Willits Bypass Project

Mitigation and Monitoring Proposal

U.S. Highway 101

Mendocino County, near the City of Willits, California

PM 43.1-52.3

01-26200

USACE file no. 1991-194740N

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Caltrans

CALIFORNIA DEPARTMENT OF TRANSPORTATION

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STATE OF CALIFORNIA
Department of Transportation

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List of Abbreviated Terms

2005 Feasibility Study;	project's wetland mitigation feasibility study
73 Federal Register [FR 19594–19705; 2008 Mitigation Rule	USACE's April 2008 Compensatory Mitigation for Losses of Aquatic Resources Final Rule
af	acre-feet
afy	acre-feet per year
APN	Assessor's Parcel Number
BMPs	best management practices
CalFire	California Department of Forestry and Fire Protection
Cal-IPC	California Invasive Plant Council
Caltrans	California Department of Transportation
CDFA	California Department of Food and Agriculture
CDFG	California Department of Fish and Game
CE	conservation easement
CESA	California Endangered Species Act
CFR	Code of Federal Regulations
cfs	cubic foot per second
CMP	Conceptual Mitigation Plan
CNPS	California Native Plant Society
CRZ	clear recovery zone
CWA	Clean Water Act
DEIS/DEIR	draft environmental impact statement/draft environmental impact report
DWR	California Department of Water Resources
EFH	essential fish habitat
EPA	U.S. Environmental Protection Agency
ESA	environmentally sensitive area
FAC	facultative
FACW	facultative wetland
FEI	functional equivalent index
FEIS/FEIR	final EIS/EIR
FHWA	Federal Highway Administration
FR	Federal Register
GPS	global position system
in/yr	inches per year
IPMP	invasive plant management plan
ITP	Incidental Take Permit
LEDPA	least environmentally damaging practicable alternative
LOS	level of service
MCRCD	Mendocino County Resource Conservation District
mi^2	square miles
MMP	mitigation and monitoring proposal
mph	miles per hour
MPR	mitigation parcels report
MRP	Monitoring and Reporting Program
NEPA/404 MOU	1994 National Environmental Policy Act/Clean Water Act Section 404 Integration Process Memorandum of Understanding
NIDIS	National Integrated Drought Information System

NMFS	National Marine Fisheries Service
NRCS	Natural Resources Conservation Service
OBL	obligate
OHWM	ordinary high water mark
project	Willits Bypass Project
RCB	reinforced concrete box
RSP	rock slope protection
RWB	North Coast Regional Water Quality Control Board
SONCC	Southern Oregon/Northern California Coast
SR	State Route
SWPPP	storm water pollution and prevention plan
TRMs	turf reinforcement mats
US 101	U.S. Highway 101
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WWTP	Willits Wastewater Treatment Plant

Chapter 1 Introduction

The California Department of Transportation (Caltrans), in conjunction with the Federal Highway Administration (FHWA), is proposing to construct the Willits Bypass Project (project), a new section of U.S. Highway 101 (US 101) that will bypass the city of Willits in Mendocino County (Figure 1-1). The project will result in unavoidable impacts on federal Clean Water Act (CWA) Section 404 jurisdictional wetlands and other waters of the United States (i.e., aquatic resources) in and adjacent to the project's right-of-way.

This document is a mitigation and monitoring proposal (MMP) that proposes compensatory mitigation for the impacts of the project on wetlands and other waters of the United States. This MMP will be used to support compliance with CWA Section 404. Its format and content are in accordance with guidelines established by the U.S. Army Corps of Engineers (USACE) (33 Code of Federal Regulations [CFR] Parts 325 and 332) and U.S. Environmental Protection Agency (EPA) (40 CFR Part 230). This introductory chapter identifies the responsible parties for the project and presents an overview of the project, including features, impacts, and refinements to the project design to avoid and further reduce impacts. The balance of the document is organized as shown below.

- Chapter 2, Objectives, describes the aquatic resource types and amounts that will be affected; summarizes the proposed mitigation; and describes the mitigation objectives, resource types and amounts that will be provided, and method of compensation (establishment, rehabilitation, and/or re-establishment). It also describes the functions and services of the affected aquatic resources.
- Chapter 3, Site Selection Criteria, describes the factors considered in identifying parcels for offsite mitigation.
- Chapter 4, Site Protection Instruments, presents information on provisions for long-term mitigation site protection and management.
- Chapter 5, Baseline Information, describes the existing ecological characteristics of the affected aquatic resources in the impact area and on the mitigation parcels.
- Chapter 6, Determination of Credits, describes the amount and type of acreage to be provided by mitigation for each affected aquatic resource and includes a brief rationale for the determination.
- Chapter 7, Mitigation Work Plan, describes the implementation plan for on- and offsite mitigation.
- Chapter 8, Mitigation Maintenance Plan, describes the on- and offsite mitigation maintenance, including post-implementation plant establishment period and the short-term maintenance period and maintenance activities that will be implemented.
- Chapter 9, Performance Standards, describes performance standards used to determine whether compensatory mitigation is achieving its objectives.

- Chapter 10, Monitoring Requirements, describes the parameters to be monitored to determine whether the mitigation is on track to meet performance standards or whether adaptive management is needed, and includes a schedule for monitoring activities.
- Chapter 11, Long-Term Management Plan, summarizes the proposed management of mitigation after performance standards have been achieved to ensure long-term sustainability, as well as long-term financing mechanisms and the responsible party for long-term management.
- Chapter 12, Adaptive Management Plan, presents a management strategy to address unforeseen changes in site conditions or other components of compensatory mitigation, including a description of the process and the responsible party for implementing adaptive management measures.
- Chapter 13, Financial Assurances, describes financial assurances that will be provided, as well as justification of their sufficiency to ensure a high level of confidence in successful completion of compensatory mitigation in accordance with performance standards.
- Chapter 14, References, lists the references used in preparation of the MMP.
- Chapter 15, List of Preparers and Reviewers, identifies the staff responsible for the preparation and quality control of the MMP, including internal and external reviewers.

Several appendices are included as part of the MMP.

- Appendix A, Nomenclature of Plant and Animal Species Mentioned in the MMP.
- Appendix B, Aquatic Resources Impact Maps.
- Appendix C, Aquatic Resources on Mitigation Parcels and Proposed Mitigation Actions.
- Appendix D, Design Plans for Onsite Wetland and Riparian Re-establishment.
- Appendix E, Design Plans for Offsite Mitigation.
- Appendix F, Haehl and Upp Creek Stream Restoration and Fish Passage Design Plans.
- Appendix G, Invasive Plant Management Plan for Offsite Mitigation Parcels.
- Appendix H, Assessment of Erosion Sites on Offsite Mitigation Parcels in Little Lake Valley.
- Appendix I, Data Collection Forms from the USACE Mitigation Parcel Assessments.
- Appendix J, Wetland Hydrology and Soil Analysis for Offsite Wetland Establishment Areas.
- Appendix K, Vegetation Sampling of Proposed (Group 1) Wetland Establishment Sites.
- Appendix L, Property Analysis Record for the U.S. Army Corps of Engineers Jurisdictional Wetland Mitigation and Monitoring Plan.
- Appendix M, Wetland Inundation Mapping for Onsite Mitigation Areas.
- Appendix N, Wetland Inundation Mapping for Offsite Mitigation Areas.

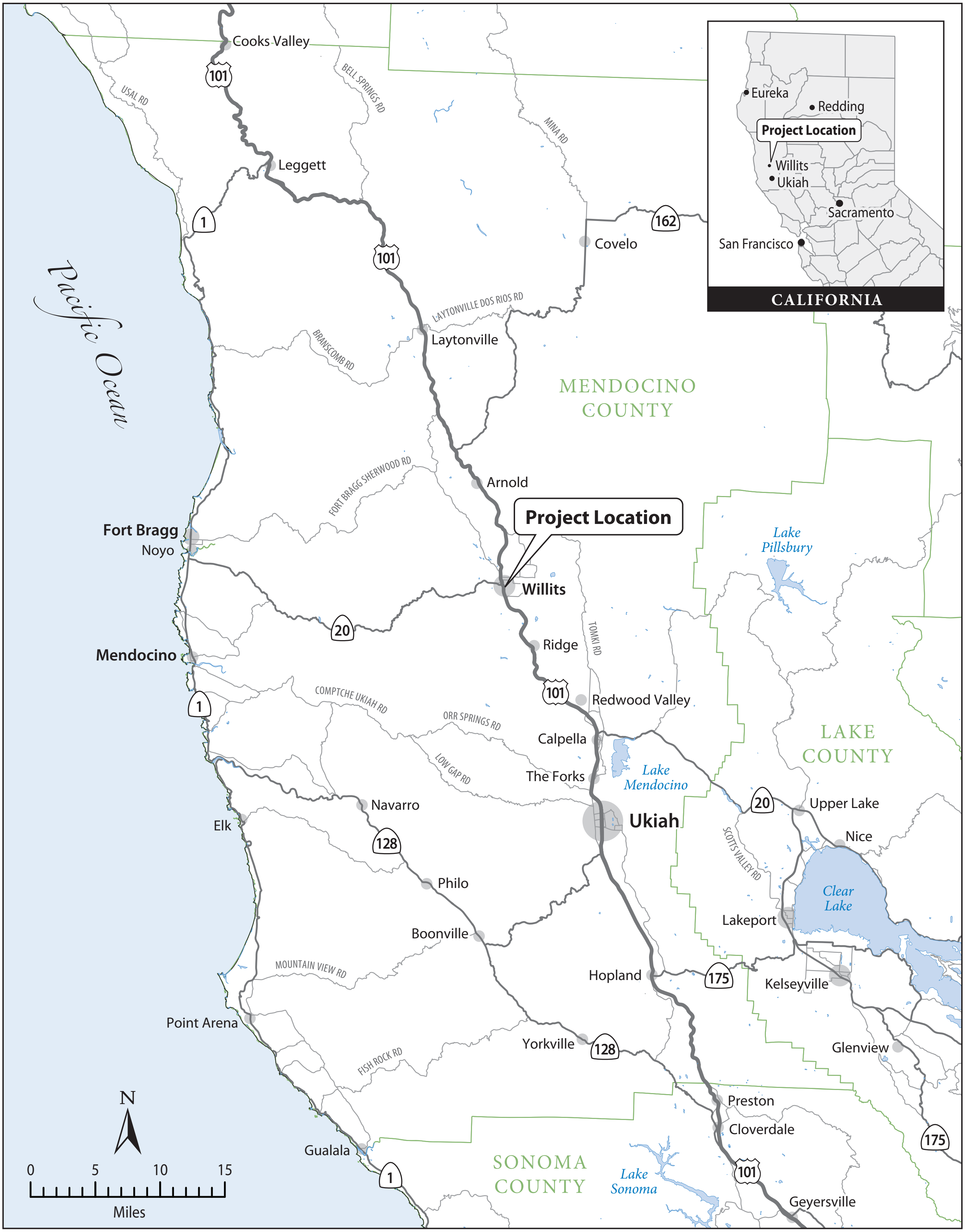

Figure 1-1
Regional Location

The appendices are bound separately from this document in three sets: Appendices A and G–L; Appendices B–D, M, and N; and Appendices E and F.

Caltrans has developed construction-level plans for the Willits Bypass Project. These plans will be provided to USACE as a stand-alone submittal from this MMP. These plans contain the preproject elevations which will be used to guide the re-contouring effort to establish pre-project conditions.

1.1 Project Overview

The project is a four-lane highway with several bridges spanning creeks and local roads, viaducts spanning a floodplain, and interchanges with existing US 101 at each end of the bypass. Maps of project features are located at the end of this chapter (Figures 1-2a to 1-2d). The bypass alignment meanders through the southwestern portion of Little Lake Valley, just east of Willits in Mendocino County. The 5.9-mile bypass begins approximately 0.6 mile south of the current Haehl Creek crossing of US 101 and ends approximately 1.8 miles south of Reynolds Highway.

The bypass alignment passes through the 100-year floodplains of Haehl, Baechtel, Broaddus, Mill, and Upp Creeks, all of which are tributaries of Outlet Creek, a tributary of the Eel River. To avoid increasing the base flood elevation of the floodplain, the bypass design incorporates 1.2-mile viaducts consisting of two parallel elevated structures (one for each direction of traffic) spanning the floodplain (Figure 1-2c).

Because of funding constraints, the bypass will be constructed in two phases. Phase 1 entails construction of a functional interim facility consisting of a two-lane highway. These two lanes will run the entire length of the project limits and will serve as the southbound lanes in the ultimate configuration under Phase 2.

Phase 2 entails construction of the other two lanes—creating a full four-lane facility—when sufficient funding becomes available. The environmental study limits encompass the proposed full four-lane bypass. Right-of-way purchased for the bypass will satisfy the requirements of the full four-lane facility. This MMP addresses the mitigation needs for Phase 1 (two-lane highway) only. A separate mitigation plan will be approved prior to construction of Phase 2 of the Willits Bypass Project. USACE approval of this additional proposal will be required prior to the beginning of the work associated with Phase 2.

For the purpose of this MMP, *bypass* refers to the four-lane bypass alignment footprint, which comprises the area disturbed by construction activities and the footprint of completed structures. Parcels located *within* the bypass alignment footprint are referred to as *onsite mitigation area* throughout this document. Parcels located *outside* the bypass alignment footprint that are included in the project's compensatory mitigation package are referred to as *offsite mitigation parcels*. Because the bypass alignment footprint passes through several offsite mitigation parcels (Benbow, Brooke, Ford, Lusher, and Niesen), these locations are referred to in both onsite and offsite parcel discussions. Although the contractor may choose not to use the proposed fill material borrow site at Oil Well Hill, and the borrow site is not within the limits of the bypass alignment footprint, the site is considered part of the onsite parcels. All aquatic resources at the

Oil Well Hill parcel have been excluded from the borrow site area so there will be no impacts from this proposed work (Chapter 2, Figure 2-2).

Section 1.1.2 below discusses the proposed four-lane facility.

1.1.1 Design Revisions after Final Environmental Impact Statement/Final Environmental Impact Report

As part of the environmental review process, several project alternatives were developed, and Modified Alternative J1T was selected as the preferred alternative. Although this alternative was not identified specifically as an alternative in the draft environmental impact statement/draft environmental impact report (DEIS/DEIR), it evolved from the CWA Section 404(b)(1) analysis, which seeks to identify the least environmentally damaging practicable alternative (LEDPA). Modified Alternative J1T shares similar project design elements with other alternatives discussed in the DEIS/DEIR, such as the J1T and LT alternatives, but it further reduces environmental and community impacts.

Since publication of the final EIS/EIR (FEIS/FEIR) in December 2006, Modified Alternative J1T has undergone several design revisions. The primary reasons for the design revisions were: (1) to avoid or further reduce impacts on sensitive resources, including avoiding conflicts with the planned Willits Wastewater Treatment Plant (WWTP) expansion project; and (2) to accommodate phased construction of the bypass. Additional design refinements to avoid or minimize impacts on sensitive resources are discussed further in Section 1.2.

The design revisions to Modified Alternative J1T are minor but have important implications for minimizing impacts on sensitive resources. The project remains a four-lane highway bypass with several bridges spanning creeks and local roads, viaducts spanning a floodplain, and interchanges at either end of the bypass. However, as noted above, because of funding constraints, the bypass will be constructed in two phases.

A functional interim two-lane facility will be constructed initially; the remaining lanes will be constructed later, when adequate funding becomes available, to complete the four-lane facility. This phased approach necessitated design revisions, including modifying the Quail Meadows interchange at the north end of the bypass. Phasing the construction of the original Quail Meadows interchange proved geometrically complex and wasteful; therefore, the interchange was shifted approximately 1,200 feet north and redesigned as a two-lane interchange in Phase 1. A roundabout was added to the west side of the interchange to connect two ramps to local roads. One of the benefits of the project is that an existing box culvert under US 101 at Upp Creek can be removed to address existing fish passage issues. In addition, all crossings of Upp Creek, previously planned as box culverts, now will be clear-span bridges (Appendix F).

Relocating the Quail Meadows interchange moved the interchange ramps such that they no longer constrained vertical clearance over the railroad, so the profile for the bypass could be lowered. Additionally, the railroad agreed to temporarily reduce clearance during construction, so the profile could be lowered further. These profile reductions, along with the interchange relocation, decreased the overall footprint of the project.

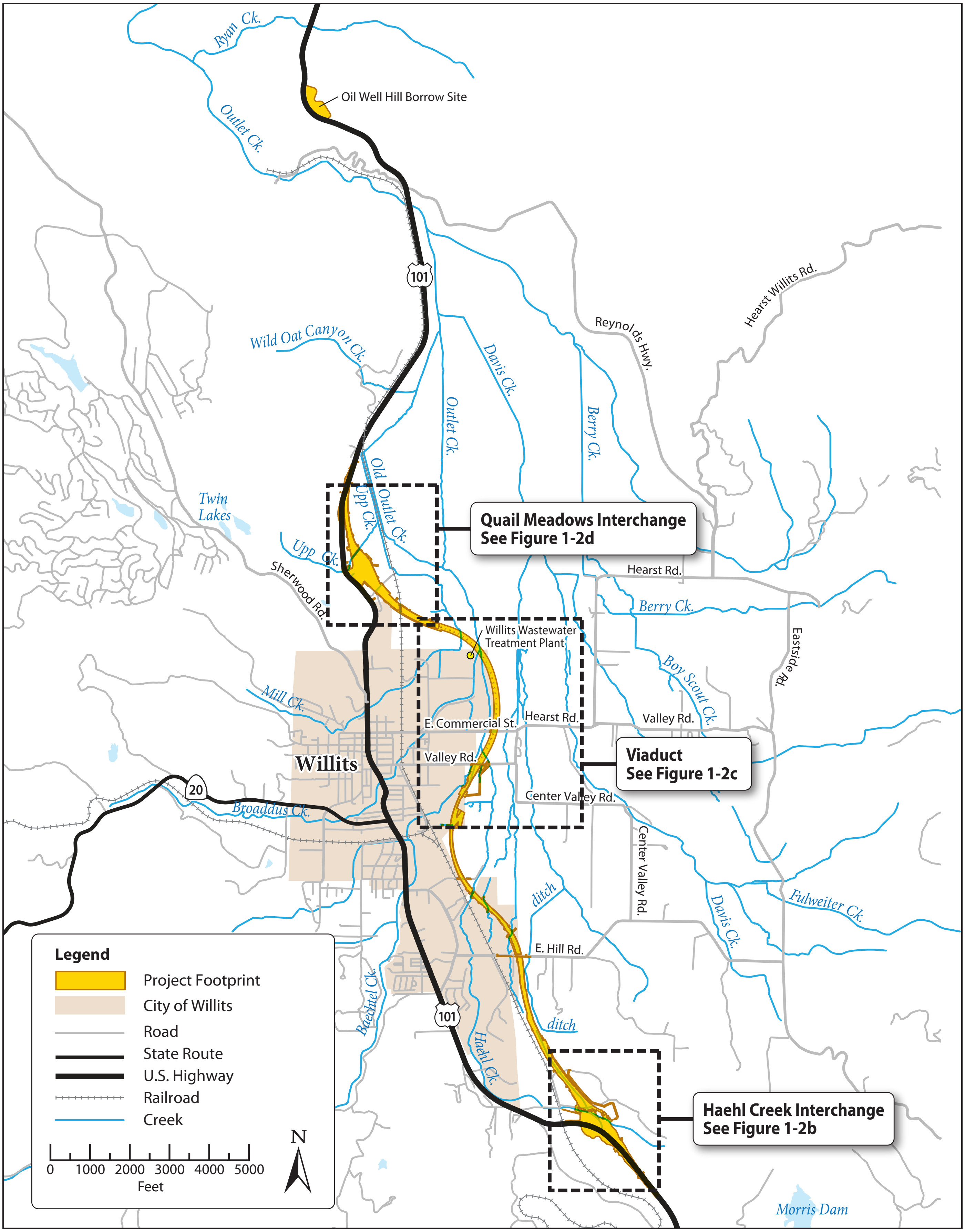

Figure 1-2a
Project Footprint—Overview Phase 1
Willits Bypass Project

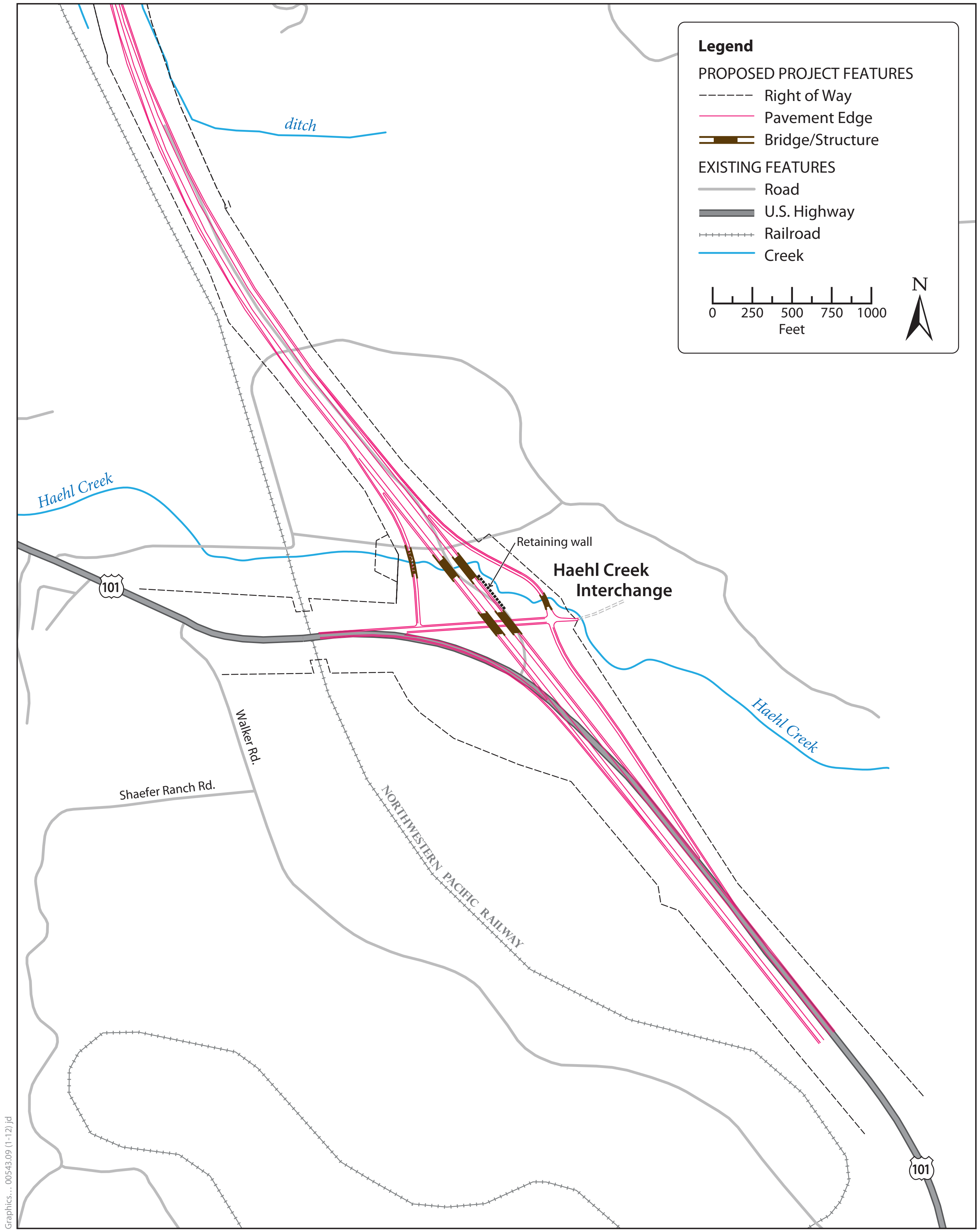

Figure 1-2b
Southern End Project Features—Haehl Creek Interchange Phase 1
Willits Bypass Project

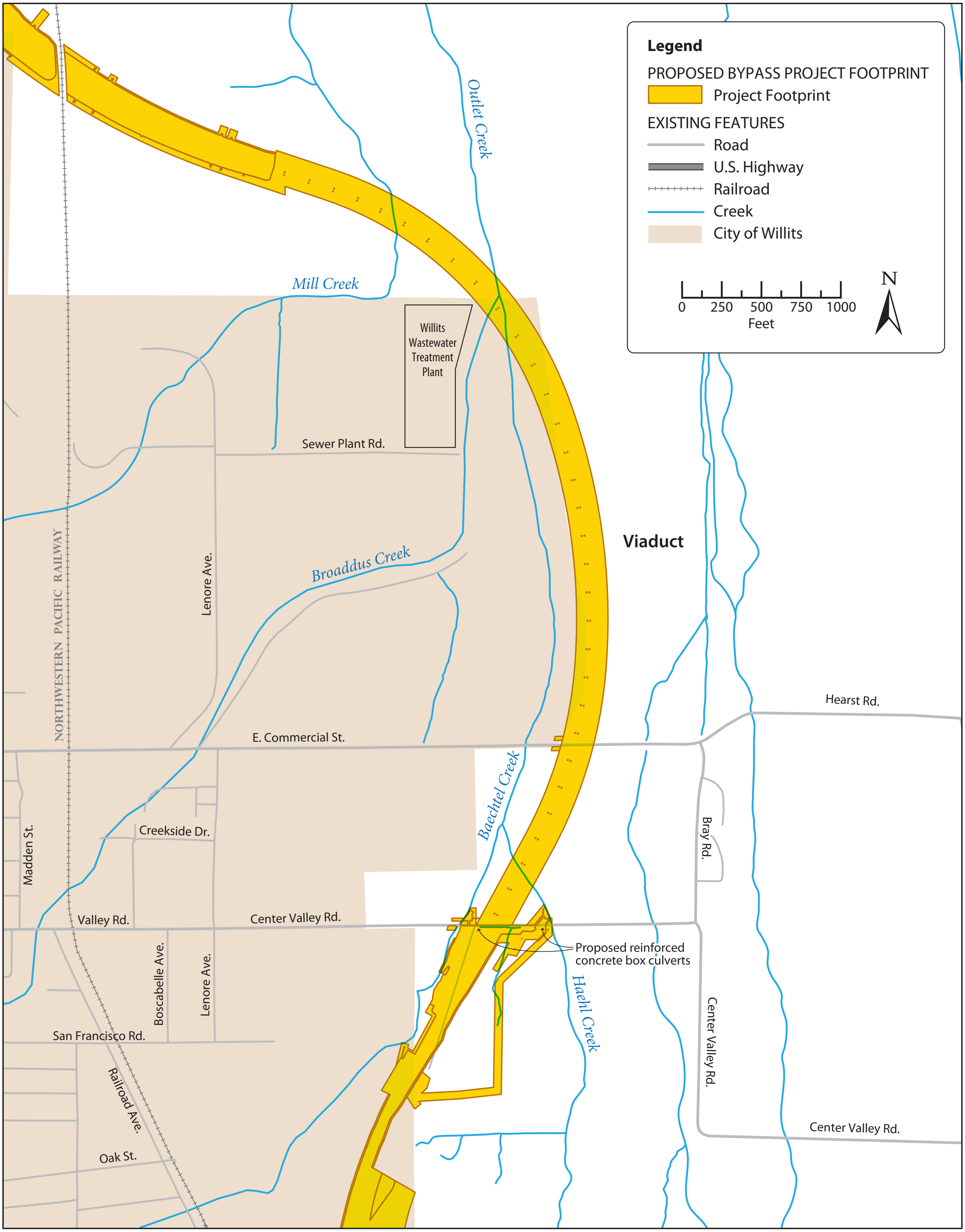

Figure 1-2c
Middle Project Footprint—Viaduct Phase 1
Willits Bypass Project

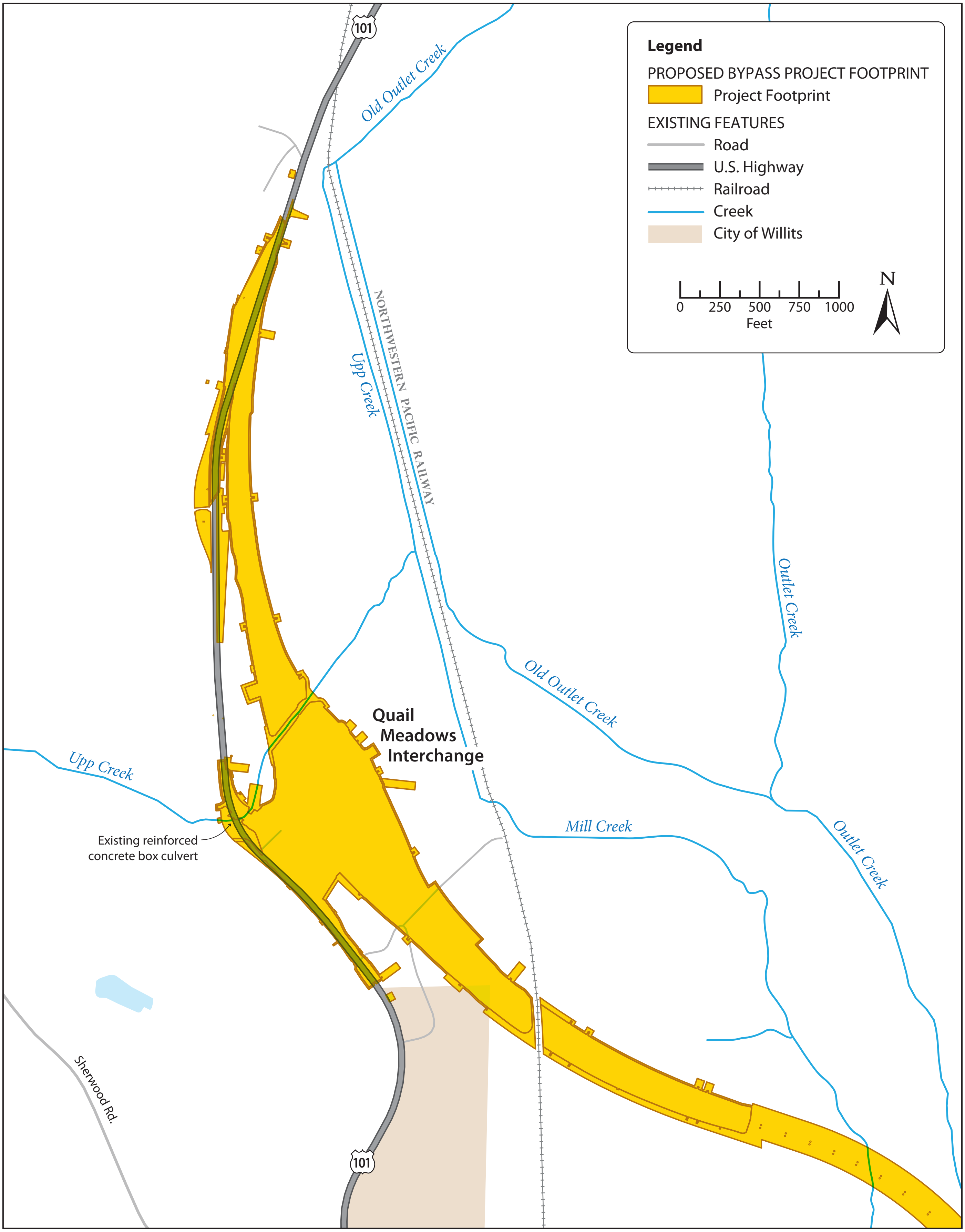

Figure 1-2d
North End Project Footprint—Quail Meadows Interchange Phase 1
Willits Bypass Project

1.1.2 Project Description

The following design elements will be incorporated into the project.

1.1.2.1 Roadway Design

The bypass is designed to accommodate the predicted interregional average annual daily traffic in 2028 at a level of service (LOS) of C or better. The bypass will be a four-lane highway with a 22-foot-wide median and barrier separating the northbound and southbound lanes. Each lane will be 12 feet wide. The inside shoulder width (nearest the median) will be 5 feet, and the outside shoulder width will be 10 feet. The highway sections will be designed for a maximum design speed of 68 miles per hour (mph) and will meet the purpose of providing at least LOS C. Where local roads will be improved or constructed, there will be two 12-foot lanes and shoulder widths meeting local design standards. The bypass alignment is shown in detail in Appendix B.

1.1.2.2 Interchanges

Two interchanges will be constructed for the bypass. The Haehl Creek interchange, at the south end of the bypass near Haehl Creek, will connect the existing US 101 south of Willits with the new facility (Figure 1-2b). The Quail Meadows interchange, near the north end of Little Lake Valley, will connect the new facility to the existing two-lane highway north of Willits (Figure 1-2d). The interchange ramps will be one lane.

1.1.2.3 Bridges and Other Structures

The bypass will traverse creeks, riparian corridors, streets, and railroad rights-of-way using 22 bridges, overcrossings, and viaducts and one retaining wall, as listed below and shown in Figures 1-2a to 1-2d:

- Six bridges in the Haehl Creek interchange area:
  - Northbound highway lanes separation with State Route (SR) 20
  - Southbound highway lanes separation with SR 20
  - Southbound off-ramp over Haehl Creek
  - Northbound on-ramp over Haehl Creek
  - Northbound highway lanes over Haehl Creek
  - Southbound highway lanes over Haehl Creek
- Two overcrossings at East Hill Road:
  - Southbound highway lanes (Phase 1)
  - Northbound highway lanes (Phase 2)
- Two clear-span bridges crossing the middle reach of Haehl Creek south of Shell Lane:
  - Southbound highway lanes (Phase 1)
  - Northbound highway lanes (Phase 2)

- One retaining wall on the west side of the southbound highway lanes just south of Center Valley Road
- Two viaducts spanning the 100-year floodplain:
  - Southbound (Phase 1)
  - Northbound (Phase 2)
- Two overcrossings of the railroad tracks in the Quail Meadows interchange area:
  - Southbound highway lanes (Phase 1)
  - Northbound highway lanes (Phase 2)
- Two overcrossings at the new connector road to the existing US 101 in the Quail Meadows interchange area:
  - Southbound highway lanes (Phase 1)
  - Northbound highway lanes (Phase 2)
- Six clear-span bridges crossing Upp Creek directly north of the Quail Meadows interchange:
  - Southbound highway lanes (Phase 1)
  - Northbound highway lanes (Phase 2)
  - Northbound on-ramp (Phase 1)
  - Northbound on-ramp (Phase 2)
  - Southbound off-ramp
  - Local intersection (roundabout)

1.1.2.4 Viaducts

The bypass alignment encroaches on the 100-year floodplain and includes two elevated structures, approximately 20 feet high, referred to as the *viaducts*. This design feature is intended to minimize floodplain and wetland impacts. The viaducts will be located in the central part of the bypass and will span Center Valley Road, the lower reach of Haehl Creek just upstream of the confluence with Baechtel Creek, East Commercial Street, Baechtel and Broaddus Creeks at the confluence with Outlet Creek, and Mill Creek (Figure 1-2c). The viaducts will span wetlands on two offsite mitigation parcels (Benbow parcels 007-010-04 and 007-020-03).

The approximately 6,000-foot-long viaducts will consist of separate northbound and southbound elevated superstructures, each approximately 42.6 feet wide. The edge-to-edge distance between the structures will be approximately 10 feet, and each generally will have at least 16.5 feet minimum clearance underneath.

1.1.2.5 Culverts

Two large reinforced concrete box (RCB) culverts and numerous smaller culverts will be built as part of the project. The RCB culverts will cross under Center Valley Road, near Shuster’s

Trucking, and will mitigate floodplain impacts associated with the roadway embankment south of Center Valley Road. The two culverts crossing Center Valley Road will be concrete boxes and will use turf reinforcement mats (TRMs) to minimize the use of rock slope protection (RSP) at the inlets and outlets.

1.1.2.6 Retaining Walls

One concrete retaining wall will be constructed just before the south end of the viaducts near Baechtel Creek. The retaining wall will be built to avoid the potential for the roadway embankment to be undermined by Baechtel Creek.

1.1.2.7 Excavation, Embankment, and Imported Borrow Material

The estimated embankment (i.e., fill) requirement for Phase 1 is approximately 1.4 million cubic yards. Because all soil that is excavated onsite will be reused as embankment, no disposal sites will be required for the bypass. From just north of the Haehl Creek interchange to the south abutment of the viaducts, and from the north abutment of the viaducts to the terminus of the bypass, the alignment is on embankment. Cut slopes generally will vary between 1:2 (vertical: horizontal) and 1:2.5. Fill slopes will vary between 1:2 and 1:4.

Because Modified Alternative J1T will be constructed largely on embankment, it will require imported borrow material in addition to material excavated onsite. The construction contractor will have the option to determine whether the source of material for earthwork fill will be the Caltrans-designated borrow site at Oil Well Hill, a commercial borrow site, or another site. Standard best management practices (BMPs) will be used to control the potential spread of invasive plants to and from the borrow site.

1.1.2.8 Fish Passage

Current fish passage opportunities at Haehl and Upp Creeks are constrained or absent as the result of the existing stream channel alignment or presence of artificial barriers (e.g., culverts) within the Caltrans right-of-way. Therefore, the project design incorporates improvements at these stream crossing locations to facilitate fish passage and improve instream habitat. Fish passage design elements were developed in consultation with the California Department of Fish and Game (CDFG) and National Marine Fisheries Service (NMFS).

Stabilization of both creek channels that pass through the interchange areas (the Haehl Creek interchange on upper Haehl Creek and the Quail Meadows interchange on Upp Creek) will consist of grade control structures at appropriate heights and intervals for the distance necessary to stabilize the natural stream gradient. Fish passage design elements comply with guidelines established by CDFG and NMFS. Additional details of these fish passage design elements are included in Section 3.3.1 and Appendix F.

1.1.2.9 Landscaping, Lighting, and Fencing

Permanently affected areas such as the cut-and-fill slopes adjacent to the roadway and along interchange ramps, as well as the median between the inside roadway shoulders, will be revegetated with native plants appropriate for Little Lake Valley. In compliance with Caltrans design standards, no trees will be planted within the clear recovery zone (CRZ) where errant vehicles could hit them. Only shrubs and herbaceous native species may be planted in these areas to prevent abrupt slowing, redirection, or launching of stray vehicles.

Highway lighting will be provided at the Haehl Creek and Quail Meadows interchanges. No lighting will be provided along the viaducts.

Fencing will be erected along the bypass right-of-way where appropriate. Right-of-way fencing is not expected to be installed at creek crossings or along the viaducts.

