources Section Lead: Document Co-Manager	Denise Heick	39 years of experience. B.A., Political Science, San Francisco State University
Description of Alternatives	Lindsay Lane	4 years of experience. B.A., Political Science, University of California, Santa Barbara; M.S., Environmental Science and Management, University of California, Santa Barbara
Transportation	Jeff Horn	6 years of experience. B.A., Environmental Studies, University of California, Santa Barbara
Non-Aquatic Biological Resources, Factual Determinations (Biological)	Nicole Rucker	5 years of experience. M.S., Environmental Science, San Jose State University, San Jose; B.S., Biology, The George Washington University
Factual Determinations (Hydrology and Water Quality)	Elizabeth Nielsen	9 years of experience. MS, Civil and Environmental Engineering, University of California, Berkeley; California Registered Civil Engineer.
Agricultural Lands and Socioeconomics	Sean Rudden	5 years of experience. B.A., Economics, California State University at Sacramento
Historical and Cultural Resources	Rebecca Meta Bunse	20 years of experience. B.A., Women's Studies and Italian Language, University of California, Davis, M.A., History/Public History, California State University, Sacramento
Section 4(f) and Section 6(f) Evaluations; Internal Technical Review	Linda Peters	15 years of experience. B.A., Archaeology, Arizona State University
Section 4(f) and Section 6(f) Evaluations	Graham Craig	8 years of experience. B.A., Urban Planning, University of Texas
Geographic Information Systems (GIS)	Rose Abbors	7 years of experience. B.S., Geography, Arizona State University
Internal Technical Review	David Fee	26 years of experience. M.A., Anthropology, University Arizona; B.A, Anthropology, San Francisco State University
Internal Technical Review	Michael Monroe	34 years of experience. M.S., Ecology, University of California, Davis; B.S., Conservation of Natural Resources, University of California, Berkeley

Project Role	Name, Registration	Years of Experience, Qualifications
Lead Editor, Editing Coordinator for EIR/EIS and Technical Reports	Dennis Rowcliffe	22 years of experience. B.A., American Studies and Journalism, California State University, Los Angeles
Word Processing and Formatting Specialist for EIR/EIS and Technical Reports	Deb Fournier	44 years of experience.

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Appendix A

Fresno to Bakersfield Section Watershed Evaluation Report

The Watershed Evaluation Report is supplied on CD.

Appendix B
Fresno to Bakersfield Evaluation of Wetland Condition Using the California Rapid Assessment Method Report

The Wetland Condition Usine the California Rapid Assessment Method Report is supplied on CD.

Appendix C
Sequenced Search for Less Environmentally Damaging Alternative

Table of Contents

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This Appendix documents the process followed to define the HST Fresno to Bakersfield Section and Project alternatives considered in the Revised DEIR/Supplemental DEIS (Authority and FRA 2012f).

C1.0 HST Project-Level Alternatives Development Process: How the Initial Range of Alternatives Was Developed

The Statewide Program EIR/EIS (Authority and FRA 2005) provided a first-tier analysis of the general effects of implementing the HST System across two-thirds of the state. That document provided the Authority and the FRA with the environmental analysis necessary to evaluate the overall HST System and to make broad decisions about general HST alignments and station locations for further study in second-tier EIR/EIS documents. This analysis included identification of a BNSF alignment as the "preferred option" from Fresno to Bakersfield. The Statewide Program EIR/EIS also identified preferred station locations in Downtown Fresno and Downtown Bakersfield, with no station in between. Figure C1-1 shows the alignment options identified for Fresno to Bakersfield in the Statewide Program EIR/EIS.

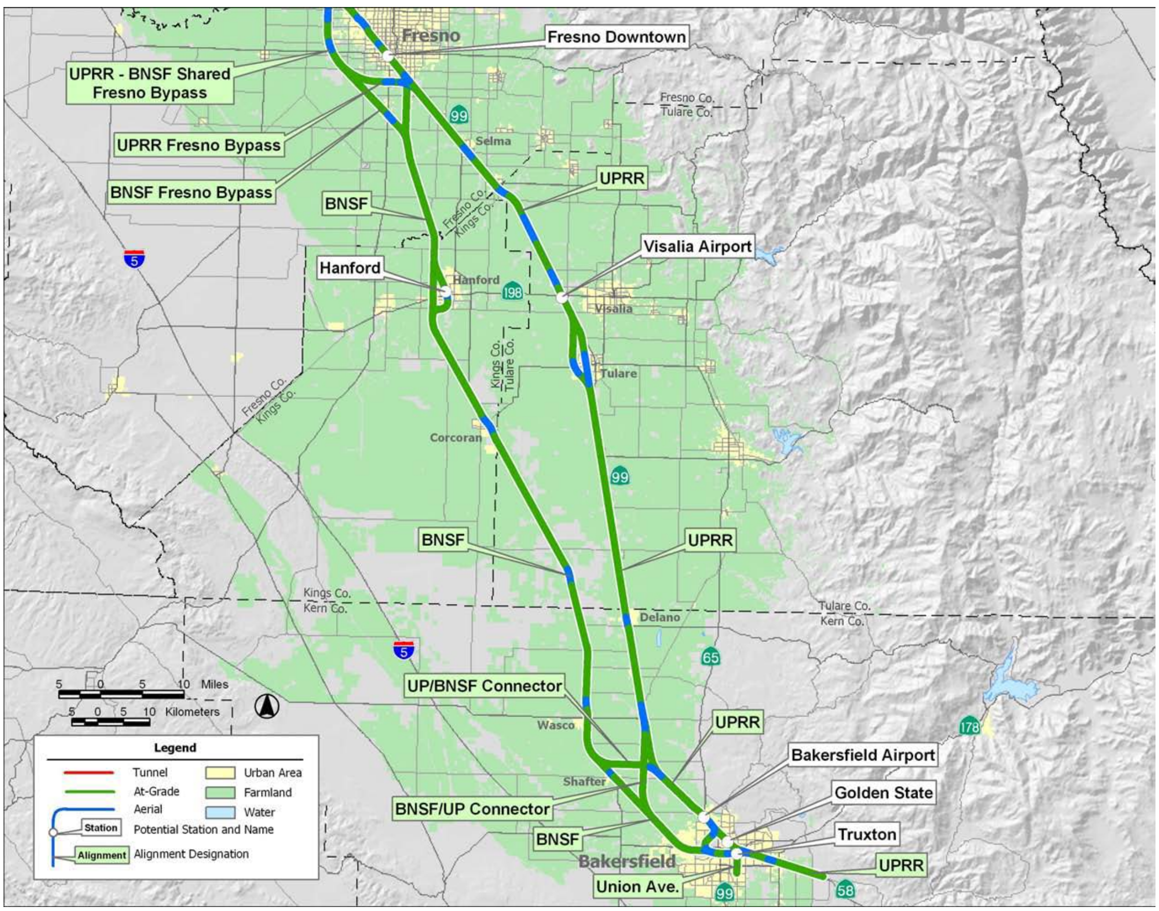


Figure C1-1
Alignment options identified for Fresno to Bakersfield in the 2005 Statewide Program EIR/EIS

A further assessment of the alternatives, the *Visalia-Tulare-Hanford Station Feasibility Study* (VTH Study) (Authority 2007) concluded the following:

- The distances and travel times were not significantly different between the alternatives.
- The alternatives through Fowler, Selma, and Kingsburg would cost 25% to 30% more than the alternatives that would bypass the cities.
- The alternatives that were parallel to the existing UPRR tracks south of Fresno would result in greater land use and infrastructure impacts than other alternatives.
- The alternatives that were parallel to the existing BNSF tracks south of Fresno would have greater impacts on farmland but fewer impacts on adjacent highways and rail facilities.
- The SR 198 West station location would capture the greatest current and projected population/employment within a 20-mile radius.

In February 2008, these findings were presented to the Authority Board, along with an overarching conclusion that a station in the Visalia-Tulare-Hanford area would be feasible. The Board accepted the VTH Study (Authority 2007), including a recommendation that the scope of the project-level environmental review for the Fresno to Bakersfield Section include a potential station in the vicinity of Visalia (Authority 2008).

The conclusions of the Statewide Program EIR/EIS and the VTH Study provided the basis for the initial range of alternatives to be considered in the alternatives analysis process, as described below.

C1.1 Development Process for Project-Level Alternatives

After completion of the Statewide Program EIR/EIS and the VTH Study, the Authority, in cooperation with FRA, began the project-specific environmental review process. FRA published a Notice of Intent (NOI) on March 16, 2009, notifying the public of FRA's intention to prepare an EIS for the Merced to Bakersfield Section of the HST System (74 FR 11172, March 16, 2009).

The Authority and FRA subsequently determined that the environmental impacts of the HST System from Merced to Bakersfield would be more appropriately assessed in two separate EIR/EIS documents: one for the section from Merced to Fresno and another for the section from Fresno to Bakersfield. A Notice of Preparation (NOP) (SCH Number 2009091126) and Notice of Intent (74 FR 50866, October 1, 2009) for the Fresno to Bakersfield Project EIR/EIS, amending the environmental process, were issued on September 29, 2009, and October 1, 2009, respectively. During the scoping period for the Fresno to Bakersfield Project EIR/EIS, the Authority and FRA received public and agency comments, including comments made during interagency coordination meetings, to inform the screening evaluation of the initial alternatives.

After the Authority identified the initial project alternatives (based on the Statewide Program EIR/EIS and the VTH Study), alignment plans, preliminary profile concepts, and cross sections were developed. The project design criteria dictated that the system be designed for 220 mph throughout with few exceptions (e.g., to avoid sensitive habitat areas, important community resources). These project design criteria provided the basis for the formal alternatives analysis described below.

C1.2 Methodology of the Alternatives Analysis

The evaluation of project-level alternatives followed the process described in *Alternatives Analysis Methods for Project EIR/EIS, Version 2* (Authority 2009). The evaluation began with the

Authority's determination of whether each alternative was consistent with the project purpose and need, the basic components of which are as follows:

- Capable of reaching operating speeds of 220 mph.
- Connects Fresno Station to Bakersfield Station.
- Is a "practicable" alternative. The practicability analysis encompassed a qualitative assessment of constructability, accessibility, operation, maintenance, right-of-way, public infrastructure impacts, railway infrastructure impacts, engineering assessment of project length, travel time, and configuration of key features of the alignment, such as the presence of existing infrastructure.

Other key objectives for the each alternative were:

- Provides intercity travel capacity to supplement critically overused interstate highways and commercial airports.
- Meets future intercity travel demand that will be unmet by the present transportation system and increases capacity for intercity mobility.
- Maximizes the use of existing transportation and utility corridors to the extent feasible.

Alternatives Analysis Reports Available for Public Review

The Alternatives Analysis, including the preliminary and supplemental reports, are available online at:

http://www.cahighspeedrail.ca.gov/Lib_Fresno_Bakersfield.aspx

The evaluation process also included measures of potential environmental effects. This assessment involved both qualitative and quantitative measures that addressed applicable policy and technical considerations. Screening included the use of environmental criteria to measure the potential effects of the proposed alternatives on the natural and human environment. The criteria included field inspections of corridors to field-verify certain data and a Geographic Information System (GIS)–based analysis of potential impacts on farmland, water resources, wetlands, threatened and endangered species, cultural resources, current urban development, and infrastructure.

The process also included an evaluation of initial alternatives according to land use and community impact criteria. The land use evaluation measured the extent to which the station alternatives supported transit use; were consistent with adopted local, regional, and state plans; and were supported by existing and future growth areas. The community impact evaluation measured the extent of disruption to neighborhoods and communities, such as the potential to minimize (1) right-of-way acquisitions, (2) division of established communities, and (3) conflicts with community resources.

C2.0 Preliminary and Supplemental Alternatives Analyses

To define the project-level alternatives to be considered in the formal environmental process, the Authority and FRA prepared four alternatives analyses (one preliminary report and three supplemental reports). These reports are listed in Table C2-1 and discussed in detail below.

C2.1 Preliminary Alternatives Analysis (June 2010)

The analysis presented in the *Fresno to Bakersfield Preliminary Alternatives Analysis Report (AA), California High-Speed Rail Authority, Board Briefing* (Preliminary AA Report) (Authority and FRA 2010a) covered an area beginning at Clinton Avenue in Fresno, approximately 2.5 miles northwest of the northern terminus of the Fresno to Bakersfield Section, and ending at Oswell Street in Bakersfield, approximately 3.0 miles southeast of the southern terminus of the Fresno to Bakersfield Section. These limits were selected for the alternatives analysis because Clinton

Avenue marks the location where the range of alternatives considered for the Merced to Fresno merged with the range of alternatives considered for the Fresno to Bakersfield Section. Thus, this location formed a logical point for the identification of the alternatives that would cross Downtown Fresno. Similarly, Oswell Street marked the location where the project alternatives for the city of Bakersfield evaluated in the Preliminary AA Report rejoin a common alignment. The Preliminary AA Report describes how the alternatives were developed, particularly the alignment and station development considerations for all of metropolitan Fresno and Bakersfield.

Table C2-1
Alternatives Analysis Reports for the Fresno to Bakersfield Section

Report	Date	Subject Matter
Preliminary Alternatives Analysis (Authority and FRA 2010a)	June 2010	Comprehensive evaluation of alternatives for the entire Fresno to Bakersfield Section, with focus on three subsections (the Fresno, Rural, and Bakersfield subsections).
Supplemental Alternatives Analysis (Authority and FRA 2010b)	September 2010	Evaluation of potential alignments adjacent to the BNSF tracks through Downtown Hanford.
Supplemental Alternatives Analysis (Authority and FRA 2011f)	May 2011	Additional screening and refinement of Project alignment alternatives throughout the section.
Supplemental Alternatives Analysis (Authority and FRA 2011g)	December 2011	Definition and evaluation of potential alignments and station locations west of Hanford.

Although the alternatives analysis process considered multiple criteria, the process emphasized the project objective to maximize the use of existing transportation and utility corridors and available rights-of-way to the extent feasible. The alternatives included in the Preliminary AA Report followed the existing freight corridors of the BNSF corridor and the UPRR, the SR 43 corridor, and an electrical transmission corridor east of Hanford.

The Fresno to Bakersfield Section includes the urbanized areas of Fresno and Bakersfield and the more rural area between the two cities; these areas have varying and different concerns. Therefore, the Preliminary AA Report divided the corridor into three subsections: Fresno, Rural, and Bakersfield. Linking alternatives from each subsection together formed the complete, end-to-end alternatives for the Fresno to Bakersfield Section.

The following subsection-by-subsection discussion explains the range of alternatives considered in the Preliminary AA Report and describes the report's recommendations for the alternatives to be carried forward in the environmental review process.

C2.1.1 Fresno Subsection

The Preliminary AA Report identified five basic initial alternative alignments that were based on either the preferred alignment in the Statewide Program EIR/EIS or input from the Fresno Technical Working Group, which consisted of representatives of local agencies in the subsection and other local stakeholders. These five alternatives were UPRR East, UPRR West, Golden State Boulevard, SR 99, and Fresno West Bypass. Working from these five basic alternatives, the Preliminary AA Report defined 13 discrete Project alignment alternatives that reflected variations in the profile of the HST guideway and in the connections to the Rural Subsection to the south. The Preliminary AA Report recommended that three alternatives be carried forward for consideration in the EIR/EIS:

- UPRR East.
- UPRR West.
- UPRR West/East Crossover.

All three of these alternatives were assumed to be elevated through Fresno, to be adjacent to the UPRR right-of-way in Fresno, to leave Fresno to the south, generally along the BNSF corridor, and to provide a Downtown Fresno Station near Mariposa Street (Figure C2-2).

The following alternatives were not carried forward for full evaluation in the Fresno to Bakersfield Section EIR/EIS:

- The Golden State Boulevard alternatives were dismissed because they would have been inconsistent with the City of Fresno's redevelopment vision and would have had relatively large community and environmental impacts with few, if any, environmental benefits.

- The SR 99 alternatives were not carried forward for further consideration due to their greater impacts on Roeding Park and their lack of connectivity to the central business district of Fresno.

- The Fresno West Bypass Alternative was eliminated from consideration because it would have been inconsistent with the project purpose and need and the objective of using existing transportation or utility corridors to the maximum extent possible. This alternative would have required acquisition of substantially more right-of-way than an alternative going through Fresno and would have resulted in substantially more impacts on environmental resources, including agricultural lands. Both the City and County of Fresno opposed this alternative.

C2.1.2 Rural Subsection

The Preliminary AA Report identified a set of initial alternatives for the Rural Subsection that originated from a combination of the Statewide Program EIR/EIS; the VTH Study; and input from local, state, and federal agency officials and stakeholders during the scoping process.