1.1.2.10 Streambank Stabilization

To prevent bank erosion and damage to the bypass, RSP will be required along short lengths of creek banks. The use of RSP will be minimized through the substitution of TRMs in appropriate locations where water velocities would not result in significant bank scour.

At locations where Haehl and Upp Creeks cross the project right-of-way, the stream channel will be designed to improve fish passage in accordance with guidelines established by NMFS and CDFG.

1.2 Design Refinements to Avoid and Minimize Impacts

Caltrans has developed a bypass alignment that avoids or minimizes impacts on aquatic resources, including wetlands and other waters of the United States. Following public circulation of the DEIS/DEIR in May 2002, a final alternatives analysis was prepared (California Department of Transportation 2005b), which identified Modified Alternative J1T as the LEDPA for the project. In accordance with CWA Section 404(b)(1) guidelines, USACE and EPA issued letters of concurrence in 2005 that Modified Alternative J1T constitutes the LEDPA and that the other alternatives considered do not meet the LEDPA criterion because of their overall environmental impacts.

Since adoption of the FEIS/FEIR and record of decision, several design elements/refinements have been incorporated into the project that further reduce the overall project footprint and impact area, avoiding or minimizing effects on aquatic resources. These design elements are listed below.

- Reduction in the roadway median width to reduce the bypass alignment footprint.
- Incorporation of steeper-than-standard embankment slopes at some locations, with additional erosion control measures to minimize the bypass alignment footprint.
- Extension of the length of the floodway viaducts to reduce the amount of fill in wetlands.
- Reduction in the height of the railroad overcrossing to reduce the footprint of the embankment.

- Shift in the alignment to avoid the WWTP expansion project and thereby avoid wetland impacts that would have been necessary to relocate the WWTP aeration ponds.
- Installation of clear-span bridges, rather than culverts, at the Haehl Creek interchange and the Quail Meadows interchange across Upp Creek to avoid permanent fill in other waters of the United States, decrease future maintenance-related impacts, and provide better passage for fish and wildlife.
- Lowering of profile near Quail Meadows overcrossing.
- Relocation of the Quail Meadows interchange to reduce the bypass alignment footprint.
- Elimination of the Center Valley Road interchanges from the project, thereby reducing the bypass alignment footprint.
- Removal of fish barrier culverts at Haehl and Upp Creeks.

These design elements have further reduced the extent of permanent impacts on aquatic resources by reducing the bypass alignment footprint. As discussed in Chapter 2, additional resource-specific minimization measures have been or will be employed before and during project construction to further reduce impacts on aquatic resources.

1.3 Developing Mitigation and Monitoring Proposal

Caltrans has developed this MMP to offset the unavoidable project impacts on wetlands and other waters of the United States. Proposed compensatory mitigation includes establishment, re-establishment, and rehabilitation of wetlands and other waters of the United States. Compensatory mitigation will increase the functions of wetlands and other waters of the United States and will be self-sustaining in perpetuity. These mitigation measure terms are defined in Chapter 2. Caltrans habitat restoration experts assessed each available parcel using the following criteria.

- Feasibility of acquisition (i.e., which property owners would be willing sellers).
- Inventory of habitats present or historically present (i.e., opportunities for establishment, rehabilitation, or re-establishment).
- Capacity of each parcel to achieve the performance standards.

Caltrans reviewed historical information to facilitate understanding of lost ecological functions that feasibly could be regained and, in coordination with USACE, evaluated the ongoing natural vegetation succession to identify which mitigation efforts would result in a sustainable natural ecosystem.

Based on a review of historical aerial photographs and other information, it was determined that the entire Little Lake Valley was generally wetter than it is today. Consequently, the valley would have supported extensive riparian forests, meandering streams, and wide floodplains fringed with marshes and wet meadows. Drier areas in the valley would have supported extensive oak savanna and grassland. Dense forests of mixed oaks and conifers would have been present on the surrounding hills. This MMP seeks to compensate for the project's impacts by maximizing the wetland functions that the current hydrologic and landscape conditions can support by eliminating agricultural management that degrades the wetland functions in Little Lake Valley. This will be achieved through establishing, rehabilitating, and re-establishing wetlands and other waters of the United States. Further details of the mitigation are presented in Section 2.4.

1.4 Agency Coordination in Development of Mitigation Vision

Development of this MMP has been a collaborative effort between Caltrans and USACE. Numerous meetings and onsite field reviews have been held with Caltrans and USACE staff to develop this MMP. This document was preceded by the following studies.

- Wetlands mitigation feasibility study (California Department of Transportation 2005b).
- Conceptual mitigation plan (California Department of Transportation 2006).
- Mitigation parcels report (California Department of Transportation 2007).
- Feasibility study of additional parcels inside and outside Little Lake Valley (ICF Jones & Stokes 2009a).
- Willits Bypass Final Mitigation and Monitoring Proposal (California Department of Transportation 2010).
- Wetland successional assessment (U.S. Army Corps of Engineers 2011).
- Extensive baseline surveys for hydrology, geomorphology, surface water quality, and vegetation (California Department of Transportation 2011).

These studies focused on the identification of suitable/available mitigation properties in Little Lake Valley, and development of the general extent and nature of mitigation strategies to offset temporary and permanent impacts. This MMP provides the temporary and permanent impact quantities for the bypass and detailed information on how the mitigation effort will be implemented to help offset the project's impacts on wetlands and other waters of the U.S. The Mendocino County Resource Conservation District (MCRCD) is the intended partner in implementing this MMP and will act as the long-term manager, but Caltrans may need other entities to perform specific tasks related to implementation and long-term management. The MCRCD has provided Caltrans with a letter of intent confirming their commitment to fill these roles. Caltrans, however, will remain the responsible entity to ensure compliance in implementing this MMP and meeting the required performance standards.

Chapter 2 Objectives

The overall goal of this MMP is to compensate for unavoidable permanent and temporary impacts on wetlands and other waters of the United States due to project construction by establishing wetlands, by improving the functions and services of existing wetlands and other waters on the offsite mitigation properties, and by re-establishing habitat functions and services on wetlands and other waters on the onsite parcels. The establishment and re-establishment mitigation together with the proposed rehabilitation mitigation of existing wetland and other waters will meet the policy of no net loss of wetlands and other waters functions and services in Little Lake Valley. Existing wetlands have relatively intact wetland hydrology and hydric soils with managed hydrophytic plant communities. Increases in aquatic functions will be small, requiring large acreages to compensate for the loss of functions associated with the net acreage loss. Therefore, compensatory mitigation will be accomplished through a combination of establishment, re-establishment, and rehabilitation. These terms are identified and defined in USACE's April 2008 Compensatory Mitigation for Losses of Aquatic Resources Final Rule (73 Federal Register [FR] 19594–19705; 2008 Mitigation Rule). Specific definitions are provided below.

- *Establishment* means manipulation of the physical, chemical, or biological characteristics present to develop an aquatic resource that did not previously exist at an upland site. It results in a gain in aquatic resource area and functions.
- *Re-establishment* means manipulation of the physical, chemical, or biological characteristics of a site with the goal of returning natural or historical functions to a former aquatic resource. It results in rebuilding a former aquatic resource and in a gain in aquatic resource area and functions.
- *Rehabilitation* means manipulation of the physical, chemical, or biological characteristics of a site with the goal of rehabilitating natural or historical functions to a degraded aquatic resource. It results in a gain in aquatic resource function, but not a gain in aquatic area.

USACE has determined that the jurisdictional wetlands presented in this MMP do not meet its definition for preservation outlined in the 2008 Mitigation Rule and therefore will not grant compensatory credit for preservation.

This chapter discusses the mitigation objectives and provides information on waters of the United States and other affected sensitive biological resources. Information also is presented on various components of the mitigation plan, such as impact minimization measures; establishment, re-establishment, and rehabilitation efforts.

2.1 Sensitive Biological Resources in the Bypass Alignment Footprint

This MMP presents compensatory mitigation for permanent and temporary impacts on jurisdictional wetlands and other waters of the United States located within the Phase I bypass alignment footprint. These waters are described below. Caltrans also is obligated to satisfy state agency mitigation requirements. Some of these requirements involve aquatic resources or species that rely on aquatic resources that can geographically overlap USACE jurisdictional areas. To provide a more complete picture of these interrelated resources, and because this overlap played a part in developing mitigation for the USACE wetland and other waters, this MMP discusses these other sensitive biological resources throughout the document. These resources include:

- **Federally listed fish:** Southern Oregon/Northern California Coast (SONCC) coho salmon, California coastal Chinook salmon, and northern California steelhead.
- **Riparian habitat:** In some areas, this encompasses protected fishery resources.
- **State-listed plants:** North Coast semaphore grass and Baker's meadowfoam.

These resources also occur on the onsite and offsite mitigation properties. Descriptions of the existing conditions of these resources on the offsite mitigation properties are provided in Chapter 5. Scientific names of plants and animal species mentioned in this MMP are included in Appendix A.

2.1.1 Jurisdictional Wetlands and Other Waters of the United States

For the purpose of this document, *wetlands* refers to all aquatic resources that were found to satisfy the definition outlined in the *Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory 1987) and the *Interim Regional Supplement to the Corps of Engineers Wetlands Delineation Manual: Western Mountains, Valleys and Coast Region* (U.S. Army Corps of Engineers 2008b). *Other waters* refers to all other jurisdictional drainages and water bodies that do not fall under the wetlands classification. Other waters discussed in this document are creeks or streams, ponds, and drainage ditches. USACE has verified jurisdictional wetland and other waters delineations for the bypass alignment footprint and offsite mitigation properties. Wetlands and other waters in the bypass alignment footprint are shown on figures in Appendix B; wetlands and other waters on the offsite mitigation properties are shown on figures in Appendix C.

2.1.1.1 Jurisdictional Wetlands

USACE requires that wetlands be categorized using the Cowardin classification system (Cowardin et al. 1979). Table 2-1 shows the Cowardin system categories and corresponding riparian vegetation communities, and these wetland habitats are described in Chapter 5.

Table 2-1. Wetland Habitat Types in the Bypass Alignment Footprint

Vegetation Type	**Wetland Habitat Type; *Cowardin Classification***
Riparian	Willow riparian scrub; *Palustrine scrub-shrub broad-leaved deciduous*
	Mixed riparian scrub; *Palustrine scrub-shrub broad-leaved deciduous*
	Mixed riparian woodland; *Palustrine forested broad-leaved deciduous*
	Oregon ash riparian woodland; *Palustrine forested broad-leaved deciduous*
	Valley oak riparian woodland; *Palustrine forested broad-leaved deciduous*
Marsh	Mixed marsh; *Palustrine emergent persistent*
	Tule marsh; *Palustrine emergent persistent*
Wet meadow	Wet meadow; *Palustrine emergent non-persistent*
Swale	Wetland swale; *Palustrine emergent non-persistent*
Vernal pool	Vernal pool; *Palustrine emergent non-persistent*

2.1.1.2 Other Waters of the United States

The project is in the Southern subbasin of the Outlet Creek Basin. The Outlet Creek Basin complex is one of the headwater tributaries of the Eel River, the third-largest river system in California. The five major streams intersecting the bypass alignment footprint are Haehl, Baechtel, Broaddus, Mill, and Upp Creeks. Several smaller jurisdictional streams are present in the southern end of the bypass alignment footprint.

Except for Upp Creek, the streams that traverse the bypass alignment footprint are shaded by mature riparian vegetation. These streams provide fish habitat and support juvenile and adult salmonids. Instream habitat consists of pools, riffles, and shallow runs and glides. Streambanks are typically steep and channels incised.

All five streams within the bypass alignment footprint and the lower parts of their tributaries provide important habitat for adult and juvenile anadromous salmonids migrating to and from Outlet Creek. These streams are considered essential fish habitat (EFH) for coho and Chinook salmon. Some spawning and seasonal rearing may occur in some reaches of these creeks in the bypass alignment footprint (Jones & Stokes Associates 1997; Harris pers. comm.). California roach and introduced warmwater species (e.g., sunfish, largemouth bass) are predominant during reduced flow periods in summer and early fall. The need to improve water quality and general stream habitat conditions exists at several locations. The general conditions of the five streams are discussed in more detail in Chapter 5.

2.1.2 Other Sensitive Biological Resources

2.1.2.1 Protected Fisheries and Riparian Habitats

Hydrologic alterations, fish barriers, increased fine sediment load, nonnative invasive perennial grass management for cattle grazing, crop production and other agricultural uses, and the introduction of invasive species have negatively affected the wetland functions and services of riparian corridors throughout Little Lake Valley.

Three salmonid species listed as threatened occur in Little Lake Valley: SONCC coho salmon, California coastal Chinook salmon, and northern California steelhead. All three species have similar life histories and habitat requirements and therefore are discussed together as *anadromous fish* or *salmonids*. Based on CDFG and NMFS consultation, five tributary streams of Outlet Creek (Haehl, Baechtel, Broaddus, Mill, and Upp Creeks) and their adjacent riparian zones within the bypass alignment footprint are designated critical habitat for anadromous fish. For the purpose of this project, the riparian zones along these anadromous fish streams and their tributaries have been categorized based on their relationship to designated critical habitat areas for listed anadromous fish. Consequently, impacts on anadromous fish and mitigation for these impacts are discussed in the context of the protected fisheries and riparian habitat.

- *Protected fisheries* are riparian habitats that occur along streams where anadromous fish are known to occur (Haehl, Baechtel, Broaddus, Mill, and Upp Creeks—all tributaries of Outlet Creek) (Figure 1-2a). These corridors provide designated critical habitat for anadromous fish. The health of these corridors has an immediate, direct effect on anadromous fish populations. The zone for protected fisheries extends to riparian vegetation 100 feet (ft) from the ordinary high water mark (OHWM) on each side of the stream.
- *Riparian habitat* refers to areas of riparian habitat not directly associated with anadromous fish–bearing streams. These areas are found mostly along other waters that are tributary to streams supporting anadromous fish (protected fisheries) and wetlands.

2.1.2.2 State-Listed Plant Species

North Coast semaphore grass and Baker's meadowfoam are state-listed plants—generally called *listed plants* in this MMP—that occur in the bypass alignment footprint and offsite mitigation parcels, and are listed in Table 2-2. The plant status designated by the California Native Plant Society (CNPS) is identified in Table 2-2. No federally listed plants are known to occur in the bypass alignment footprint or on the offsite mitigation properties. The habitat requirements and locations for North Coast semaphore grass and Baker's meadowfoam in the project area and on the offsite mitigation properties are described in Chapter 5.

Table 2-2. Listed Plants in the Project Vicinity

Common and Scientific Name	Status		Natural Communities	Blooming Period
	State[1]	CNPS[2]		
North Coast semaphore grass (*Pleuropogon hooverianus*)	T	1B.1	Broadleaf upland forest; meadows and seeps; North Coast coniferous forest areas; mesic openings and edges	April–June
Baker's meadowfoam (*Limnanthes bakeri*)	R	1B.1	Meadows and seeps; marshes and swamps (freshwater); valley and foothill grassland (vernally mesic); vernal pools	April–May

[1] California state status codes:

T = Listed as threatened under the California Endangered Species Act (CESA). Species likely to become endangered in the foreseeable future.

R = Listed as rare under the CESA. Species that, although not presently threatened with extinction, may become endangered in the foreseeable future. This category is no longer used for newly listed plants, but some plants previously listed as rare retain this designation.

[2] CNPS status codes:

1B.1 = Rare, threatened, or endangered in California and elsewhere; seriously threatened in California (high degree/immediacy of threat).

2.2 Impacts on Waters of the United States and Other Sensitive Biological Resources in the Bypass Alignment Footprint

Construction of the project will result in temporary and permanent impacts on wetlands and other waters of the United States (Table 2-3). These impacts will result in the loss of aquatic functions and services associated with those features. Impacts on aquatic functions and services will comprise loss of physical, chemical, and biologic functions, including flood storage, flood desynchronization, groundwater recharge, base flow, sediment removal and sequestration, transformation of pollutants, food chain support, and wildlife habitat and botanical resources.

Construction of the project also will result in temporary and permanent impacts on anadromous fish critical habitat, North Coast semaphore grass, Baker's meadowfoam, and riparian vegetation; these impacts will be described in a separate MMP developed by Caltrans to address the mitigation requirements of CDFG and the North Coast Regional Water Quality Control Board (RWB).

Determination of temporary and permanent impacts on wetlands and other waters of the United States were calculated as shown below. Temporary impacts are areas that are filled temporarily during construction.

- All areas under new roadways and associated embankments were considered permanently affected. Temporary impacts were calculated as the area from the roadway embankment catchpoint (i.e., the toe of the embankment) to 3 meters beyond and any areas around new drainages that will be temporarily disturbed.
- Areas under newly placed utility poles were considered permanent impacts, and impacts from trenching to the new utility pole locations were considered temporary.
- The construction areas along the viaducts extend out 100 ft east and 55 ft west of the viaducts. Within the construction area, the areas where pier footings will be placed were calculated as permanent. The remaining areas were calculated as temporary impacts.

- A portion of the Rutledge pond will be filled. This area was considered a permanent impact. In addition, the pond will be reconfigured to allow for the same water retention as is currently afforded. The area occupied by the reconfigured pond was considered a permanent impact.

Table 2-3 presents Phase 1 impact acreages for wetlands (by type) and other waters.

Table 2-3. Phase 1 Project Impacts on Wetlands (by Type) and Other Waters

Wetland Type/Other Waters	Project Impacts (acres)[1]		
	Temporary	Permanent	Total
Marsh	1.00	6.10	**7.10**
Riparian Wetland	2.32	2.47	**4.79**
Swale	0.07	0.41	**0.48**
Vernal Pool	0.05	0.15	**0.20**
Wet Meadow	17.08	31.34	**48.42**
Total Wetlands	**20.52**	**40.47**	**60.99**
Other Waters	2.37	2.29	**4.66**
Total All Waters	**22.89**	**42.76**	**65.65**

Note:
[1] Numbers rounded for presentation, totals in table reflect sum of nonrounded numbers.

Phase 1 of the project is expected to result in 40.47 acres of permanent and 20.52 acres of temporary impacts on jurisdictional wetlands. Phase 1 is also expected to result in 2.29 acres of permanent and 2.37 acres of temporary impacts on jurisdictional other waters.

The ultimate four-lane project will result in a total of 52.97 acres of permanent impacts and 27.95 acres of temporary impacts on wetlands. It also will result in a total of 2.69 acres of permanent impacts and 3.12 acres of temporary impacts on jurisdictional other waters.

2.3 Determination of Required Wetland Mitigation Ratios

The objectives of this MMP are to offset unavoidable impacts on wetlands and other waters of the United States by replacing and increasing wetland functions primarily through the establishment and rehabilitation of wetlands that reflect fully functional successional unmanaged wetlands with respect to current circumstances in Little Lake Valley and will be self-sustaining in perpetuity (33 CFR 332.7[b]). Self-sustaining wetlands will have persistent functions and services, with little to no human intervention or management (e.g., water pumping, dredging, grazing or other means of vegetative management).

In general, the USACE San Francisco District requires a minimum mitigation ratio of 1:1, but typically increases mitigation requirements based on the wetland/functional components of the impact areas or the proposed compensatory mitigation areas. Impacts and compensatory mitigation are usually measured by surface area. Factors considered in assigning ratios include temporal delays between impacts and target mitigation conditions, speculative consideration of proposed mitigation, change in wetland types, loss of identified principal wetland functions not being replaced at compensatory mitigation sites, wetland-consuming mitigation proposals, rare or regionally significant wetland types, and site- or project-specific issues. The absence of a practical or institutionally recommended functional assessment process requires USACE to rely on best professional judgment. Typically, determinations are based on rendered field observations at the impact and mitigation sites.

To determine what was needed for no net loss of functions and services of waters of the United States, USACE undertook a direct assessment (USACE Phase 1 Impact Assessment) of the permanent and temporary impacts on waters of the United States for Phase 1 of the project. This assessment was used to assign preliminary mitigation ratios to impacts based on the current functions and services of the affected wetlands.

Subsequent to the USACE Phase 1 Impact Assessment, USACE and Caltrans held several meetings to discuss the wetland mitigation approach and associated mitigation ratios. The result of these meetings was the basis for the mitigation action approach and wetland mitigation crediting system. A description of the wetland mitigation crediting system is provided in Chapter 6.

2.3.1 U.S. Army Corps of Engineers Phase 1 Impact Assessment

In March 2011, USACE assessed the current condition of waters and wetlands affected by Phase 1 of the project. This information was used to assign mitigation ratios.

The USACE impact assessment resulted in the grouping of permanent impact areas into four units based on having similar wetland characteristics and conditions. Temporary impact areas were grouped into four units based on wetland type and proposed impact. Each group’s range of wetland qualities was captured in the site characteristics for most of the impacts.

The permanent and temporary impact groupings and recommended mitigation ratios are summarized below and in Table 2-4.

- **Permanent Impact Group 1—Palustrine Emergent Wetland Nonagricultural +/- Disturbed:** This group included a small number of emergent wetlands at the south end of the project. Most were previously affected by disturbances associated with grading from roads, runoff from roads, or drainage impediments from earth movement. Total area for this group is 1.26 acres, and a 1:1 mitigation ratio was recommended.
- **Permanent Impact Group 2—Palustrine Emergent Wetland Agricultural Managed:** This group included most of the permanent impacts and was scattered across the length of the project. Wetlands in this group had various degrees of disturbance, from horse and cattle pasture to hayed/grazed fields. In general, wetland soil and hydrology were intact for the current circumstance for the unit’s landscape position. Functions associated with the wetland hydrology and hydric soils would be lost for these areas. Areas proposed for enhancement have similar soil types, wetland hydrology, and plant communities. Total area for this group is 31.03 acres, and a mitigation ratio of 1.25:1 was recommended.
- **Permanent Impact Group 3—Palustrine Emergent Wetland Fallow:** This group included mostly abandoned agricultural lands and prolonged ponded areas that have

succeeded to perennial marsh. Wetlands in this group are fully developed for wetland criteria in their landscape position. Proposed enhancement areas would need to undergo prolonged plant succession or aggressive planting to replace developed plant communities. Total area for this group is 5.84 acres, and a mitigation ratio of 3:1 was recommended.

- **Permanent Impact Group 4—Palustrine Forested Wetland Fallow and Riparian:** This group included a small number of wooded, abandoned agricultural fields and areas of wetland woody vegetation removal at perennial stream crossings. Wetlands in this group are fully developed for wetland criteria in their landscape position. The wetland riparian community provides aquatic functions unique to its landscape position. Proposed enhancement areas would need to undergo prolonged plant succession or aggressive planting to replace developed plant communities. Total area for this group is 2.33 acres, and a mitigation ratio of 3:1 was recommended.
- **Temporary Impact Group 2—Palustrine Emergent Wetland Fill:** This group included large areas associated mostly with the edges of the actual fill footprint or with the viaducts. Impacts on the wetlands in this group are understood to be available to contractors for the duration of the project and may include placement of fill, stockpiling materials, trenching for utilities, removing vegetation, and other activities that would affect the character of the wetlands. Because of the uncertain impacts and duration of work in wetlands associated with this group, compensatory mitigation will be required. Wetland areas will be returned to their original topographic and soil condition after project completion as a special condition of the USACE permit. Long-term impacts on some plant communities under the viaducts may occur because of shading and vegetation management associated with the road. Total area for this group is 18.17 acres, and a mitigation ratio of 1:1 was recommended.
- **Temporary Impact Group 4—Palustrine Forested Wetland Fill:** This group included areas of woody vegetation associated mostly with perennial or intermittent streams. Impacts on the wetlands in this group are understood to be available to contractors for the duration of the project and may include placement of fill, stockpiling materials, removing vegetation, and other activities that would affect the character of the wetlands. Because of the uncertain impacts and duration of work in wetlands associated with this group, compensatory mitigation will be required. Wetland areas will be returned to their original topographic and soil condition after project completion as a special condition of the USACE permit. Some permanent impacts on vegetation may occur because of vegetation management associated with the road. Total area for this group is 2.32 acres, and a mitigation ratio of 2:1 was recommended.

There are a number of linear units generally outside the bypass construction footprint. These palustrine emergent and forested wetland areas are available to the contractors during construction for vehicle access during the dry season. These areas do not qualify as fill in a wetland and are not included in the sum of the temporary impacts; they require no compensatory mitigation. Wetland areas will be monitored to confirm that they are not affected and that they are in their original condition after project completion.

2.3.2 Phase 1 Impact Assessment—Additional Information

Further clarification of project impacts has been provided by Caltrans subsequent to the USACE impact assessment. This information includes clarification on the level of temporary disturbance from utility relocations. In addition, USACE and Caltrans have been in discussion regarding the final compensation ratio for temporary impacts. USACE has requested further clarification of the projects' temporary impacts. The following information provides a more complete review of the temporarily affected areas and their mitigation than what was previously available to USACE at the time of their assessment of required credits.

- Baseline information for the temporary impact areas is available in Sections 5.1 and 5.2. A wetland delineation prepared for the bypass impact area provides more information on existing vegetation, hydrology, and soils. In addition, inundation mapping for both impact sites and mitigation areas was made available to USACE subsequent to the completion of their impact assessment.
- Temporary impacts resulting from the project will be fully re-established on-site. The contractor will be required to restore temporarily affected areas to the currently existing grade and elevation (original ground) as marked on project plans. Project features such as culverts and the floodplain viaducts will perpetuate existing hydrology. Performance standards in Chapter 9 require the re-establishment of wetland vegetation and hydrology.
- Restoration plans for the re-establishment of temporary impacts are available in Appendix D.
- Areas within the Caltrans right-of-way will be maintained in accordance with the Caltrans Maintenance Manual. Water quality is subject to permitting requirements of the State Water Resources Control Board and Regional Water Quality Control Boards. Any future impacts on resources remaining in the right-of-way covered by the CWA are subject to further permitting requirements.

Table 2-4. Summary of USACE-Determined Mitigation Ratios

Impact Group	Impacts (acres)	Mitigation Ratio	Required Mitigation (acres)
Permanent Group 1—Palustrine Emergent Wetland Non-Agricultural	1.262	1:1	1.262
Permanent Group 2—Palustrine Emergent Wetland Agricultural Managed	31.034	1.25:1	38.793
Permanent Group 3—Palustrine Emergent Wetland Fallow	5.844	3:1	17.532
Permanent Group 4—Palustrine Forested Wetland Fallow and Riparian	2.328	3:1	6.984
Subtotal	**40.468**	**–**	**64.571**
Temporary Group 2—Palustrine Emergent Wetland Fill	18.175	1:1	18.175
Temporary Group 4—Palustrine Forested Wetland Fill	2.315	2:1	4.63
Subtotal	**20.490**	**–**	**22.805**
Total	**60.958**	**–**	**87.376**

2.4 Functions and Services of Wetlands

Wetland functions and services were considered in developing the mitigation objectives and strategies/actions. *Wetland functions* are the processes by which the normal physical and biological properties of wetlands are supported and maintained (Brinson 1993; Smith et al. 1995). Not all wetlands perform the same functions or levels of functions; rather, these vary with wetland category, size, proximity to other wetlands, type and degree of previous and current disturbances, and adjacent land uses. In general, *wetland services* are benefits that wetland functions provide to human society, such as flood protection, maintenance of water quality, and recreation (Mitsch and Gosselink 2007) and societal value. Wetlands in the bypass alignment footprint and vicinity perform functions in three basic categories: hydrology functions, water quality and related functions, and flora and fauna habitat support.

Farming and urban development have resulted in major changes to the landscape of Little Lake Valley. Past and current land use has reduced the areal extent and degraded the functional capacity of wetlands and streams (other waters) that once covered most of Little Lake Valley. These wetlands and streams once provided high-function fish, wildlife, and plant habitat long into summer. These wetland and stream complexes allowed anadromous fish to feed and migrate through the valley into foothill spawning areas. Wetlands served as a natural filter to retain fine sediment carried into the valley by numerous streams. They also recharged groundwater aquifers. The extensive modern-day reduction and degradation of wetlands throughout the valley have severely affected the environmental quality of the Outlet Creek Basin.

The aquatic resources described above and other biological resources described in Chapter 5 are threatened by current land use practices, including intensive grazing and haying, vegetation management to increase or retain pastureland, cattle access to streambeds and streambanks, and water diversions for irrigation and draining wetlands. Not only do these practices negatively affect aquatic resources in Little Lake Valley, but they also affect downstream water quality and habitat for aquatic species. These practices degrade wetlands, diminishing their functionality in absorbing nutrients and sediments from the surrounding uplands. These practices also limit the capacity of the streams and associated riparian habitat in providing important dispersal corridors to areas up- and downstream of Little Lake Valley and in providing breeding and foraging habitat for fish and wildlife, including anadromous fish.

2.4.1 Hydrology Functions

Wetland hydrology comprises "all hydrologic characteristics of areas that are periodically inundated or have soils saturated to the surface at some time during the growing season" (Environmental Laboratory 1987). Wetland hydrology provides the basis for all wetland functions. Wetlands in the project vicinity carry out three general hydrologic functions:

- Groundwater recharge.
- Groundwater discharge.
- Floodflow alteration.

2.4.1.1 Groundwater Recharge

Groundwater recharge is the process in which surface flows are stored for a period sufficient for water to percolate into the soil or groundwater table. Groundwater recharge helps maintain the wetland hydrology of wet meadows. In the project vicinity, the potential for groundwater recharge is generally low. The terrain is relatively flat, but numerous artificial drainages and swales convey surface runoff into streams. Mixed marsh, which is found in internally drained basins and low-lying troughs in the northern portion of Little Lake Valley, has the highest potential for groundwater recharge. Vernal pools also have basins, but the subsurface restrictive layer that causes inundation prevents percolation.

2.4.1.2 Groundwater Discharge

Groundwater discharge occurs where the groundwater table intercepts the soil surface. It is important for maintaining stream flows during summer, as well as maintaining seeps, springs, and wetlands that depend on a shallow groundwater table. In the project vicinity, the potential for groundwater discharge is generally low. Groundwater discharge occurs in some areas of wet meadow where seeps and springs are present. These wetlands serve as a possible partial source of water for Outlet Creek downstream of Little Lake Valley, where it becomes a perennial stream during summer, when the stream reaches in the valley are usually dry.

2.4.1.3 Floodflow Attenuation

Short-term water storage decreases the amount and velocity of runoff, reducing peak floods and distributing storm flows over longer periods. The dissipation of energy in moving water reduces its erosive impact and helps reduce downstream sedimentation. This function is provided primarily by vegetated wetlands associated with riverine and lacustrine ecosystems, especially when the tributaries have natural broad floodplains in unchannalized/natural channels with unmanaged vegetation and secondarily by infiltration and detention on wet meadows. Surface roughness (e.g., thatch) increases detention time, promoting infiltration and shallow base discharge. Stream channels in the project vicinity have moderate to high potential for floodflow attenuation, with the highest potential occurring in riparian habitat and in the broad wetland meadows between tributaries. Marsh communities also have moderate potential for floodflow attenuation because they occur in shallow basins, but this potential is limited by the size and depth of the basins. Riparian communities not associated with stream channels, wet meadows, vernal pools, and swales help slow floodflow velocities but have low potential for floodflow retention because they lack basins.

2.4.2 Water Quality and Related Functions

Water quality and related functions (biogeochemical functions) are the characteristics that enable wetland ecosystems to transport and transform particulates, organics, and inorganic materials. Wetlands remove dissolved substances from water through various means, such as absorption, adsorption, solubilization, oxidation, biological transformation, and precipitation. Wetlands, by definition, are vegetated, and this vegetation is responsible for a wide range of physical and biochemical processes. Wetlands in the project vicinity carry out three general biogeochemical functions.

- **Sediment and toxicant retention:** Currently, water moves quickly through Little Lake Valley because of the shortened floodflow attenuation period associated with the managed vegetation and human-made hydrologic modifications. Mitigation actions on the offsite mitigation properties will improve both sediment and toxicant retention by allowing water to move more slowly through thatch and mature wetland vegetation consisting of both woody and herbaceous species. Bank stabilization measures also will create a net benefit for the retention of sediments in the valley.
- **Nutrient removal and transformation:** High nutrient loads in Little Lake Valley are a product of agricultural activities and other upstream land uses (LeDoux-Bloom and Downie 2008). The offsite mitigation will improve nutrient removal and transformation through wetland establishment and rehabilitation. Moreover, removal and reduction of grazing will allow water to move more slowly through the valley. Removal of grazing likely will result in an increase in herbaceous wetland and grassland biomass and the natural recruitment of riparian and oak woodland trees, shrubs, and herbaceous wetland species. Removal of grazing also will likely result in a decrease in fecal coliforms and organics.
- **Production export:** Much of the wetland area in Little Lake Valley is contiguous, with differing agricultural management activities among fields separated by fencing. Most of the wetland establishment and rehabilitation areas on the offsite mitigation properties are designed to increase production and nutrient export in the valley. Reduction of erosional areas, enhancement of water retention, and provision of more natural flow regimes through the valley will increase production and allow more effective export and nutrient movement.

2.4.2.1 Sediment and Toxicant Retention

Vegetation slows the velocity of water, reducing its ability to hold particles in suspension. Water in watersheds with more wetlands tends to have lower specific conductance (a measure of the total concentration of dissolved substances) and lower concentrations of chloride, lead, inorganic nitrogen, suspended solids, and total dissolved phosphorus than does water in watersheds with fewer wetlands. Also, certain wetland plant species help remove heavy metals. Therefore, wetlands improve water quality by removing both dissolved substances and suspended particulates.

In the project vicinity, the marsh community has a high potential for sediment and toxicant retention because it occurs in shallow basins, allowing water to be impounded and acted on by the vegetation. Most other wetland communities in the project vicinity have low potential for sediment and toxicant retention because they lack the ability to impound water.

Riparian habitat on and adjacent to channel banks has moderate potential to remove sediment because the vegetation, together with riffle and pool complexes, slows the water flow, but the streams do not impound water long enough for the vegetation to remove toxicants. Other riparian communities, oak woodlands, and grasslands occurring on floodplain surfaces also have the potential to remove sediment.

2.4.2.2 Nutrient Removal and Transformation

Growing vegetation removes dissolved nutrients and other substances from the water and soil, often metabolizing them and sometimes sequestering them in plant tissues. Bacteria growing in the soil or plant roots also break down or alter these substances so that they are removed from the water, either by plants or as a gas.

In the project vicinity, the marsh community has a high potential for nutrient removal and transformation because it occurs in a shallow basin, allowing water to be impounded and acted on by the vegetation. Most wetland communities in the project vicinity have a low level of nutrient removal and transformation because they lack the ability to impound water. Other riparian communities, oak woodlands, and grasslands occurring on floodplain surfaces also contribute to nutrient removal.

2.4.2.3 Production Export

The nutrients and carbon fixed by plants are cycled when the plants are eaten by herbivores or when the plants die and decompose. The flow of water through wetlands provides the efficient movement and distribution of nutrients and energy throughout the entire ecosystem.

In the project vicinity, none of the wetland communities has high potential for production export. Both wet meadow and marsh are highly productive communities, but the spread of nutrients in these communities and export to other communities are limited by the seasonal wetland hydrology and lack of connectivity with other habitats. Riparian habitat has relatively high primary productivity, but much of that productivity is stored in woody material and is not readily available for export.

2.4.3 Flora and Fauna Habitat Support

Wetlands are productive environments that provide diversity in the landscape. The flux of nutrients and energy in wetlands is relatively high because of the high growth rate and rapid turnover of the wetland vegetation. Dead organisms and other organic matter in wetlands are broken down into organic compounds by bacterial action, providing food for invertebrates. These invertebrates are the foundation of the food web that supports a broad array of wildlife species, from shorebirds to amphibians. Wetlands provide habitat where many plants and animals can fulfill one or more life cycle stages. Wetlands in the project vicinity carry out three general flora and fauna habitat support functions: wildlife habitat diversity, connectivity of wetland corridors for wildlife, and aquatic habitat diversity.

2.4.3.1 Wildlife Habitat Diversity

Wetlands support a diverse array of trophic (feeding) levels in both the wetland and surrounding upland environments. Many species use wetlands for feeding and uplands for nesting. Habitat connectivity, fragmentation, vertical structure, and patch size all affect the capability of wildlife movement in a wetland, and between the wetland and adjacent upland habitat. Barriers between the wetlands and adjacent uplands (e.g., roads, berms, culverts, fencing, presence of grazing livestock, haying) prevent some species from moving into or out of the wetlands, making them unable to reproduce or complete their life cycle. Large mammals, birds, and flying insects are affected less by such barriers. Changing land uses in or adjacent to wetlands alters their function as habitat and limits the ability of wildlife to move between habitat patches.

Disturbance also lowers the wildlife habitat function of wetlands. The more intensely the landscape is disturbed, the more the characteristic vegetation can change. With disturbance from grazing, plowing, or grading, the characteristic vegetation can be susceptible to invasive species (both native and exotic). When wetlands are farmed or overgrazed so that the existing wetland vegetation is removed from the soil surface, wildlife use changes. Habitat for some species is diminished because there is insufficient vegetation to provide food, shelter, and nesting opportunities.

Wetlands in the project vicinity generally have moderate to high potential for wildlife habitat function. Riparian habitat and marsh all have high structural diversity and open water areas that provide both foraging and breeding habitat. The wet meadow community has low structural diversity because of agricultural management. Vernal pools and swales exist in complexes with wet meadows and have similar wildlife habitat functions, but they also provide habitat for species that are uniquely adapted to vernal pools.

2.4.3.2 Connectivity of Wetland Corridors for Wildlife

Buffers and wetland habitat can function as wildlife habitat and migration corridors that are created by contiguous parcels, promoting dispersal and movement. The offsite mitigation properties surround Outlet Creek, the major stream draining Little Lake Valley, and several of Outlet Creek's upstream tributaries (Haehl, Baechtel, Broaddus, Mill, and Upp Creeks). Mitigation provided by the project will ensure the existence of the wildlife habitat and migration corridors surrounding Outlet Creek and its tributaries in perpetuity. Connecting riparian corridors and increasing their size also will improve landscape connectivity and breeding and foraging habitat for riparian-dependent bird species. Riparian vegetation surrounding Category I riparian corridors will be added throughout the length of the offsite mitigation properties, creating a continuous cover for wildlife protection. Wetlands in the project vicinity have high potential for wildlife corridor habitat function. Specific jurisdictional wetland types providing this function include wet meadow and riparian habitat.