The initial alternatives represented variations on alignments following the BNSF and UPRR / SR 99 corridors from Fresno to Bakersfield. Two of the initial alternatives generally followed the BNSF right-of-way, one to the west of Hanford and one to the east of Hanford (connecting with the SR 198 West station location identified in the VTH Study). The other initial alternatives were derived from the VTH Study; they consisted of alignments along the UPRR / SR 99 corridor that either passed through Fowler, Selma, and Kingsburg or bypassed those cities to the west. The initial alternatives also included alignments that followed different routes south of Visalia from the UPRR / SR 99 corridor into Bakersfield. These routes differed in terms of how and where they transitioned from the UPRR corridor to the BNSF right-of-way before approaching Bakersfield.

The Preliminary AA Report screening of the initial alternatives identified six alternatives through the entire length of the Rural Subsection. Three of these alternatives were based on the preferred alignment of the Statewide Program EIR/EIS; these alternatives generally paralleled the BNSF right-of-way from Fresno to Bakersfield and served a potential station just east of Hanford. The other three alternatives were configured to serve a potential station closer to Visalia and generally paralleled the UPRR between Fresno and Visalia before rejoining the BNSF right-of-way south of Corcoran.

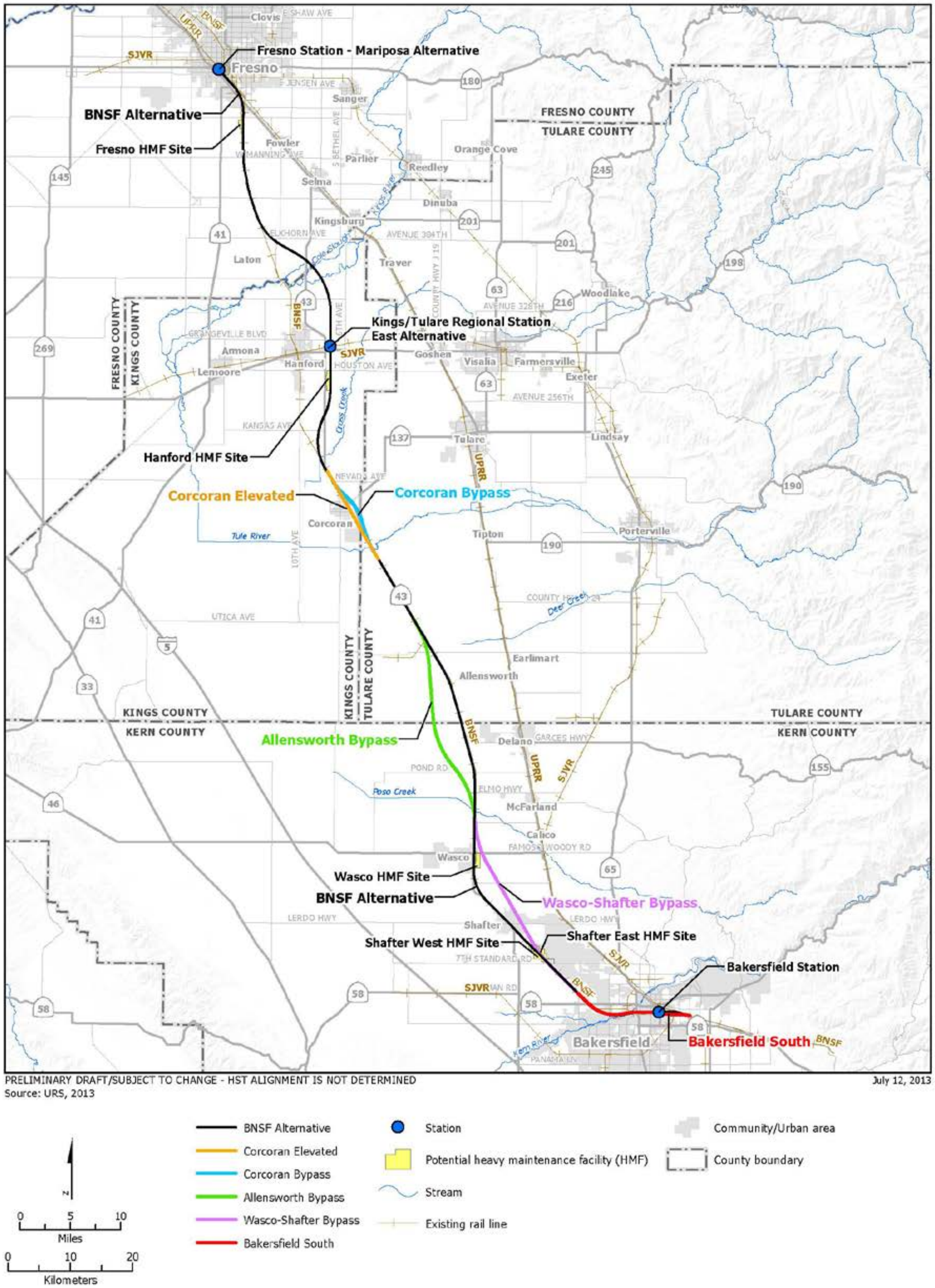


Figure C2-2
Fresno to Bakersfield Section project alternatives from the DEIR/DEIS

In addition to these six alternatives for the Rural Subsection, the Preliminary AA Report evaluated a series of "local options" related to the six alternatives. The local options included different approaches to passing through five areas: (1) Fowler, Selma, and Kingsburg; (2) Hanford; (3) Corcoran; (4) Allensworth; and (5) Wasco and Shafter. In most cases, these options represented choices to either pass through or around these areas, with additional options in some locations concerning the profile of the HST guideway (either at-grade or elevated).

After evaluating a variety of factors, the Preliminary AA Report recommended that the BNSF–East Bypass be carried forward for consideration in the EIR/EIS. This recommendation narrowed the range of local options to those related to the BNSF alignment. Among the remaining local options, the Preliminary AA Report recommended that the following be carried forward into the EIR/EIS (Figure C2-2):

- Elevated through Corcoran.
- Corcoran At-Grade Bypass.
- Allensworth Avoidance.
- Elevated through Wasco and Shafter.
- Wasco and Shafter At-Grade Bypass.

C2.1.3 Bakersfield Subsection

The initial alternatives described in the Preliminary AA Report were all variations on the preferred alignment in the Statewide Program EIR/EIS and were developed to reduce potential effects on surrounding land uses, to address community concerns in Bakersfield, and to locate an HST station in Downtown Bakersfield, near the existing Amtrak Station.

The initial alternatives were grouped into four "families." The five Family 1 initial alternatives circumvented the Flying-J Refinery and paralleled the Westside Parkway right-of-way. Two of these alternatives were not carried forward for further consideration because reasonable operating speeds could not be maintained on these alignments, and a third alternative was removed from consideration due to business displacements and constructability issues. The two alternatives carried forward from Family 1 were Alternative D1 and Alternative D2. Alternative D1 had two local options, one with an elevated alignment north of UPRR (D1-N) and one with an elevated alignment south of UPRR (D1-S). Alternative D2 also had two local options, one with an elevated alignment north of the BNSF right-of-way in central Bakersfield (D2-N) and one with an elevated alignment over the BNSF right-of-way in central Bakersfield (D2-S).

The Family 2 initial alternatives consisted of the three alternatives that would most closely follow the path of the preferred alignment in the Statewide Program EIR/EIS. None of the three alternatives were carried forward for further consideration because all three of the alternatives would have traveled through the Flying-J Refinery along the BNSF right-of-way. The freight rail right-of-way is narrow in this area and would not allow HST tracks to share the constrained right-of-way. Also, gas pipelines parallel and pass under the right-of-way and their presence posed an obstacle for construction and the possibility of encountering fuel leaks and contaminated soil.

The Family 3 initial alternatives consisted of one alignment that followed the proposed roadway alignments of the Centennial Corridor east of the Kern River. This alternative was not carried forward for further consideration because the required speeds could not be maintained on this alternative without cutting through established residential communities.

The Family 4 initial alternatives consisted of a single alignment that deviated substantially from the BNSF right-of-way and avoided Downtown Bakersfield. This alternative was not carried forward for further consideration because it would not meet the project's purpose and need to provide a station in Downtown Bakersfield.

Alternatives D1-S and D2-N (from the Family 1 alternatives) were carried forward into the Draft EIR/EIS analysis (Figure C2-2), with each featuring a station location consistent with the Bakersfield station location in Downtown Bakersfield near Truxtun Avenue in the vicinity of the existing Amtrak station. Alternative D1-N was not carried forward for further consideration in the Draft EIR/EIS because it would have required a large number of residential displacements in an environmental justice community, displacement of a power transmission substation, and the construction requirements necessary to maintain the design speed were impracticable. Alternative D2-S was also removed from consideration because it would have required construction of a 3-mile elevated structure above the existing BNSF yard and mainline tracks, which was determined to be impracticable.