2.4.3.3 Aquatic Habitat Diversity

Some wetlands and waters in the project vicinity have high potential for aquatic habitat functions. Streams, together with their associated riparian habitat, provide fish habitat, including EFH for coho salmon, Chinook salmon, and steelhead, and support juvenile and adult salmonid runs. They also provide habitat for California roach and introduced warmwater species (e.g., sunfish, largemouth bass). When inundated, wetland pools provide habitat for aquatic invertebrates.

Disturbance lowers the aquatic habitat diversity of wetlands. The introduction of nonnative plant species, including the perennial pasture grasses that dominate most of the vegetation communities in the mitigation parcels, land disturbance (e.g., plowing, grading), cultivation of pasture grasses, overgrazing, and other land uses, results in the loss or degradation of aquatic native plant communities. Native wetland plants may be displaced by nonnative vegetation that forms monotypic stands, or the structural diversity of native vegetation may be altered by grazing. The functions of wetlands in the project area are discussed in Section 2.4.3.1.

2.4.4 Wetland Services

Many factors contribute to the services of wetlands in the project vicinity (e.g., provide habitat used by threatened or endangered species and are part of a unique wetland area). Little Lake Valley is one of the largest valleys in the North Coast Ranges. Geologically, the valley is a *graben*—a tectonically down-thrust block of ground surrounded by hills or mountains and separated from them by faults. Historically, the valley bottom contained extensive meadows, marshes, and riparian woodlands. Large expanses of these habitat types are unusual in the North Coast Ranges because wide graben-type valleys with poor drainage are uncommon. Because they are regionally uncommon, these extensive wetland and riparian habitats are particularly important to migrating waterfowl and other wildlife species such as black-tailed deer, elk, western pond turtle, yellow warbler, and yellow-breasted chat. Also, Baker’s meadowfoam and North Coast semaphore grass are state-listed special-status species that contribute to the uniqueness and botanical heritage of Little Lake Valley.

2.5 Mitigation Goals and Objectives

This MMP was developed by evaluating Little Lake Valley through historical research and studying current conditions with a goal of developing a comprehensive and successful ecosystem restoration project with positive effects on waters of the U.S., including wetland and other waters functions and services to compensate for the lost functions resulting from project impacts.

The project will be constructed in Little Lake Valley, a mosaic of upland and wetland agricultural fields, human-altered stream corridors, and fallow wetlands. Historically, the valley flooded regularly during typical winter rains, creating large expanses of emergent wetlands, wet meadows, riparian forest, floodplain, and streams that flow north into Outlet Creek, the Eel River, and the Pacific Ocean (LeDoux-Bloom and Downie 2008). Based on historical aerial photographs from 1952, 1956, 1978, and 1988, information from historical reports, and more recent field studies, it has been determined that the valley historically supported wider floodplains, a series of meandering streams, and riparian forests surrounded by wet meadows, marshes, and oak savannas (Dean 1920; LeDoux-Bloom and Downie 2008). Carpenter and Millberry (1914:110–111) reported that:

> Little Lake Valley at the most contains about 12,000 acres, two-thirds of which is cultivatable land when properly drained. But little over half that amount is now so used, the balance being pastured or cut to wild hay…. As pasture land it is unrivaled in the county, the natural grasses keeping green until later summer, affording dairies the best of opportunity for profitable business.

The project's compensatory mitigation strategy is to establish, re-establish, and rehabilitate a mosaic of high-functioning wetlands and other waters to replace the loss of functions as a result of the unavoidable impacts associated with the project. This MMP describes the mitigation details for wetlands and other waters of the United States.

This mitigation strategy will be attained through the following mitigation goals.

- Implementing impact avoidance measures before and during project construction.
- Re-establishing all temporarily affected areas in the project footprint to their preproject condition or better.
- Establishing, re-establishing, and/or rehabilitating wetlands and other waters in Little Lake Valley to compensate for permanently affected wetlands and other waters.
- Improving the functions and services of aquatic resources in the Outlet Creek Basin.
- Reducing habitat fragmentation by using large contiguous parcels that are adjacent to existing habitats for mitigation.
- Improving riparian connectivity.
- Increasing habitat complexity by creating a mosaic of habitats in mitigation areas.
- Rehabilitating water quality through the improvement of aquatic functions.
- Preserving existing habitats through the acquisition of parcels that contain aquatic resources, special-status plant species, or sensitive habitats (e.g., critical habitat for anadromous fish).
- Promoting self-sustaining wetlands that allow for natural succession by removing management activities (e.g. haying, grazing).
- Protecting and maintaining all offsite mitigation properties in perpetuity.

To meet these goals, mitigation objectives were established that are linked to increasing the quantity and improving the existing functions and services of wetlands and other waters in Little Lake Valley. These mitigation objectives are discussed below.

- **Mitigation Objective 1:** Establish wetlands that are high-quality and self-sustaining. Performance standards to measure this objective are listed in Chapter 9.
- **Mitigation Objective 2:** Rehabilitate wetlands on offsite properties to improve aquatic wetland functions and promote fully functional successional unmanaged wetland vegetation communities with respect to the current circumstances of Little Lake Valley. Performance standards to measure this objective are listed in Chapter 9. The performance standards are the measurable characters for inferred functional lift of the suite of functions listed in Section 2.4 above.
- **Mitigation Objective 3:** Re-establish onsite wetlands temporarily affected by project construction to restore aquatic wetland functions and promote historical wetland vegetation communities. Performance standards to measure the re-establishment of wet meadow and riparian habitat are listed in Chapter 9.

- **Mitigation Objective 4:** Improve habitat quality for listed fish. Mitigation actions will improve fish passage, increase riparian cover, improve hydrology, and reduce sediment in streams. The performance standards that will be used to measure this objective will be discussed in the state MMP.
- **Mitigation Objective 5:** Promote cover and diversity of native plants. Increasing cover of riparian habitat also will increase riparian habitat connectivity. Native plant cover will be increased for riparian vegetation and measured through the performance standards listed in Chapter 9. Limiting invasive (establishment and re-establishment sites) and noxious plants (rehabilitation sites) also will be used to ensure that cover of native plants is maximized.
- **Mitigation Objective 6:** Manage invasive plants in established wetlands and rehabilitated areas on the offsite mitigation properties. The invasive plant performance standard listed in Chapter 9 will be used to measure this objective.

Portions of some of the offsite mitigation properties have been degraded by overgrazing, agricultural practices, and stream channelization. As part of the overall mitigation strategy for Little Lake Valley, compensatory mitigation per parcel may involve a combination of wetland establishment, grazing exclusion, establishing riparian plantings, and rehabilitating incised drainages, which will increase quantity and improve aquatic functions and services in the valley.

Some offsite mitigation parcels, such as Benbow (APN 108-020-06) and Watson (APN 037-250-05), contain representative examples of high-quality wet meadow wetlands. These areas helped to guide the design of wet meadow on the offsite mitigation properties. Most of the wetlands that will be established and rehabilitated as part of wetland mitigation efforts are in areas that have been altered over time by human-induced changes associated with flood control and grazing management. An array of activities will be used to establish, re-establish, or rehabilitate wetlands in Little Lake Valley to increase their functions and services.

After the bypass is in place and the compensatory mitigation is implemented, functions and services of wetland resources are anticipated to increase. Once mitigation construction is complete and after 10 years (5 years for certain wetlands) of management and monitoring, the valley as a whole will exhibit greater ecological function than existed before project construction. The valley will enjoy a long-term benefit because of increased functions provided by the offsite mitigation properties that will be protected in perpetuity. These properties will be publicly owned or managed, and will be managed adaptively to maintain and increase the functions and services of the aquatic resources. Overall, existing amounts of wetlands and riparian and oak woodlands will be increased, and barriers to wildlife passage and movement will be reduced or eliminated.

2.6 Summary of Mitigation Actions and Acreages

As outlined in Section 2.2, construction of the project will result in temporary and permanent impacts on waters of the United States and the loss of aquatic functions and services associated with those features. In addition, the project will result in impacts on anadromous fish (SONCC coho salmon, California coastal Chinook salmon, and northern California steelhead), Baker's meadowfoam, and North Coast semaphore grass. Caltrans' proposed mitigation for impacts on waters of the United States is outlined in Table 2-5. Mitigation for impacts on other waters also will serve as mitigation for impacts on anadromous fish. Mitigation actions will be conducted to compensate for impacts on Baker's meadowfoam, North Coast semaphore grass, and other riparian habitats; however, these actions are not discussed in this document.

Table 2-5. Summary of Mitigation Actions for Wetlands and Other Waters of the United States

Parcel	Assessor's Parcel Number (APN)	Offsite Mitigation		
		Wetland Establishment (less acres of temporary wetland impacts)	Wetland Rehabilitation (acres)	Other Waters Rehabilitation (acres)
Benbow	007-020-03		17.13	
	007-010-04		23.27	
	108-040-13	1.65	32.23	
	108-030-07		19.57	
	108-020-06	1.34		
Ford	108-010-05		6.44	
	108-010-06	2.14	1.32	8.08
	108-020-04	6.48	27.04	
	108-030-02	1.86	27.17	
	108-030-05		61.75	
Goss	103-230-02	0.23		
Lusher	108-030-04	5.22	18.04	
MGC North	103-230-06	5.34		
MGC Middle	103-250-14	0.23	1.28	
Nance	108-050-06		3.49	
Niesen	108-040-02	5.12	1.47	
Watson	037-221-30	8.72	25.06	
	037-250-05		49.53	
Wildlands	108-020-07	2.18		0.35
	108-030-08		2.08	
	108-060-01	4.80	2.97	10.60
	108-070-08		7.09	
	108-070-09	4.27	9.83	
	108-060-02		7.33	
TOTAL		**49.58**	**344.63**	**19.03**

2.6.1 Impact Avoidance and Minimization

In addition to the establishment, re-establishment, and rehabilitation strategies included in this MMP, Caltrans has incorporated numerous avoidance and minimization measures as part of the refinement of the project design (see Section 1.2). Additional minimization measures to be implemented during project construction are listed below, and details are provided in Chapter 7.

- Establishment of work windows for instream construction and vegetation clearing to minimize impacts on water quality, listed fish, and nesting birds.
- Incorporation of BMPs as part of the stormwater pollution prevention plan (SWPPP).

- Seed collection and salvage of North Coast semaphore grass plants for replanting onsite.
- Seed collection and topsoil harvesting and reapplication at offsite locations to minimize impacts on Baker's meadowfoam.

Sample BMPs from the FEIR/FEIS are presented below.

- All construction-related materials shall be stored in designated staging areas at least 100 ft from perennial waterways and drainages.
- Refueling and vehicle maintenance shall be performed at least 100 ft from creeks and other water bodies.
- Operation of heavy equipment shall be minimized in perennial creeks (to the greatest extent possible). If equipment must access perennial creeks, this will occur during the late summer months when the stream flows are low, or when no water is in the channels. If water is flowing, the channels will be temporarily dewatered.
- Temporary sedimentation barriers, such as sandbags or siltation fencing, shall be installed to minimize the amount of silt entering the creeks and any ephemeral drainages with water present in the channel. The location of these barriers shall be determined by the resident engineer and environmental monitor, and shall be clearly marked in the field before construction activities begin.
- Additional BMPs shall be implemented to prevent runoff from adjacent lands from flowing across construction areas; slow down the runoff traveling across construction sites, remove sediment from onsite runoff before it leaves the site, and provide soil stabilization.
- To address potential water quality impacts during construction, Caltrans will require the contractor to use a combination of BMPs to control potential erosion and sedimentation from the project site. Caltrans has developed a suite of construction site BMPs that will be implemented on the proposed project. The construction site BMP manual can be downloaded at: http://www.dot.ca.gov/hq/construc/stormwater/stormwater1.htm.
- Caltrans will prohibit the contractor from discharging oils, greases, chemicals, or spillage of concrete and grout into receiving waters. For example, on this project, equipment operating in water bodies will be required to be steam-cleaned prior to arrival onsite, and be maintained in a clean condition during the length of activities.
- Following the construction process, the contractor will stabilize disturbed soil areas through permanent revegetation or other means. An appropriate design will be used that will allow all finished slopes to achieve stabilization, even under severe conditions, and also provide erosion control BMPs at all point source discharges of stormwater runoff. Treatment BMPs, such as biofiltration, will be incorporated where feasible.
- As part of standard operation and maintenance procedures, Caltrans has developed a standard Hazardous Waste and Spill Response Plan, which Caltrans will ensure is implemented during the project. These BMPs address water quality issues associated with accidental spills.

2.6.2 Establishment, Re-Establishment, and Rehabilitation

This section describes the MMP actions for wetlands and other waters. The wetland establishment, re-establishment, and rehabilitation actions are described further in Chapter 7. The method for determining the mitigation credits, in terms of acreage, is described in Chapter 6.

Wetland establishment, re-establishment, and rehabilitation areas are shown on Figures 2-1a and 2-1b and the figures in Appendices C and D. Discussions of these interrelated strategies are presented below.

2.6.2.1 Establishment

Wetlands will be established on some of the offsite mitigation properties. Wetland establishment will aid in replacing wetland functions lost through the impacts of the project. Establishment areas were selected where feasible to improve habitat continuity. An important aspect of wetland establishment is the improvement of wetland functions and services, as discussed below and presented by parcel in Table 7-2.

- Groundwater recharge helps maintain the hydrology of wetlands dependent on groundwater discharge, such as marsh and wet meadow. Increased plantings of native riparian and wetland vegetation as part of wetland establishment will increase groundwater recharge.
- Floodflow attenuation will be provided by establishment of vegetated wetlands associated with riverine and lacustrine ecosystems. Specifically, this will occur in riparian habitat established adjacent to stream channels.
- Nutrient removal/transformation will take place in established habitats such as marsh and wet meadow in conjunction with some mitigation actions. Removal of cattle grazing on wetland rehabilitation parcels and exclusion of grazing from riparian corridors will decrease soil compaction, reduce streambank erosion, and reduce nutrient and bacteria loads.
- Reintroduction and planting of common, locally native wetland plant species in the wetlands and at the wetland-upland edge as part of habitat establishment, in conjunction with the removal of agricultural management (e.g. grazing, haying), will increase wildlife diversity and abundance, as well as aquatic diversity and uniqueness.

2.6.2.2 Rehabilitation

Rehabilitation actions are planned for offsite wetlands and other waters of the United States as well as riparian corridors associated with other waters of the United States. Wetland rehabilitation on the offsite parcels will include the removal of grazing and haying, reduction of nonnative plants and the recruitment and planting of native wetland species in designated areas, and control of noxious invasive species. Other waters rehabilitation on the offsite parcels will include the removal of grazing, recruitment and planting of native riparian species, and control of invasive species.

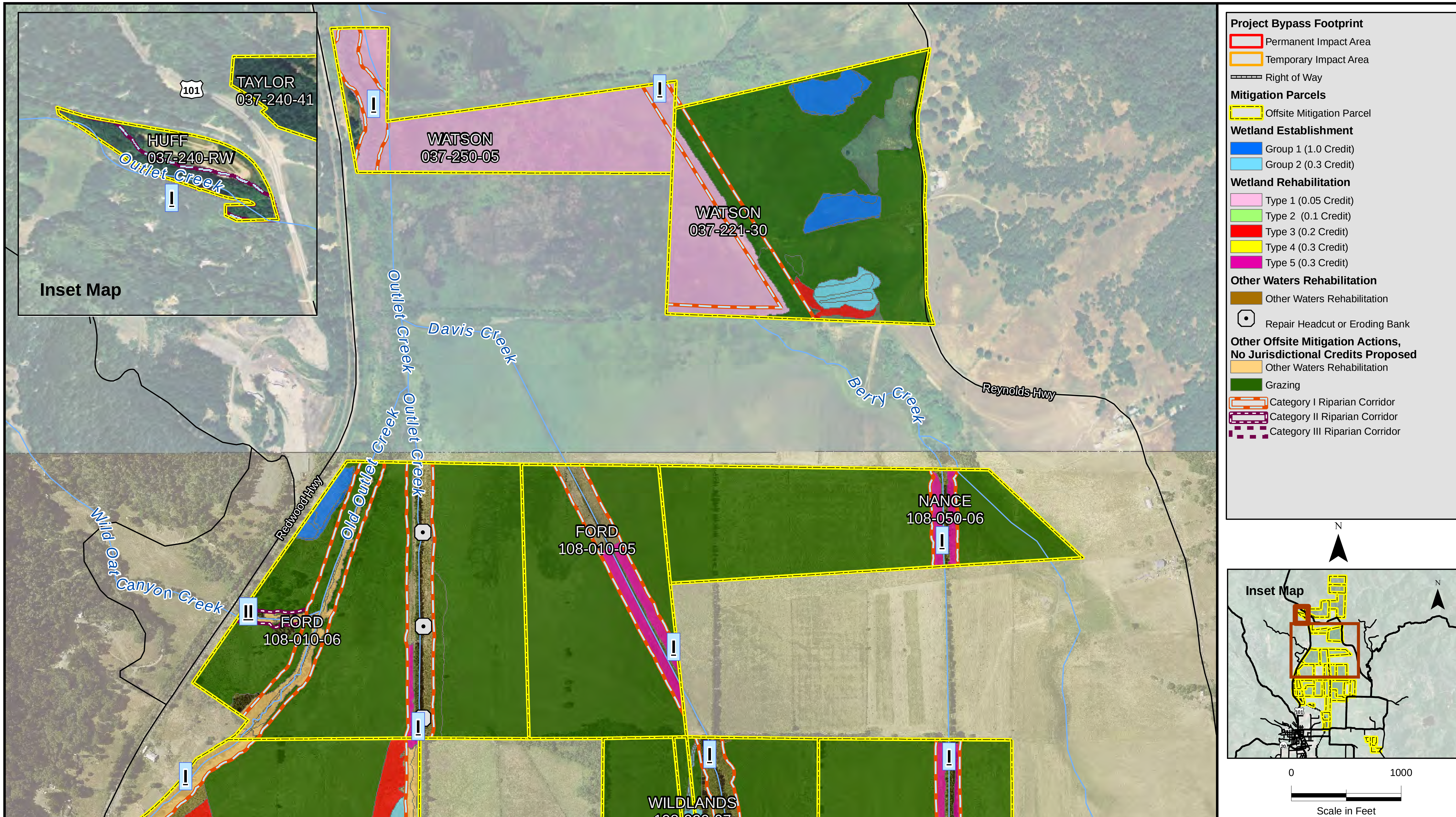

Figure 2-1a

Offsite Mitigation Actions for Wetlands and Other Waters of the U.S.

Willits Bypass Project

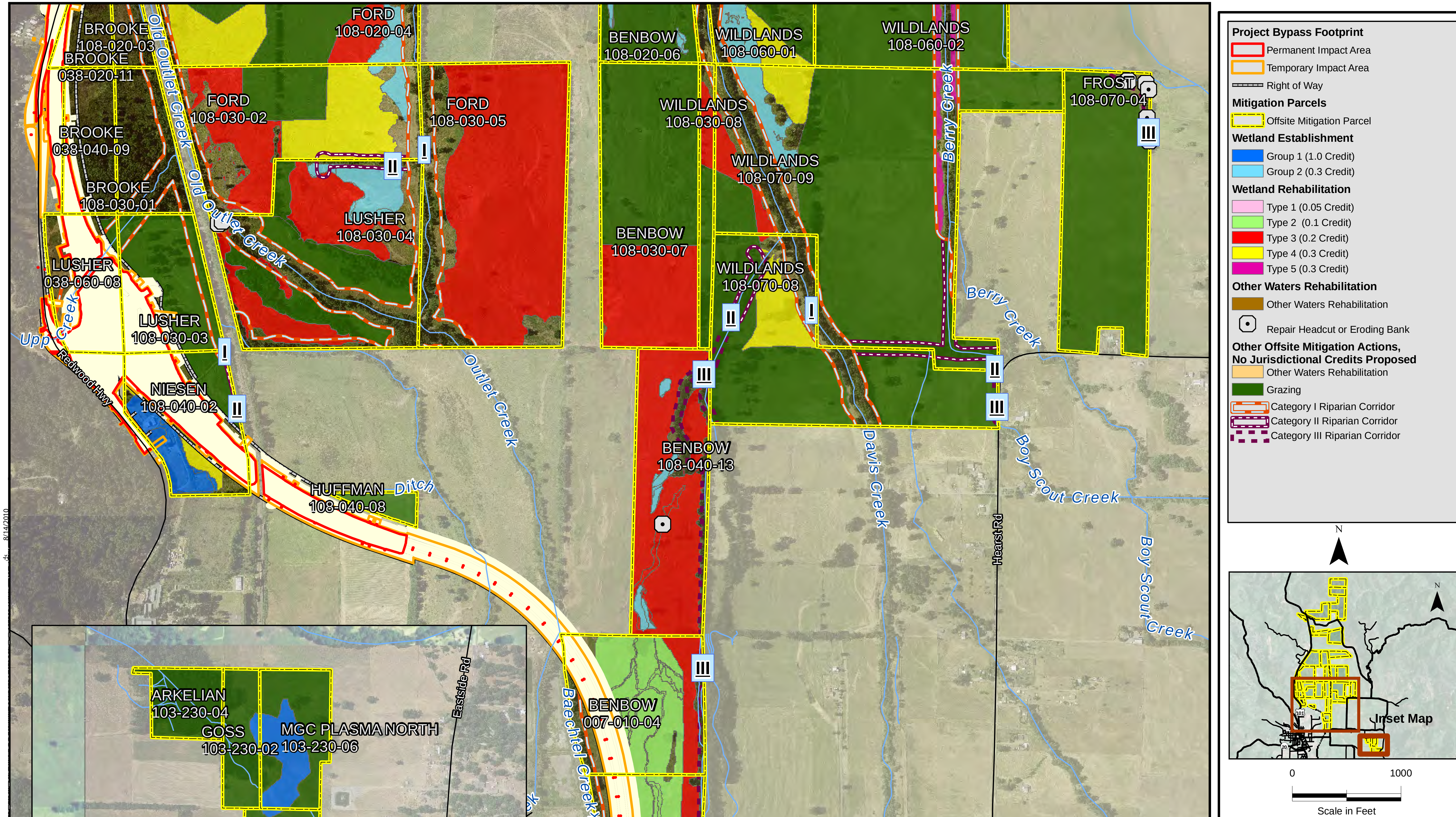

Figure 2-1b

Offsite Mitigation Actions for Wetlands and Other Waters of the U.S.

Willits Bypass Project

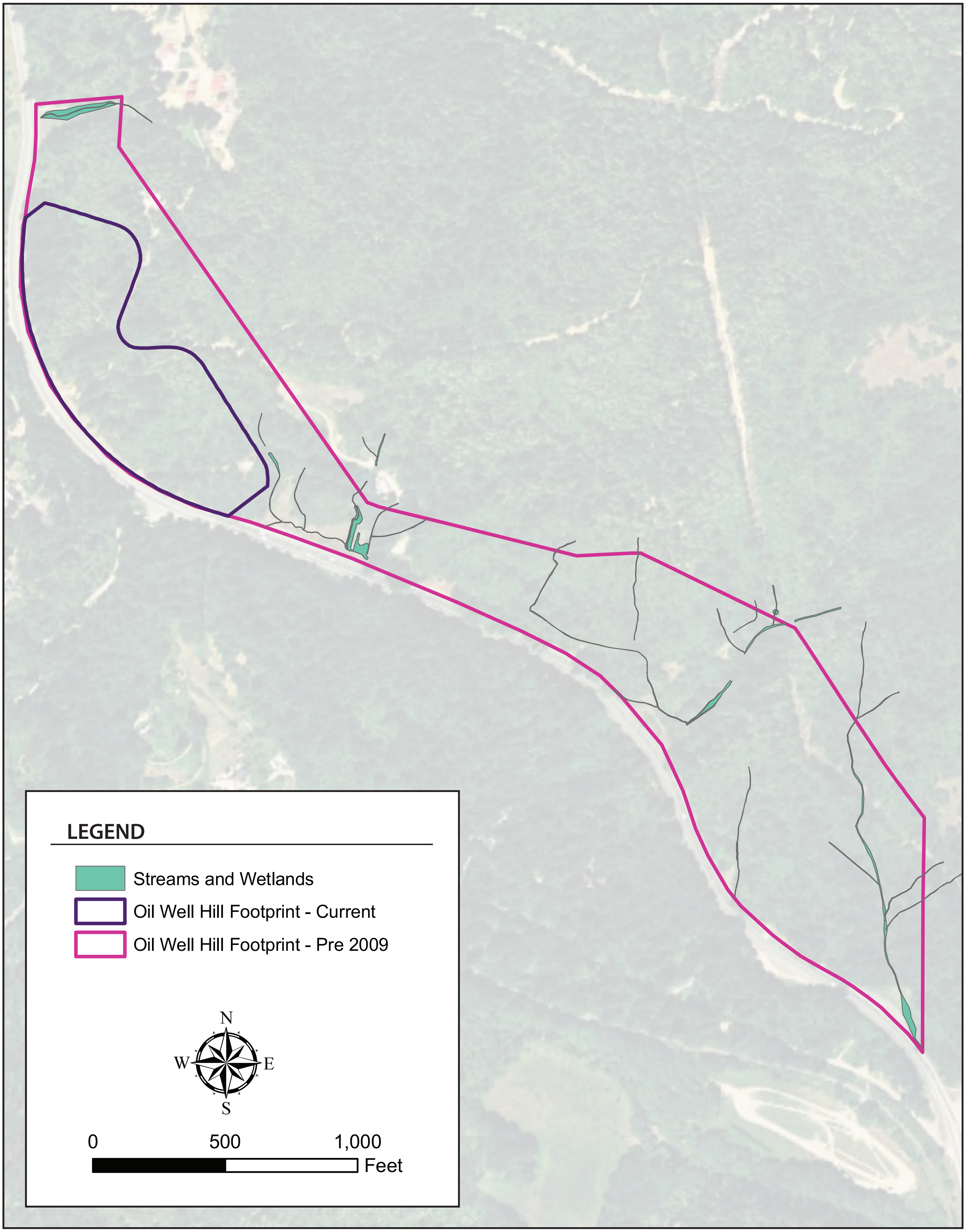

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Figure 2-2
Oil Well Hill Project Footprint and Jurisdictional Waters
Willits Bypass Project

Removal of fish passage barriers will improve the movement of anadromous fish through Little Lake Valley into the spawning areas in the surrounding foothills. Planting of riparian vegetation will improve shaded riverine aquatic habitat, reduce water temperature, and increase dissolved oxygen levels in the streams.

Control of invasive plant species will promote native plant diversity, recruitment, and abundance.

An important aspect of rehabilitation activities is the improvement of wetland functions and services as discussed below and presented by parcel in Table 7-2.

- Groundwater recharge helps maintain the wetland hydrology of wetlands dependent on groundwater discharge, such as wet meadow. Planned rehabilitation actions will increase groundwater recharge through removal of grazing, and increased plantings of native riparian and wetland vegetation.
- Removal of grazing will increase the amount of residual dry matter on the ground, in both uplands and wetlands, thereby reducing the amount of sediment entering drainages. Widening riparian corridors, including riparian wetlands, by planting will result in improved sediment and toxicant retention and reduced bank erosion. It also will greatly increase the areal extent of stream wetlands.
- Removal of grazing and the rehabilitation of herbaceous and woody vegetation in existing wetlands and riparian corridors will decrease soil compaction, reduce streambank erosion, and reduce nutrient and bacteria loads.
- Rehabilitation of wetlands will enhance wetlands through increase in biomass. Increased biomass will decrease water velocity during high-flow events and will establish additional forage and cover for wildlife.
- Reintroduction and planting of common, locally native wetland plant species at select offsite rehabilitation and establishment areas will increase wildlife diversity and abundance, as well as aquatic diversity and uniqueness.

2.6.2.3 Re-Establishment

Re-establishment refers to the repair of temporary impacts on wetland and riparian habitat in the onsite bypass alignment footprint and in the offsite mitigation areas where existing wetlands are disturbed during the construction of new wetlands. The onsite re-establishment areas will be recontoured, seeded, and replanted to encourage the reestablishment of vegetation and restoration of wetland functions. The riparian areas directly under the viaduct will be planted with woody riparian shrubs, instead of trees, to avoid the need to maintain or remove trees that could grow tall enough to interfere with the structure. The offsite re-establishment areas are those areas where wetland establishment activities will temporarily affect wetland habitat. These areas will be restored to pre-project conditions or better. For the purpose of this MMP, these actions are not considered compensatory mitigation for the project’s impacts.

Chapter 3 Site Selection Criteria

The compensatory mitigation package presented in this MMP seeks to establish, re-establish, and rehabilitate self-sustaining, high-functioning wetlands and other waters in perpetuity in Little Lake Valley. Other compensatory mitigation (sensitive biological resources) for federally listed fisheries and state-listed plants also is described because, as discussed in Chapter 2, they played a part in developing mitigation for the USACE wetland and other waters. These actions will ensure continued and improved functions and services of the distinctive aquatic resources in Little Lake Valley. This chapter describes the background and process of selecting compensatory mitigation sites.

3.1 Background

A primary goal of compensatory mitigation is to offset unavoidable impacts on wetlands and other waters. The process of selecting suitable mitigation sites to offset the impacts of the project has considered many factors.

The primary consideration was the practicality of undertaking mitigation efforts at each potential site (e.g., appropriate soils, hydrology, access for construction equipment). The amount of wetland establishment available was also a key factor because much of Little Lake Valley is unavailable for wetland establishment because it already contains jurisdictional wetlands. Selection criteria also were identified in consideration of the need to mitigate impacts on multiple sensitive biological resources on a limited number of parcels. However, the management requirements of state-listed plants have resulted in further constraining opportunities for wetland rehabilitation. The criteria listed below also were considered during the site-selection process:

- Presence of slowly draining soils needed for successful wetland establishment and rehabilitation.
- Need to ensure the self-sustainability of any established or rehabilitated wetlands by selecting mitigation sites that would have the greatest probability of long-term success.
- Degree of landscape and hydrologic manipulation required to construct the mitigation project, and the effects that such manipulation could have on other resources (natural or cultural) and on neighboring properties.
- General condition of the habitat on a given parcel (e.g., degraded or heavily grazed wet meadow).
- Presence and extent of listed plant species on a given parcel.
- Desire to achieve maximum habitat connectivity and avoid habitat fragmentation by seeking a collection of larger, contiguous mitigation properties to help support habitat diversity, quality, and stability.

Before evaluating potential offsite mitigation parcels on the basis of these criteria, two key limiting factors needed to be addressed: (1) the physical presence of suitable soils and hydrology needed for successful wetland establishment and rehabilitation, and (2) the willingness of landowners to sell their parcels. These two limiting factors are interconnected, as discussed below.

The rationale behind selection of the current offsite mitigation properties for each jurisdictional resource type addressed in this MMP is described in Sections 3.2 and 3.3. The locations of the offsite mitigation properties are shown in Figures 2-1a and 2-1b. The rationale behind selection of offsite mitigation properties for state-listed plants is summarized in Section 3.5. A summary of the rationale behind selection of offsite mitigation properties for other sensitive biological resources will be covered in detail under a separate MMP. The discussion relative to other sensitive biological resources is included to provide the overall context of mitigation actions at the offsite mitigation properties.

The rationale behind selection of the onsite other waters locations is discussed in Section 3.3.

3.2 Mitigation Site Selection for Jurisdictional Wetland Establishment

Identification or availability of suitable upland area for wetland establishment presented the most challenging obstacle; identification and availability of suitable opportunities to mitigate impacts on other resource types was less challenging. Because of state and federal policies of no net loss of wetlands, it was necessary to seek upland habitat types that could support wetland establishment. Much of Little Lake Valley historically has supported wetland habitats, a large amount of which has been degraded through historical land use practices, including grazing and agricultural management.

Wetland rehabilitation will be used to compensate for the deficiency of suitable lands for wetland establishment. Wetland rehabilitation actions will result in the development of successional plant communities to replace nonnative, invasive managed pasture and haylands in wetlands. Wetland rehabilitation by definition does not contribute to the establishment of new wetlands. In addition, while degraded wetlands may be rehabilitated, on a per-acre basis, they provide only low compensatory mitigation credit and low functions and services lift above current conditions.

Efforts to identify suitable wetland establishment and rehabilitation properties in the Little Lake Valley began with preparation of the project’s wetland mitigation feasibility study (2005 Feasibility Study; California Department of Transportation 2005b). The 2005 Feasibility Study was a preliminary investigation of candidate mitigation sites intended to determine whether onsite conditions existed that would support the establishment of wetlands.

Caltrans then identified all parcels owned by willing sellers in the valley. A large-scale reconnaissance-level field investigation of the available parcels was conducted to identify parcels with the greatest potential for wetland establishment. Twenty-six parcels totaling approximately 250 acres of potential establishment were identified as likely candidates for mitigation because they appeared to have slow-draining soils, would not require extensive grading, were contiguous with other candidate properties, were available for sale or easement, and had at least some uplands that potentially could be converted to wetlands.

Therefore, the 2005 Feasibility Study concluded that favorable conditions were present on the 26 candidate parcels and that sufficient wetland establishment opportunities appeared to be available within Little Lake Valley. Because the cost to study all candidate parcels in detail would have been prohibitive, the 2005 Feasibility Study was conducted at a coarse scale; no formal wetland delineations were conducted at that time. Caltrans held a number of meetings with the resource agencies during development of the 2005 Feasibility Study and provided draft copies for their review and comment. Although no formal written concurrence with the 2005 Feasibility Study was required under the 1994 National Environmental Policy Act/Clean Water Act Section 404 Integration Process Memorandum of Understanding (NEPA/404 MOU), Caltrans received informal verbal concurrence on the adequacy of its findings from the agencies.

Following completion of the 2005 Feasibility Study, a conceptual mitigation plan (CMP) (California Department of Transportation 2006a) was developed in accordance with the NEPA/404 MOU. The final CMP presented a conceptual plan of the overall proposed mitigation strategy for the project, as well as preliminary impact numbers and projected mitigation ratios for each resource based on the best design information available at that time. As with the development the 2005 Feasibility Study, the resource agencies played a collaborative role in the development of the CMP by participating in meetings and reviewing and commenting on draft versions of the document. In accordance with NEPA/404 MOU Appendix A, formal written concurrence was received from USACE, EPA, NMFS, and the U.S. Fish and Wildlife Service (USFWS) that the CMP established an appropriate framework to mitigate project impacts on waters of the United States, including wetlands. The CMP also presented mitigation strategies for other sensitive resources.

Following completion of the CMP and the FEIS/FEIR (California Department of Transportation 2006b), Caltrans initiated a series of more detailed field studies on the candidate mitigation properties; the results were documented in the mitigation parcels report (MPR) (California Department of Transportation 2007). The MPR narrowed the search for suitable candidate mitigation properties to 15 parcels, with most of the wetland establishment efforts planned on the Gary and Diane Ford parcels and a large amount of wetland and Baker’s meadowfoam preservation planned on the Rutledge parcels. Formal wetland delineations then were initiated on this short list of parcels to confirm their establishment potential.

After completion of the MPR and during the wetland delineation fieldwork, the Fords and the Rutledges informed Caltrans that they no longer were interested in offering any of their land for mitigation. In addition, during a February 2008 field review involving Caltrans, staff from multiple natural resource agencies, and wetland restoration experts, it was determined that the Benbow parcels and some of the Ford parcels had limited potential for wetland establishment because most of the properties were already wetlands. This determination further reduced the list of prospective candidate parcels for wetland establishment.

The remaining parcels on the list were concluded to have very limited opportunities for wetland establishment and had been included in the MPR primarily as mitigation for other resources. In March 2008, Caltrans and the resource agencies determined that further efforts should be made to identify additional willing sellers in Little Lake Valley to ensure that no wetland establishment opportunities had been overlooked. Therefore, Caltrans reinitiated contact with parcel owners initially contacted in 2004 during the 2005 Feasibility Study effort and with additional parcel owners who had not responded previously. As a result of this effort, 11 additional candidate parcels (six parcel owners) were identified for further reconnaissance-level review: Frost, MGC Plasma, Goss, Arkelian, DeFranco, and Carrillo.

Of these parcels, Frost East and West appeared to have the most readily available water sources and to be the most promising for wetland establishment and rehabilitation. At the time, initial wetland delineations conducted on the Frost parcels identified a substantial amount of upland—more than 100 acres—that could provide opportunities for wetland establishment. Later, during the wetland verification process, USACE delineated these areas as wetlands; consequently, they were no longer suitable for wetland establishment. The Frost parcels were desirable because of their continuity with one of the 11 contiguous Ford and Wildlands parcels. Combined, the Frost, Nance, Ford, Wildlands, and Benbow parcels would make up a large contiguous mitigation area (more than 1,100 acres) at the north end of the valley.

The remaining parcels analyzed in 2008—Carrillo, DeFranco, Arkelian, Goss, MGC Plasma North, and MGC Plasma Middle—appeared to present limited establishment and rehabilitation opportunities as a result of difficult-to-access water sources; consequently, wetland establishment would require extensive manipulation of hydrology (e.g., ditches, culverts, water pumping). In some instances (DeFranco and Carrillo), established wetlands potentially could affect the groundwater level on neighboring properties. The establishment of a raised water table could limit neighbors' crop production and grazing. These issues called into question the proposed wetlands' long-term ability to support successful, naturally functioning wetland systems. In addition, many of these parcels are small and lack overall connectivity. In light of these potential complications, the DeFranco and Carrillo parcels were ruled out as candidates for wetland establishment.

A letter sent to the resource agencies in July 2008 indicated that establishment opportunities continued to be elusive. Establishment opportunities on the Frost parcels were unlikely to result in as much acreage as originally estimated, and adequate opportunities on the remaining properties were doubtful. The letter indicated that Caltrans intended to focus on a mixed strategy of wetland establishment, rehabilitation, and preservation. RWB responded with a letter in September 2008 reaffirming the state's no-net-loss policy. On October 20, 2008, a meeting was held between Caltrans and RWB to determine a mutually agreeable strategy for wetland mitigation. RWB requested that Caltrans expand its search for wetland establishment opportunities to further demonstrate due diligence in meeting the no-net-loss policy.

In response to this request, Caltrans initiated the 2009 Feasibility Study (ICF Jones & Stokes 2009a). Caltrans contacted owners in a much broader geographic area surrounding Little Lake Valley to determine their willingness to sell. The areas addressed in the 2009 Feasibility Study are shown in Figure 3-1. This study reviewed several thousand acres of land to assess their potential for wetland establishment. It indicated that, out of the approximately 11,000 acres considered, only a few small, isolated establishment opportunities were available on land owned by willing sellers. Therefore, even if the failure to meet the criterion of preserving habitat connectivity was dismissed, Caltrans would still fall substantially short of meeting the

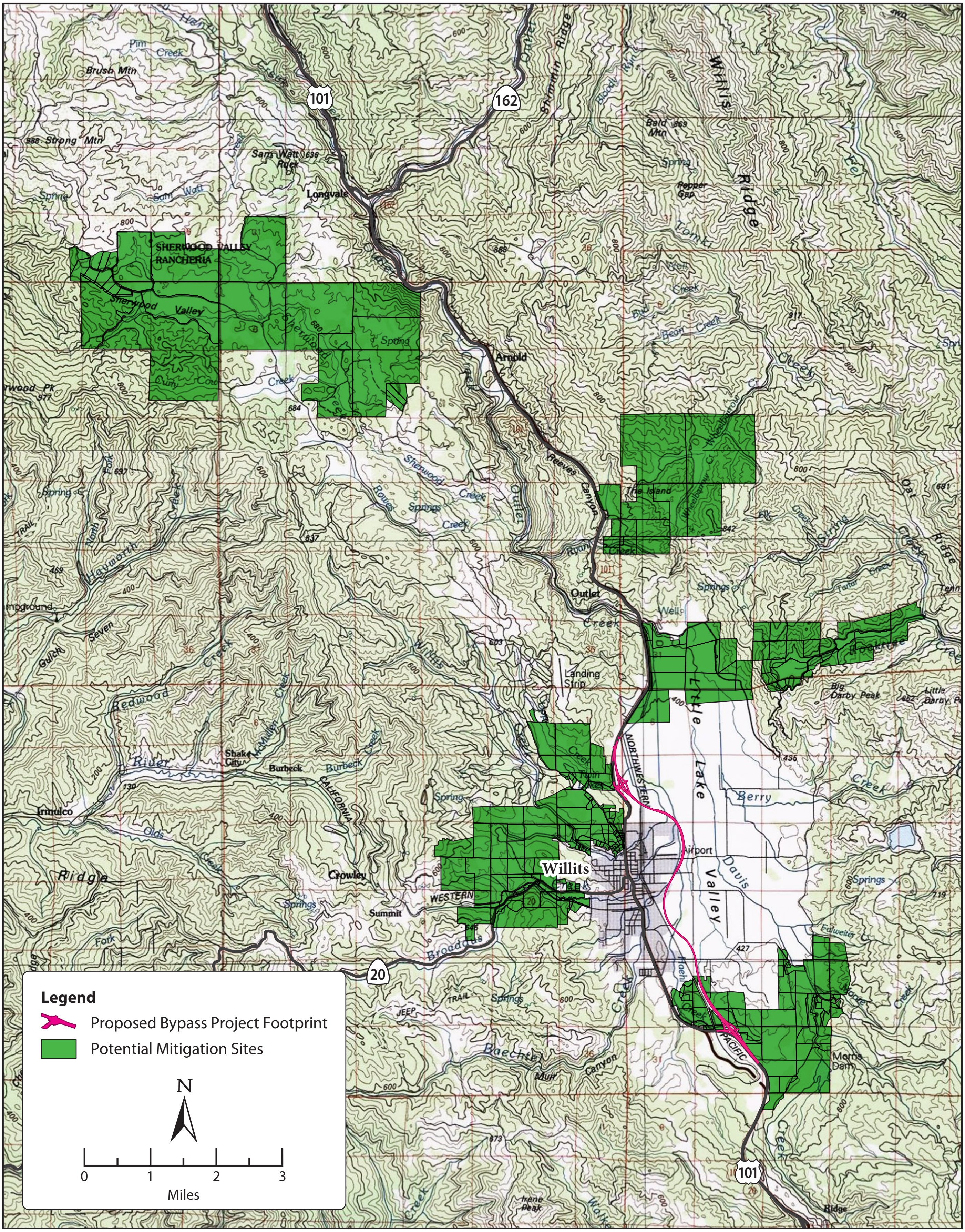

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Figure 3-1
Potential Mitigation Sites Considered in the 2009 Feasibility Report

conventional mitigation requirement for establishment, even with the few suitable sites identified outside the valley included (ICF Jones & Stokes 2009a).

Caltrans also moved forward with wetland delineations of sites on properties that would provide rehabilitation and preservation opportunities. Included in this effort were formal delineations of the Brooke, Niesen, Lusher, Huff, Watson, and Benbow parcels. Delineations of the Taylor Ranch parcels also were conducted for portions on the floor of Little Lake Valley; however, because the parcels south of Reynolds Highway contain existing wetlands and listed plant populations and are already under easements for protection of Baker's meadowfoam, they offer limited wetland establishment opportunities and were not considered potential mitigation sites.

Also, in 2009, the Frost West parcel (108-070-03) and the eastern portion of the Nance parcel became unavailable because the owners were not willing to sell.

The final suite of parcels is a result of right-of-way discussions within Caltrans and the feasibility studies and wetland delineations discussed above, which were considered in concert with existing data for the Ford Ranch and Wildlands parcels. Figure 3-2 identifies the location of the offsite mitigation parcels in relation to the bypass alignment. Wetland establishment, wetland rehabilitation, and other waters rehabilitation opportunities, by parcel, are identified in Table 3-1.

Table 3-1. Establishment and Rehabilitation Mitigation Actions by Parcel

Parcel	APN	Mitigation Actions		
		Wetland Establishment	Wetland Rehabilitation	Other Waters Rehabilitation
Benbow	007-020-03		X	
	007-010-04		X	
	108-040-13	X	X	
	108-030-07		X	
	108-020-06	X		
Ford	108-010-05		X	
	108-010-06	X	X	X
	108-020-04	X	X	
	108-030-02	X	X	
	108-030-05		X	
Goss	103-230-02	X		
Lusher	108-030-04	X	X	
MGC North	103-230-06	X		
MGC Middle	103-250-14	X	X	
Nance	108-050-06		X	
Niesen	108-040-02	X	X	
Watson	037-221-30	X	X	
	037-250-05		X	
Wildlands	108-020-07	X		X
	108-060-02		X	
	108-030-08		X	
	108-060-01	X	X	X
	108-070-08		X	
	108-070-09	X	X	

As of the date of this MMP, the known opportunities for successful, self-sustainable wetland establishment have been exhausted. Caltrans has expended a great deal of effort and has acted diligently to identify suitable wetland establishment opportunities both in and outside the valley among landowners who have expressed willingness to participate in the mitigation process. In view of the challenges discussed above, Caltrans believed it would be in the best interest of the wetland resources to pursue mitigation on larger contiguous parcels in the valley using multiple strategies of establishment, re-establishment, and rehabilitation to work toward achievement of no net loss of functions and services of wetlands. USACE withdrew preservation as an option for compensatory mitigation, noting that the properties did not meet the criteria listed in the 2008 Mitigation Rule.

Caltrans worked in coordination with USACE to develop and refine the wetland and other waters mitigation actions presented in this MMP and the methods for determination of credits.

3.3 Mitigation Site Selection for Other Waters of the United States Rehabilitation

Preliminary discussions with USACE determined that implementation of riparian plantings and bank stabilization along various streams and improvements to fish passage would be acceptable mitigation for impacts on other waters in lieu of establishment of new other waters.

3.3.1 Onsite Mitigation for Other Waters

Fish passage repair increases the amount of available habitat in a stream system. If habitat abundance is the limiting factor for a migratory fish species, its population may rise in response to access to additional habitat. However, the population response to habitat gain also depends on numerous other factors, such as the quality and quantity of newly available habitat and the abundance and nature of the predators, competitors, and prey that reside there.

The primary objective for project design on both Haehl and Upp Creeks is to repair fish passage opportunities that currently are constrained or absent because of stream channel alignment or artificial barriers (e.g., culverts). These improvements are incorporated into the project design. Fish passage design elements will comply with guidelines established by NMFS and CDFG.

Fish passage design addresses one component of a healthy, sustainable, and functioning riparian habitat that supports anadromous fish. The design includes stabilization of streambanks using a variety of biotechnical measures, including rootwad revetment, live siltation, and vegetated RSP (Appendix E). Planting of containerized plants and cuttings from willows and cottonwoods will be included as part of the overall strategy to fully repair the riparian stream zone (Appendix E).

Obstacles or barriers currently exist in both creeks within Caltrans right-of-way. At Haehl Creek, the obstacle is a 72-inch corrugated metal pipe culvert with a 4- to 6-foot entryway jump at the downstream end. This culvert will be removed, and grade control structures will be located downstream of the culvert at appropriate heights and intervals for the distance necessary to stabilize the natural stream gradient (Appendix E). Also, in the Haehl Creek interchange, the

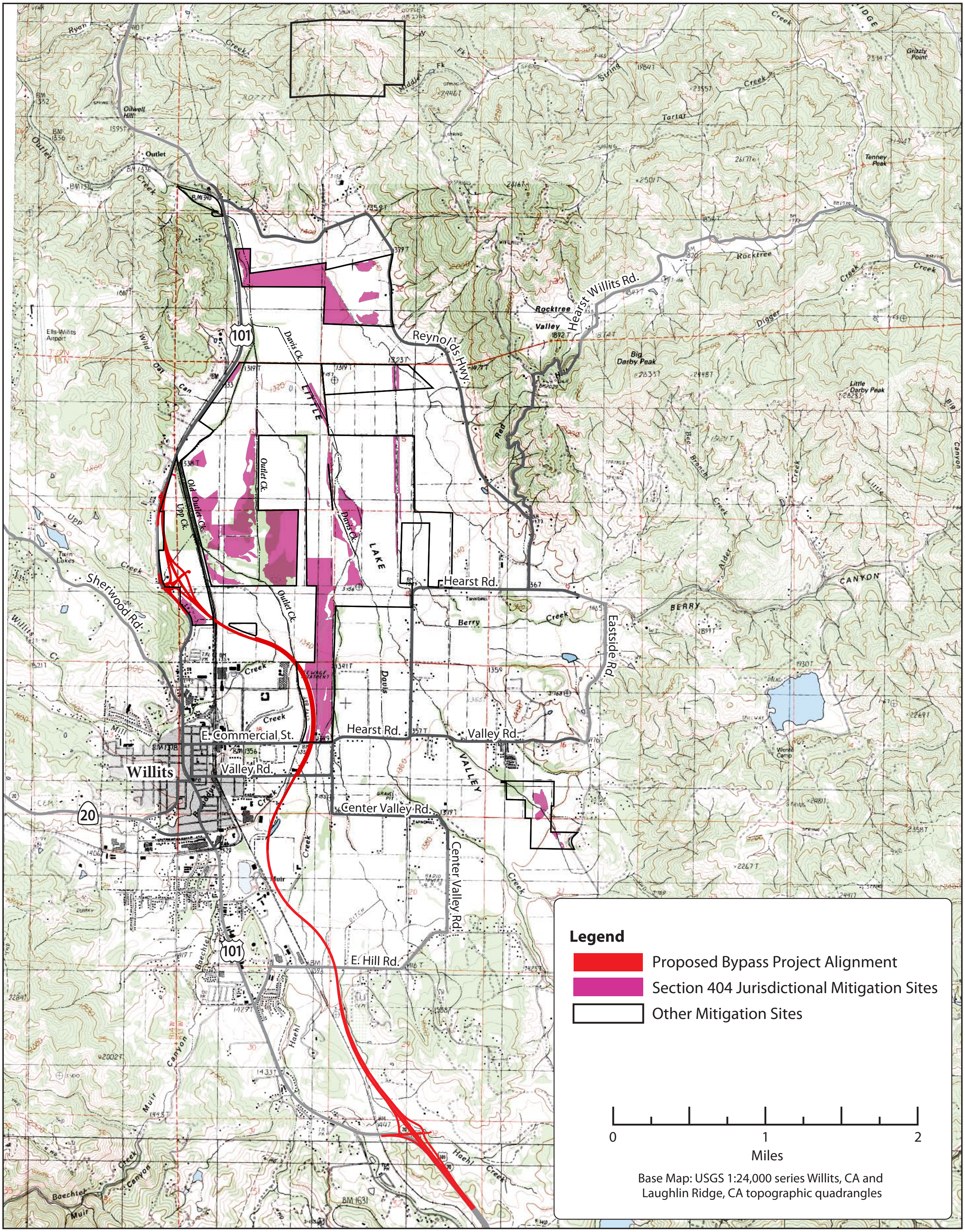

Figure 3-2
Proposed Bypass and Offsite Mitigation Sites

northbound on-ramp has a bridge that does not require any changes to the existing creek alignment but will have grade control structures placed to maintain the natural stream gradient (Appendix E). These structures also will allow the existing culvert belonging to the adjacent property owner to be backwatered if necessary.

The barrier along Upp Creek is a 10-by-5-foot box culvert. It appears to be in good condition and its size is adequate for necessary capacity, but it creates a fish barrier because of a combination of low flows and water levels, high velocity, and a slight entryway jump. This RCB culvert will be removed, and grade control structures will be located at appropriate heights and intervals for the distance necessary to stabilize the natural stream gradient (Appendix E).

The primary fish passage measure being proposed on both creeks are grade control structures that consist of rock sills and weirs. These structures are low-profile, typically constructed of boulders that span the width of the channel and are keyed into the channel bank. Collectively, the boulders are placed to concentrate the flows toward the center of the channel and away from streambanks. Rock weirs typically are arranged to form an upstream-pointing arch in plan view, with the lowest point (as seen in profile view) at the apex of the arch. They can be used to:

- Redirect the lowest point of the channel.
- Control channel alignment in confined areas or near infrastructure.
- Alter and maintain the width-to-depth ratio of the channel.
- Protect an eroding or sensitive streambank.
- Establish and maintain a scour pool for fish habitat.
- Concentrate low flow into a deeper, narrower channel to improve fish passage in otherwise flat-bottomed channels.
- Backwater the upstream channel to increase riffle water depth.
- Provide fish passage over barrier drops, provide water to diversions, or other uses.
- Encourage natural sorting of sediment at the pool outflow.

Although they are similar to drop structures in appearance, rock structures (which include rock weirs and sills) can withstand small shifts of material and continue to function as intended. They are made of individual rocks stabilized by the weight of the material and by contact with other rocks. Because they can withstand small deformations and continue to provide fish passage, these types of drop structures are better suited than rigid weirs to withstand downstream channel adjustments. Also, because of the inherent irregularities in the surface of rock structures, they generally provide increased hydraulic diversity and better passage performance than rigid weirs.

Both Upp and Haehl Creeks have unstable banks that increase sediment transport and bedload while reducing biological functions as they pertain to spawning habitat for anadromous fish. Although bank erosion is a natural and important geomorphic process in many disturbed systems, the erosion at both creeks appears to be occurring at an accelerated rate, especially at the Haehl Creek Interchange. The proposed bank protection at the creeks is designed to rehabilitate natural functions while enabling long-term natural stream processes to take place.

3.3.2 Offsite Mitigation for Other Waters

3.3.2.1 Riparian Site Selection

The priority for selecting riparian corridor planting areas is to increase contiguous canopy cover longitudinally along the streams, as opposed to creating wider, intermittent corridors. Ample riparian plantings to satisfy mitigation needs for other waters, which also benefit federally listed fish, were identified along the various streams across the offsite mitigation parcels.

Long stream reaches supporting protected fisheries that would benefit from riparian plantings are present along both Davis and Outlet Creeks. Consultations with Craig Martz and Scott Harris of CDFG and Tom Daugherty of NMFS on April 18, 2008, indicated a preference for riparian plantings that serve as fisheries mitigation to occur on Outlet Creek because it supports populations of all three listed fish species (salmon and steelhead) potentially affected by the project. The longest reach of Outlet Creek available for mitigation traverses several of the John Ford and Wildlands parcels; accordingly, these properties have been selected to fulfill the fisheries mitigation requirements. In addition, the John Ford and Wildlands parcels are contiguous with other offsite mitigation parcels: Brooke, Lusher, Benbow, Nance, and Frost.

In a meeting held on May 14, 2009, Mr. Daugherty expressed a desire to reduce the width of riparian establishment and instead extend the riparian establishment in a more linear fashion to encompass more streambank. This approach to riparian establishment would have a more direct, positive effect on the quality of fish habitat.

In addition to planting along anadromous streams, riparian species and oaks will be planted adjacent to or near streams tributary to streams supporting anadromous fish to provide bank stabilization, stream shading, and a source of organic material for benthic invertebrates and salmonids, all of which will improve instream habitat.

3.3.2.2 Bank Erosion and Headcut Repair Site Selection

Numerous drainages throughout Little Lake Valley drain wet meadows to allow more efficient and extensive grazing of pastureland. These drainages are often interconnected and flow to the lowest point on the parcel, where they exit the parcel and flow onto another parcel or into an adjacent stream. In addition to draining surface water from the wet meadow more quickly than under natural conditions, the drainages also dewater adjacent wetland habitat, thereby potentially affecting adjacent wetland plant communities. Some disturbed drainages are unvegetated and show signs of channel bed and bank erosion (usually in the form of headcuts). Caltrans conducted an assessment of all the erosion sites located in the mitigation areas, which included inventory, prescription, and prioritization of mitigation actions that would reduce erosion and sedimentation in the Outlet Creek Basin.

Erosion features on the offsite mitigation properties that are contributing excessive sediment to and causing water quality degradation in channels and streams in Little Lake Valley have been prioritized for restoration as follows.

1. The erosion feature contributes significantly to water quality degradation, as related to the contribution of excessive sediment from erosion of native soil.
2. The erosion feature can be restored without impacts on existing sensitive biological resources, including special-status plants and jurisdictional wetlands.
3. The erosion feature can be restored in coordination with planned mitigation actions.
4. The erosion feature can be restored using restoration approaches that are very constructable (i.e., construction of the feature is easy and access to it is direct).
5. The erosion feature's restoration will create a synergy by combining site-specific restoration opportunities to create a major effect at a cumulative level. Priority is given to particular erosion sites because restoration actions at these sites can address immediately many of the priority items above. The following are considered to be four highest-priority bank erosion and headcut repair sites.
    a. **Ford (APN 108-010-06):** There are three eroding bank sites on the east bank of Outlet Creek.
    b. **Frost Complex (APN 108-070-04):** There are five headcut sites located in the northeast corner of the parcel—three are instream headcut sites, and two are upland headcut sites.
    c. **Lusher (APN 108-030-04):** There are two headcut sites in the southwest corner of the parcel.
    d. **Benbow (APN 108-040-13):** There is one headcut site in the southern end of the parcel.

Specific actions related to these drainages and headcuts for each of the erosion sites are described in Chapter 7, and the construction design drawings are provided in Appendix E.

3.4 Mitigation Site Selection for State-Listed Plants

Offsite mitigation parcels for the purpose of providing mitigation for state-listed plants were selected based on the presence of occupied or potential Baker's meadowfoam and North Coast semaphore grass populations. The offsite mitigation parcels on which these species occur will be grazed and therefore do not contribute to the mitigation program for USACE jurisdictional wetlands.

3.4.1 North Coast Semaphore Grass

North Coast semaphore grass is a perennial species that spreads through underground rhizomes; although there is potential for its distribution to vary annually, the variation is not substantial. For this reason, only areas where the plant was observed during special-status plant surveys were considered during the determination of both impact and protection areas. Wetland mitigation parcels were selected based on the presence of occupied or potential North Coast semaphore grass populations.

3.4.2 Baker's Meadowfoam

Preservation is used for compensation for impacts on Baker's meadowfoam because the establishment of populations of annual plant species is considered to have limited success. Because the distribution varies annually, Caltrans' efforts to identify suitable offsite mitigation parcels included protocol-level surveys for Baker's meadowfoam that focused on available parcels with either observed populations or suitable habitat (determined by soil type, elevation, and slope). The methods used to determine suitable habitat are presented in the MPR. Additional factors considered were contiguity with other mitigation properties, connectivity with other habitats, and percentage of the parcel supporting the species or its potential habitat.

Wetland mitigation parcels were selected based on the presence of occupied or potential Baker's meadowfoam populations.

Chapter 4 Site Protection Instruments

Caltrans has completed its purchase of the offsite mitigation properties. A conservation easement (CE) will be placed over the properties and will be held by CDFG. Caltrans will provide USACE with an opportunity to review the draft copies. The CEs will provide protection in perpetuity of the conservation values for which the properties were purchased. The CE will be tailored to ensure that the level of protection is adequate, while retaining the flexibility to carry out the necessary maintenance and management measures. All CE documents will be submitted to Mendocino County for recording no later than 1 year after the date the California Transportation Commission votes to approve the project (currently scheduled for February 2012).

Caltrans will provide an endowment to fund the initial startup costs and the long-term protection and management of the properties. A long-term management plan is provided in Chapter 11; it outlines the necessary management activities and will direct the land manager on how the properties will be maintained. An endowment calculation has been prepared and is found in Chapter 13.

For all offsite mitigation properties, CDFG will act as the endowment holder and CE holder/compliance monitor. MCRCD will act as the fee title holder following transfer of the titles from Caltrans and as the land manager. Fee title transfer will take place by the completion of construction of all mitigation. The endowment holder is responsible for holding and managing the endowment funds, the CE holder is the party to which the CE is granted, and the fee title holder legally owns the real property. The land manager is responsible for performing the actions set forth in the long-term management plan, adaptive management plan, and CE. The compliance monitor is responsible for ensuring that the land is being managed in accordance with the terms of the CE. In no case will the land manager also be designated the compliance monitor, nor will the fee title holder also be the CE holder; these two situations would create conflicts of interest.

The locations of onsite mitigation will not be included under CEs because permanent protection within the Caltrans right-of-way could interfere with maintenance of the roadway. However, resources within the Caltrans right-of-way still would be afforded protection under the CWA and other environmental laws.

Chapter 5 Baseline Information

This chapter describes existing resources in the onsite mitigation area (i.e., within the bypass alignment footprint) and the offsite mitigation properties (i.e., adjacent to or away from the bypass alignment footprint). In a few cases, the bypass alignment footprint passes through offsite mitigation properties (i.e., portions of the Benbow, Brooke, Ford, Lusher, and Niesen parcels). Baseline information discussed in this chapter includes:

- Historical and existing surface water and groundwater hydrology.
- Historical and existing geology and geomorphology.
- Historical and existing vegetation.
- Historical and existing hydrology/topography.
- Soils and substrates.
- Jurisdictional wetlands and other waters of the United States.
- Protected fisheries.
- Riparian habitats.
- Listed plants (North Coast semaphore grass and Baker's meadowfoam).

Note that this chapter first provides the discussion of historical and existing surface water and groundwater hydrology, geology, and geomorphology because the discussion relates to valleywide conditions. Subsequent discussion in the chapter is broken down into onsite mitigation area and offsite mitigation properties.

5.1 Valleywide Hydrology, Geology, and Geomorphology

5.1.1 Historical and Existing Surface Water Hydrology

Little Lake Valley contains many streams that convey water from the surrounding hills through the valley to Outlet Creek, which collects water from Little Lake Valley and eventually carries it to the Eel River. Generally, all of the streams are perennial upstream of Little Lake Valley and become intermittent in their lower reaches depending on the water-year type. The flow through Little Lake Valley is generally southeast to northwest.

Historically, during the wet season valley streams would overflow their banks and inundate the surrounding meadows, creating high-quality wetlands and forming a seasonal lake in the north end of the valley. Soil survey information from 1920 (Dean 1920) indicates that a lake historically formed at the northern end of Little Lake Valley during the rainy season, even during very low rainfall years. At the end of a series of heavy rainfall events in February 1915, the lake encompassed 1,875 acres and was 12 ft deep over a 300-acre area. At that time, the high water mark of the lake was at the 1,330-ft contour, which historically would have flooded most of the northern half of the Ford property.

A lake no longer forms because the invert of Outlet Creek at the north end of Little Lake Valley has been lowered. Around the turn of the twentieth century valley settlers blasted natural rock formations downstream of the current US 101 alignment to allow the valley to drain more quickly. Other factors that affected flows and inundation levels and duration in the north end of the valley were the raising of US 101 above flood levels in 1964 and the construction of the current US 101 bridge crossing.

With the development of the city of Willits and agricultural conversion of the surrounding lands, many other drainage projects have been implemented throughout Little Lake Valley. These drainage projects often have resulted in incised streambeds, redirected creeks, ripped hardpan, and construction of numerous artificial drainage ditches. All these drainage features efficiently remove water from Little Lake Valley at an accelerated rate, quickly drying former wetland meadows to accommodate early grazing and hay production. A number of reservoirs[1] in the surrounding hills further reduce wet-season flows through Little Lake Valley. Despite these extensive artificial alterations, a number of wetland habitats persist throughout Little Lake Valley.

5.1.1.1 Precipitation and Stream Discharge

Precipitation data were collected near Brooktrails during 1877–2002 and at the California Department of Forestry and Fire Protection's (CalFire's) Howard Forest near Davis Creek during 1988–2002. Almost all precipitation falls as rain. The Brooktrails site averaged 50 inches per year (in/yr) over the 125-year record. The late 1800s had the lowest average annual rainfall with less than 35 in/yr, and the 1950s and 1990s had the highest (60–65 in/yr). The Howard Forest site averaged 56 in/yr during the more than 15-year period, with a low of 35 in/yr and a high of 90 in/yr. Data from both sites were compared to known El Niño events. The highest rainfall events coincided with El Niño events: 1957–58; 1968–69; 1973–74; 1982–83; and 1997–98. El Niño events increased the average rainfall by 120% (LeDoux-Bloom and Downie 2008).

Streamflow data were collected from the U.S. Geological Survey (USGS) river gage in the Outlet Creek Basin near Longvale on Outlet Creek (USGS ID 11472200) during 1956–94; and a new gage installed at Lake Emily on Willits Creek in 2003 (USGS ID 11472160).

5.1.1.2 Flooding

The north coast of California is dominated by intense, short-duration rainstorms in winter, with peak flows that are among the highest on record for the western United States (Sommerfield et al. 2002 as cited in LeDoux-Bloom and Downie 2008). Outlet Creek flooded in 1907, 1938,

[1] These include Lake Emily Dam (on Willits Creek with a surface area of 275 acre-feet [af]); Ada Rose Dam (on Willits Creek with a surface area of 138 af); Boy Scout Camp Dam (on Boy Scout Creek with a surface area of 800 af); Pine Mountain Dam (on Moore Creek with a surface area of 45 af); Morris Dam (on Davis Creek with a surface area of 620 af); and Centennial Dam (on Davis Creek with a surface area of 512 af).

1950, 1955, and 1964, with the latter two floods causing severe damage. The 1955 flood deposited large amounts of debris and sediment that aggraded creeks throughout Little Lake Valley. During winter 1964, rain fell on the local snow pack and caused the release of a tremendous amount of water during a relatively short period, resulting in a significant increase in streamflow and velocity. High water in Outlet Creek washed away the railroad embankments along several sections of track during the 1964 flood. This flood was very damaging to the Eel River, its estuary, and smaller headwater basins, such as Outlet Creek (LeDoux-Bloom and Downie 2008).

Figure 5-1 shows the results of the flood frequency analysis for Outlet Creek near Longvale for the period of record. Peak annual discharge was fit using a Log-Pearson Type III distribution using standard procedures. It is interesting to note that the 1964 flood event had an estimated peak discharge of 77,900 cfs, which is the largest flow on record. The estimated 100-year event is 57,200 cfs and has an approximate return period of 385 years (P = 0.0026). Smaller, more recent significant rain events occurred in 1993, 1995, 1997, and 1998. Flood events are tightly correlated with El Niño events in California (LeDoux-Bloom and Downie 2008).

5.1.2 Historical and Existing Geology and Geomorphology

5.1.2.1 General Physiography—Outlet Creek Basin

Outlet Creek Basin in northern Mendocino County is part of the (Northern California) Coast Range Geomorphic Province. Outlet Creek Basin is the southwestern headwaters of the Eel River, the third largest river system in California. The Basin represents an area of approximately 160 square miles (mi^2) (90,527 acres) or approximately 4% of the Eel River watershed. Outlet Creek is approximately 30 miles long from its headwaters to the Eel River and receives water from 12 tributary streams. The Basin is a combination of steep headwaters (greater than 20% gradient) that flow into Little Lake Valley and ultimately Outlet Creek. Small and large cobble and boulders dominate the high-transport reaches. Gravel and fine sediment, and in some places, bedrock, dominate the low-depositional reaches (primarily in Little Lake Valley).

Outlet Creek Basin has been divided into three separate subbasins for assessment and analysis purposes as described in the Outlet Creek Basin Assessment Report (LeDoux-Bloom and Downie 2008): the Northern, Middle, and Southern subbasins. The onsite mitigation area and offsite mitigation properties are in the Southern subbasin (Figure 5-2). Although the following description of geologic and geomorphic conditions covers the entire Outlet Creek Basin, its main focus is the Southern subbasin (and area of 64 mi^2 [40,960 acres]).

5.1.2.2 Geology

The dominant geology in the Outlet Creek Basin is the Tertiary-Jurassic Central Belt,[2] which is very soft to soft geology that is highly erodible. In Little Lake Valley, Quaternary alluvium is

[2] Geologists have subdivided the Franciscan Complex into larger map units called belts and smaller map units called terranes. The Tertiary-Jurassic Central Belt of the Franciscan Complex contains mélange (an accretionary assemblage) consisting of arkosic and lithic metasandstone and meta-argillite of pumpellyite and lawsonite metamorphic grade (high-pressure and relatively low-temperature blueschist facies) (McLaughlin et al. 2000).

dominant. On the southern boundary of Little Lake Valley, where alluvial fans are present, Pliocene-Pleistocene fill[3] is present. Fine sediment is contributed consistently from Outlet Creek Basin into the Eel River.

Hillslope elevation ranges from 1,000 to 3,000 ft. Little Lake Valley has an approximate elevation of 1,280 ft and is considered a graben (an intermountain valley bound by faults and associated ridges on each side, locally widened into a basin or dropped downward in relation to adjacent portions).

5.1.2.3 Outlet Creek Basin Watershed Classification

Watershed Overview

The Outlet Creek Basin stream network flows primarily in a northern direction and can be divided into three distinct segments:[4] the source headwaters and the depositional valley floor (both part of the Southern subbasin), and the slower transport reaches downstream (also part of the Northern and Middle subbasins). The headwater streams include Berry, Davis, Baechtel, Broaddus, and Willits Creeks and the smaller perennial streams that flow into them.

The source-headwaters reaches occupy steeper and more confined forested valleys with bedrock structural control and fairly shallow alluvial deposits. This structural control creates fairly straight channel reaches with low sinuosity.

In the depositional valley floor, the stream valley is naturally unconfined with an essentially flat gradient and deep alluvial floor. Here the bedload is finer and channel sinuosity is higher; however, as subsequently discussed, artificial straightening has significantly decreased the sinuosity of many local channels.

There are slower transport reaches present downstream of Little Lake Valley. Stream gradient is variable, but is significantly steeper than that of the valley floor of Little Lake Valley and not as steep as the source-headwaters reaches. Specifically, Outlet Creek becomes confined and has a relatively steep gradient as it travels north along Sherwood Ridge and US 101. The gradient decreases above the confluence with Long Valley Creek, coinciding with a wider channel. Downstream of its confluence with Long Valley Creek, Outlet Creek turns east and is bound on its south side by Shimmin Ridge where it joins the Eel River.

Channel Form in Little Lake Valley

Based on field observations (Appendix H) and the stream classification methods of Montgomery and Buffington (1998), the various watercourses in Little Lake Valley occur in an alluvial valley segment dominated by plane-bed and pool-riffle reaches. Plane-bed and pool-rifle reaches are

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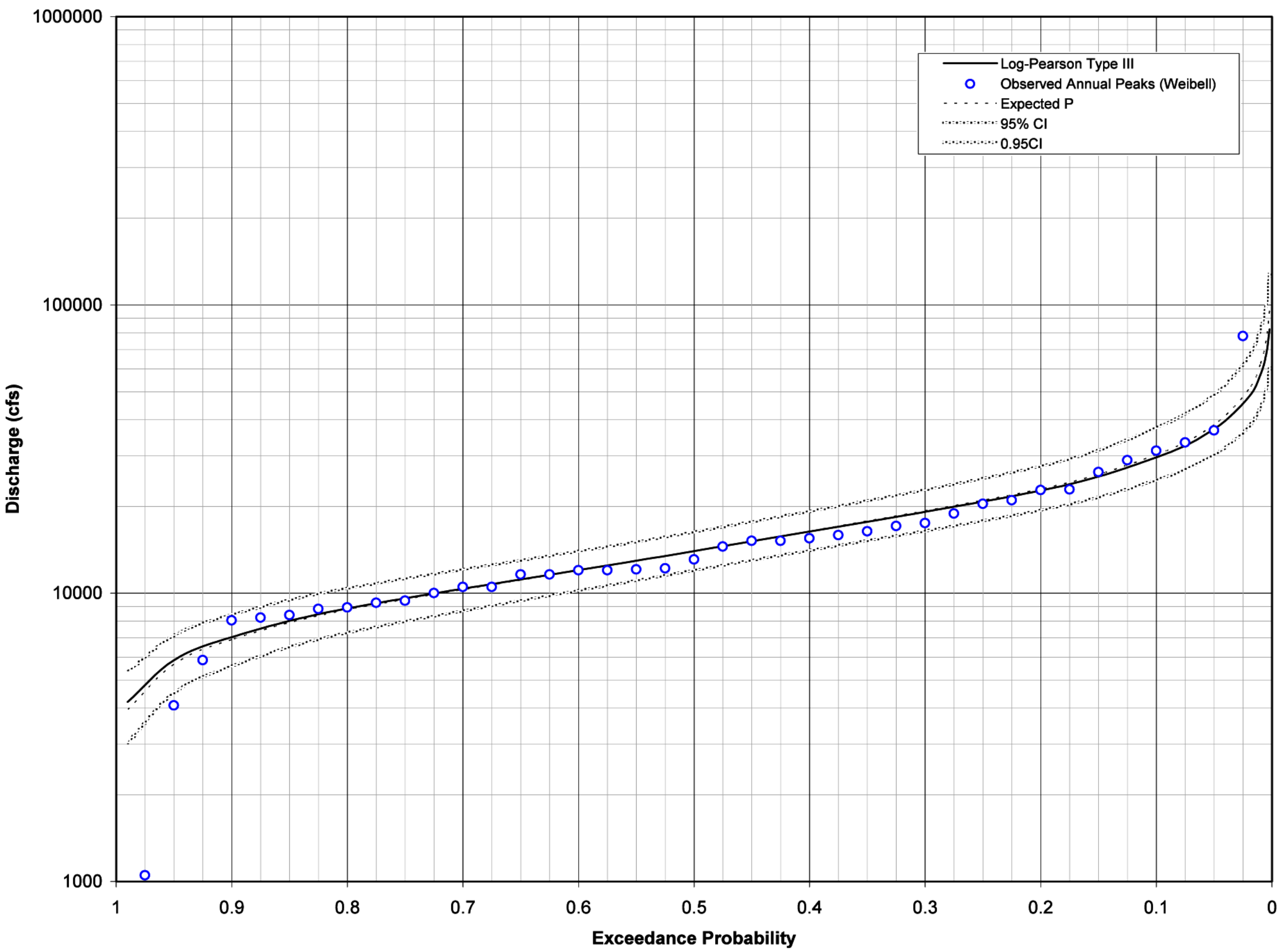
Metasandstone is locally interleaved with chert and metabasalt. Carbonate concretions and local chert beds contain microfossils that are Late Jurassic to Late Cretaceous in age.

[3] Pliocene-Pleistocene fill consists of fine-grained lake deposits, coarser-grained alluvial gravel, and fine-grained fluvial overbank deposits (Woolace et al. 2005).

[4] Bisson and Montgomery (1996) refer to such geomorphic regions as *valley segments*, whereby they share similar geomorphic properties as well as hydrologic and sediment transport characteristics.



Source: LeDoux-Bloom and Downie 2008.

Figure 5-1
Flood Frequency Analysis of Peak Annual Discharge for Outlet Creek

Source: LeDoux-Bloom and Downie 2008.

Figure 5-2
Outlet Creek Subbasins and CalWater2.2a Planning Watersheds

transport-limited;[5] therefore, the various watercourses in Little Lake Valley behave as response (or storage) channels, constantly adjusting their bed morphologies to water or sediment.

5.1.2.4 Historical Alterations to Hydrology and Geomorphology in Little Lake Valley

Before stream channels were relocated and dredged in the 1900s, Little Lake Valley functioned as a large, shallow lake and wetland until late spring or early summer, depending on the amount of rainfall of that given year (Dean 1920; LeDoux-Bloom and Downie 2008). Furthermore, the various drainages in Little Lake Valley lacked a discernible hydrologic connection to Outlet Creek. As described by Dean (1920):

> An interesting and significant feature of the drainage of this Valley is that although all of the larger creeks have deep, wide channels that occupy a considerable portion of their respective valleys at the point where they enter the main valley, none of them are directly connected with Outlet Creek. The sudden decrease in the velocity of flow in these creeks which occurs upon their entering the main valley has caused them to deposit most of the suspended material which they carry, so that the channels become entirely filled by the time they have reached the flat portion known locally as the lake bed.

To a certain extent, this same process of channel filling occurs today, especially on smaller unnamed drainages and within wetlands on the floodplains. However, around the beginning of the last century, artificial channels were created by ox and plow to facilitate the draining of Little Lake into Outlet Creek for agricultural purposes, such as potato production, grazing (California Department of Water Resources 1965 as cited in LeDoux-Bloom and Downie 2008), and railroad construction. The largest channel appears to have been dredged from the confluence of Outlet Creek south through Little Lake where it joined Mill Creek. This channel was straightened and moved to the east to accommodate the railroad tracks (J. Ford, Ford Ranch, personal communication as cited in LeDoux-Bloom and Downie 2008).

One of the original channels (possibly the thalweg) through the lake is still visible and is referred to as the Outlet Creek overflow. This channel was later dredged straight south and merged with the confluences of Broaddus and Baechtel Creeks. This dredged channel was named Outlet Creek and is noted as such on maps today. Historical and current maps indicate that lower Berry and Davis Creeks were also straightened along property ownership lines to facilitate the drainage of Little Lake. By the end of the 1930s, Baechtel, Broaddus, Berry, and Davis Creeks were straightened, relocated, and/or leveed so the land area could be used for the expanding agricultural and transportation activities (LeDoux-Bloom and Downie 2008).