C2.1.4 Heavy Maintenance Facility

In November 2009, using specific site and facility requirements, the Authority solicited Expressions of Interest from parties between Merced and Bakersfield who could provide proposals for building an HMF. The Fresno to Bakersfield Section of the HST System received eight proposals. The analysis in the Preliminary AA Report recommended four of the eight sites for further analysis in the Draft EIR/EIS. The four sites that were recommended for further analysis were:

- The Fresno Works–Fresno HMF Site.
- The Kings County–Hanford HMF Site.
- The Kern Council of Governments–Wasco HMF Site.
- The Kern Council of Governments–Shafter East HMF Site.

A fifth site, Kern Council of Governments—Shafter West, was added for consideration after completion of the Preliminary AA Report. The HMF site alternatives are not included in this analysis because they will be separately considered in the context of the overall system requirements.

C2.1.5 Board Direction

On June 3, 2010, the Authority Board met to consider the recommendations of the Preliminary AA Report (Authority 2010a). The Board acted to accept the recommendations, which are summarized below (from north-south, according to subsection):

- Fresno UPRR West Elevated
- Fresno UPRR East Elevated
- Fresno UPRR Cross
- Rural Full
- BNSF–Hanford East
- Rural Local Options
- Through Corcoran, East Side of BNSF, Elevated
- Corcoran East Bypass, At-Grade
- Allensworth Bypass Alternative, At-Grade (west of BNSF right-of-way)
- Through Wasco and Shafter, Elevated
- Wasco and Shafter Bypass, At-Grade
- Bakersfield North
- Bakersfield South (in California Ave)
- HMF site alternatives
- Fresno Works–Fresno
- Kings County–Hanford
- Kern Council of Governments–Wasco
- Kern Council of Governments–Shafter

This action provided the basis to move forward with development of the project definition to be evaluated in the Draft EIR/EIS.

C2.2 Supplemental Alternatives Analysis (September 2010)

In September 2010, in response to concerns about the potential impacts on agricultural lands and the operation of the BNSF–Hanford East Alternative, the Authority issued a Supplemental Alternatives Analysis (Authority and FRA 2010b) to update the Preliminary AA Report (Authority and FRA 2010a). This analysis identified two alignment options (H1 and H2) that would essentially follow the BNSF right-of-way through Hanford. The two options differed principally in terms of the location of a potential station. The general characteristics of the two alignments were as follows:

- Both alignment options remained essentially parallel to the BNSF right-of-way through southern Fresno County (including the community of Laton) and into Kings County before entering Hanford.
- Both alignment options diverged from the BNSF right-of-way from the Kings River to approximately Excelsior Avenue in Kings County because the geometry of the BNSF right-of-way could not accommodate a high-speed train.
- South of Hanford, both alignment options stayed along the BNSF right-of-way before reaching Corcoran, at which point they joined the alignment alternatives carried forward for that area (i.e., the through-town and bypass).
- Both alignment options again diverged from the BNSF right-of-way north of Kansas Avenue because of the geometry of the BNSF right-of-way.
- To avoid excessive community disruption and provide sufficient clearance above the Cross-Valley Railroad tracks, BNSF spur tracks, and SR 198, both alignment options were on elevated structures through Hanford and for a considerable distance to the north and south.

Under Option H1, the alignment was designed to accommodate a station in Downtown Hanford. To accomplish this while conforming to the project engineering design standards for station tracks and platforms, the alignment departed from the BNSF right-of-way approximately ¼ mile south of Grangeville Road. The alignment then rejoined the BNSF right-of-way near Hanford-Armona Road, approximately ½ mile south of SR 198. This departure from the BNSF right-of-way allowed for the 6,000 feet of straight track required for the station. Under Option H1, the station platform was located just north of the intersection of Lacey Boulevard and 11th Avenue, in an area occupied by a shopping center. Because of its urban location, the station parking under this option was to be accommodated in a multi-level structure.

Under Option H2, the alignment generally followed the BNSF right-of-way all of the way through Hanford. The high-speed track geometry required a wider curve than was available within the BNSF right-of-way, from approximately Elm Street to Third Street. Under Option H2, the potential station was located approximately halfway between Hanford-Armona Road and Houston Avenue, at the southern edge of Hanford. This area was the only area in Hanford that could accommodate the need for 6,000 feet of straight track for the station and platforms under this alignment. Because of its suburban location, the station parking under this option was to be accommodated in a surface lot.

The September 2010 Supplemental Alternatives Analysis recommended that neither of these alternatives be carried forward into the Draft EIR/EIS for the following reasons (relative to the BNSF–Hanford East Alternative):

- Increased residential, business and public facility relocations.
- Extend noise impacts on another 1,200 receivers.
- Directly take property from two parks.
- Increase visual impacts on 2,000 residents.
- Reduced connectivity for a potential regional station.

In addition, there is no community support for an alignment through Hanford.

On September 2, 2010, the Authority Board considered and accepted the recommendations of the September 2010 Supplemental Alternatives Analysis (Authority 2010b). Thus, no changes were made to the alternatives being developed for consideration in the Draft EIR/EIS.

C2.3 Supplemental Alternatives Analysis (May 2011)

In May 2011, the Authority issued a second Supplemental Alternatives Analysis (Authority and FRA 2011f) to update the Preliminary AA Report from June 2010 (Authority and FRA 2010a) and the September 2010 Supplemental Alternatives Analysis (Authority and FRA 2010b). The May 2011 Supplemental Alternatives Analysis presented documentation and analysis of recommended modifications to the alternatives contained in the prior reports, including the following:

- Additions of new alternatives (alignments, station sites, and HMF sites).
- Removal of existing alternatives.
- Shifts in the horizontal alignments of alternatives.
- Changes in the profiles of existing alternatives from elevated to at-grade.

These recommendations were the result of eight months of development of the alternatives after the completion of the September 2010 Supplemental Alternatives Analysis. The preceding development of the alternatives included preliminary engineering, environmental impact analysis, public and stakeholder input, federal and state environmental agency input, and value engineering (i.e., review of engineering designs to identify the most cost-effective solutions).

Each of the modifications recommended in the May 2011 Supplemental Alternatives Analysis was based on one or more of the following benefits:

- Reduced impacts on sensitive natural resources and urban populations.
- Increased benefits to local residents, property owners, and business owners.
- Reduced project and stakeholder costs.
- A project with fewer impacts that is more cost-effective overall.

The recommend modifications were as follows (discussed by geographic subsection or key issue).

C2.3.1 Fresno Subsection

- *Change the UPRR West Alternative profile from elevated to at-grade from San Joaquin Street to Jensen Avenue.* Placing this 2.8-mile section of the project at-grade would provide benefits to city residents and property owners in terms of reduced noise and visual impacts, improved traffic flow due to the creation of several road grade separations over the UPRR, and greater freight railroad safety due to the closure of several at-grade crossings. Placing the alignment at-grade would enhance the ability of the City of Fresno to integrate the HST station into its plans for the downtown and reduce the overall life-cycle costs for the project and for local stakeholders.

- *Add an alternative station location at Mariposa Street.* This location was a new alternative to the Kern Street location, which was included in the Preliminary AA Report as the only station location for the western alignment alternative. The City of Fresno believes this site is more consistent with the City's vision for the station area and would allow the city to establish the HST station as a focal point for its downtown economic development and redevelopment initiatives.

- *Remove UPRR East and Crossover Alternatives from further consideration.* The UPRR East Alternative paralleled the UPRR West Alternative on the east side of the UPRR right-of-way. The Crossover Alternative was a combination of the UPRR West and East Alternatives that required two crossovers of the UPRR facility. The benefits of removing these alternatives mirrored those associated with changing the western alignment from elevated to at-grade. Also, removal of the eastern alignment had the added benefits of eliminating direct impacts on the historic Southern Pacific Depot and allowing the City of Fresno additional flexibility in planning for development of the property that otherwise would have been occupied by the HST guideway and structures. Removal of these alternatives had the added benefit of eliminating the need for expensive elevated crossings of the UPRR tracks.

C2.3.2 Hanford/Kings County Subsection

- *Shift the existing alignment between Conejo and Corcoran in two locations.* The locations were (1) between Conejo and the proposed Kings/Tulare Regional Station (east of Hanford at SR 198) and (2) between Idaho Avenue (south of the Kings/Tulare Regional Station) and Niles Avenue just north of Corcoran. In the case of the first shift, the new alignment would follow property boundaries more directly and the 7½ Avenue utilities corridor, which runs north-south through the area. Although this shift had the benefit of being less disruptive to agricultural properties and operations (including numerous dairies) and of being more consistent with the Authority's objective of following existing transportation and utility corridors as closely as possible, it would result in the displacement of several residential properties in the Lacey Rural Community. The second shift would allow the HST alignment to avoid the Kaweah Delta Water Conservation District's Tulare Lakebed Mitigation Site, which covers approximately 1,300 acres north of Corcoran (east of SR 43 and north of Nevada Avenue) as well as approximately 5 acres of sensitive wetlands and other high-quality aquatic resources. This shift would also avoid key agricultural operations in the area west of SR 43.