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[5] River segments can be classified into three classes based on their position within the watershed and the relative ratios of transport capacity to sediment supply (Montgomery and Buffington 1998). Headwater source segments are typically transport-limited (often because of limited channel runoff) but offer sediment storage that is intermittently initiated under large flow events, debris flows, or other gravitational events (e.g., landslides). Transport segments are composed of morphologically resilient, supply-limited reaches (e.g., bedrock, cascade, step-pool) that rapidly convey increased sediment inputs. Response segments consist of lower-gradient, more transport-limited depositional reaches (e.g., plane-bed, pool-riffle, step-pool sequences) where channel adjustments occur in response to changes in sediment supply delivered from upstream.

These events have altered the hydrologic characteristics of Little Lake Valley and have enabled the widening of the channels. This has decreased the number and depth of pools and increased runoff, resulting in a general increase in streambank erosion. The levees along many of the channels have excluded overbank flows, except during large flood events greater than the 5- to 10-year peak discharge. The straightening, relocation, and levying of the channels in the lower parts of Davis, Baechtel, Broaddus, and Mill Creeks and the upper straightened part of Outlet Creek have caused the channels to become undefined and aggraded. This has led to subsurface flow that disconnects these streams from the rest of the watershed during the summer and early fall months (LeDoux-Bloom and Downie 2008).

5.1.2.5 Upstream Land Uses Affecting Geomorphic Characteristics of Little Lake Valley

Dams

As mentioned previously, six reservoirs in the surrounding hills reduce wet-season flows through Little Lake Valley. These dams and associated reservoirs impound a total of 1,670 acre-feet per year (afy) and are filled by rain that usually falls November through February. The construction of these dams has resulted in a significant decrease in discharge, especially in the early 1990s after the construction of the Centennial Dam in 1989. In addition, the channels below the dams have become more incised, armored, and straighter and have experienced more bank erosion—all common effects created by dams (Knighton 1998; Thorne et al. 1996). Furthermore, other nonappropriated diversions of water upstream of Little Lake Valley also have reduced summer and fall flows necessary for juvenile salmonid survival (LeDoux-Bloom and Downie 2008).

Roads, Culverts, Bridges, and Weirs

Roads have led to an increase in impervious surfaces, which has concentrated flows into the stream system. Concentrated flows have increased the erosive power of water, leading to accelerated streambank erosion and associated downstream sedimentation. Erosion features associated with culverts include headcuts in the upstream direction, scour areas in the downstream direction, and/or eroding gullies in either direction. All of these erosion features were observed in the offsite mitigation parcels (Appendix H). Bridges tend to constrict water movement in the channel, thereby increasing stream energy and accelerating streambank erosion, especially in the vicinity of the bridge itself. Weirs can increase erosion and incision locally through hyper-concentration of flow (Doyle et al. 2000).

Timber Harvesting

The lack of erosion control facilities throughout areas of Little Lake Valley and the Outlet Creek Basin in general, coupled with the uncontrolled installation of fills and failure to remove fills adjacent to watercourses, left the land vulnerable to large storm events. Intense, prolonged runoff during large storm events in the mid 1950s and 1960s caused erosion from channel incision, slides, and washing of soil and debris into watercourses. The residual effects still can be seen in some areas of Little Lake Valley. Anecdotal observations suggest that significant logjams in several streams coincided with these large storm events; for example, at least one logjam occurred on Willits Creek between 1957 and 1960 that was approximately 50 ft wide and 300 ft long. At the south end of Little Lake Valley, sediment accumulated near the confluences of Haehl, Baechtel, and Broaddus Creeks. The creeks were straightened, channelized, and leveed along property lines and relocated to flow into a single stream called Outlet Creek, which flows into and out of Little Lake Valley (J. Ford, Ford Ranch, personal communication as cited in LeDoux-Bloom and Downie 2008). Although timber harvesting practices are more environmentally sensitive today than in the past, sedimentation from timber harvesting practices is still a problem in the Outlet Creek Basin (LeDoux-Bloom and Downie 2008).

Vegetation Removal

Vegetation removal from channel clearing or through grazing, logging, or conversion to agricultural and developed lands can reduce channel and bank roughness and therefore increase flow velocities. As mentioned previously, an increase in concentrated flows has increased the erosive power of water, leading to accelerated streambank erosion (and loss of streamside vegetation) and downstream sedimentation.

5.1.2.6 Geomorphic Characteristics of Little Lake Valley

Caltrans assessed existing erosion sites at the offsite mitigation properties in May 2010 (California Department of Transportation 2010; Appendix H). The assessment documented existing erosion points (e.g., headcuts) and linear (e.g., eroding banks) features on upland and instream areas and evaluated these features in terms of contribution of sediment to swales and creeks, effects on adjacent sensitive resources, and ease of constructability/access to restore the erosion feature. General information on the geomorphic characteristics of Little Lake Valley also was noted as part of this effort.

The following geomorphic characteristics have been synthesized from the erosion site assessment and an accompanying literature search to identify the processes currently operating in Little Lake Valley, to understand the geomorphic landforms on the offsite mitigation properties, and to identify the likely geomorphic effects associated with mitigation efforts.

Substrate Composition and Embeddedness

Caltrans did not collect data on substrate composition and embeddedness as part of the erosion site assessment. However, visual inspection of the channel beds on the offsite mitigation properties suggests that fine sediment (silts and sands) dominates the channel bed sediment. However, in other areas of the channels (such as upper Davis and Old Outlet Creeks), gravels (and associated extensive point bar development) are also present.

Based on the Outlet Creek Basin Assessment Report (LeDoux-Bloom and Downie 2008), findings relevant to substrate composition and embeddedness at the offsite mitigation properties include:

- Fine sediment deposits in low-gradient reaches contribute to shallow pool depth and small spawning substrate (and can lead to an increase in flooding through loss of channel capacity, which in turn exacerbates bank erosion).
- Embeddedness levels are unsuitable in many streams (which signals fine-sediment deposition from bank and near-bank processes).
- The six dams have significantly decreased downstream gravel recruitment.

Bank Instability and Bank Characteristics

Bank erosion has been identified as the most significant contributor of excess sediment in the Outlet Creek Basin (LeDoux-Bloom and Downie 2008). Bank composition ranges from unconsolidated to consolidated silt, sand, and gravel. In general, in riverine environments where no other significant land use practices that destabilize and introduce sediment to the surrounding topography occur, eroding banks are generally thought to be the principal source of excessive local sedimentation (Hooke 1980; Lawler 1992, 1995; Lawler et al. 1997; Rosgen 1996). In addition, much of Little Lake Valley has been used for livestock grazing. Livestock grazing in riverine environments also can lead to bank erosion as a result of trampled ground that becomes compacted enough to prohibit the establishment of vegetation but not so much as to prohibit the contribution of soil particles to the water column from high-velocity flows (Myers and Swanson 1993). Bank erosion from steep headwater source streams and streams in Little Lake Valley likely delivers much of the fine sediment in the Outlet Creek Basin (LeDoux-Bloom and Downie 2008).

Caltrans analyzed bank erosion on the offsite mitigation properties as part of the 2010 erosion assessment in the Outlet Creek Basin (Appendix H). Eleven eroding bank sites were identified on the offsite mitigation properties (an area that encompasses approximately 2,089 acres). Three bank erosion sites (on the Ford parcel 108-010-06) were observed to have the potential to provide excessive sedimentation to downstream channels. Each of these sites is an instream eroding bank that occurs on Outlet Creek in the center of the parcel, and all three sites are similar because they have unstable, mostly unvegetated right (i.e., east) cutbanks created by convergence flow on the riffle/gravel bar complex opposite the cutbank. The presence of these gravel bars and opposite bank erosion indicate that Outlet Creek is trying to locally increase its sinuosity through lateral migration (see the discussion under Channel Pattern below). The banks are approximately 6 ft tall from the toe of the bank. Lateral migration and upstream fluvial scour, combined with direct trampling by livestock, likely have initiated these erosion features. All three erosion sites appear unstable, as evidenced by active slumping.

Other sites where unstable streambanks were documented but do not appear to be contributing excessive sedimentation include two sites on Benbow parcel 108-040-13 (with lengths of 64 and 20 ft); two sites on Benbow parcel 007-020-03 (with lengths of 30 and 820 ft); one site on Ford parcel 108-020-04 (with a length of 35 ft); one site on Ford parcel 108-030-05 (with a length of 35 ft); and two sites on the Wildlands parcel 108-060-01 (with lengths of 90 and 105 ft). In addition, six gullies experiencing either continuous or discontinuous erosion as evidenced by incision, localized slumping, or other erosion features were identified on Taylor parcels 037-221-68 and 037-240-41.

Most of the channels and streams in the offsite mitigation parcels appeared to have adequate vegetation cover, and the small amount of eroding banks in proportion to the total linear feet of streams in the offsite mitigation parcels do not point to large-scale bank instability. However, high erosion potential combined with flashy instream conditions on noncohesive banks either devoid of vegetation or containing only shallow-rooted or annual plant species has created streambanks that have the *potential* to erode easily (LeDoux-Bloom and Downie 2008).

Pool, Riffle, and Run Frequency (Habitat Complexity)

Caltrans did not collect habitat complexity data as part of the erosion site assessment (Appendix H). However, visual inspection of the channels on the offsite mitigation properties suggests that most habitat units consist of long runs dominated by fine sediments (silts and sands). Shallow pool depths were noted, and riffles (although present near gravel bars) were not abundant. Woody debris influence is generally low (except in upper Davis and Old Outlet Creeks).

Channel Pattern

A review of historical aerial photography, and the description in the 1920 Soil Survey of the Willits Area, California (Dean 1920), indicate that channel sinuosity was historically much greater in Little Lake Valley than today, and that some of the channels were anabranching (multithread). Today, channel pattern can be described as straight and single-thread. As described above, channel straightening has led to many undesired consequences for the channels in Little Lake Valley (e.g., exacerbated channel incision and bank erosion). Most of the channels on the offsite mitigation properties are straight (sinuosity value of 1). Upstream of the offsite mitigation properties, channel sinuosity increases and ranges from slightly sinuous (sinuosity value of 1.1–1.3) to sinuous (sinuosity value of 1.4–1.7).

Channels in Little Lake Valley are unconfined by hillslopes; however, almost all channels are incised (see discussion below). As a result of channel straightening, it is likely that some of the channels are experiencing continued incision and lateral migration. An example of this occurs on Outlet Creek on Ford parcel 108-010-06, where the presence of gravel bars results in opposite bank erosion, suggesting that Outlet Creek is trying to locally increase its sinuosity through lateral migration.

Degree of Incision and Stage of Channel Evolution

Channel incision has several negative consequences for stream channels. First, incision leads to deepened channels. This deepening limits channel-floodplain interaction, thereby increasing such variables as unit stream power (Brizga and Finlayson 1990). An increase in unit stream power has the potential to further increase the instability of streambanks because of increased shear stress on those banks. Limited channel-floodplain interaction also restricts ecological interactions between the channel and the floodplain (Doyle et al. 2000). Second, incised channels further increase the flashy response of channels in semi-arid environments where infrequent events dominate geomorphic effectiveness (Wolman 1988). Third, channel habitat units, such as pool-riffle sequences, are rare in incised channels, and those that do exist do so for only limited periods (Shields et al. 1988). Last, the increased depth of flow associated with incision, coupled with an increased flashy regime, results in bed armoring and a decreased frequency of bed mobilization (Doyle et al. 2000).

Based on field observations (Appendix H), most of the channels on the offsite mitigation properties are incised. Degree of incision is high because of the presence of steep, sometimes unstable, and near vertical streambanks adjacent to floodplains. In addition, some streambanks (e.g., the lower portion of Davis Creek) are denuded of vegetation, an indication of little or no hydrologic interaction between the floodplain and the channel under most flows, which generally denotes incision. Finally, the lack of splay deposits; vegetation with a smoothed, flooded appearance in the downstream direction; and natural levee development also were noted as indications of incision.

In summary, excessive erosion and downstream deposition appear to be influencing channel form, and at present there is no balance between sediment supply and water discharge, as noted by excessive sedimentation. However, no site-specific data were evaluated, and future trends of channel incision would require repetitive cross-sectional and longitudinal profile surveys.

5.1.3 Groundwater Hydrology

Little Lake Valley is underlain by a layer of Holocene alluvium estimated to be a maximum of 250 ft deep. The alluvium is composed of silt, clay, gravel, and sand. There is a layer of continental basin deposits under the alluvium and Franciscan Complex bedrock under the continental basin deposits.

The alluvium layer is the most productive aquifer for groundwater wells because it generally has relatively high porosity and permeability (Farrar 1986). The presence of sheets of fine-grained sediments in the alluvium causes much of the aquifer to be confined or semiconfined (California Department of Water Resources 2004). While the city of Willits obtains its water from Morris Reservoir, groundwater wells are used for agriculture and residential use outside of Willits (Farrar 1986).

The California Department of Water Resources (DWR) (2010) reports well depth and elevation measurements from five wells in Little Lake Valley (Figure 5-3). Wells 1 and 2 are near Willits adjacent to the mountains on the west side of Little Lake Valley. Wells 3, 4, and 5 are toward the center of Little Lake Valley to the southeast, east, and northeast of Willits, respectively. Measurements from these wells indicate that groundwater could be close to the ground surface (i.e., shallow), particularly in the wells located away from the edges of Little Lake Valley (wells 3, 4, and 5). This shallow groundwater supports many depressional wetlands that occur throughout Little Lake Valley.

Groundwater levels measured in wells represent piezometric water surface levels. For an unconfined aquifer, the well elevations are roughly the same as the elevation of the top of the aquifer, but for confined aquifers, well elevations can be higher than the elevation at the top of the aquifer. As a result, it is difficult to determine with certainty whether the groundwater supporting wetlands in Little Lake Valley is perched on impermeable layers above the main aquifer or whether it represents the top portion of the main aquifer. Regardless of the mechanism (perched water versus main aquifer), the abundance of wetlands in Little Lake Valley indicates shallow groundwater levels occur and are available to support existing and proposed established wetlands.

The DWR well data indicate that groundwater elevations can fluctuate seasonally from 5 to 15 ft (California Department of Water Resources 2010) (Figure 5-3). Seasonal fluctuations in groundwater level result primarily from pumping and precipitation (Farrar 1986), although other factors such as groundwater movement to and from streams, evapotranspiration, and recharge from irrigation play a role. Wells 2, 3, and 4 are no longer in use, so the fluctuations in their levels (Figure 5-3) are not a result of pumping of these wells, although pumping at other wells could be affecting the levels in wells 2, 3, and 4. The well data also indicate that groundwater levels in Little Lake Valley can decrease slightly during periods of drought. For example, well-

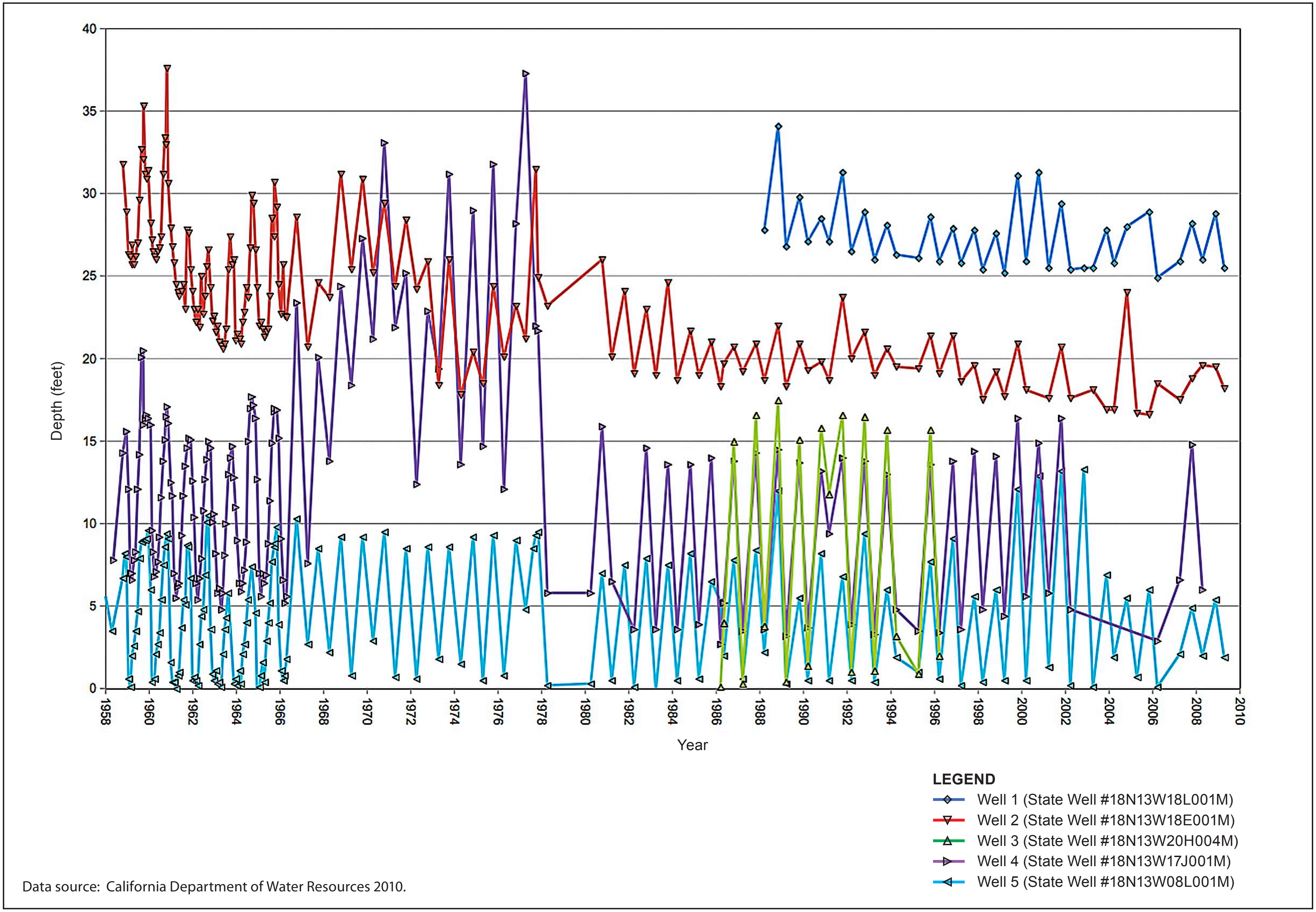

Figure 5-3
Depth to Groundwater in Five Wells Located in Little Lake Valley

level recovery was slightly reduced in some wells during some dry winters such as 1977. However, in general there has been little change in well levels from year to year, suggesting that to the extent that the main aquifer supports wetlands, groundwater is usually available to support wetland hydrology.

The presence of groundwater discharge at a large marsh at the north end of Little Lake Valley, located where water leaves the valley via Outlet Creek, further indicates that groundwater levels are close to the soil surface. During particularly wet winters, the marsh becomes a shallow lake as a result of groundwater and surface water inflow (Farrar 1986).

5.1.3.1 Summary of Winter 2010–2011 Groundwater and Wet Meadow Inundation Sampling

This section summarizes the results of groundwater monitoring and wet meadow inundation surveys. Groundwater monitoring conducted during at monthly intervals from December 2010 through March 2011. In April and May 2011, data were collected twice a month. Wet meadow inundation surveys were performed from December 2010 through May 2011. This monitoring was performed as part of a baseline survey performed for biological and physical resources in Little Lake Valley and on the mitigation parcels. The complete monitoring results are contained in the Draft Monitoring Reporting Program (MRP)/Incidental Take Permit (ITP) Baseline Conditions Report (California Department of Transportation 2011).

Groundwater Monitoring

Groundwater wells were installed in representative wet meadows on parcels in the bypass area and the mitigation area. In the impact area, some groundwater wells were installed in wet meadows in the haul road alignment to determine whether project impacts from the haul roads would be temporary, as expected, or permanent. In the mitigation area, groundwater wells were installed in representative wet meadows on each parcel to capture variations in soils and topography; however, where soil and topography conditions are relatively homogenous across parcels (e.g., Benbow parcels), groundwater wells were not installed on each parcel. Groundwater wells also were installed near sites where wetland establishment is proposed.

Shallow groundwater with a seasonal variation (highest in spring, lowest in fall) is a dominant feature of the valley. Historical records from a few wells near Willits indicate water levels fluctuate by about 5 to 10 ft from spring to summer in several wells located along the creeks in the valley. This shallow groundwater helps maintain water in the surface soils and extends the period of soil saturation after the seasonal rainfall ends in May or early June. Given the abundance of wetlands in the valley, along with the moderately permeable soil, it seems likely that the shallow groundwater (water table) remains close to the surface across most of the valley during the rainy season. The shallow groundwater then slowly drains to a depth of 5–10 ft through seepage to the creek channels.

Many of the shallow groundwater wells indicated that the soil profiles were nearly saturated within 6 inches of the surface. A few indicated relatively dry conditions on the first survey in mid-December. Although the cumulative rainfall was about 20 inches by December 15, the shallow groundwater had not yet saturated the soils in most of the wells on the Benbow parcels. All wells on the Ford parcels generally were saturated in mid-December. Nearly all of the wells showed saturated soil conditions in the late March and early April surveys. All Benbow parcel wells indicated that the shallow groundwater had declined to below the well depth (30 inches) by the end of April. All Benbow parcel wells are along the Baechtel Creek and Outlet Creek channels. The creek channels are relatively deep (incised) along these parcels, and the shallow groundwater could drain several feet as seepage to the creek channels after the high creek flows decrease to baseflow conditions. The seepage rate at these locations or on other wet meadows at the offsite mitigation areas adjacent to creek channels is dependent on localized soil conditions and is expected to vary depending on location. For example, soil surveys performed for proposed Group 2 wetland establishment site along Outlet Creek and Davis Creek indicated that soil textures and permeability in upland areas that are proposed to be lowered for wetland establishment had soil characteristics similar to adjacent wet meadows and therefore would not serve as a “drain” to the wetland.

As part of the evaluation of North Coast semaphore grass habitat in the valley, 20 shallow groundwater monitoring wells were installed in the vicinity of semaphore grass habitat (eight wet meadow sites, five riparian sites, and seven upland sites). The data from these shallow wells are indicative of the shallow groundwater variations that are expected at other wetlands parcels in the valley. Groundwater levels were monitored intermittently from April 24, 2010, to June 27, 2010. Data from these wells indicate that the shallow groundwater elevations increased with rainfall and decreased at a similar rate after rainfall ended for the year. The groundwater elevations generally increased between April 24, 2010, and April 29, 2010 in response to about 2.25 inches of rainfall. Groundwater elevations then decreased between April 29 and May 19 (rainfall of about 1 inch). Groundwater elevations increased again between May 19 and June 7 (rainfall of about 2.5 inches) and then decreased from June 7 to June 27.

The City of Willits also installed shallow monitoring wells along Outlet Creek where they irrigate the wet meadow with effluent during the summer and where they constructed treatment/storage wetland ponds in 2010 on the other side of Outlet Creek from the existing treatment plant (Jeff Anderson and Associates 2007). These shallow wells indicate a similar pattern of groundwater levels increasing to near the surface and saturation of the soils throughout the wet season, with a slowly declining water elevation of 5 to 10 ft during the summer and fall. Some of the City’s parcels have shallow groundwater pumps for summer spray irrigation, but pumping of the groundwater is not extensive, and the shallow groundwater elevations below most of the valley slowly decrease as the soils and shallow groundwater drain to the stream channels during the summer and fall.

Wet Meadow Inundation Monitoring

Inundation of the wet meadow portion of each parcel in the impact and offsite mitigation areas was monitored through field measurement of the surface area of ponding. Measurement included the surface area extent, depth, and duration of ponding. A minimum area of 400 ft^2 (20 ft x 20 ft) with a minimum water depth of 4 inches was used for mapping the inundation of each parcel. The surface area extent data were collected using a sub-meter-precision GPS receiver. Water depth was measured at several points in each inundated wetland area. Inundation data were collected from December 2010 through March 2011 at monthly intervals. In April and May 2011, data were collected twice a month. Duration was estimated from a combination of inundation maps and streamflow depth records from adjacent stream stations.

The surveyed areas represent approximately 25% of the total area in the valley below the 1,400-ft elevation contour. The total surveyed area was approximately 1,500 acres, of which 1,037 acres (70%) were classified as jurisdictional wet meadow. Generally, the January 2011 survey recorded the smallest inundated wet meadow acreage (approximately 20% of total wet meadow on the parcels). The December survey recorded approximately 325 acres of inundated wet meadow (31% of total wet meadow on the parcels). The February survey recorded approximately 407 acres of inundated wet meadow (39% of total wet meadow on parcels), and the March survey indicated nearly 840 acres of inundated wet meadow (81% of total wet meadow on the parcels). Although the monthly surveys were not scheduled to coincide with rainfall conditions, the four surveys indicated that a considerable portion of the wet meadows are inundated for weeks or months during the wet season.

5.2 Bypass Alignment Footprint Impact Area

The project entails construction of a new four-lane segment of US 101. The new segment will be 5.6 miles long beginning 2.0 miles south of Willits and ending 1.0 mile north of Willits. The bypass alignment footprint's permanent and temporary impact areas will encompass 236.06 acres, including the roadway, construction access roads, staging areas, and the Oil Well Hill borrow site (12.15 acres). The bypass alignment footprint is east of Willits, and generally crosses agricultural areas in Little Lake Valley. Construction of the bypass will affect the following sensitive biological resources:

- Listed fish: SONCC coho salmon, California coastal Chinook salmon, and northern California steelhead.
- Listed plants: North Coast semaphore grass and Baker's meadowfoam.
- Riparian habitat encompassing protected fisheries resources (Category I Riparian Corridors).
- Jurisdictional wetlands and other waters of the United States.
- Riparian woodlands (Categories II and III Riparian Corridors).
- Oak woodlands and associated uplands/grasslands.

Sections 5.2.1 through 5.2.7 describe existing sensitive biological resources within the bypass alignment footprint (i.e., the onsite mitigation area). Appendix B provides maps of onsite sensitive biological resources.

5.2.1 Historical and Existing Vegetation

The native vegetation of Little Lake Valley has been affected primarily by land conversion for agricultural production. Large areas of open meadows that once consisted of high-quality wet meadows and vernal pools have been converted into pastures and hay production fields. These wet meadows currently support Kentucky bluegrass, tall fescue, spreading rush, and several sedge species. The vernal pools currently support Davy's semaphore grass (CNPS List 4), Pacific foxtail, and pennyroyal. Tall fescue, Italian ryegrass, and nonnative clovers (i.e., white clover, rose clover, and shamrock) dominate the drier transition areas of these meadows.

Streams, swales, and artificial drainages drain water from the meadows and support riparian forest habitat throughout the bypass alignment footprint. In these areas, white alder, Oregon ash, and valley oak dominate the canopy, while arroyo willow and Himalayan blackberry form the shrubby understory prevalent along open banks. In the wetter areas of the north part of Little Lake Valley, Oregon ash forests are dominant, with only occasional valley oaks and an understory of California blackberry, red-twig dogwood, cow parsnip, and spreading gooseberry. Freshwater marsh habitats east of existing US 101 at the northern end of the bypass alignment footprint support tule, Nebraska sedge, western goldenrod, Baltic rush, slender hairgrass, soft rush, dense sedge, and creeping bentgrass.

5.2.2 Historical and Existing Hydrology/Topography

The project will affect a predominantly lowland area on the western side of Little Lake Valley. This area contains many streams that convey water from the surrounding hills through Little Lake Valley to Outlet Creek, which collects water from Little Lake Valley and eventually carries it to the Eel River. Flow through Little Lake Valley is generally southeast to northwest. The streams that will be affected by the bypass alignment footprint are Haehl Creek, Baechtel Creek, Broaddus Creek, Mill Creek, and Upp Creek. All of these streams are intermittent.

Historically, during the wet season, these streams would overflow their banks and inundate the surrounding meadows, creating high-quality wetlands. With the development of the city of Willits and agricultural conversion of the surrounding lands, many drainage projects have been implemented throughout Little Lake Valley. These drainage projects have often resulted in incised streambeds, redirected creeks, ripped hardpan, and construction of numerous artificial drainage ditches. All these drainage features efficiently remove water from Little Lake Valley at an accelerated rate, quickly drying former wetland meadows to accommodate early grazing and hay production. A number of reservoirs[6] in the surrounding hills further reduce wet-season flows through Little Lake Valley. Despite these extensive artificial alterations, a number of wetland habitats persist throughout the bypass alignment footprint.

5.2.3 Soils/Substrates

The Natural Resources Conservation Service (NRCS) *Eastern Mendocino County Soils Survey* was used to analyze soils in the bypass alignment footprint (Figures 5-4a through 5-4h). Hydric status for map units ranged from nonhydric to partially hydric, while the dominant drainage class ranged from very poorly drained to well-drained.

[6] These include Lake Emily Dam (on Willits Creek with a surface area of 275 af); Ada Rose Dam (on Willits Creek with a surface area of 138 af); Boy Scout Camp Dam (on Boy Scout Creek with a surface area of 800 af); Pine Mountain Dam (on Moore Creek with a surface area of 45 af); Morris Dam (on Davis Creek with a surface area of 620 af); and Centennial Dam (on Davis Creek with a surface area of 512 af).

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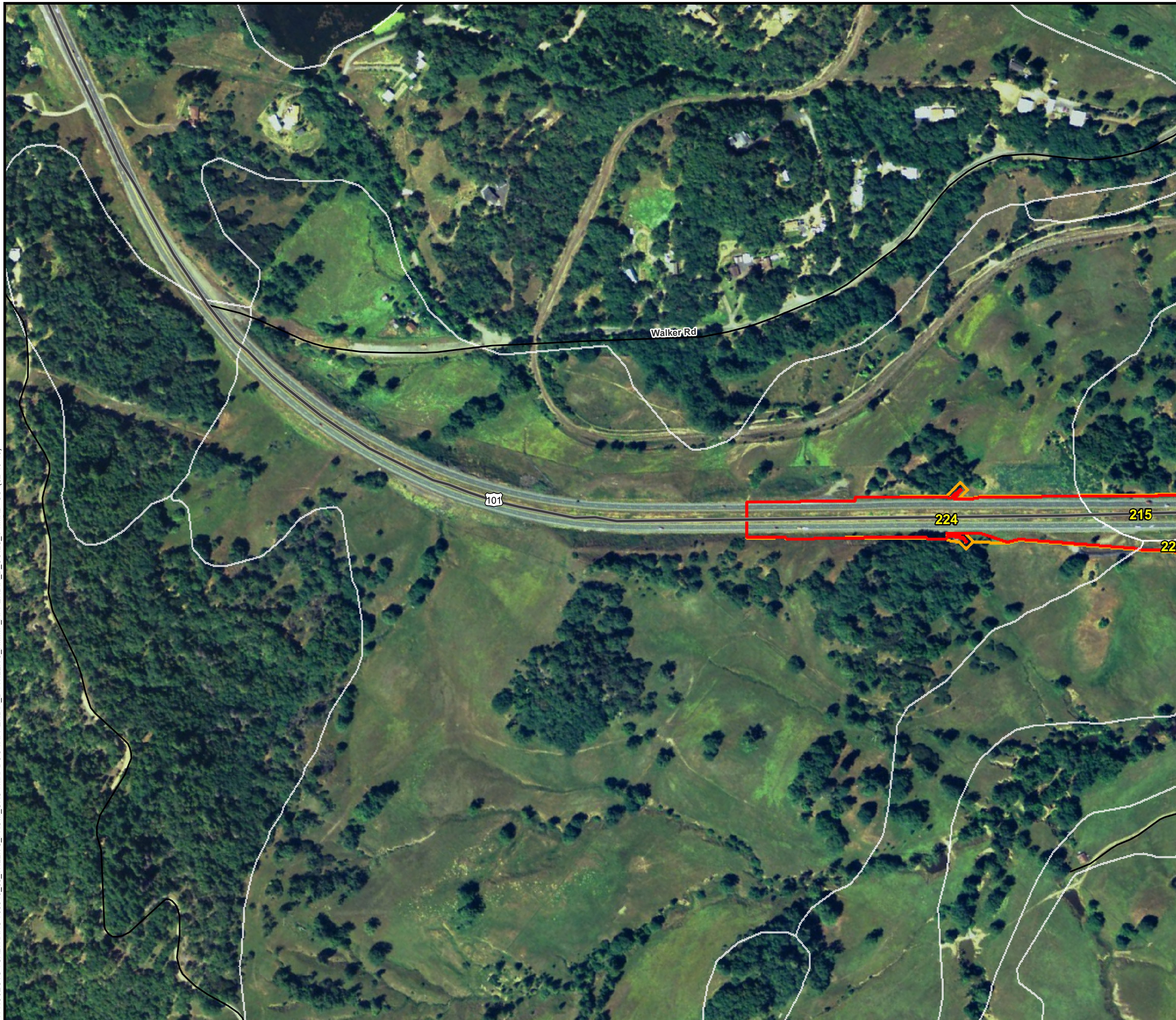
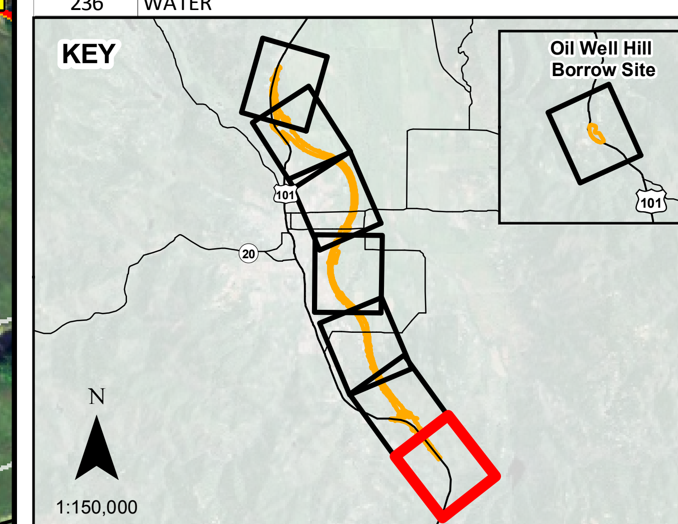


SSURGO Map Unit
Permanent Impact Boundary
Temporary Impact Boundary
Road

SSURGO Map Unit Label Description

178 Map Unit Symbol

Map Unit Symbol	Map Unit Name
110	CASABONNE-WOHLY LOAMS, 30 TO 50 PERCENT SLOPES
115	COLE CLAY LOAM, 0 TO 2 PERCENT SLOPES
123	FELIZ LOAM, 0 TO 2 PERCENT SLOPES
124	FELIZ LOAM, 2 TO 5 PERCENT SLOPES
127	FLUVAQUENTS, 0 TO 1 PERCENT SLOPES
128	GIELOW SANDY LOAM, 0 TO 5 PERCENT SLOPES
133	HAPLAQUEPTS, 0 TO 1 PERCENT SLOPES
155	KEKAWAKA-CASABONNE-WOHLY COMPLEX, 30 TO 50 PERCENT SLOPES
210	URBAN LAND
213	WOHLY-CASABONNE-PARDALOE COMPLEX, 50 TO 75 PERCENT SLOPES
215	XEROCHREPTS-HAPLOXERALFS-ARGIXEROLLS COMPLEX, 9 TO 30 PERCENT SLOPES
216	XEROCHREPTS-HAPLOXERALFS-ARGIXEROLLS COMPLEX, 30 TO 50 PERCENT SLOPES
221	YOKAYO SANDY LOAM, 0 TO 8 PERCENT SLOPES
224	YOKAYO-PINOLE-PINNOBIE COMPLEX, 0 TO 15 PERCENT SLOPES
236	WATER



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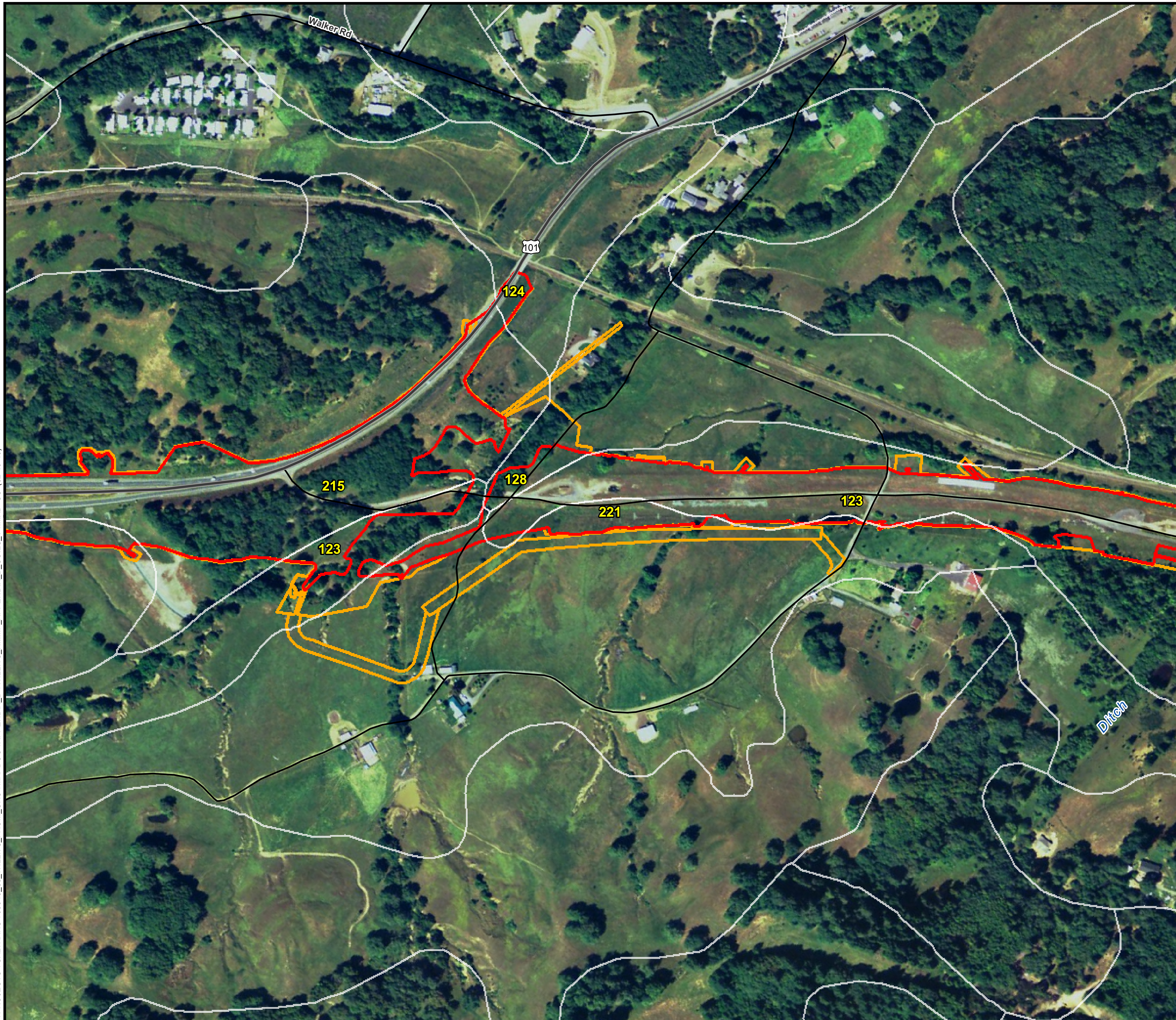
Scale in Feet

Figure 5-4a

Soil Types within the Proposed Bypass Project Footprint

Proposed Willits Bypass Project



SSURGO Map Unit
Permanent Impact Boundary
Temporary Impact Boundary
Road

SSURGO Map Unit Label Description

178 Map Unit Symbol

Map Unit Symbol	Map Unit Name
110	CASABONNE-WOHLY LOAMS, 30 TO 50 PERCENT SLOPES
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124	FELIZ LOAM, 2 TO 5 PERCENT SLOPES
127	FLUVAQUENTS, 0 TO 1 PERCENT SLOPES
128	GIELOW SANDY LOAM, 0 TO 5 PERCENT SLOPES
133	HAPLAQUEPTS, 0 TO 1 PERCENT SLOPES
155	KEKAWAKA-CASABONNE-WOHLY COMPLEX, 30 TO 50 PERCENT SLOPES
210	URBAN LAND
213	WOHLY-CASABONNE-PARDALOE COMPLEX, 50 TO 75 PERCENT SLOPES
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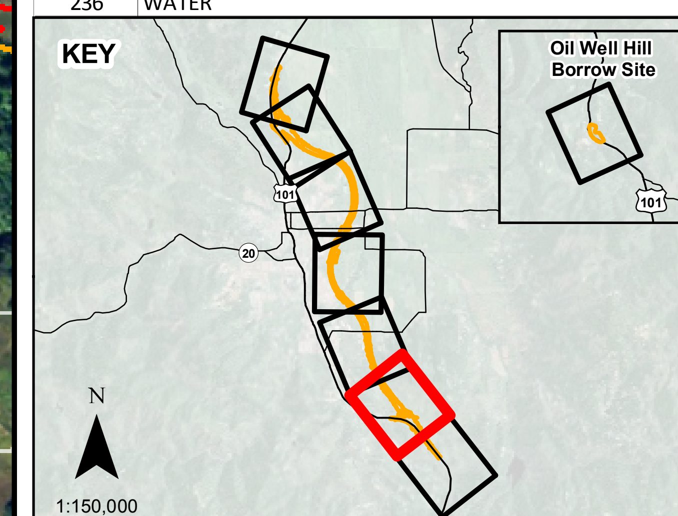
216	XEROCHREPTS-HAPLOXERALFS-ARGIXEROLLS COMPLEX, 30 TO 50 PERCENT SLOPES
221	YOKAYO SANDY LOAM, 0 TO 8 PERCENT SLOPES
224	YOKAYO-PINOLE-PINNOBIE COMPLEX, 0 TO 15 PERCENT SLOPES
236	WATER



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Scale in Feet

Figure 5-4b

Soil Types within the Proposed Bypass Project Footprint

Proposed Willits Bypass Project

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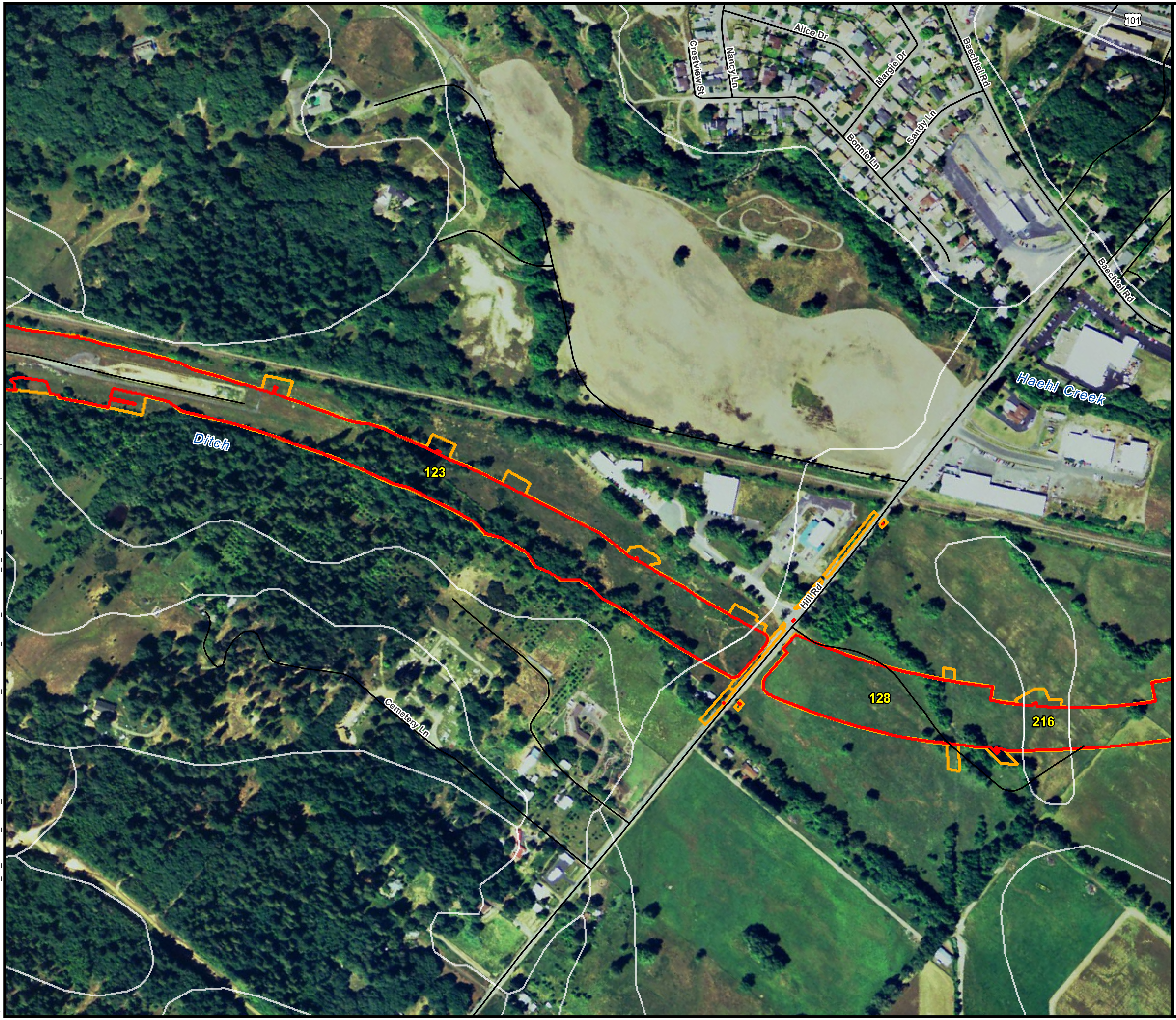

SSURGO Map Unit
Permanent Impact Boundary
Temporary Impact Boundary
Road

SSURGO Map Unit Label Description

178 Map Unit Symbol

Map Unit Symbol	Map Unit Name
110	CASABONNE-WOHLY LOAMS, 30 TO 50 PERCENT SLOPES
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133	HAPLAQUEPTS, 0 TO 1 PERCENT SLOPES
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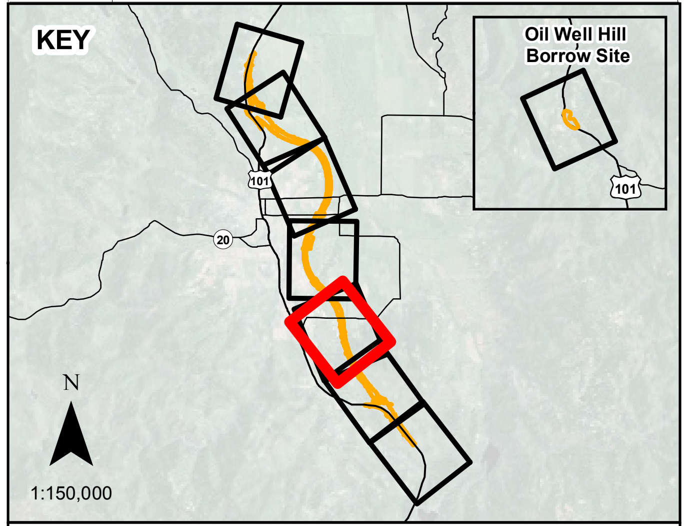
216	XEROCHREPTS-HAPLOXERALFS-ARGIXEROLLS COMPLEX, 30 TO 50 PERCENT SLOPES
221	YOKAYO SANDY LOAM, 0 TO 8 PERCENT SLOPES
224	YOKAYO-PINOLE-PINNOBIE COMPLEX, 0 TO 15 PERCENT SLOPES
236	WATER



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Scale in Feet

Figure 5-4c

Soil Types within the Proposed Bypass Project Footprint

Proposed Willits Bypass Project

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SSURGO Map Unit
Permanent Impact Boundary
Temporary Impact Boundary
Road

SSURGO Map Unit Label Description

178 Map Unit Symbol

Map Unit Symbol	Map Unit Name
110	CASABONNE-WOHLY LOAMS, 30 TO 50 PERCENT SLOPES
115	COLE CLAY LOAM, 0 TO 2 PERCENT SLOPES
123	FELIZ LOAM, 0 TO 2 PERCENT SLOPES
124	FELIZ LOAM, 2 TO 5 PERCENT SLOPES
127	FLUVAQUENTS, 0 TO 1 PERCENT SLOPES
128	GIELOW SANDY LOAM, 0 TO 5 PERCENT SLOPES
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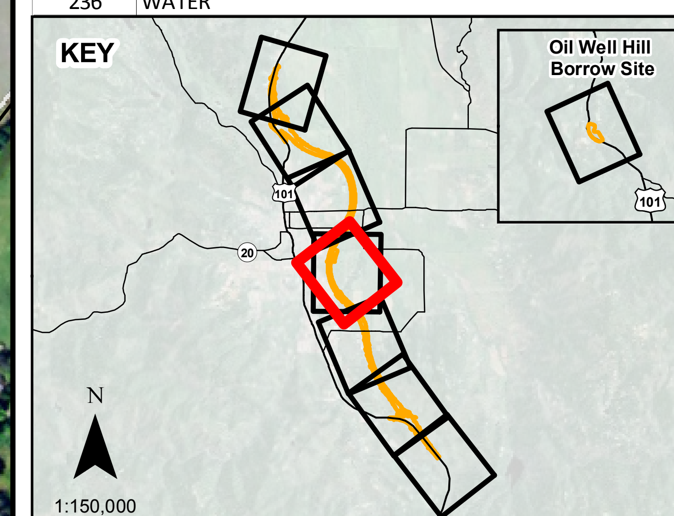
216	XEROCHREPTS-HAPLOXERALFS-ARGIXEROLLS COMPLEX, 30 TO 50 PERCENT SLOPES
221	YOKAYO SANDY LOAM, 0 TO 8 PERCENT SLOPES
224	YOKAYO-PINOLE-PINNOBIE COMPLEX, 0 TO 15 PERCENT SLOPES
236	WATER



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Scale in Feet

Figure 5-4d

Soil Types within the Proposed Bypass Project Footprint

Proposed Willits Bypass Project

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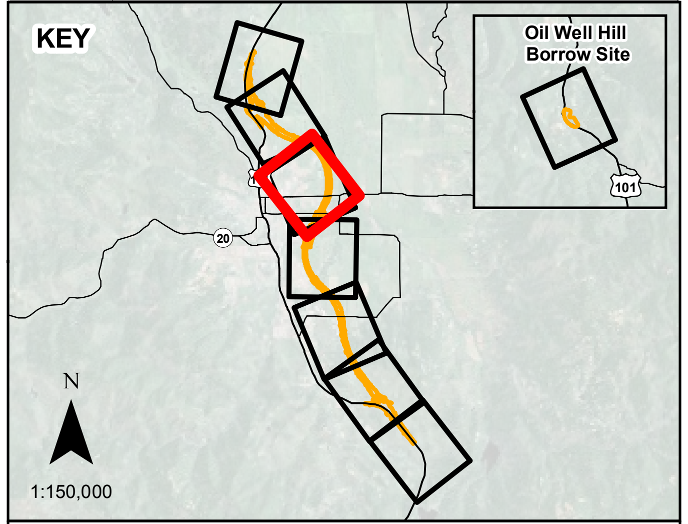
SSURGO Map Unit
Permanent Impact Boundary
Temporary Impact Boundary
Road

SSURGO Map Unit Label Description

178 Map Unit Symbol

Map Unit Symbol	Map Unit Name
110	CASABONNE-WOHLY LOAMS, 30 TO 50 PERCENT SLOPES
115	COLE CLAY LOAM, 0 TO 2 PERCENT SLOPES
123	FELIZ LOAM, 0 TO 2 PERCENT SLOPES
124	FELIZ LOAM, 2 TO 5 PERCENT SLOPES
127	FLUVAQUENTS, 0 TO 1 PERCENT SLOPES
128	GIELOW SANDY LOAM, 0 TO 5 PERCENT SLOPES
133	HAPLAQUEPTS, 0 TO 1 PERCENT SLOPES
155	KEKAWAKA-CASABONNE-WOHLY COMPLEX, 30 TO 50 PERCENT SLOPES
210	URBAN LAND
213	WOHLY-CASABONNE-PARDALOE COMPLEX, 50 TO 75 PERCENT SLOPES
215	XEROCHREPTS-HAPLOXERALFS-ARGIXEROLLS COMPLEX, 9 TO 30 PERCENT SLOPES
216	XEROCHREPTS-HAPLOXERALFS-ARGIXEROLLS COMPLEX, 30 TO 50 PERCENT SLOPES
221	YOKAYO SANDY LOAM, 0 TO 8 PERCENT SLOPES
224	YOKAYO-PINOLE-PINNOBIE COMPLEX, 0 TO 15 PERCENT SLOPES
236	WATER



N

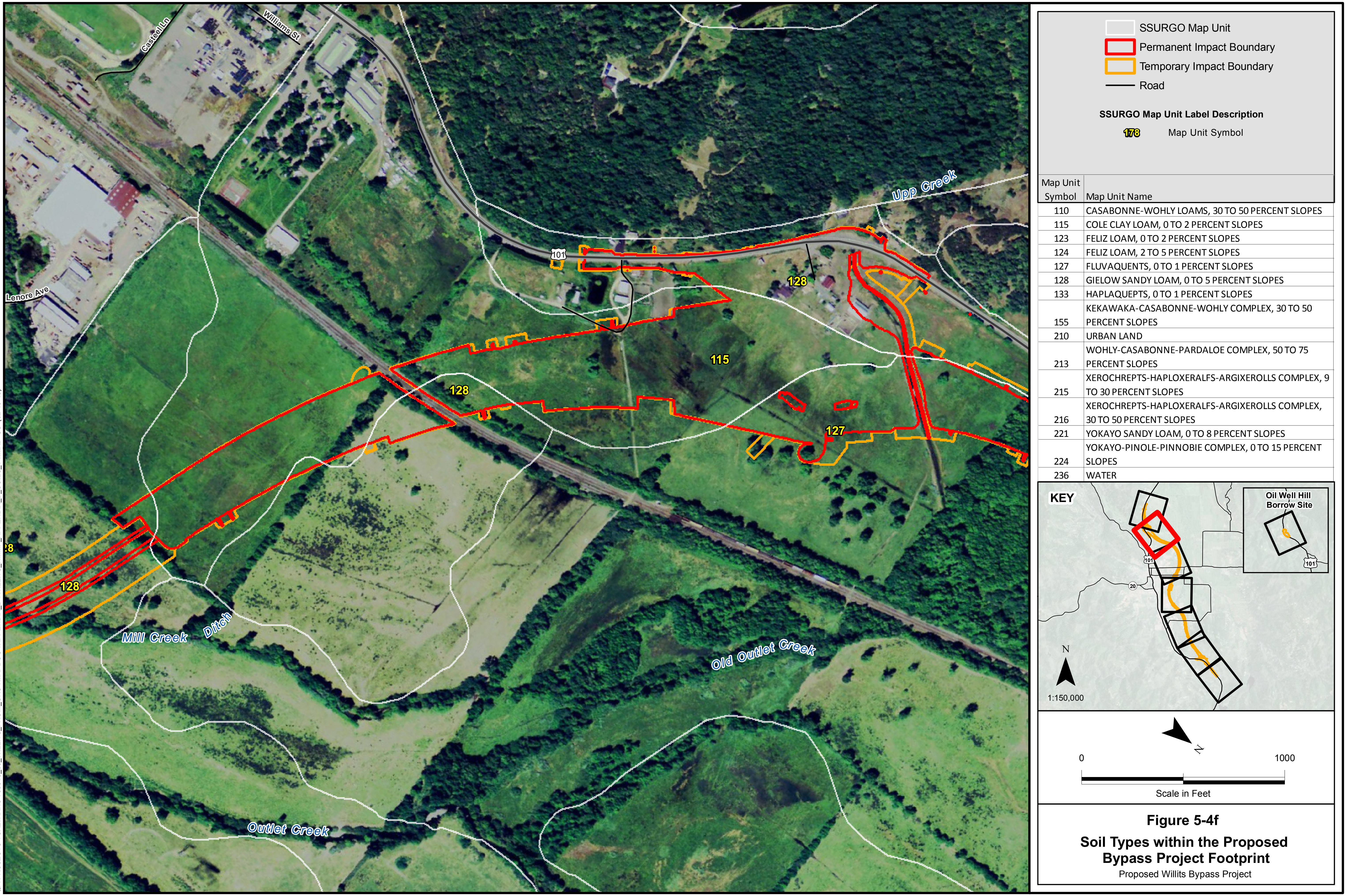
0 1000

Scale in Feet

Figure 5-4e

Soil Types within the Proposed Bypass Project Footprint

Proposed Willits Bypass Project



SSURGO Map Unit
Permanent Impact Boundary
Temporary Impact Boundary
Road

SSURGO Map Unit Label Description

178 Map Unit Symbol

Map Unit Symbol	Map Unit Name
110	CASABONNE-WOHLY LOAMS, 30 TO 50 PERCENT SLOPES
115	COLE CLAY LOAM, 0 TO 2 PERCENT SLOPES
123	FELIZ LOAM, 0 TO 2 PERCENT SLOPES
124	FELIZ LOAM, 2 TO 5 PERCENT SLOPES
127	FLUVAQUENTS, 0 TO 1 PERCENT SLOPES
128	GIELOW SANDY LOAM, 0 TO 5 PERCENT SLOPES
133	HAPLAQUEPTS, 0 TO 1 PERCENT SLOPES
155	KEKAWAKA-CASABONNE-WOHLY COMPLEX, 30 TO 50 PERCENT SLOPES
210	URBAN LAND
213	WOHLY-CASABONNE-PARDALOE COMPLEX, 50 TO 75 PERCENT SLOPES
215	XEROCHREPTS-HAPLOXERALFS-ARGIXEROLLS COMPLEX, 9 TO 30 PERCENT SLOPES
216	XEROCHREPTS-HAPLOXERALFS-ARGIXEROLLS COMPLEX, 30 TO 50 PERCENT SLOPES
221	YOKAYO SANDY LOAM, 0 TO 8 PERCENT SLOPES
224	YOKAYO-PINOLE-PINNOBIE COMPLEX, 0 TO 15 PERCENT SLOPES
236	WATER

N

0 1000

Scale in Feet

Figure 5-4f

Soil Types within the Proposed Bypass Project Footprint

Proposed Willits Bypass Project

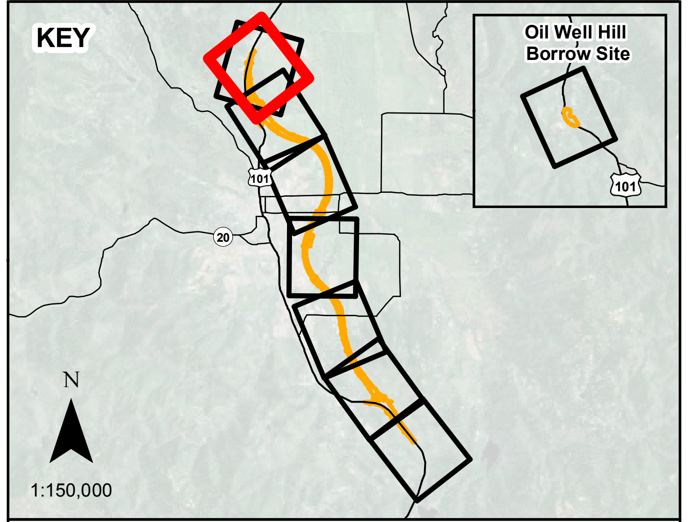
Q:\PROJECTS\CALTRANS\00543_09_WILLITS_FROM_URS\MAPDOC\APPENDIX_B\WILLITS_HMMP_APPENDIX_B_SOILS_V4.MXD SS (02-19-10)

SSURGO Map Unit
Permanent Impact Boundary
Temporary Impact Boundary
Road

SSURGO Map Unit Label Description

178 Map Unit Symbol

Map Unit Symbol	Map Unit Name
110	CASABONNE-WOHLY LOAMS, 30 TO 50 PERCENT SLOPES
115	COLE CLAY LOAM, 0 TO 2 PERCENT SLOPES
123	FELIZ LOAM, 0 TO 2 PERCENT SLOPES
124	FELIZ LOAM, 2 TO 5 PERCENT SLOPES
127	FLUVAQUENTS, 0 TO 1 PERCENT SLOPES
128	GIELOW SANDY LOAM, 0 TO 5 PERCENT SLOPES
133	HAPLAQUEPTS, 0 TO 1 PERCENT SLOPES
155	KEKAWAKA-CASABONNE-WOHLY COMPLEX, 30 TO 50 PERCENT SLOPES
210	URBAN LAND
213	WOHLY-CASABONNE-PARDALOE COMPLEX, 50 TO 75 PERCENT SLOPES
215	XEROCHREPTS-HAPLOXERALFS-ARGIXEROLLS COMPLEX, 9 TO 30 PERCENT SLOPES
216	XEROCHREPTS-HAPLOXERALFS-ARGIXEROLLS COMPLEX, 30 TO 50 PERCENT SLOPES
221	YOKAYO SANDY LOAM, 0 TO 8 PERCENT SLOPES
224	YOKAYO-PINOLE-PINNOBIE COMPLEX, 0 TO 15 PERCENT SLOPES
236	WATER



N

0 1000

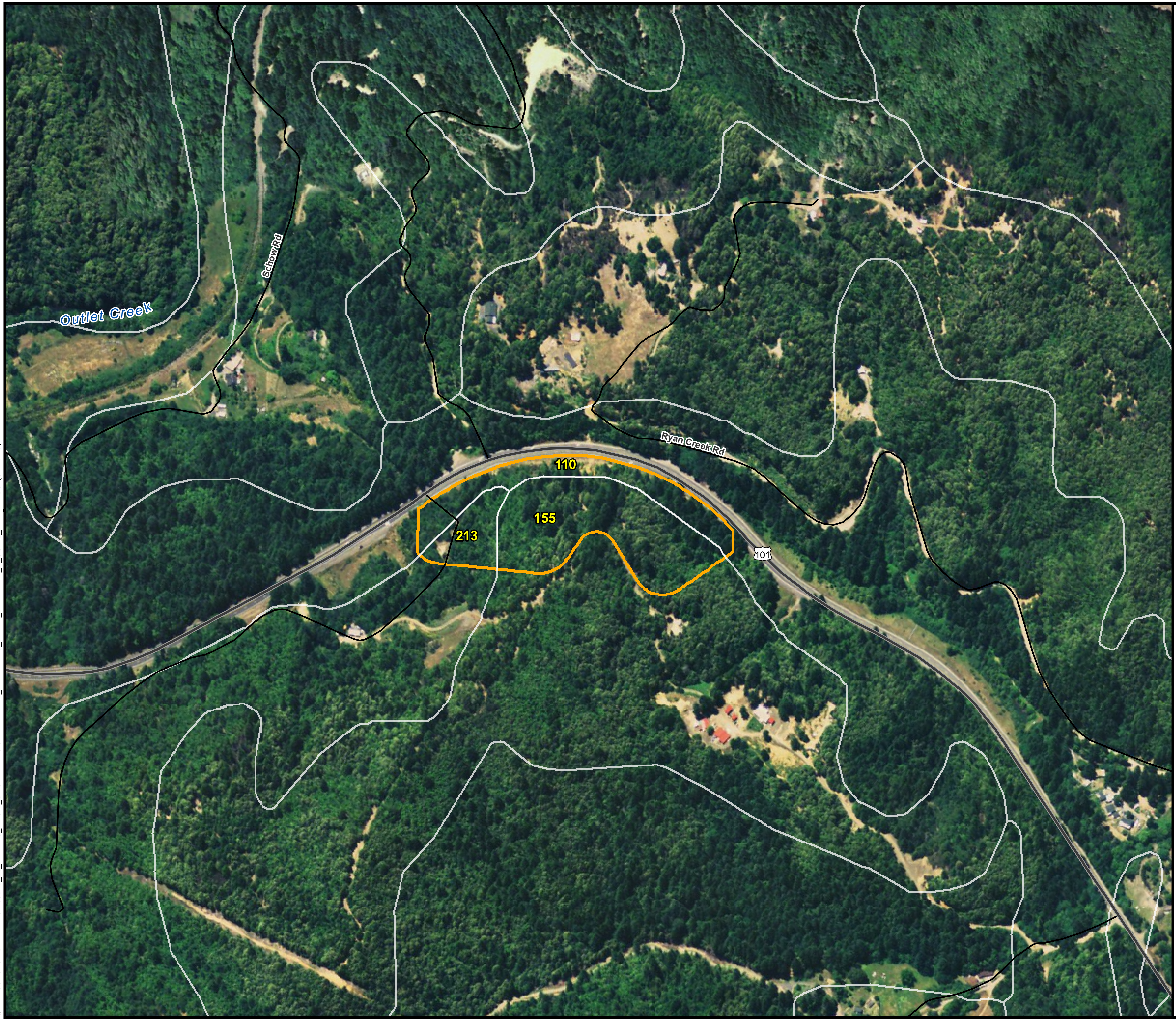
Scale in Feet

Figure 5-4g

Soil Types within the Proposed Bypass Project Footprint

Proposed Willits Bypass Project

Q:\PROJECTS\CALTRANS\00543_09_WILLITS_FROM_URS\MAPDOC\APPENDIX_B\WILLITS_HMMP_APPENDIX_B_SOILS_V4.MXD SS (02-19-10)

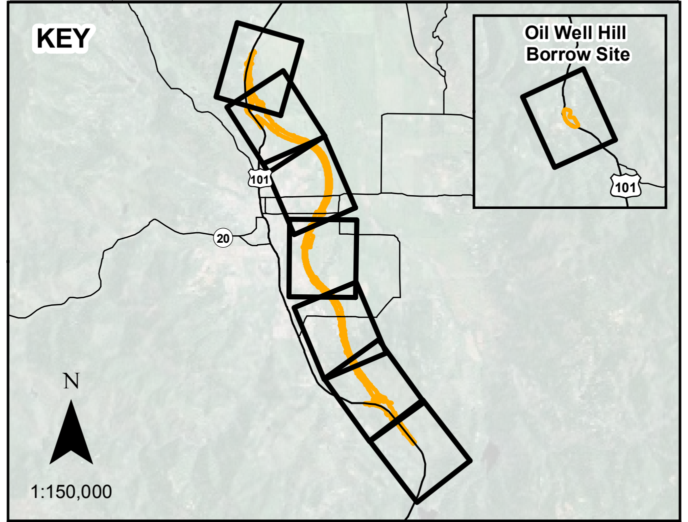


SSURGO Map Unit
Permanent Impact Boundary
Temporary Impact Boundary
Road

SSURGO Map Unit Label Description

178 Map Unit Symbol

Map Unit Symbol	Map Unit Name
110	CASABONNE-WOHLY LOAMS, 30 TO 50 PERCENT SLOPES
115	COLE CLAY LOAM, 0 TO 2 PERCENT SLOPES
123	FELIZ LOAM, 0 TO 2 PERCENT SLOPES
124	FELIZ LOAM, 2 TO 5 PERCENT SLOPES
127	FLUVAQUENTS, 0 TO 1 PERCENT SLOPES
128	GIELOW SANDY LOAM, 0 TO 5 PERCENT SLOPES
133	HAPLAQUEPTS, 0 TO 1 PERCENT SLOPES
155	KEKAWAKA-CASABONNE-WOHLY COMPLEX, 30 TO 50 PERCENT SLOPES
210	URBAN LAND
213	WOHLY-CASABONNE-PARDALOE COMPLEX, 50 TO 75 PERCENT SLOPES
215	XEROCHREPTS-HAPLOXERALFS-ARGIXEROLLS COMPLEX, 9 TO 30 PERCENT SLOPES
216	XEROCHREPTS-HAPLOXERALFS-ARGIXEROLLS COMPLEX, 30 TO 50 PERCENT SLOPES
221	YOKAYO SANDY LOAM, 0 TO 8 PERCENT SLOPES
224	YOKAYO-PINOLE-PINNOBIE COMPLEX, 0 TO 15 PERCENT SLOPES
236	WATER



N

0 1000

Scale in Feet

Figure 5-4h

Soil Types within the Proposed Bypass Project Footprint

Proposed Willits Bypass Project

Q:\PROJECTS\CALTRANS\00543_09_WILLITS_FROM_URS\MAPDOC\APPENDIX_B\WILLITS_HMMP_APPENDIX_B_SOILS_V4.MXD SS (02-19-10)

Soils drain better and are less likely to be hydric along the southern third of the bypass alignment footprint (from the Haehl Creek interchange to East Hill Road). Soils are also well-drained and not likely to be hydric in the Oil Well Hill area. Soils along the remaining portion of the alignment footprint (north of East Hill Road) are less well-drained (ranging from somewhat poorly drained to very poorly drained) and are more likely to have areas that meet hydric conditions. North Coast semaphore grass and Baker's meadowfoam were found in these northern areas and were associated primarily with the Cole Clay Loam, 0–2% slopes map unit and the Fluvaquents, 0–1% slopes map unit. Sections 5.2.3.1 through 5.2.3.14 provide brief descriptions of the map units that intersect the bypass alignment footprint boundaries.

Caltrans performed soil surveys in 2010 and 2011 in support of Group 1 and Group 2 wetland establishment sites, respectively. The soil surveys indicate that the soil characteristics at the Group 1 and 2 establishment sites would support wetland establishment. Appendix J includes memoranda summarizing the results of these soil surveys.

5.2.3.1 Casabonne-Wohly Loams, 30–50% Slopes

This map unit is on hills and mountains. The native vegetation is mainly Douglas-fir, tanoak, and Pacific madrone. Included in this unit are small areas of Bearwallow, Hellman, Hopland, Pardaloe, and Woodin soils. Included areas make up approximately 20% of the map unit.

The Casabonne soil is deep and well-drained, and formed in material weathered from sandstone or shale. Typically, the surface layer is loam approximately 15 inches thick. Permeability of the Casabonne soil is moderate. Available water capacity is high. Effective rooting depth is 40–60 inches, and runoff is rapid.

The Wohly soil is moderately deep and well-drained, and formed in material weathered from sandstone or shale. Typically, the surface layer is loam approximately 11 inches thick. Permeability of the Wohly soil is moderate. Available water capacity is low to moderate. Effective rooting depth is 20–40 inches, and runoff is rapid.

Among the common forest understory plants are brackenfern, blue wildrye, rose, perennial bromes, and fescues. However, the soils in this unit retain their tendency to produce woody species. Grass is difficult to maintain in most areas.

5.2.3.2 Cole Clay Loam, 0–2% Slopes

This very deep, somewhat poorly drained soil is on alluvial plains and in basins, and formed in recent alluvium derived primarily from sedimentary rock. The vegetation in uncultivated areas is mainly annual grasses and forbs. Included in this unit are small areas of Clear Lake soils and Cole soils that are poorly drained and have a water table at a depth of less than 18 inches. Included areas make up approximately 5% of the map unit.

Typically, the surface layer is clay loam approximately 8 inches thick. Permeability of this Cole soil is slow. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is ponded, and there is a high water table year round at a depth of 18–36 inches.

5.2.3.3 Feliz Loam, 0–2% Slopes

This very deep, well-drained soil is on alluvial plains and fans, and formed in alluvium derived primarily from sedimentary rock. The vegetation in areas not cultivated is mainly annual grasses and scattered oaks. Included in this unit are areas of Russian loam. Also included are small areas of Cole, Pinnobie, Pinole, and Talmage soils and Xerofluvents. Included areas make up approximately 15% of the map unit.

Typically, the surface layer is loam over clay loam approximately 26 inches thick. Permeability of this Feliz soil is moderate. Available water capacity is very high. Effective rooting depth is 60 inches or more, and runoff is slow.

5.2.3.4 Feliz Loam, 2–5% Slopes

This very deep, well-drained soil is on alluvial plains and fans, and formed in alluvium derived primarily from sedimentary rock. The vegetation in areas not cultivated is mainly annual grasses and scattered oaks. Included in this unit are areas of Russian loam. Also included are small areas of Cole, Pinnobie, Pinole, and Talmage soils and Xerofluvents. Included areas make up approximately 15% of the map unit.

Typically, the surface layer is loam over clay loam approximately 26 inches thick. Permeability of this Feliz soil is moderate. Available water capacity is very high. Effective rooting depth is 60 inches or more, and runoff is slow.

5.2.3.5 Fluvaquents, 0–1% Slopes

These very deep, poorly drained and very poorly drained soils are on floodplains, and formed in recent alluvium derived primarily from sedimentary rock. The native vegetation is mainly annual and perennial grasses and forbs. Included in this unit are small areas of Cole and Gielow soils, and small areas of Haplaquepts in basins toward the northern end of Little Lake Valley. Included areas make up approximately 15% of the map unit.

No single profile of Fluvaquents is typical, but one commonly observed in the survey area has a mottled, sandy loam surface layer approximately 2 inches thick. Permeability of these Fluvaquents is moderately slow to moderately rapid. Available water capacity is generally high but is lower in areas where sandy material makes up more than half of the upper 60 inches. Runoff is very slow to ponded, and a seasonal (November to March) high water table fluctuates between the surface and a depth of 18 inches.

5.2.3.6 Gielow Sandy Loam, 0–5% Slopes

This very deep, somewhat poorly drained soil is on alluvial plains and fans. This soil formed in alluvium derived primarily from sedimentary rock. The vegetation in areas not cultivated is mainly annual and perennial grassland and oaks. Included in this unit are small areas of Clear Lake, Cole, Feliz, Russian, and Talmage soils. In Little Lake and Pound valleys, soils that have narrow bands of gravel make up 1–5% of the unit. Included areas make up approximately 10% of the map unit.

Typically, the surface layer is stratified, sandy loam, and loam approximately 18 inches thick. Permeability of this Gielow soil is moderate. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is very slow to slow and a seasonal (November to March) high water table fluctuates between depths of 18 and 36 inches.

5.2.3.7 Haplaquepts, 0–1% Slopes

These very deep, poorly drained soils are in basins and on floodplains. These soils formed in alluvium derived primarily from sedimentary rock. The native vegetation is mainly aquatic herbs, sedges, and annual grasses. Included in this unit are small areas of Cole clay loam bordering basin areas. Also included are small areas of Gielow sandy loam adjacent to drainageways, and Fluvaquents along old creek bottoms and drainageways. Included areas make up approximately 10% of the map unit.

No single profile of Haplaquepts is typical, but one commonly observed in the survey area has a clay loam surface layer approximately 3 inches thick. Permeability of these Haplaquepts soils is slow to moderately slow. Available water capacity is high to very high. Effective rooting depth is 60 inches or more. Runoff is ponded, and a seasonal (December to April) high water table is 12 inches above the surface to 12 inches below the surface.

5.2.3.8 Kekawaka-Casabonne-Wohly Complex, 30–50% Slopes

This map unit is on side slopes of hills and mountains. The native vegetation is mainly coniferous forest. Among the common forest understory plants are brackenfern, blue wildrye, rose, and perennial bromes and fescues. This unit is 35% Kekawaka loam, 20% Casabonne gravelly loam, and 20% Wohly loam. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used. Included in this unit are small areas of Cummiskey, Sanhedrin, Pardaloe, and Woodin soils, rock outcrop, and soils similar to the Casabonne and Kekawaka soils. Included areas make up approximately 25% of the map unit.

The Kekawaka soil is very deep and well-drained, and formed in material derived primarily from sandstone and siltstone. The surface layer is loam approximately 4 inches thick. Permeability of the Kekawaka soil is moderately slow. Available water capacity is high, effective rooting depth is 60 inches or more, and runoff is rapid.

The Casabonne soil is deep and well-drained. It formed in material derived predominantly from sandstone and shale. Typically, the surface layer is gravelly loam approximately 15 inches thick. Permeability of the Casabonne soil is moderate. Available water capacity is moderate to high. Effective rooting depth is 40–60 inches, and runoff is rapid.

The Wohly soil is moderately deep and well-drained, and formed in material weathered from sandstone and shale. Typically, the surface layer is loam approximately 11 inches thick. Permeability of the Wohly soil is moderate. Available water capacity is low to moderate. Effective rooting depth is 20–40 inches, and runoff is rapid.

5.2.3.9 Urban Land

This map unit is on terraces and alluvial plains in Ukiah and Little Lake Valleys. Approximately 60% of this unit consists of areas covered by concrete, asphalt, buildings, or other impervious surfaces, and approximately 30% consists of open areas that have been altered by cutting and filling or grading for housing developments, shopping centers, schools, parks, industrialized areas, and other similar uses.

Included in this unit are small areas of Talmage soils and Xerofluvents near creekbeds and Cole, Feliz, Pinole, Pinnobie, and Yokayo soils in relatively undisturbed areas. Included areas make up approximately 10% of the map unit. Drainage, permeability, surface runoff, and available water capacity are all variable.