C2.3.3 Corcoran Subsection

- *Add a new alternative west of BNSF at-grade.* This alternative begins at Nevada Avenue north of Corcoran and ends at Quebec Avenue (Avenue 144) south of Corcoran. Placement of this section at-grade would provide benefits to city residents and property owners in terms of reduced noise and visual impacts, improved traffic flow due to the creation of several road grade separations over the BNSF tracks, and greater freight railroad safety due to the closure of several at-grade crossings. Also, the project and local stakeholders would benefit from a reduction in overall life-cycle costs.

- *Shift the Preferred Corcoran Alternative closer to Corcoran.* As a result of the realignment of the Hanford alignment to avoid wetlands and other aquatic resources north of Corcoran, it was possible to shift the Preferred Corcoran Alternative to the west, closer to Corcoran. Because of this shift, the bypass would be considerably shorter and have less impact on agricultural resources and facilities. Project life-cycle costs would be lower as well.

C2.3.4 Allensworth Subsection

- *Shift the Allensworth Bypass Alternative to the west.* This modification extended from approximately 5 miles north of Colonel Allensworth State Historic Park to Taussig Avenue, a total distance of 19.1 miles. This shift would allow the alignment to avoid encroachment into sensitive natural resources, including wetlands and endangered species habitat, and would reduce impacts on agricultural land and facilities as well.

C2.3.5 Wasco-Shafter Subsection

- *Shift the BNSF Alternative closer to BNSF tracks near Kimberlina Road.* This minor shift would allow the HST alignment to run closer to the BNSF tracks, thereby largely eliminating "landlocked" property between the two facilities. (The BNSF tracks would be shifted closer to the HST alignment in one location as well.) The shifted alignment would also avoid important agricultural property and facilities immediately to the east.

- *North of Shafter: Change the BNSF Alternative profile from elevated to at-grade.* The profile change, between Merced Avenue and Fresno Avenue (approximately 1.5 miles) would result in the addition of two grade separations, thereby improving local traffic flow and freight railroad safety. The change would reduce overall life-cycle costs as well.

- *South of Shafter*: Change the BNSF Alternative profile from elevated to at-grade, and shift the alignment from east to west of the BNSF tracks. This modification would be situated between Los Angeles Avenue south of Shafter to Hageman Road near Bakersfield, a total length of 9.2 miles. Placement of this component at-grade would benefit residents and property owners in terms of reduced noise and visual impacts, improved traffic flow due to the creation of several road grade separations over the BNSF tracks, and greater freight railroad safety due to the closure of several at-grade crossings. Shifting the alignment from the east side to the west side of the BNSF tracks would remove conflicts with the Shafter International Trade and Transportation Center and with the Shafter Cemetery. This shifting of the alignment would also reduce the need to move or relocate various BNSF track facilities.

- *Shift the Wasco-Shafter Bypass Alternative slightly to the east.* This realignment would avoid a property eligible for placement on the National Register of Historic Places and various active oil extraction and storage facilities in the area.

- *Add a new Shafter candidate HMF site west of the BNSF tracks.* The Kern Council of Governments requested this addition to provide for a competitive HMF site south of Shafter that could be accessed from the shifted alignment on the west side of the BNSF tracks. The total area of land required, accessibility to jobs, and traffic impacts would be similar to those characteristics for the proposed HMF site on the east side of the BNSF tracks.

C2.3.6 Bakersfield Subsection

- *Change the profile from elevated to at-grade between Hageman Road and Palm Avenue.* The total length of this modification was 2.3 miles, and it applied to both the Bakersfield North and the Bakersfield South alternatives. Changing to an at-grade profile would benefit residents and property owners in terms of reduced noise and visual impacts, improved traffic flow due to the creation of several road grade separations over the BNSF tracks, and greater freight railroad safety due to the closure of several at-grade crossings. The project and local stakeholders would also receive a modest benefit in the form of a reduction in life-cycle costs.

C2.3.7 Use of BNSF Right-of-Way

- *Clarify that alternatives would be adjacent to BNSF right-of-way rather than share the BNSF right-of-way.* Through the Preliminary AA and the September 2010 Supplemental Alternatives Analysis, it was planned that the HST would share the BNSF right-of-way wherever possible to the extent allowed by safety considerations, BNSF business and operations requirements, and infrastructure conflicts. After discussions with BNSF and refinement of preliminary designs resulted in a need to change this approach—namely, to keep the HST outside of BNSF right-of-way, but otherwise remain as close as possible to it.

On May 5, 2011, the Authority Board considered and accepted the recommendations of the May 2011 Supplemental Alternatives Analysis (Authority 2011a). With these recommendations, in conjunction with the recommendations of the Preliminary AA Report, the project description and the alternatives to be considered in the Draft EIR/EIS were established.

C2.4 Supplemental Alternatives Analysis (December 2011)

In December 2011, after circulation of the draft EIR/EIS, the Authority issued a third Supplemental Alternatives Analysis (Authority and FRA 2011g) to update the Preliminary AA Report from June 2010 (Authority and FRA 2010a), the September 2010 Supplemental Alternatives Analysis (Authority and FRA 2010b), and the May 2011 Supplemental Alternatives Analysis (Authority and FRA 2011f). The previous reports served as the basis for the alternatives contained in the Draft EIR/EIS that was published in August 2011. The December 2011 Supplemental Alternatives Analysis presented documentation and analysis of a recommended new alignment and station location west of Hanford in Kings County.

In response to stakeholder, agency, and public feedback on the HST alignment that bypasses Hanford to the east, the Authority re-introduced alternative routes that would bypass Hanford to the west, along with alternative station locations (north and south of SR 198) to serve the Kings/Tulare region. A variation on the Hanford West Bypass 1 and 2 alternatives was identified in the 2005 Statewide Program EIR/EIS (Authority and FRA 2005), so inclusion of these alternatives was consistent with previous decisions.

In commencing with the preparation of the December 2011 Supplemental Alternatives Analysis, the following general characteristics of a new Hanford West Bypass Alternative were defined:

- Between Conejo and Corcoran, it would remain adjacent to the BNSF tracks to the greatest extent possible.
- It would run primarily at-grade, though other profiles in the general area of SR 198 and the SJVR–Cross-Valley Railroad tracks would be possible.
- It would have two variations at the south end to join with either the Corcoran C1 and C2 alignments (east side of the BNSF tracks) or the Corcoran C3 alignment (west side of the BNSF tracks).
- It would be defined to minimize impacts on dairies, wetlands, other agricultural lands, housing, and community facilities, while providing a feasible, cost-effective option for the Authority.

Opportunities for alignments and station locations within an approximately 3-mile-wide corridor were then identified. The 2005 Programmatic Alternative, at the eastern edge of this corridor, was briefly considered but not carried forward because it passed through two residential subdivisions (consisting of approximately 100 homes) constructed since the alignment was set in 2004. The 2005 Programmatic Alternative also (1) would have provided only one limited location for a station; (2) would have passed through the center of Laton, exacerbating the division of the community caused by the BNSF tracks; (3) would have passed directly through two operating dairy facilities and the Golden State Feed and Grain facility; and (4) would have passed immediately adjacent to the Kings Evangelical Free Church and Koinonia Church. The alignment was, thus, judged to be infeasible from the perspectives of impact and utility.

Alignments in the western portion of the corridor (west of Armona) were also considered but found to be infeasible, given that they (1) would have deviated too far from the BNSF transportation corridor; (2) would not have supported a station location within or near the Hanford urban area; and (3) would have had greater impacts on agricultural lands than the other alternatives considered.

Potential alignments in the center of the 3-mile corridor were then considered. Two alignment alternatives were defined: the Hanford West Bypass (HW) Alternative and the Hanford West Bypass Option (HW Option) Alternative. The HW Option alignment was identical to the HW alignment from Lacey Boulevard south to Corcoran; the two alternatives only differed north of Lacey Boulevard.

The December 2011 Supplemental Alternatives Analysis applied the evaluation measures established by the Authority for review of alternatives throughout the entire HST System to the HW and HW Option alternatives. Although the two alternatives were found to be similar in many respects, the evaluation identified a number of findings that favored the HW Alternative:

- The HW Alternative would avoid an area designated by the Laton Community for future growth.
- The HW Alternative would be more than ¼ mile farther away from the existing Kingston Park, a potential Section 4(f) property. The HW Option Alternative would lie within 100 feet of that park.
- Between the Kings River and Lacey Boulevard, the HW Option alignment would be closer to 13th Avenue than the HW alignment and would require more substantial reconstruction of 13th Avenue due to the roadway grade separations required to protect the HST tracks.
- The HW Alternative would affect fewer acres of agricultural and natural resources (including wetlands) and three fewer residential parcels.
- The HW Alternative would affect fewer residential noise and vibration–sensitive receivers and would be farther than the HW Option Alternative from two existing schools.

After consideration of these findings, the December 2011 Supplemental Alternatives Analysis recommended that only the HW Alternative be carried forward for impact analysis and inclusion in the Revised DEIR/Supplemental DEIS (Authority and FRA 2012f). In doing so, the report specified two locations where an elevated profile would be necessary: (1) the Kings River crossing and (2) the BNSF crossing between Kent and Kansas Avenues (to match the C1 and C2 Corcoran Alternatives). The HST profile near the SJVR and SR 198 crossings was specified to be at-grade with the appropriate undercrossings or overcrossings of local roads, SJVR, and SR 198.

The December 2011 Supplemental Alternatives Analysis also recommended that a station alternative be located east of 13th Avenue and north of SVJR, rather than at an alternative location south of SR 198. The northern location was determined to afford the best opportunity for intermodal connections, including regional bus service, Amtrak service (via a shuttle to the Downtown Hanford Station), and potential future commuter rail service using the SJVR. This location was also determined to provide the best opportunity for transit-oriented development, particularly due to its superior access to Downtown Hanford and the city’s principal retail and office corridor (Lacey Boulevard).

On December 13, 2011, the Authority Board considered and accepted the recommendations of the December 2011 Supplemental Alternatives Analysis (Authority 2011b). With these recommendations, the project description and alternatives to be considered in the Revised DEIR/Supplemental DEIS (Authority and FRA 2012f) were established (Figure C2-3).

C2.5 Refinements of Alternatives

After the December 2011 Supplemental Alternatives Analysis, a series of meetings and outreach activities led to further refinement of the Bakersfield alternatives. The Authority and FRA, in cooperation with the affected stakeholders, developed a hybrid alternative alignment for the Bakersfield subsection to address substantive comments received during public and agency review of the Draft EIR/EIS. This hybrid alternative is a variation of the two Bakersfield subsection alternatives evaluated in the Draft EIR/EIS, with all three alternatives sharing corresponding termini and an HST station generally in the vicinity of Downtown Bakersfield, near the Amtrak station. The Bakersfield Hybrid Alternative (Figure C 2-3), developed in early 2012, was carried forward into the environmental analysis in the Revised DEIR/Supplemental DEIS (Authority and FRA 2012f) (Figure C 2-3).

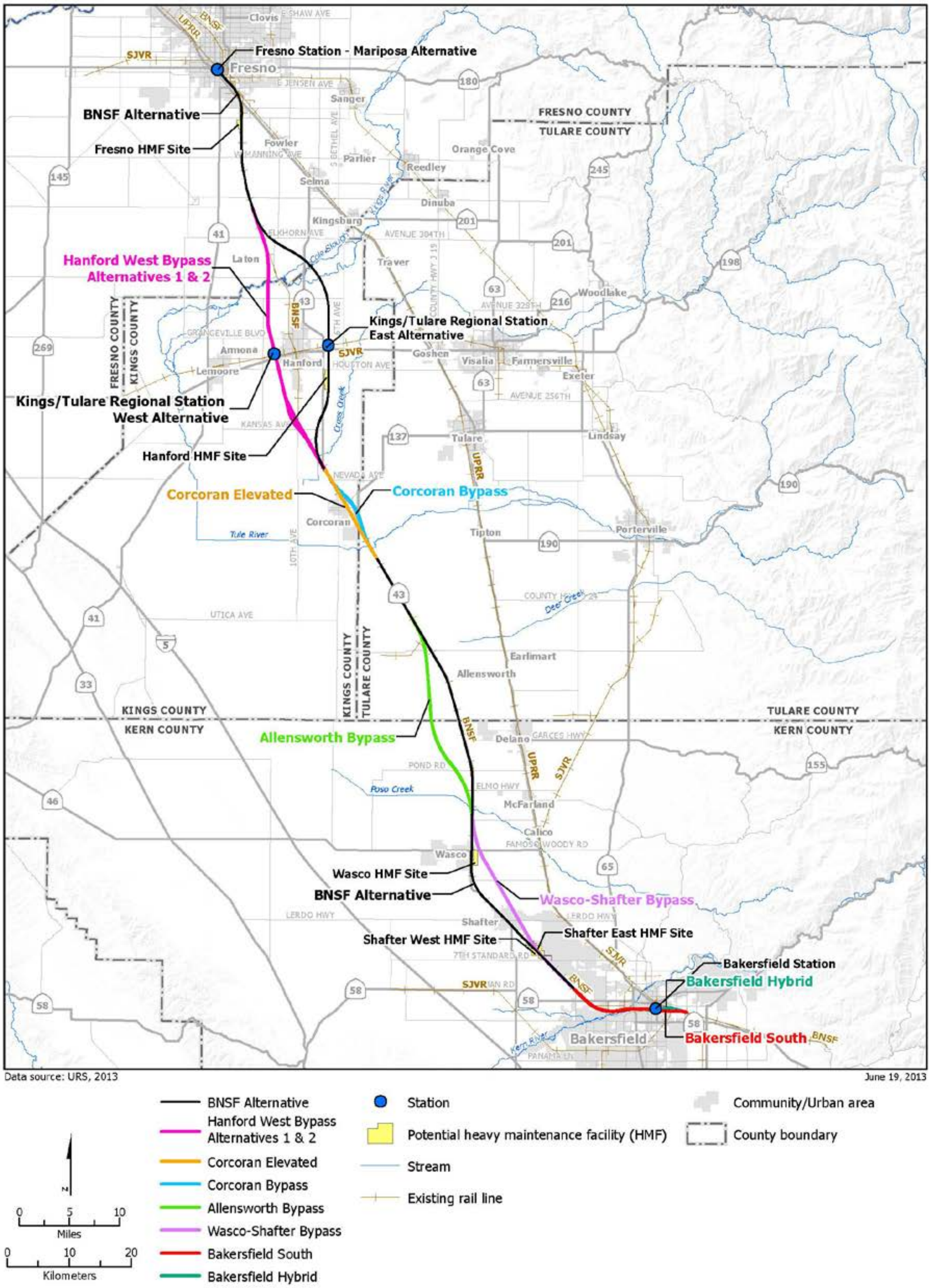
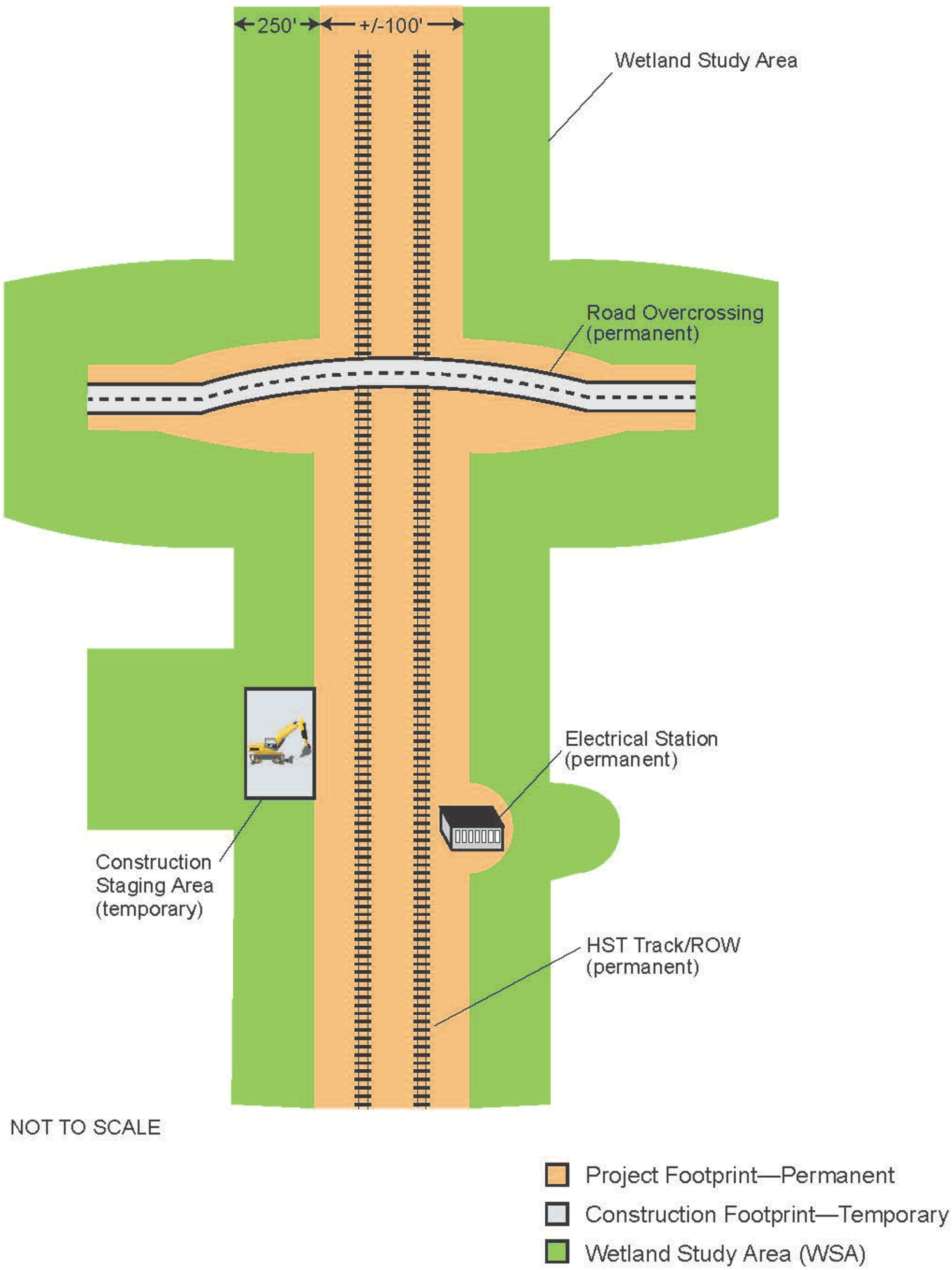