5.2.3.10 Wohly-Casabonne-Pardaloe Complex, 50–75% Slopes

This map unit is on hills and mountains. The native vegetation is mainly Douglas-fir, tanoak, Pacific madrone, and California black oak. Among the common forest understory plants are brackenfern, blue wildrye, rose, and perennial grasses. This unit is 45% Wohly loam, 20% Casabonne gravelly loam, and 15% Pardaloe gravelly loam. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used. Included in this unit are small areas of Bearwallow, Kekawaka, Squawrock, and Yorkville soils. This map unit makes up approximately 20% of the total impact area.

The Wohly soil is moderately deep and well-drained, and formed in material weathered from sandstone and shale. Typically, the surface layer is loam approximately 11 inches thick. Permeability of the Wohly soil is moderate. Available water capacity is low to moderate. Effective rooting depth is 20–40 inches, and runoff is rapid.

The Casabonne soil is deep and well-drained, and formed in material derived predominantly from sandstone and shale. Typically, the surface layer is gravelly loam approximately 15 inches thick. Permeability of the Casabonne soil is moderate. Available water capacity is moderate to high. Effective rooting depth is 40–60 inches, and runoff is rapid.

The Pardaloe soil is deep and well-drained, and formed in material weathered from sandstone, siltstone, or shale. The surface layer is gravelly loam approximately 10 inches thick. Permeability of the Pardaloe soil is moderate. Available water capacity is low. Effective rooting depth is 40–60 inches, and runoff is very rapid.

5.2.3.11 Xerochrepts-Haploxeralfs-Argixerolls Complex, 9–30% Slopes

This map unit is on dissected stream terraces and terrace escarpments. The native vegetation is mainly scattered oaks, ponderosa pine, Douglas-fir, and manzanita. Among the common forest understory plants are manzanita, reed fescue, poison-oak, and bedstraw. This unit is 35% Xerochrepts, 30% Haploxeralfs, and 25% Argixerolls. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used. Included in this unit are small areas of Redvine soils on ridgetops; Feliz, Gielow, and Talmage soils along streams; Yorkville soils on hills are underlain by sedimentary rock; and eroded soils. Included areas make up approximately 10% of the map unit.

The Xerochrepts are very deep and well-drained. They formed in alluvium derived from various kinds of rock. No single profile of these soils is typical, but one commonly observed in the survey area has a surface layer of loam approximately 12 inches thick. Permeability of the Xerochrepts is moderate. Effective rooting depth is 60 inches or more, and runoff is rapid.

The Haploxeralfs are very deep and well-drained. They formed in alluvium derived from various kinds of rock. No single profile of these soils is typical, but one commonly observed in the survey area has a surface layer of sandy loam or loam 9 inches thick. Permeability of the Haploxeralfs is moderate to moderately rapid. Available water capacity is moderate. Effective rooting depth is 60 inches or more, and runoff is medium to rapid.

The Argixerolls are very deep and are moderately well-drained to well-drained. They formed in alluvium derived from various kinds of rock. No single profile of these soils is typical, but one commonly observed in the survey area has a surface layer of gravelly loam or loam 11 inches thick. Permeability of the Argixerolls is slow to moderately rapid. Available water capacity is high to very high. Effective rooting depth is 60 inches or more, and runoff is medium to rapid.

5.2.3.12 Xerochrepts-Haploxeralfs-Argixerolls Complex, 30–50% Slopes

This map unit is on dissected stream terraces and terrace escarpments. The native vegetation is mainly scattered oaks, ponderosa pine, Douglas-fir, and manzanita. Among the common forest understory plants are manzanita, red fescue, poison-oak, and bedstraw. This unit is 40% Xerochrepts, 30% Haploxeralfs, and 20% Argixerolls. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used. Included in this unit are small areas of Redvine soils on ridgetops, Yorktree soils on hills and underlain by sedimentary rock, and eroded soils. Included areas make up 10% of the map unit.

The Xerochrepts are very deep and well-drained. They formed in alluvium derived from various kinds of rock. No single profile of these soils is typical, but one commonly observed in the survey area has a surface layer of loam approximately 12 inches thick. Permeability of the Xerochrepts is moderate. Effective rooting depth is 60 inches or more, and runoff is rapid.

The Haploxeralfs are very deep and well-drained. They formed in alluvium derived from various kinds of rock. No single profile of these soils is typical, but one commonly observed in the survey area has a surface layer of sandy loam or loam 9 inches thick. Permeability of the Haploxeralfs is moderate to moderately rapid. Available water capacity is moderate. Effective rooting depth is 60 inches or more, and runoff is medium to rapid.

The Argixerolls are very deep and are moderately well-drained to well-drained. They formed in alluvium derived from various kinds of rock. No single profile of these soils is typical, but one commonly observed in the survey area has a surface layer of gravelly loam or loam 11 inches thick. Permeability of the Argixerolls is slow to moderately rapid. Available water capacity is high to very high. Effective rooting depth is 60 inches or more, and runoff is medium to rapid.

5.2.3.13 Yokayo Sandy Loam, 0–8% Slopes

This very deep, well-drained soil is on old dissected terraces, and formed in old alluvium derived primarily from sedimentary rock. Vegetation in areas not cultivated is mainly annual grasses and scattered oaks. Oregon white oak, blue oak, California black oak, and Pacific madrone are the main tree species in areas where this unit has not been cleared. Among the common forest understory plants are manzanita, poison-oak, ripgut brome, and bluestem wildrye. Included in this unit are small areas of Pinnobie, Pinole, and Redvine soils. Included areas make up approximately 15% of the map unit.

Typically, the surface layer is sandy loam approximately 8 inches thick. Permeability of this Yokayo soil is moderately rapid to a depth of 8 inches and very slow below this depth. Available water capacity is moderate. Effective rooting depth is 60 inches or more, and runoff is medium.

5.2.3.14 Yokayo-Pinole-Pinnobie Complex, 0–15% Slopes

This map unit is on old dissected stream terraces. The native vegetation is mainly annual grasses and occasional oaks and chaparral. Common plants are soft chess, wild oat, purple needlegrass, and filaree. This unit is 35% Yokayo sandy loam, 30% Pinole gravelly loam, and 20% Pinnobie loam. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used. Included in this unit are small areas of Redvine soils on ridgetops, Feliz and Talmage soils along streams, and Yorktree soils on hills underlain by sedimentary rock. Included areas make up approximately 15% of the map unit.

The Yokayo soil is very deep and well-drained, and formed in old alluvium derived primarily from sedimentary rock. Typically, the surface layer is sandy loam approximately 8 inches thick. Permeability of this Yokayo soil is moderately rapid to a depth of 8 inches and very slow below this depth. Available water capacity is moderate. Effective rooting depth is 60 inches or more, and runoff is medium.

The Pinole soil is very deep and well-drained, and formed in alluvium derived primarily from sedimentary rock. Typically, the surface layer is gravelly loam approximately 10 inches thick. Permeability of the Pinole soil is moderately slow. Available water capacity is moderate. Effective rooting depth is 60 inches or more, and runoff is medium.

The Pinnobie soil is very deep and well-drained. It formed in alluvium derived primarily from sedimentary rock. Typically, the surface layer is loam approximately 11 inches thick. Permeability of the Pinnobie soil is moderate. Available water capacity is high. Effective rooting depth is 60 inches or more, and runoff is medium.

5.2.4 Jurisdictional Wetlands and Other Waters of the United States

The project will affect numerous jurisdictional wetlands and other waters of the United States. These jurisdictional features include wet meadows, riparian scrub, riparian woodland wetlands, vernal pools, swales, marshes, creeks and streams, and drainages (Appendix B).

Wet meadow is the most extensive wetland type in the bypass alignment footprint, found in multiple locations in both natural and artificial settings. Large areas of managed hayland and/or grazed pasture are included as wet meadow. Typically, introduced, nonnative perennial forage grasses dominate wet-meadow agricultural pasture. Wet meadows develop in areas where the soil and hydrology have remained undisturbed (or only minimally disturbed) for many years. Wet meadows typically have poorly drained soils and receive water from winter and spring precipitation, agricultural field and pasture irrigation, creek floodplain aquifers, overbank flooding, and sheet drainage from excessive runoff. Facultative and facultative wet wetland species such as sedges and rushes often compose a significant component of the total hydrophytic vegetation in wet meadows in the bypass alignment footprint. Other dominant species include pasture grasses such as tall fescue, Italian ryegrass, velvet grass, Harding grass, and other wetland species such as Davy’s semaphore grass, creeping bentgrass, meadow foxtail, California oatgrass, creeping ryegrass, pennyroyal, western buttercup, and curly dock. In addition, ash and valley oak trees are found sporadically in some wet meadows.

During wet winters, portions of the wet-meadow areas flood, providing habitat for a number of wildlife species, including cinnamon teal, mallard, American widgeon, northern shoveler, wood duck, and American coot. These wetlands serve as a source of water for Outlet Creek downstream of Little Lake Valley, where it becomes a perennial stream during the summer months, when the stream reaches in the valley are usually dry.

Vernal pools and swales are found throughout the wet meadow communities and in upland grassland habitats south and north of East Hill Road. Swales are shallow, vegetated channels that tend to accumulate surface runoff during wet seasons (California Department of Transportation 2005a). Vernal pools consist of small to large depressions in areas where heavy clay soil horizons occur. They are internally drained basins that collect rainfall and surface runoff from surrounding grasslands. The impervious layer of subsoil prevents water from quickly infiltrating into the soil, forming a shallow, perched water table that is exposed in some depressions. The frequency and duration of ponding and saturation vary among vernal pools depending on the size of the watershed, depth to the impervious subsoil layer, and timing and amounts of rainfall during each rainy season. Characteristic annual hydrophytic plant species in the vernal pools and swales include bracted popcornflower, purslane speedwell, downingia, Bolander’s water-starwort, toad rush, Baker’s meadowfoam, Douglas’ meadowfoam, semaphore grass, and owl’s-clover. Herbaceous perennials include spreading rush, slender beak sedge, greensheath sedge, meadow foxtail, Timothy grass, pennyroyal, and curly dock (California Department of Transportation 2005a).

Marsh is the second most widely affected wetland type, by area. Two marsh communities were identified in the bypass alignment footprint: mixed marsh and tule marsh, as described below. Floodwater from Outlet Creek that is trapped in basins and shallow groundwater are the principal sources of water for marshes in Little Lake Valley.

- Mixed marsh in the bypass alignment footprint is found in internally drained basins and low-lying troughs throughout the northern portion of Little Lake Valley. In the bypass alignment footprint, mixed marsh occurs primarily in the Quail Meadows area. Mixed marsh is characterized by annual and perennial herbs and grass-like species with taller perennials scattered throughout. Dominant species include knotweed, broadleaf water plantain, common spikerush, reed canary grass, broadleaf cattail, tule, and Nebraska sedge (California Department of Transportation 2000, 2005a).

- Tule marsh is found in the northern portion of Little Lake Valley where it borders wet meadows and riparian woodlands and forms small to large patches within mixed marsh wetlands. Unlike mixed marshes, which support a diversity of plants, tule marshes are dominated by dense monotypic thickets of tule, with minimal cover by other species (California Department of Transportation 2005a).

Most of the marsh is east of US 101 on the Brooke parcel at the northern end of the bypass alignment footprint (Appendix B). A large area of riparian woodland wetland is associated with this marsh area. Smaller areas of marsh are shown in Appendix B.

The project will affect some areas of riparian scrub and riparian woodland wetland. These jurisdictional wetlands are associated with various riparian areas throughout the project vicinity. Riparian scrub is found in scattered locations throughout Little Lake Valley along streams and drainage ditches, as follows.

- Willow riparian scrub is found in scattered locations throughout the bypass alignment footprint. In addition, willow riparian scrub extends throughout the same ranges as valley oak riparian woodland. The main species are arroyo willow, red willow, and Scouler's willow.
- Mixed riparian scrub usually develops in artificial or highly disturbed habitats along ditches. Mixed scrub vegetation grows 10–30 ft tall and is dominated by coyote bush, poison-oak, California rose, Himalayan blackberry, blue elderberry, and arroyo willow. Wet meadow species form the dominant understory in portions of the mixed scrub community. Mixed riparian scrub in upland areas generally lacks a herbaceous layer and is dominated by coyote bush, poison-oak, and Himalayan blackberry.

Riparian woodlands in the bypass alignment footprint range from multilayered, multispecies woodlands with dense scrub understory to small groups of trees. Riparian woodland communities might have occupied extensive portions of Little Lake Valley before these areas were cleared for pasture and agriculture. In general, riparian communities qualify as sensitive plant communities because they are relatively scarce compared to their historical extent and because they provide important foraging and nesting habitat for many resident and migratory wildlife species (Gaines 1974; Remsen 1978; Harris et al. 1988; Sanders and Flett 1989). Three types of riparian woodland habitat occur in the bypass alignment footprint.

- Mixed riparian woodland, comprising canopy, midstory, shrub, and herb layers, is found along major creeks and drainages throughout the bypass alignment footprint. Box elder, red alder, Oregon ash, Fremont cottonwood, valley oak, and arroyo willow dominate the canopy and midstory layers. Himalayan blackberry, California blackberry, dogwood, twinberry, gooseberry, California rose, blue elderberry, and clematis dominate the shrub layer. Common plants in the herb layer include short-scale sedge, creeping ryegrass, spreading rush, avens, cow parsnip, common dandelion, and common meadow-rue (California Department of Transportation 2000, 2005a).
- Ash riparian woodland is common in the northern and central portions of the bypass alignment footprint, where it is found along creeks, fence rows, levees, troughs, and low

terraces. This community occurs in wetter landscape positions than other riparian habitat types in Little Lake Valley, and the long-term flooding and soil saturation that characterize it can preclude the establishment of other riparian tree species. The overstory consists entirely of Oregon ash. The shrubs and herbaceous species found in the understory vary with the amount of soil moisture. Oregon ash saplings, arroyo willow, and blackberry are commonly observed in the understory; in wetter areas, other dominant species are sedges, rushes, perennial ryegrass, western buttercup, cutleaf geranium, common spikerush, reed canary grass, broadleaf cattail, and tule. In drier areas, blackberry shrubs are interspersed with hawthorn, poison-oak, honeysuckle, Pacific ninebark, and white snowberry (California Department of Transportation 2005a).

- Valley oak riparian woodlands are scattered throughout the bypass alignment footprint, typically along low and high terraces adjacent to creeks and intermittent drainages. Scattered individual valley oaks are common in open fields, while groves of valley oaks grow along creeks, fences, and roads on higher terraces (California Department of Transportation 2005a).

Haehl, Baechtel, Broaddus, Mill, Upp, and Outlet Creeks are the major other waters of the United States affected by the project. All these creeks cross the bypass alignment footprint as they convey water through Little Lake Valley. The project also will affect a number of smaller tributaries and drainages in the bypass alignment footprint.

Except for Upp Creek, most streams that traverse the bypass alignment footprint are shaded by mature riparian vegetation. These streams provide fish habitat and support juvenile and adult salmonids. Instream habitat consists of pools, riffles, and shallow runs and glides. Streambanks are typically steep and channels incised.

All five streams within the bypass alignment footprint and the lower parts of their tributaries provide important habitat for adult and juvenile anadromous salmonids migrating to and from Outlet Creek. These streams are considered EFH for coho and Chinook salmon. Some spawning and seasonal rearing could occur in some reaches of these creeks in the bypass alignment footprint (California Department of Transportation 1997; Harris pers. comm.). California roach and introduced warmwater species (e.g., sunfish, largemouth bass) are predominant during reduced-flow periods in summer and early fall. There is a need to improve water quality and general stream habitat conditions at several locations.

Haehl Creek is a 5.1-mile intermittent stream draining a watershed of approximately 6.2 mi^2. The watershed is privately owned and primarily managed for urban residential and commercial development (California Department of Fish and Game 1995). In spring 2004, nine reaches of Haehl Creek in the project area were surveyed for Modified Alternative J1T (California Department of Fish and Game 2004). These surveys found existing aquatic habitat for salmonid fish to be extremely poor in three of the reaches and fair in six. Flows ranged from subsurface/intermittent to less than 1 cubic foot per second (cfs). The poorer reaches almost entirely comprised silt-laden runs and pools. The fair reaches had a mix of fines and gravel across pools, runs, and riffles.

Baechtel Creek is a 3.24-mile blue-line stream draining a watershed of approximately 9.17 square miles. Oak grassland dominates the watershed. The watershed is mostly in private ownership; approximately one third of the watershed lies within the Willits city limits (California Department of Fish and Game 1995). The Humboldt County Resource Conservation District conducted an aquatic invertebrate study on Baechtel Creek in 1998 and found the creek to have moderate to high degradation because of increased sediment loads caused by mass wasting, slumps, and highly erosive soils (Humboldt County Resource Conservation District 1998). In spring 2004, two reaches of Baechtel Creek in the project area were surveyed for Modified Alternative J1T (California Department of Fish and Game 2004). These surveys found existing aquatic habitat for salmonid fish to be fair. Flows were at approximately 3 cfs, and substrates were found to consist of silt/sand/gravel in runs and gravel in riffles.

Broaddus Creek is a 6.27-mile blue-line stream draining a watershed of approximately 7.95 square miles. The watershed is privately owned and is managed as rangeland. One fifth of the watershed is within the Willits city limits. Broaddus Creek has a moderate gradient (2–4%) with entrenched “gully” streambanks for its first 7,037 ft. The Humboldt County Resource Conservation District conducted an aquatic invertebrate study on Broaddus Creek in 1998 and found the creek to have moderate to high degradation because of increased sediment loads caused by mass wasting, slumps, and highly erosive soils (Humboldt County Resource Conservation District 1998). In spring 2004, two reaches of Broaddus Creek in the project area were surveyed for Modified Alternative J1T (California Department of Fish and Game 2004). These surveys found existing aquatic habitat for salmonid fish to be fair. Flows were at approximately 2 cfs, and substrates were found to consist of fines in pools, fines/gravel/boulders in runs, and gravel in riffles.

Upp Creek is an intermittent stream. In spring 2004, two reaches of Upp Creek in the project area were surveyed for Modified Alternative J1T (California Department of Fish and Game 2004). These surveys found existing aquatic habitat for salmonid fish to be extremely poor. Flows were subsurface/intermittent, and substrates were found to consist of fines in pools, fines covering gravel in runs, and gravel in riffles.

Mill Creek is an intermittent stream. In spring 2004, two reaches of Mill Creek in the project area were surveyed for Modified Alternative J1T (California Department of Fish and Game 2004). These surveys found existing aquatic habitat for salmonid fish to be fair.

5.2.5 Protected Fisheries

The project will affect Outlet Creek, five tributary creeks to Outlet Creek (Haehl, Baechtel, Broaddus, Mill, and Upp Creeks), and the streams’ riparian corridors. These streams are designated critical habitat for SONCC coho salmon, California coastal Chinook salmon, and northern California steelhead, and are referred to as *protected fisheries* in this MMP. The bypass alignment footprint crosses Haehl Creek and its riparian corridor at three locations. One is near the footprint’s southern end where the creek flows west across the alignment area (Appendix B). In this area, the bypass alignment footprint has been minimized to reduce the impact, although the project includes both the exit and entry ramps to the roadway in addition to the main roadway. Haehl Creek then flows north, crossing the footprint twice more near the central portion before it merges with Baechtel Creek, which is located west of the bypass alignment footprint.

Downstream of the confluence with Haehl Creek, Baechtel Creek flows outside the bypass alignment footprint until its confluence with Broaddus Creek. At this confluence, the two streams form Outlet Creek. This intersection is just east of the north corner of the WWTP (Appendix B). North of the confluence of Baechtel and Broaddus Creeks, the bypass alignment footprint crosses Mill and Upp Creeks (Appendix B).

5.2.6 Riparian Habitats

Areas of nonprotected fisheries riparian habitat are found along Haehl Creek in the southern half of the bypass alignment footprint and in the northern half of the bypass alignment footprint north of East Hill Road, along the northern edge of the Rutledge stock pond, along an area east and west of the railroad corridor, lining a tributary of Mill Creek, and on the Brooke parcel (Appendix B).

5.2.7 State-Listed Plants

The project will affect two state-listed plants: North Coast semaphore grass and Baker’s meadowfoam.

The North Coast semaphore grass populations in the bypass alignment footprint occur in the northern portion of the Huffman parcel just east of the bypass alignment intersection with the railroad corridor along a small swale lined with Oregon ash and valley oak trees.

Most Baker’s meadowfoam habitat (observed populations) in the bypass alignment footprint is on the Rutledge parcels and the Niesen and Lusher parcels between the railroad tracks and US 101 extending into the meadows surrounding Upp Creek. There is also a large area of potential Baker’s meadowfoam habitat on the Benbow parcels.

North Coast semaphore grass populations in Little Lake Valley most commonly are associated with forest and woodland edges and other partially to fully shaded mesic sites. The largest and highest-density populations of this species occur east of the bypass alignment footprint. However, there is a population in wet meadow and along the fringe of riparian woodland within the bypass alignment footprint on the Huffman parcel (Appendix B). Field surveys in 2007, 2008, 2009, and 2010 located occurrences of North Coast semaphore grass both within the bypass alignment footprint and on the offsite mitigation properties.

Baker’s meadowfoam populations in Little Lake Valley occur primarily in the wetter northern end of the valley. The largest and highest-density populations of this species occur east of the bypass alignment footprint. The Lusher populations occur at the edge of these larger and more central populations.

In an effort to better identify the extent of potential Baker’s meadowfoam habitat in the bypass alignment footprint, a 1993 study (Balance Hydrologics 1993), which defined the environmental conditions (soil types, hydrology, elevation, and geomorphology) associated with the occurrence of Baker’s meadowfoam, was undertaken. The occurrence of these environmental conditions within the bypass alignment footprint and the distribution of known plant locations reported in 1997 and 2003 were imported into ArcView GIS, and the overlap of these data was used to develop areas of high probability for the presence of Baker's meadowfoam. Baker's meadowfoam areas from the 1993, 1997, and 2003 surveys were used to develop polygons of observed and potential Baker's meadowfoam habitat and were depicted in the CMP (California Department of Transportation 2006a). These areas of high-probability Baker's meadowfoam habitat encompass and extend beyond the areas of the observed plant locations reported during the 1997 and 2003 surveys. Subsequent to preparation of the CMP, there were surveys in 2007, 2008, 2009, and 2011. Information from those surveys was merged with the previous data to create a complete dataset of Baker's meadowfoam observed and potential habitat in Little Lake Valley.

Many remaining populations of North Coast semaphore grass and Baker's meadowfoam are stressed or in decline. The primary threat has been habitat disturbance or conversion. Habitat disturbance arises from vegetation removal, mowing, intensive grazing, and competition from invasive and/or managed agricultural grasses. Habitat conversion arises from various types of development, such as road construction and maintenance, and vegetation-type change (e.g., wetland to riparian forest affects Baker's meadowfoam, and the converse is partially true for North Coast semaphore grass).

5.3 Offsite Mitigation Properties

The offsite mitigation properties are east of the bypass alignment footprint or in some cases (Benbow, Brooke, Ford, Lusher, and Niesen) on parcels occupied by the bypass alignment footprint (Figure 3-2). Most of the offsite parcels currently are used for livestock grazing and/or hay production, and a few are fallow. The biological resources on the offsite mitigation properties are similar to those in the bypass alignment footprint in that they include North Coast semaphore grass, Baker's meadowfoam, anadromous fish habitat, jurisdictional wetlands and other waters of the United States, and riparian habitat. These biological resources are discussed in Sections 5.3.1 through 5.3.10 by parcel. Table 5-1 lists the offsite mitigation properties that provide jurisdictional wetland and other waters mitigation, their size, APN, and the acreage of sensitive biological resources present on each parcel. Figures 5-5a, 5-5b, and 5-5c show the soil types on each offsite mitigation property.

Note that the acreage numbers provided in Table 5-1 and the parcel descriptions in Sections 5.3.1 through 5.3.13 reflect the *existing* resources on the parcel. In other words, they reflect the properties as they are found prior to the bypass alignment construction and establishment of new wetlands. As stated above, the bypass alignment intersects with some of the mitigation parcels (e.g., Benbow). After construction of the bypass and new wetlands, the acreage numbers of biological resources present will be different from what were found prior to this work.

Some of the offsite mitigation properties support riparian vegetation not associated with protected fisheries, and designated as *other riparian* in this document. This riparian habitat is associated with streams not identified as habitat for listed salmonids and in areas often located along fence lines or in low areas; in some cases the riparian habitat occurs along abandoned channels where flow has been diverted upstream into other channels. Many of these isolated

Offsite Mitigation Parcels

SSURGO Map Unit

Road

Permanent Impact Boundary

Temporary Impact Boundary

SSURGO Map Unit Label Description

178 Map Unit Symbol

Study Area Label Description

Frost Property Owner

108-07-04 Assesor Parcel Number

Code	Soil Type
110	CASABONNE-WOHLY LOAMS, 30 TO 50 PERCENT SLOPES
111	CASABONNE-WOHLY-PARDALOE COMPLEX, 50 TO 75 PERCENT SLOPES
112	CLEAR LAKE CLAY, 0 TO 2 PERCENT SLOPES
115	COLE CLAY LOAM, 0 TO 2 PERCENT SLOPES
123	FELIZ LOAM, 0 TO 2 PERCENT SLOPES
124	FELIZ LOAM, 2 TO 5 PERCENT SLOPES
126	FELIZ CLAY LOAM, GRAVELLY SUBSTRATUM, 2 TO 8 PERCENT SLOPES
127	FLUVAQUENTS, 0 TO 1 PERCENT SLOPES
128	GIELOW SANDY LOAM, 0 TO 5 PERCENT SLOPES
133	HAPLAQUEPTS, 0 TO 1 PERCENT SLOPES
137	HENNEKE-MONTARA COMPLEX, 50 TO 75 PERCENT
172	PARDALOE-KEKAWAKA-CASABONNE COMPLEX, 50 TO 75 PERCENT SLOPES
178	PINOLE GRAVELLY LOAM, 2 TO 8 PERCENT SLOPES
194	SANHEDRIN-KEKAWAKA-SPEAKER COMPLEX, 30 TO 50 PERCENT SLOPES
203	TALMAGE GRAVELLY SANDY LOAM, 0 TO 2 PERCENT
211	WITHERELL-HOPLAND-SQUAWROCK COMPLEX, 50 TO 75 PERCENT SLOPES
215	XEROCHREPTS-HAPLOXERALFS-ARGIXEROLLS COMPLEX, 9 TO 30 PERCENT SLOPES
224	YOKAYO-PINOLE-PINNOBIE COMPLEX, 0 TO 15 PERCENT SLOPES
233	YORKVILLE-SQUAWROCK-WITHERELL COMPLEX, 30 TO 50 PERCENT SLOPES
236	WATER

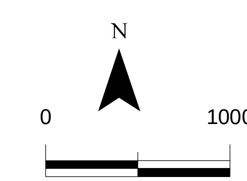


Figure 5-5a

Soil Types within the Offsite Mitigation Parcels

Proposed Willits Bypass Project

Offsite Mitigation Parcels
SSURGO Map Unit
Road
Permanent Impact Boundary
Temporary Impact Boundary

SSURGO Map Unit Label Description

178 Map Unit Symbol

Study Area Label Description

Frost Property Owner
108-07-04 Assesor Parcel Number

Code	Soil Type
110	CASABONNE-WOHLY LOAMS, 30 TO 50 PERCENT SLOPES
111	CASABONNE-WOHLY-PARDALOE COMPLEX, 50 TO 75 PERCENT SLOPES
112	CLEAR LAKE CLAY, 0 TO 2 PERCENT SLOPES
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128	GIELOW SANDY LOAM, 0 TO 5 PERCENT SLOPES
133	HAPLAQUEPTS, 0 TO 1 PERCENT SLOPES
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203	TALMAGE GRAVELLY SANDY LOAM, 0 TO 2 PERCENT
211	WITHERELL-HOPLAND-SQUAWROCK COMPLEX, 50 TO 75 PERCENT SLOPES
215	XEROCHREPTS-HAPLOXERALFS-ARGIXEROLLS COMPLEX, 9 TO 30 PERCENT SLOPES
224	YOKAYO-PINOLE-PINNOBIE COMPLEX, 0 TO 15 PERCENT SLOPES
233	YORKVILLE-SQUAWROCK-WITHERELL COMPLEX, 30 TO 50 PERCENT SLOPES
236	WATER

N

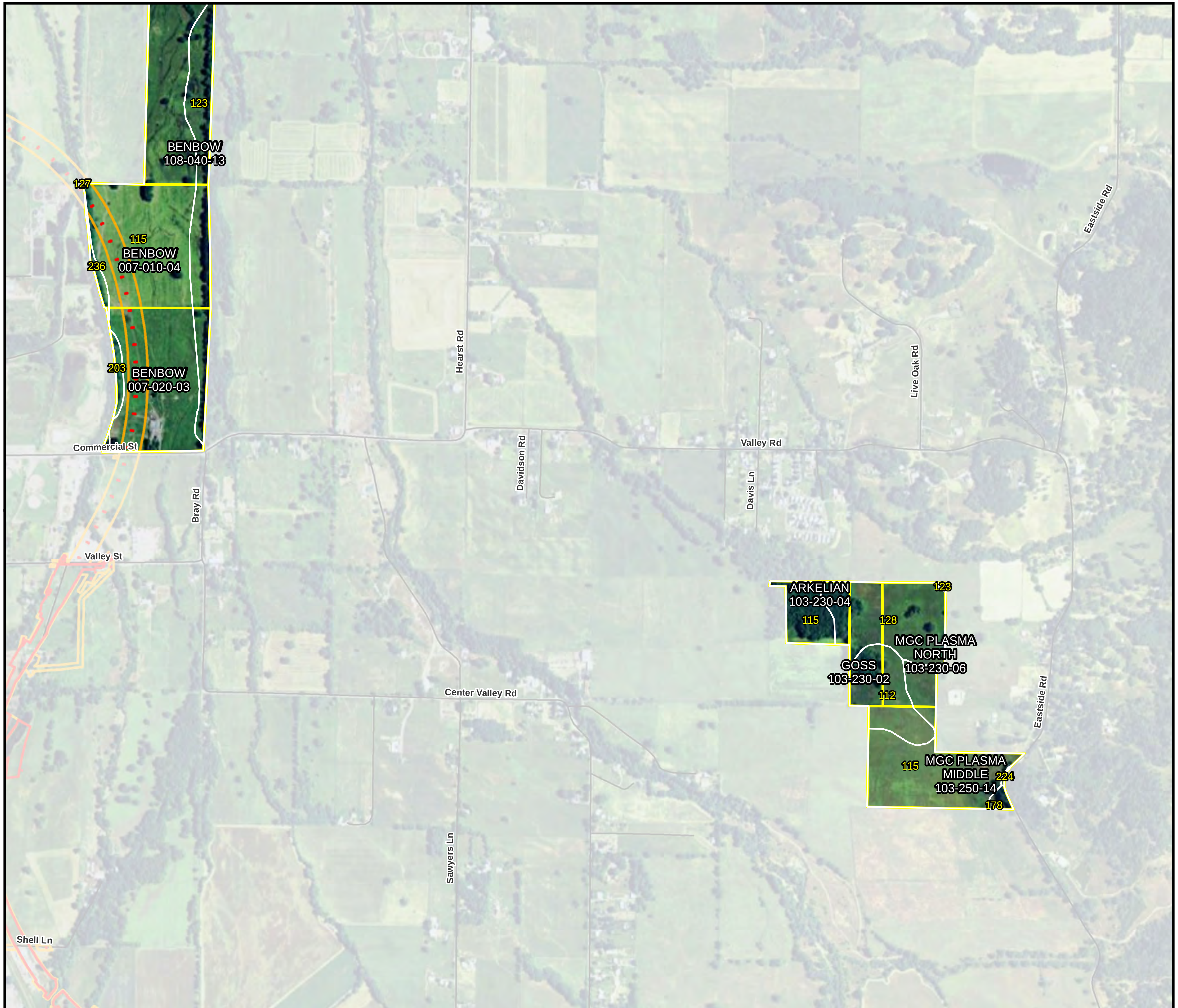
0 1000

Scale in Feet

Figure 5-5b

Soil Types within the Offsite Mitigation Parcels

Proposed Willits Bypass Project



Offsite Mitigation Parcels

SSURGO Map Unit

Road

Permanent Impact Boundary

Temporary Impact Boundary

SSURGO Map Unit Label Description

178 Map Unit Symbol

Study Area Label Description

Frost Property Owner

108-07-04 Assesor Parcel Number

Code	Soil Type
110	CASABONNE-WOHLY LOAMS, 30 TO 50 PERCENT SLOPES
111	CASABONNE-WOHLY-PARDALOE COMPLEX, 50 TO 75 PERCENT SLOPES
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172	PARDALOE-KEKAWAKA-CASABONNE COMPLEX, 50 TO 75 PERCENT SLOPES
178	PINOLE GRAVELLY LOAM, 2 TO 8 PERCENT SLOPES
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203	TALMAGE GRAVELLY SANDY LOAM, 0 TO 2 PERCENT
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215	XEROCHREPTS-HAPLOXERALFS-ARGIXEROLLS COMPLEX, 9 TO 30 PERCENT SLOPES
224	YOKAYO-PINOLE-PINNOBIE COMPLEX, 0 TO 15 PERCENT SLOPES
233	YORKVILLE-SQUAWROCK-WITHERELL COMPLEX, 30 TO 50 PERCENT SLOPES
236	WATER

N

0 1000

Scale in Feet

Figure 5-5c

Soil Types within the Offsite Mitigation Parcels

Proposed Willits Bypass Project

areas of riparian habitat appear to have been created during land-clearing for agricultural purposes. In view of the overarching vision of restoring wetland functions and services, protecting other riparian areas that historically were connected to the much more extensive riparian woodlands that occurred in Little Lake Valley is consistent with the mitigation strategy employed on the offsite mitigation properties.

The discussion of baseline conditions below includes information gathered from aerial photographs, topographic maps, soil surveys, and previous studies, which include wetlands delineations and a study by USACE on these parcels in early 2011 The purpose of the evaluations was to characterize soil, vegetation, and hydrology components of the wetlands on the parcels and identify/observe parcel or unit modification(s) that affect wetland components. USACE looked at the three wetland attributes used to define wetlands subject to USACE jurisdiction: hydrophytic vegetation, hydric soils, and wetlands hydrology. The USACE data are included in the following discussion of the baseline conditions on the offsite mitigation properties. Chapter 6 provides a more detailed discussion of the USACE findings, and Appendix I provides the USACE data.

Table 5-1. Summary of Existing Sensitive Biological Resources That Presently Occur on the Offsite Mitigation Properties

Owner	APN	Size (acres)	NCSG Observed	BM Observed	BM Potential Habitat	Jurisdictional Wetland	Other Waters of the United States	Riparian Habitat
Benbow	007-010-04	36.16	0.0	0.0	27.78	29.36	0.33	3.75
	007-020-03	33.54	0.0	0.0	27.04	27.02	0.23	2.22
	108-020-06	46.53	0.0	1.37	43.72	44.91	0.0	2.29
	108-030-07	54.74	0.0	1.01	52.76	53.86	0.0	1.89
	108-040-13	40.96	0.0	0.01	28.75	36.00	1.16	5.90
Ford	108-010-05	76.57	0.0	13.40	59.68	75.24	1.22	3.56
	108-010-06	138.87	0.0	18.14	95.28	113.02	3.38	18.30
	108-020-04	143.75	0.0	4.44	132.37	113.54	1.75	11.94
	108-030-02	50.99	0.0	0.11	48.38	37.12	0.49	4.32
	108-030-05	80.39	0.0	0.08	71.99	60.23	2.15	13.96
Goss	103-230-02	10.08	4.32	0.004	0.0	8.45	0.0	3.19
Lusher	108-030-04	66.17	0.59	0.0	0.0	36.06	2.02	24.97
MGC Plasma North	103-230-06	18.22	0.04	0.10	0.0	4.04	0.0	0.08
MGC Plasma Middle	103-250-14	27.04	0.0	0.0	0.0	2.51	0.0	0.00
Nance	108-050-06	73.90	0.0	27.43	46.47	72.46	0.20	1.42
Niesen	108-040-02	27.43	0.0	2.15	19.04	19.26	0.46	0.14
Watson	037-221-30	115.59	0.0	0.0	95.94	81.14	0.26	16.01
	037-250-05	51.11	0.0	0.0	50.15	49.26	0.19	12.15
Wildlands	108-020-07	7.77	0.0	0.04	5.68	2.91	0.16	2.29
	108-030-08	8.00	0.0	0.01	5.26	7.03	0.0	1.09
	108-060-01	63.39	0.0	0.93	57.14	41.03	1.39	10.66
	108-060-02	106.81	0.0	42.38	61.85	101.48	1.19	6.00
	108-070-08	64.06	0.0	4.40	47.96	51.14	1.49	16.64
	108-070-09	121.87	0.0	3.22	93.26	97.53	2.68	22.07
	Total	**2098.22**	**5.10**	**126.654**	**1,099.11**	**1294.27**	**23.32**	**231.90**

APN = assessor’s parcel number.
NCSG = North Coast semaphore grass.
BM = Baker’s meadowfoam.

5.3.1 Benbow (APNs 007-010-04, 007-020-03, 108-020-06, 108-030-07, and 108-040-13)

The Benbow property consists of five contiguous parcels totaling approximately 212 acres. The Benbow parcels start just north of East Commercial Street and continue north for approximately 2 miles. The Benbow parcels are used for grazing horses and cattle, and grazing intensity appears to be light. There is no evidence to suggest that the parcels currently are irrigated or that they have been irrigated in the recent past. There was no evidence of cultivation or mowing during field surveys in 2008 and 2009.

A residence, water tower, and barns are on Benbow parcel 007-020-03, just north of East Commercial Street.

5.3.1.1 Historical and Existing Vegetation

The Benbow property likely was vegetated historically in a mosaic of wetland meadow and riparian woodland that extended onto the property from the adjacent drainages. The overstory likely was dominated by a mix of valley oak, Oregon ash, cottonwood, alder, and willow. A 1956 aerial photograph (Cartwright Aerial Surveys 1956) shows a pattern of parallel, north-south lines in the two northernmost parcels (108-020-06 and 108-030-07), suggesting that these parcels were likely in hay production in the past. The photo shows scattered trees and a thin strip of riparian vegetation along the fence rows and channels.