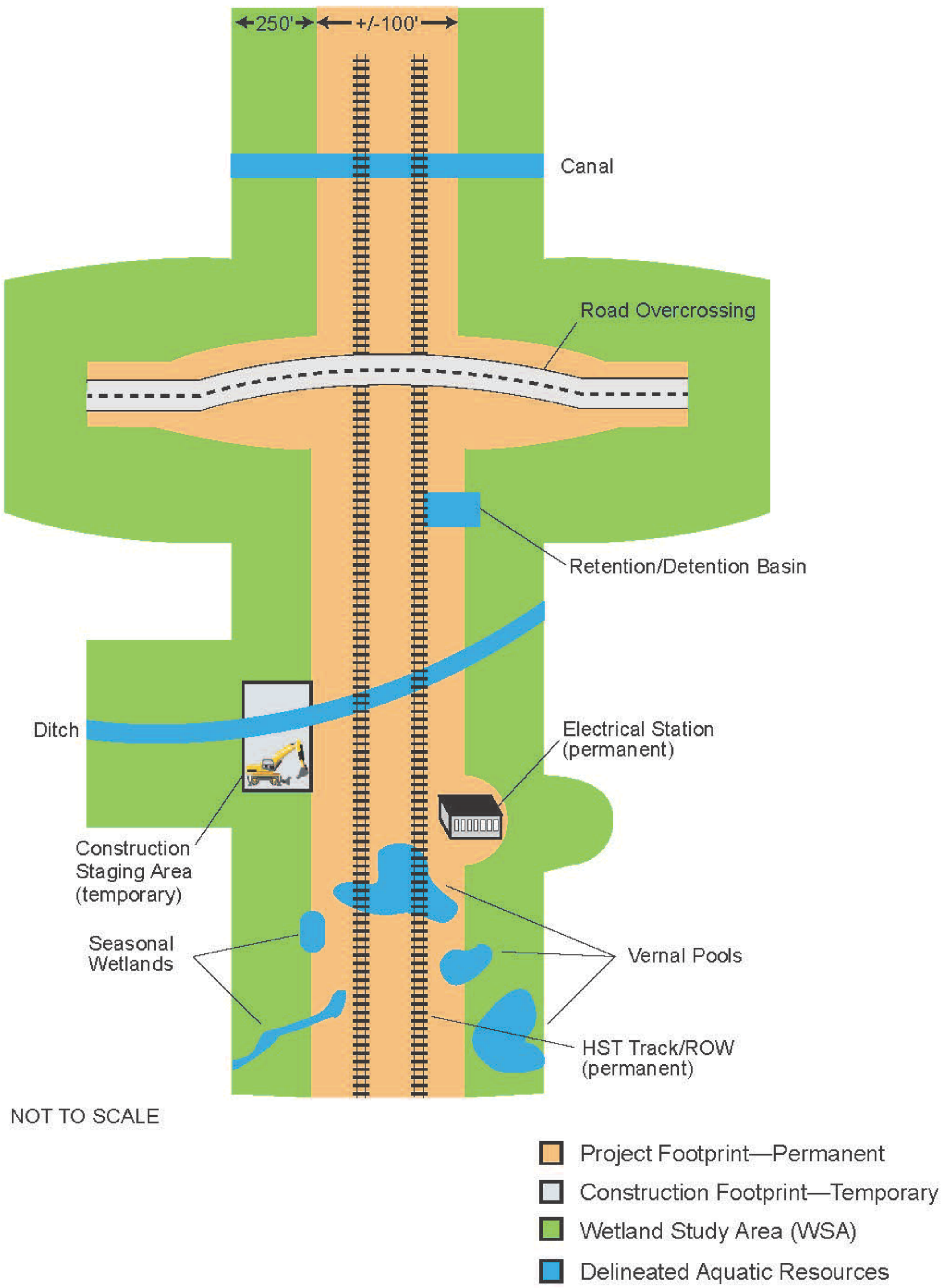
Figure C2-3
Fresno to Bakersfield Section project alternatives from Revised DEIR/Supplemental DEIS

Attachment 1
Impact Evaluation Schematics

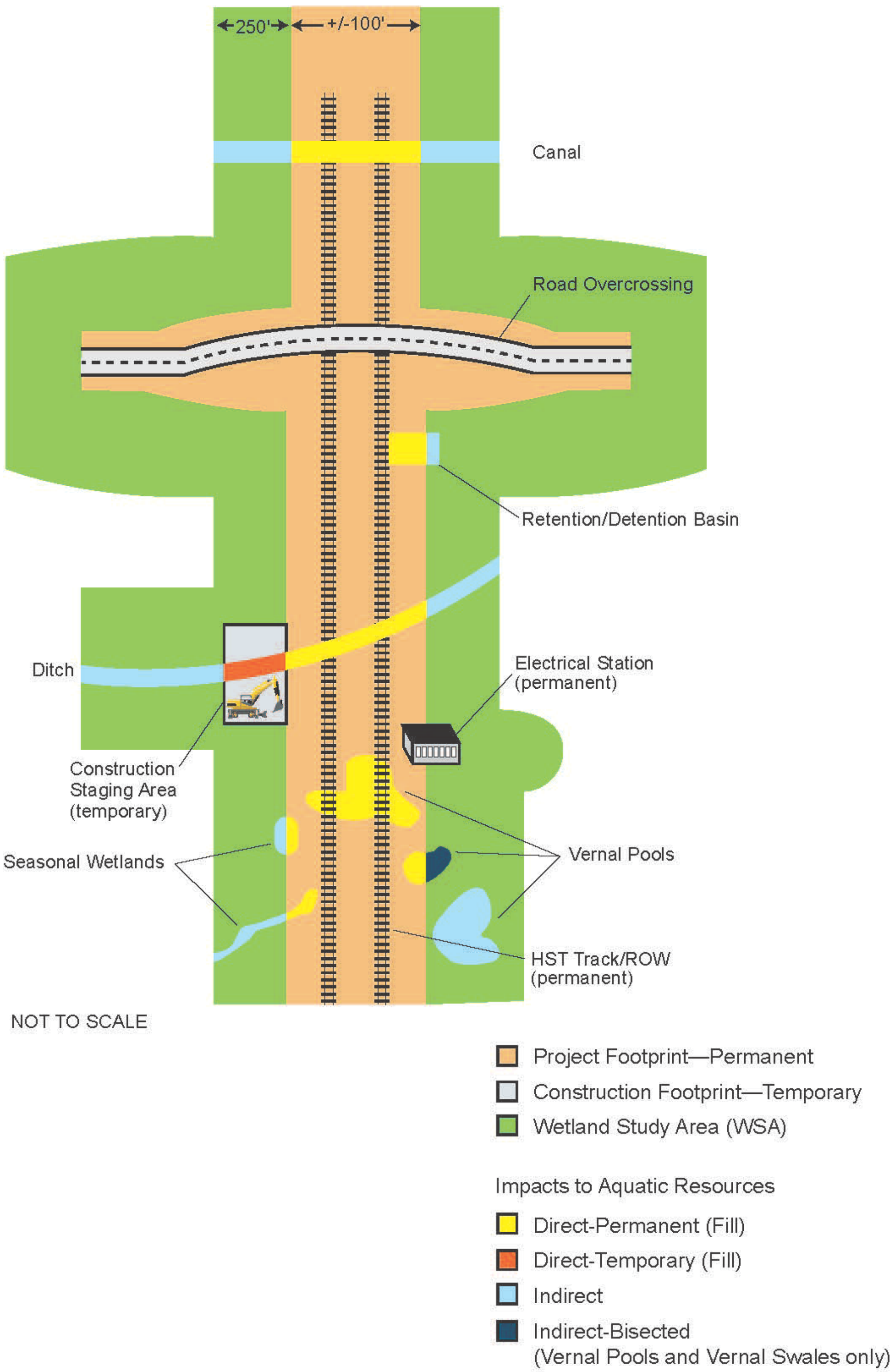
Project and Construction Footprint



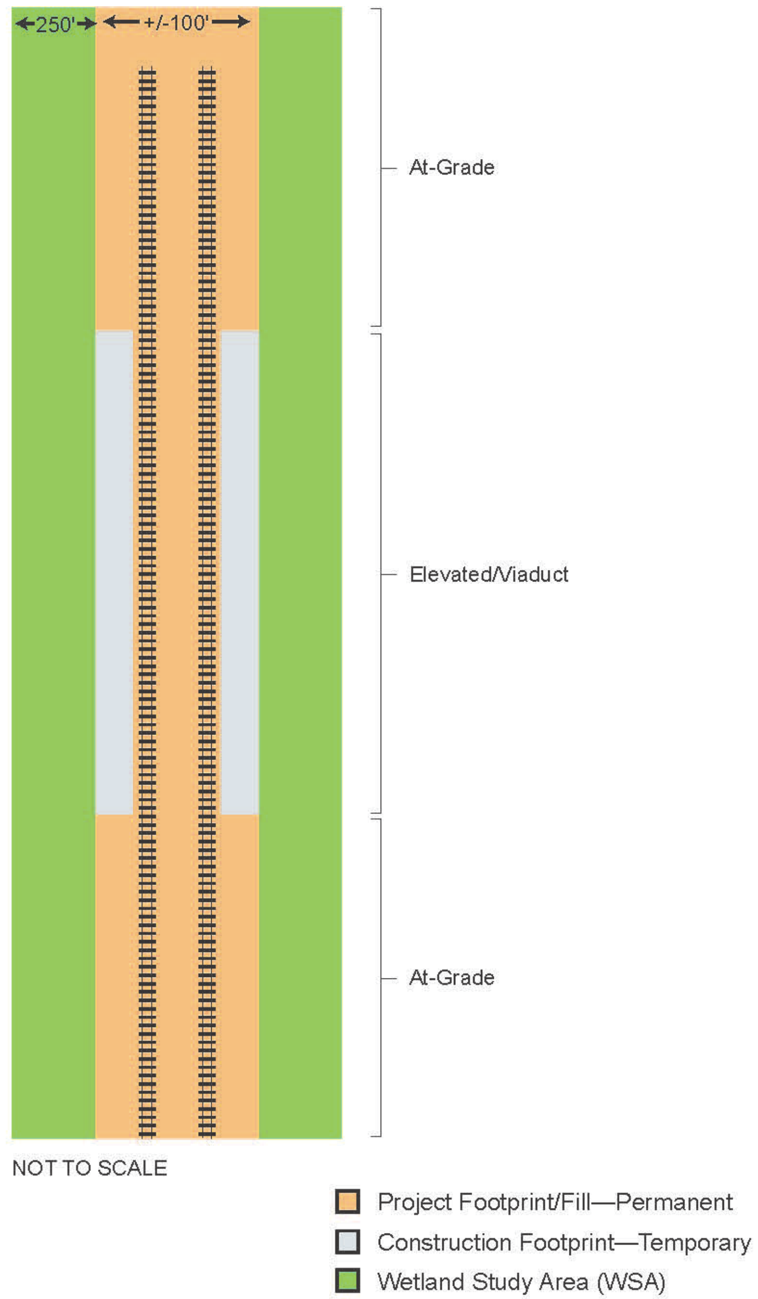
Wetland Delineation



Construction and Project Impacts



At-grade vs. Elevated



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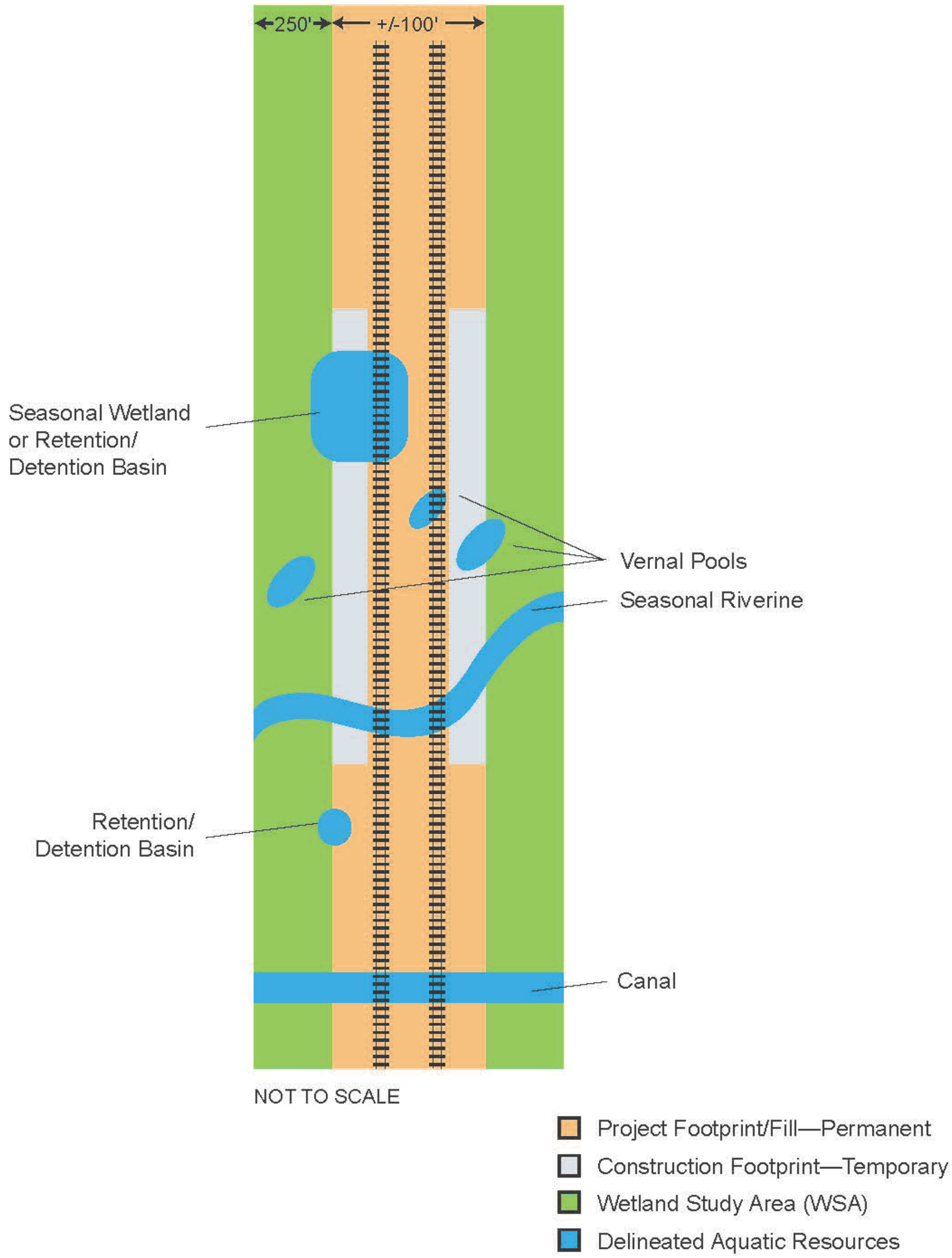

Construction and Project Impacts