The Benbow parcels currently are managed for grazing and contain mostly perennial grassland and wet-meadow plant communities. The dominant upland grassland species include Kentucky bluegrass, clovers, tall fescue, rough cat’s ear, cranesbill, and perennial ryegrass. Dominant species in the wetlands include meadow foxtail, field sedge, straight beaked buttercup, California semaphore grass, spreading rush, pennyroyal, lythrum, and stipulate popcornflower. Masses of invasive Himalayan blackberry occur in some areas, particularly those that appear to have been disturbed along the western property boundary. Nonnative annual grassland, dominated by Mediterranean barley and perennial ryegrass, occurs in a few very small areas. (California Department of Transportation 2009a; U.S. Army Corps of Engineers 2011)

Riparian woodlands occur along fence rows and the stream channels that border the Benbow parcels. Riparian woodland types include valley oak riparian woodland, mixed riparian woodland, Oregon ash riparian woodland, and willow riparian scrub. Isolated mature valley oaks and Oregon ash occur throughout the Benbow parcels (California Department of Transportation 2009a; U.S. Army Corps of Engineers 2011). These woodlands appear to be much denser than in the 1956 aerial photographs (Cartwright Aerial Surveys 1956).

5.3.1.2 Historical and Existing Hydrology/Topography

Soil survey information from 1920 (Dean 1920) indicates that a lake historically formed at the northern end of Little Lake Valley during the rainy season, even during very low rainfall years. At the end of a series of heavy rainfall events in February 1915, the lake encompassed 1,875 acres and was 12 ft deep over a 300-acre area. At that time, the high water mark of the lake was at the 1,330-ft contour, which roughly corresponds to the north-south midsection of the Benbow parcels.

A 1942 USGS 15-minute series topographic map (included in Wildlands 2008) depicts Baechtel Creek along the western border and an unnamed tributary of Davis Creek along the eastern border of parcels 007-010-04 and 007-020-03. Davis Creek is depicted crossing the northern half of parcel 108-020-06. A 1956 aerial photograph depicts the remnants of this channel in parcel 108-020-06 and shows the realigned Davis Creek channel on the adjoining parcel to the east.

The Benbow parcels currently are drained by numerous swales and channelized intermittent streams tributary to Davis Creek that form the eastern boundary of the parcels. Baechtel Creek forms the boundary of the southwestern side of Benbow parcels 007-010-04 and 007-020-03. Near the northwest corner of parcel 007-010-04, Baechtel and Broaddus Creeks merge and become Outlet Creek. Surface water on the Benbow parcels generally drains toward the northeast along numerous swale systems tributary to Davis Creek. Swales and associated depressions are subject to ponding. These features and low-lying planar areas are subject to a seasonal high water table.

A wetland swale complex on parcel 007-010-04 flows north onto parcel 108-040-13, where it becomes a well-developed unnamed stream channel with riparian vegetation. This channel continues to the northeast and eventually flows into Davis Creek. Another swale complex originates on parcel 108-030-07 and flows northwest onto parcel 108-020-06, eventually forming one swale that continues to the northwest outside this parcel. This swale is bordered on its western bank by a 3-foot-high artificial berm. This swale eventually feeds into an unnamed stream that flows into Outlet Creek.

During fieldwork in May 2010 for the erosion site assessment of the offsite mitigation properties (California Department of Transportation 2010), eight erosion sites were identified on Benbow parcels 108-020-06 (two instream headcuts), 108-040-13 (two instream eroding banks and two upland sites), and 007-020-03 (two instream eroding banks) (Appendix H).

Parcel 108-020-06 was identified as having two instream headcuts that occur on swales near its southwest corner (Figure 3-1 in Appendix H). The areas of and adjacent to each headcut are well-vegetated wet meadow with sandy loam soils (Gielow sandy loam, 0–5% slopes; see Section 5.3.2.3). These headcuts appear relatively stable and are not contributing to downstream sedimentation because both have very small drops (0.5–0.6 foot), and any associated sediment derived from these headcuts is minimal and is spread out and deposited in the existing wetland complex to the north. Water quality monitoring data will be collected for several parameters, including parameters related to sediment levels. If the data show that increased sedimentation is occurring in the vicinity of the offsite mitigation properties, these erosion features will be inspected to determine whether the headcuts are becoming unstable and contributing excessive sediment to the parcel and valley streams (Chapter 11).

Parcel 108-040-13 was identified with two instream eroding bank sites and two upland sites. The instream eroding bank sites occur in association with a large swale and an intermittent stream channel (see Figure 3-1 in Appendix H). Both of these sites have streambanks that range from 2 to 3 ft high and are composed of relatively compact and stable soil. The two upland erosion sites are in the center of the parcel. One of these sites is a large headcut in a swale that is tributary to the aforementioned intermittent stream, and the other is a small pothole adjacent to this swale. The areas adjacent to these sites are well-vegetated wet meadow, swale, and/or riparian woodland with clay loam soils (Cole clay loam, 0–2% slopes; see Section 5.3.2.3). All of the erosion sites, except the large upland site on the aforementioned swale, appear relatively stable. Sediment derived from these sites likely enters a discontinuous intermittent stream channel that runs along the eastern edge of the parcel. This channel appears to once have connected to Davis Creek but no longer has an active hydrologic connection to that creek. Therefore, potential sedimentation from these sites essentially enters an active sediment sink (the discontinuous intermittent stream). However, the large headcut identified in the swale on this parcel (Figure 4-6 in Appendix H) will be rehabilitated as part of wetland rehabilitation actions to reduce the potential for sedimentation from the site to nearby streams. See Appendix H for rehabilitation concepts for this large headcut.

Water quality monitoring data will be collected for several parameters, including parameters related to sediment levels. If the data show that increased sedimentation is occurring in the vicinity of the offsite mitigation properties, these erosion features will be inspected to determine whether the headcuts are becoming unstable and contributing excessive sediment to the parcel and valley streams (Chapter 11).

Parcel 007-020-03 was identified with two instream eroding banks along the eastern edge of the parcel. One of these consists of an eroding berm/levee at the confluence of two intermittent streams; one runs south to north on the parcel, and the other joins this channel from the parcel to the east. The other is an incised gully with pockets of bank erosion that crosses the southern boundary of the parcel. The area adjacent to the eroding berm/levee is well-vegetated with valley oak riparian woodland with loam soils (Feliz loam, 0–2% slopes; see Section 5.3.2.3). The area of and adjacent to the incised gully is fairly well–vegetated with wet meadow vegetation with clay loam soils (Cole clay loam, 0–2% slopes; see Section 5.3.2.3). These eroding banks appear to be relatively stable, and potential sedimentation from these sites essentially enters the same active sediment sink described above. Water quality monitoring data will be collected for several parameters, including parameters related to sediment levels. If the data show that increased sedimentation is occurring in the vicinity of the offsite mitigation properties, these erosion features will be inspected to determine whether the headcuts are becoming unstable and contributing excessive sediment to the parcel and valley streams (Chapter 11).

5.3.1.3 Soils/Substrates

The *Mendocino County, Eastern Part and Southwestern Part of Trinity County Soil Survey* (Natural Resources Conservation Service 2009) depicts the Benbow parcels as having the following soil map units.

- **Cole clay loam, 0–2% slopes:** Very deep, somewhat poorly drained soil on alluvial plains and in basins, that formed in recent alluvium derived primarily from sedimentary rock. This soil formed from alluvium from mixed sources. Surface horizon textures consist of loam, clay loam, silt loam, or silty clay loam with a representative clay content of 30%. Subsurface horizon textures consist of silty clay loam, clay loam, and silty clay.

- **Gielow sandy loam, 0–5% slopes:** Deep, somewhat poorly drained soils that typically occur on alluvial plains and fans. This soil is formed from alluvium from sedimentary rocks. Surface horizon textures consist of sandy loam or loam. Subsurface horizon textures consist of stratified loam, fine sandy loam, sandy loam, or sandy clay loam.
- **Fluvaquents, 0–1% slopes:** These soils are formed from alluvium weathered from sedimentary rock and are found on floodplains. They are characterized by very little to no horizon development and the presence of aquic conditions within 20 inches of the soil surface at some time during normal years, and are formed in fluvial environments. Typical surface horizons consist of gravelly sandy loam, while subsurface horizon textures can vary.
- **Feliz loam, 0–2% slopes:** Very deep, well-drained soils that typically occur on floodplains formed from alluvium from mixed sedimentary rocks. Surface horizon textures consist of loam. Subsurface horizon textures consist of clay loam.
- **Talmage gravelly sandy loam, 0–2% slopes:** Somewhat excessively drained soils found on alluvial fans. Surface soils consist of gravelly sandy loam and stratified very gravelly coarse sandy loam to very gravelly loam. Subsurface soils include stratified very gravelly coarse sandy loam to very gravelly loam, and stratified very gravelly coarse sand to very gravelly loamy sand.

Soil data were collected on the Benbow parcels during wetland delineation efforts and the USACE January 2011 study. Surface soil textures range from gravelly sandy loam to clay loam. Hydric soil indicators were found on the parcels. (California Department of Transportation 2009a; U.S. Army Corps of Engineers 2011.)

5.3.1.4 Jurisdictional Wetlands and Other Waters of the United States

According to a wetland delineation on the Benbow parcels (California Department of Transportation 2009a), there are 192.14 acres of jurisdictional wetlands and 1.73 acres of other waters. Wetland types mapped on these parcels include wetland swale, wet meadow, and riparian woodland wetland. Other waters of the United States mapped on the Benbow parcels include two forks of an intermittent stream that is a tributary of Davis Creek.

A total of 3.09 acres of wetland swales was mapped on parcels 007-010-04 (0.81 acre), 007-020-03 (0.32 acre), 108-020-06 (0.37 acre), 108-030-07 (0.06 acre), and 108-040-13 (1.52 acres). Dominant vegetation included tall fescue, Italian ryegrass, bentgrass, meadow foxtail, sedges, buttercup, California semaphore grass, spreading rush, and stipulate popcornflower.

A total of 177.124 acres of wet meadow was mapped on Benbow parcels 007-010-04 (24.89 acres), 007-020-03 (23.54 acres), 108-020-06 (43.64 acres), 108-030-07 (53.79 acres), and 108-040-13 (31.26 acres). Wet meadows were found throughout the Benbow property. Dominant vegetation included meadow foxtail, sedges, buttercup, California semaphore grass, spreading rush, and stipulate popcornflower.

A total of 11.93 acres of riparian woodland wetland was mapped on Benbow parcels 007-010-04 (3.661 acres), 007-020-03 (3.15 acres), 108-020-06 (0.89 acre), 108-030-07 (0.01 acre), and 108-

040-13 (4.22 acres). Riparian woodland types include valley oak riparian woodland, mixed riparian woodland, Oregon ash riparian woodland, and willow riparian scrub.

Other waters mapped on the Benbow parcels consist of two forks of an intermittent stream on parcel 108-040-13 (1.16 acres) and an intermittent stream on the eastern boundary of parcels 007-010-04 (0.33 acre) and 007-020-03 (0.23 acre). These streams have low-gradient channels with a mix of silt, sand, and gravel substrates. Both channels have well-developed riparian corridors along their banks.

During studies conducted by USACE in January of 2011, the wetlands areas were observed to have the following hydrologic indicators: surface water, high water table, saturation, and sediment deposits. USACE further defined the hydrology on the parcels as having a very long–duration subsurface saturation, occasional flooding, ponding in depressions, localized sheet flow, and flow through swales.

5.3.1.5 Protected Fisheries

Riparian habitat around protected fisheries occurs along the western boundary of Benbow parcels 007-010-04 and 007-020-03 and along the eastern boundary of parcel 108-020-06. This riparian corridor is along Baechtel Creek and consists of mixed riparian woodland and Oregon ash riparian woodland. There is a total of 2.97 acres of riparian habitat around protected fisheries on the Benbow parcels.

5.3.1.6 Riparian Habitats

A total of 13.08 acres of riparian habitat was mapped on the Benbow parcels. These riparian corridors were mapped as valley oak riparian woodland, Oregon ash as riparian woodland (along fence rows), willow riparian scrub, and scattered Oregon ash and valley oak trees.

5.3.1.7 State-Listed Plants

Special status–plant surveys were performed on the Benbow parcels in April 2007. These surveys identified Baker’s meadowfoam throughout the wet-meadow portions of parcels 108-020-06, 108-030-07, and 108-040-13. No listed plants were identified on the remaining Benbow parcels (007-010-04 and 007-020-03). Areas of potential Baker’s meadowfoam habitat also were mapped on all the Benbow parcels.

A total of 182.44 acres of Baker’s meadowfoam habitat (observed and potential) was identified on the Benbow parcels: 2.39 acres of observed Baker’s meadowfoam on parcels 108-020-06 (1.37 acres), 108-030-07 (1.01 acres), and 108-040-13 (0.01 acre); and 180.05 acres of potential Baker’s meadowfoam habitat on parcels 007-010-04 (27.78 acres), 007-020-03 (27.04 acres), 108-020-06 (43.72 acres), 108-030-07 (52.76 acres), and 108-040-13 (28.75 acres).

5.3.2 Ford Ranch (APNs 108-010-05, 108-010-06, 108-020-04, 108-030-02, and 108-030-05)

The Ford property consists of five contiguous parcels totaling approximately 491 acres along the northwestern side of Little Lake Valley just east of US 101. The Ford parcels currently are used for cattle grazing and hay production.

5.3.2.1 Historical and Existing Vegetation

Aerial photographs from 1952, 1978, and 1988 depict the Ford parcels transitioning from areas largely devoid of trees to the development of areas of dense riparian vegetation along the streams passing through the parcels (Wildlands 2008). The 1952 aerial photograph depicts much of the land cleared of trees for cattle grazing and farming. In the 1988 photograph, Ford parcels 108-030-05 and 108-030-02 are depicted as heavily vegetated in woodlands, although most of the remaining parcels were still relatively open. Between 1988 and 2005, most of the woodland areas on parcels 108-030-05 and 108-030-02 were removed (Google, Inc. 2009; Wildlands 2008).

The Ford parcels currently are vegetated with wet meadow, mixed marsh, and upland grassland communities. The wet-meadow community covers most of the Ford parcels. These areas are dominated by meadow foxtail, Harding grass, curly dock, camas, annual hairgrass, tall fescue, perennial ryegrass, rayless goldfields, Baker’s meadowfoam, pennyroyal, Davy’s semaphore grass, and western buttercup. The mixed marsh community is found along the northern boundary of the Ford parcels. Dominant vegetation in this area consists of broadleaf water-plantain, rushes, water-plantain buttercup, and tule. The upland grassland areas occur along the higher ground adjacent to Outlet Creek. These areas are dominated by red fescue, Mediterranean barley, creeping ryegrass, Pacific bluegrass, slender fescue, soft chess, bur-clover, and white clover. (California Department of Transportation 2009a; U.S. Army Corps of Engineers 2011.)

The remainder of the Ford parcels is vegetated in riparian woodland, described as Oregon ash riparian woodland, valley oak riparian woodland, and mixed riparian woodland. The mixed riparian woodlands are dominated by Oregon ash, valley oak, arroyo willow, white alder, and cottonwoods (California Department of Transportation 2009a; U.S. Army Corps of Engineers 2011). Understory vegetation in the three riparian woodland types includes Himalayan blackberry, California blackberry, poison-oak, and dogwood (California Department of Transportation 2009a).

5.3.2.2 Historical and Existing Hydrology/Topography

Soil survey information from 1920 (Dean 1920) indicates that a lake historically formed at the northern end of Little Lake Valley during the rainy season, even during very low rainfall years. At the end of a series of heavy rainfall events in February 1915, the lake encompassed 1,875 acres and was 12 ft deep over a 300-acre area. At that time, the high water mark of the lake was at the 1,330-ft contour, which historically would have flooded most of the northern half of the Ford property. The lake no longer forms because the invert of Outlet Creek at the north end of Little Lake Valley has been lowered.

A review of a 1942 15-minute series USGS topographic map (included in Wildlands 2008) shows that most of the Ford parcels was once part of the extensive marshlands that extended south from the area of the historical lake. This topographic map also shows Old Outlet Creek in its current location but does not show the channelized, north-south reach of Outlet Creek.

The Ford parcels currently are subject to seasonal inundation in the marshes on the northern half of parcels 108-010-06 and 108-010-05, likely resulting largely from localized ponding, with some potential bank overflow coming from Old Outlet Creek and Davis Creek, which flow through the parcels from south to north. The wet-meadow areas are seasonally saturated with areas of surface water in swales and depressions.

During field work in May 2010 for the erosion site assessment of the offsite mitigation properties (California Department of Transportation 2010), a total of five eroding bank sites were identified along Outlet Creek on Ford parcels 108-010-06 (three eroding banks), 108-020-04 (one eroding bank), and 108-030-05 (one eroding bank) (Appendix H).

Parcel 108-010-06 was identified as having three instream eroding banks on Outlet Creek in the center of the parcel (Figures 3-1 and 4-1 in Appendix H). The erosion sites are vegetated in Oregon ash riparian woodland; adjacent areas are vegetated with wet-meadow vegetation with soils altered through levee construction. All three sites have unstable, mostly vegetated cutbanks created by convergence flow on the riffle/gravel bar complex on the opposite side of the cutbank. The banks are approximately 6 ft tall and actively slumping. These areas will be rehabilitated as part of riparian rehabilitation actions to reduce sedimentation from the banks to Outlet Creek. See Appendix H for rehabilitation concepts for these three eroding bank sections. Water quality monitoring data will be collected for several parameters, including parameters related to sediment levels. If the data show that increased sedimentation is occurring in the vicinity of the offsite mitigation properties, these erosion features will be inspected to determine whether they are becoming unstable again and contributing excessive sediment to the parcel and valley streams (Chapter 11).

Parcel 108-020-04 was identified as having one instream eroding bank on Outlet Creek in the southeast corner of the parcel (Figure 3-1 in Appendix H). This eroding bank is well-vegetated with mixed riparian woodland with Fluvaquent soils (*Fluvaquents, 0–1% slopes*; see Section 5.3.4.3) and the adjacent areas are well-vegetated with wet-meadow vegetation and similar soils. This 6- to 8-ft-tall bank appears to have stabilized somewhat, based on the vegetative growth on and adjacent to the bank. Water quality monitoring data will be collected for several parameters, including parameters related to sediment levels. If the data show that increased sedimentation is occurring in the vicinity of the offsite mitigation properties, this erosion feature will be inspected to determine whether it is becoming unstable and contributing excessive sediment to the parcel and valley streams (Chapter 11).

Parcel 108-030-05 was identified as having one instream eroding bank on Outlet Creek near the southern boundary of the parcel (Figure 3-1 in Appendix H). This eroding bank is well-vegetated with valley oak riparian woodland with Fluvaquent soils (*Fluvaquents, 0–1% slopes*; see Section 5.3.4.3), and the adjacent areas are well-vegetated with wet-meadow vegetation on sandy loam soils (*Gielow sandy loam, 0–5% slopes*; see Section 5.3.4.3). This 4- to 6-foot-tall bank is a slumped erosion feature that appears to be stabilized based on the vegetative growth on and adjacent to the bank. Water quality monitoring data will be collected for several parameters, including parameters related to sediment levels. If the data show that increased sedimentation is occurring in the vicinity of the offsite mitigation properties, this erosion feature will be inspected to determine whether it is becoming unstable and contributing excessive sediment to the parcel and valley streams (Chapter 11).

5.3.2.3 Soils/Substrates

The *Mendocino County, Eastern Part and Southwestern Part of Trinity County Soil Survey* (Natural Resources Conservation Service 2009) depicts the Ford parcels as having the following soil map units.

- **Fluvaquents, 0–1% slopes:** These soils are formed from alluvium weathered from sedimentary rock and are found on floodplains. They are characterized by very little to no horizon development and the presence of aquic conditions within 20 inches of the soil surface at some time during normal years, and are formed in fluvial environments. Typical surface horizons consist of gravelly sandy loam, while subsurface horizon textures can vary.
- **Gielow sandy loam, 0–5% slopes:** Deep, somewhat poorly drained soils that typically occur on alluvial plains and fans. This soil is formed from alluvium from sedimentary rocks. Surface horizon textures consist of sandy loam or loam. Subsurface horizon textures consist of stratified loam, fine sandy loam, sandy loam, or sandy clay loam.
- **Haplaquepts, 0–1% slopes:** Poorly drained soil formed from alluvium derived from sedimentary rock. These soils consist of clay loam underlain by gravelly clay loam. They have minimal horizon development and evidence of aquic conditions within 24 inches of the soil surface. Depth to a restrictive feature is more than 80 inches.
- **Pinole gravelly loam, 2–8% slopes:** Very deep, well-drained soils that typically occur on terraces formed from alluvium from sedimentary and other rock sources. Surface horizon (below 10 inches) consists of clay loam or sandy clay loam.

Soil data were collected on the Ford parcels during wetland delineation efforts and the USACE January 2011 study (California Department of Transportation 2009a; U.S. Army Corps of Engineers 2011). Hydric soil indicators were observed in wet-meadow areas during the wetland delineation and during the USACE January 2011 study (California Department of Transportation 2009a; U.S. Army Corps of Engineers 2011).

5.3.2.4 Jurisdictional Wetlands and Other Waters of the United States

According to the wetland delineation on the Ford parcels, there are 399.14 acres of jurisdictional wetlands and 8.97 acres of other waters. Wetland types mapped on these parcels include wet meadow, mixed marsh, and riparian woodland wetland. The other waters of the United States mapped on the Ford parcels are two intermittent streams (Old Outlet and Outlet Creeks) and one perennial stream (Davis Creek).

A total of 357.72 acres of wet meadow was mapped on parcels 108-010-05 (67.12 acres), 108-010-06 (82.63 acres), 108-020-04 (112.94 acres), 108-030-02 (35.81 acres), and 108-030-05 (59.206 acres). Wet meadow is the dominant vegetative cover on all the Ford parcels. Meadow foxtail, camas, annual hairgrass, rayless goldfields, Baker's meadowfoam, pennyroyal, and western buttercup dominate these areas.

A total of 32.581 acres of mixed marsh was mapped on parcels 108-010-05 (5.71 acres) and 108-010-06 (26.87 acres). The areas of mixed marsh are in low-lying areas at the north end of these parcels. Broadleaf water-plantain, water-plantain buttercup, and tule dominate the vegetation.

A total of 8.54 acres of riparian woodland wetland and riparian scrub wetland was mapped on parcels 108-010-05 (2.38 acres), 108-010-06 (3.52 acres), 108-020-04 (0.60 acre), 108-030-02 (1.02 acres), and 108-030-05 (1.02 acres). The areas of riparian woodland wetland occur in association with the streams that pass through these parcels, and in and adjacent to the wet-meadow areas. Valley oaks, Oregon ash, black cottonwood, red willow, arroyo willow, Himalayan blackberry, and California blackberry dominate the vegetation in the riparian woodland wetlands. Riparian scrub was mapped in an area adjacent to Old Outlet Creek at the north end of parcel 108-010-06. Willow shrubs dominate this area.

A total of 8.974 acres of other waters was mapped on parcels 108-010-05 (1.22 acres), 108-010-06 (3.38 acres), 108-020-04 (1.75 acres), 108-030-02 (0.49 acre), and 108-030-05 (2.15 acres). Other waters mapped on the Ford parcels are two intermittent streams—Old Outlet Creek and Outlet Creek—and one perennial stream—Davis Creek. These creeks have low-gradient channels with a mix of silt, sand, and gravel substrates. All these channels have been modified to facilitate drainage of the adjoining parcels for agricultural uses. Old Outlet and Outlet Creeks have well-developed riparian corridors along their banks. Davis Creek on parcel 108-010-05 is devoid of vegetation along its banks.

During USACE studies in January 2011, the following hydrologic indicators were observed: surface water (marsh and depressions and swales in wet meadows), saturation, sediment and drift deposits (marsh only), high water table, and algal matting (marsh only). USACE further defined the hydrology in the areas of marsh as having very long–duration ponding and subsurface saturation, and frequent flooding. The areas of wet meadow were defined as having very long–duration subsurface saturation, surface water in swales and depressions, and seasonal and occasional flooding.

5.3.2.5 Protected Fisheries

Riparian corridors are present along protected fisheries on all the Ford parcels. These riparian corridors are present along Old Outlet Creek, Outlet Creek, and Davis Creek and are vegetated with Oregon ash riparian woodland, mixed riparian woodland, and valley oak riparian woodland. A total of 28.41 acres of riparian corridors along protected fisheries habitat was mapped on the Ford parcels.

5.3.2.6 Riparian Habitats

A total of 23.65 acres of riparian habitat is present along Wild Oat Canyon Creek in parcel 108-010-06, an unnamed tributary of Outlet Creek on parcel 108-030-02, and spread throughout the remainder of the Ford parcels, including fence rows and isolated clusters within areas of wet meadow. Riparian habitat includes valley oak riparian woodland and Oregon ash riparian woodland communities.

5.3.2.7 State-Listed Plants

Special status–plant surveys were performed on the Ford parcels in April 2007. These surveys identified Baker's meadowfoam on all the Ford parcels. Most of the Baker's meadowfoam was found on the wetter northern parcels. Areas of potential Baker's meadowfoam habitat were also mapped on all the Ford parcels.

A total of 443.87 acres of Baker's meadowfoam habitat (observed and potential) was identified on the Ford parcels: 36.16 acres of observed Baker's meadowfoam on parcels 108-010-05 (13.40 acres), 108-010-06 (18.14 acres), 108-020-04 (4.44 acres), 108-030-02 (0.10 acre), and 108-030-05 (0.08 acre); and 407.70 acres of potential Baker's meadowfoam habitat on 108-010-05 (59.68 acres), 108-010-06 (95.28 acres), 108-020-04 (132.37 acres), 108-030-02 (48.38 acres), and 108-030-05 (71.99 acres).

5.3.3 Frost (APN 108-070-04)

The 47-acre Frost parcel is along the east side of Little Lake Valley immediately north of Hearst Road. The Frost parcel currently is used for cattle grazing.

5.3.3.1 Historical and Existing Vegetation

Historical aerial photographs show evidence of past farming activity as early as 1952. Aerial photographs from 1952, 1978, 1988, and 2005 depict conditions similar to those at present: vegetated with low-growing herbaceous plants (Wildlands 2008; Google, Inc. 2009). Some trees appear along the fence row in these historical photographs, much as they do today.

The Frost parcel is almost entirely vegetated with wet-meadow vegetation. Other vegetation communities include swale, riparian woodland, and small areas of upland grassland.

Dominant vegetation in the wet meadow, swales, and adjacent grassland on this parcel include California oatgrass, soft chess, foxtails, rye grass, broadleaf water-plantain, rushes, sedges, buttercups, clovers, perennial ryegrass, coyote thistle, pennyroyal, tall fescue, poison hemlock, Himalayan blackberry, velvet grass, Harding grass, and meadow foxtail (California Department of Transportation 2009a; U.S. Army Corps of Engineers 2011).

The riparian woodland is in the northeast corner of the parcel and is dominated by Oregon ash and Himalayan blackberry.

5.3.3.2 Historical and Existing Hydrology/Topography

Historically, this parcel most likely functioned as a high-quality wetland similar to wetlands on the Ford and Wildlands parcels to the north. The hydrology of the Frost parcel has been altered by creek diversions, drainage ditch excavations, cross ripping, and plowing. The hydrology has also been altered, though to a lesser degree, by heavy grazing and the resultant compaction and increased runoff. A stream channel in the northern portion of this parcel has been backfilled and now functions as a seasonal swale. This stream once flowed west from the adjacent parcel on the east toward the adjacent Frost West parcel. This stream, and two others to the north, were channelized and diverted onto the Ford and Wildlands parcels to the north. Water diversions, intensive soil disturbance, and grazing have transformed the formerly extensive high-quality wetlands on this parcel into mostly marginal wetlands.

During fieldwork in May 2010 for an erosion site assessment of the offsite mitigation properties (California Department of Transportation 2010), five erosion sites were identified near the northeast corner of the Frost parcel (Figures 3-1 and 4-2 in Appendix H). Three of these are instream headcuts on a small unnamed tributary of Berry Creek, and two are upland headcut sites. These areas are sparsely vegetated in Oregon ash riparian woodland with Haplaquept soils (*Haplaquepts, 0–1% slopes*; see Section 5.3.5.3). These areas appear to be unstable and have a high potential to contribute sediment to Berry Creek via the unnamed tributary. These sites will be rehabilitated as part of wetland rehabilitation actions (Chapter 7, Section 7.3.1.16) to reduce the potential for sedimentation from the site to Berry Creek. See Appendix H for rehabilitation concepts for these headcuts. Water quality monitoring data will be collected for several parameters, including parameters related to sediment levels. If the data show that increased sedimentation is occurring in the vicinity of the offsite mitigation properties, these erosion features will be inspected to determine whether the headcuts are becoming unstable again and contributing excessive sediment to the parcel and valley streams (Chapter 11).

5.3.3.3 Soils/Substrates

The *Mendocino County, Eastern Part and Southwestern Part of Trinity County Soil Survey* (Natural Resources Conservation Service 2009) depicts the Frost parcel as having the following soil map units.

- **Cole clay loam, 0–2% slopes:** Very deep, somewhat poorly drained soils that typically occur on river terraces, basins, and floodplains or on alluvial fans. This soil is formed from alluvium from mixed sources. Surface horizon textures consist of loam, clay loam, silt loam, or silty clay loam. Subsurface horizon textures consist of silty clay loam, clay loam, silty clay, or clay.
- **Gielow sandy loam, 0–5% slopes:** Deep, somewhat poorly drained soils that typically occur on alluvial plains and fans. This soil is formed from alluvium from sedimentary rocks. Surface horizon textures consist of sandy loam. Subsurface horizon textures consist of stratified loam, fine sandy loam, sandy loam, or sandy clay loam.

Soil data were collected on the Frost parcel during wetland delineation efforts and the USACE January 2011 study (California Department of Transportation 2009a; U.S. Army Corps of Engineers 2011). Surface soil textures observed during the wetland delineation generally consisted of finer surface textures than those mapped for this area. Hydric soil indicators were observed in sample points on the Frost parcel during the wetland delineation and during the USACE January 2011 study (U.S. Army Corps of Engineers 2011).

5.3.3.4 Jurisdictional Wetlands and Other Waters of the United States

According to a wetland delineation on the Frost parcel, there are 41.60 acres of jurisdictional wetlands and 0.26 acre of other waters of the United States. Wetland types mapped on the Frost parcel include swale and wet meadow. A small intermittent stream was mapped as other waters at the northeast corner of the Frost parcel.

There is a total of 41.48 acres of wet meadow throughout the Frost parcel. The wet meadows are dominated by straight-leaf rush, common velvet grass, bentgrass, and Baker's meadowfoam. Depressions in these wetlands contain pennyroyal, western buttercup, and Davy's semaphore grass near a drainage swale adjacent to the east fence.

There is a total of 0.12 acre of swale on the Frost parcel. This feature crosses the parcel from east to west. It appears to be a backfilled streambed that is currently approximately 12–30 inches deep. Dominant vegetation observed in the swale consists of pennyroyal, California semaphore grass, and Baker's meadowfoam.

The other waters mapped on the Frost parcel consist of a small, unnamed stream that originates from small creeks and springs flowing from the adjacent parcel on the east. The channel banks are vegetated with Oregon ash and Himalayan blackberry, with some broadleaf water-plantain, pennyroyal, common spikerush, and Baltic rush present in portions of the channel.

During USACE studies in January 2011, the following hydrologic indicators were observed: surface water, saturation, and a high water table. USACE further defined the hydrology on the parcel as having very long–duration subsurface saturation, localized sheet flow during storm events, surface water in small depressions, surface flow in a channel near the northeast corner, and the parcel probably is not subject to flooding during major events.

5.3.3.5 Protected Fisheries

No protected fisheries habitat was mapped on this parcel.

5.3.3.6 Riparian Habitats

A total of 0.67 acre of riparian habitat was mapped on the Frost parcel. This area was classified as Oregon ash riparian woodland.

5.3.3.7 State-Listed Plants

Special status–plant surveys were performed on the Frost parcel in April 2008, April 2009, and March 2010. These surveys identified Baker's meadowfoam and North Coast semaphore grass throughout the parcel, but primarily in association with the wet meadow and a swale. During the April 2008 and April 2009 surveys, a total of 2.06 acres of Baker's meadowfoam was mapped in the swales and wet-meadow areas of the parcel. In March 2010, a total of 0.02 acre of North Coast semaphore grass was mapped near the southeast corner of the parcel.

5.3.4 Goss (APN 103-230-02)

The 10-acre Goss parcel is at the southeast end of Little Lake Valley between the Arkelian parcel and MGC Plasma north parcel. The Goss parcel appears to be used for light grazing, and evidence of hay production (mowing) was observed during the wetland delineation field surveys. There is no evidence to suggest that the parcel currently is irrigated or that it has been irrigated in the past. The parcel contains numerous drainage ditches that appear to drain water away from the parcel.

5.3.4.1 Historical and Existing Vegetation

The Goss parcel likely was vegetated historically with a greater density of riparian woodland and an herbaceous wetland understory. A 1956 aerial photograph (Cartwright Aerial Surveys 1956) shows the Goss parcel vegetated with patches of woodland and open grassland/meadow, similar to the way it appears today.

Vegetation communities on the Goss parcel include swale, wet meadow, riparian woodland, and upland grassland. Pennyroyal, tufted hair grass, sedges, Harding grass, mountain mint, North Coast semaphore grass, coyote thistle, meadow barley, navarretia, and white brodiaea dominate the swale areas. Tall fescue, perennial ryegrass, vulpia, pennyroyal, spreading rush, Baltic rush, and western buttercup dominate wet meadows on the Goss parcel. A small amount of Baker’s meadowfoam was identified in these areas. Oregon ash and valley oak dominate the riparian woodland overstory, and Himalayan blackberry, California blackberry, rushes, curly dock, buttercup, velvet grass, North Coast semaphore grass, and poison-oak dominate the understory. Hedgehog dogtail grass, orchard grass, and vetch dominate upland grassland in the northeast corner of the parcel (California Department of Transportation 2009a; U.S. Army Corps of Engineers 2011).

5.3.4.2 Historical and Existing Hydrology/Topography

Analysis of the Willits USGS 7.5-minute quadrangle map (U.S. Geological Survey 1991) indicates that an unnamed intermittent tributary of Davis Creek historically traversed the parcel from southeast to northwest and continued onto the adjacent parcel to the west (the Arkelian parcel). This former channel is no longer distinguishable on the Goss parcel; a stand of mature riparian woodland indicates the general area of the former channel. The Goss parcel appears to be influenced by a seasonal high water table, which could be related to the movement of subsurface flows along the historical intermittent stream course on this parcel.

Hydrology on the Goss parcel currently is influenced by a series of artificial drainages apparently intended to drain surface water away from the center of the parcel to enable hay production. These drainages form the western, southern, and eastern boundaries of the parcel, generally directing surface-water flows from south to northwest. An additional artificial swale bisects the parcel, draining surface water from southeast to northwest, and includes a corrugated metal culvert that allows equipment to access the south end of the parcel for mowing. It appears that excavation of this feature has allowed the northeast corner of the Goss parcel to develop into or to remain as upland.

During field work in May 2010 for an erosion site assessment of the offsite mitigation parcels (California Department of Transportation 2010), one erosion site was identified on the Goss parcel (Appendix H). The erosion site is an upland headcut at the confluence of the east-to west-swale with the main drainage ditch on the western end of the parcel (Figure 3-1 in Appendix H). The areas of and adjacent to the headcut are well-vegetated valley oak riparian woodland with sandy loam soils (*Gielow sandy loam, 0–5% slopes*; see Section 5.3.6.3). The headcut appears relatively stable because it has a very small drop, and average width and length (0.7, 3.0, and 7.0 ft, respectively); no excessive sedimentation was observed on the parcel. Water quality monitoring data will be collected for several parameters, including parameters related to sediment levels. If the data show that increased sedimentation is occurring in the vicinity of the offsite mitigation properties, this erosion feature will be inspected to determine whether the headcut is becoming unstable and contributing excessive sediment to the parcel and valley streams (Chapter 11).

5.3.4.3 Soils/Substrates

The *Mendocino County, Eastern Part and Southwestern Part of Trinity County Soil Survey* (Natural Resources Conservation Service 2009) depicts the Goss parcel having the following soil map units.

- **Clear Lake clay, 0–2% slopes:** Very deep, poorly drained soils that typically occur in basins and in swales of drainageways. The soils are derived from fine-textured alluvium from sandstone and shale. Surface and subsurface horizon textures consist of silty clay or clay.
- **Gielow sandy loam, 0–5% slopes:** Deep, somewhat poorly drained soils that typically occur on alluvial plains and fans. This soil formed from alluvium from sedimentary rocks. Surface horizon textures consist of sandy loam. Subsurface horizon textures consist of stratified loam, fine sandy loam, sandy loam, or sandy clay loam.

Soil data were collected on the Goss parcel during wetland delineation efforts and the USACE January 2011 study (California Department of Transportation 2009a; U.S. Army Corps of Engineers 2011). Surface soil textures ranged from loam to clay loam to loamy clay. Hydric soil indicators were observed during the wetland delineation and the USACE January 2011 study (California Department of Transportation 2009a; U.S. Army Corps of Engineers 2011). None of the soil profiles contains a claypan or a duripan.

5.3.4.4 Jurisdictional Wetlands and Other Waters of the United States

According to a wetland delineation, the Goss parcel has 8.45 acres of jurisdictional wetlands. Wetland types mapped on the Goss parcel include swale, wet meadow, and riparian woodland wetland.

There is a total of 0.35 acre of swales on the Goss parcel. These swales form the western, southern, and eastern boundaries of the Goss parcel, generally directing surface water flows from south to northwest. An additional artificial drainage bisects the parcel, draining surface water from southeast to northwest. Dominant vegetation in these swales consists of pennyroyal, tufted hairgrass, sedges, Harding grass, mountain mint, North Coast semaphore grass, coyote thistle, meadow barley, navarretia, and white brodiaea.

There is a total of 5.40 acres of wet meadow on the Goss parcel. Wet meadow vegetation dominates the southern one third of the parcel and the area immediately north of the riparian woodland wetland. Dominant vegetation in the wet meadows consists of tall fescue, perennial ryegrass, spreading rush, Baltic rush, and western buttercup.

There are a total of 2.69 acres of riparian woodland wetland in the middle of the Goss parcel. Dominant vegetation consists of valley oak and Oregon ash in the overstory and Himalayan blackberry, California blackberry, and poison-oak in the understory.

During USACE studies in January 2011, the following hydrologic indicators were observed: surface water and saturation. USACE further defined the hydrology on the parcel as having very long–duration subsurface saturation and surface water in depressions (U.S. Army Corps of Engineers 2011).

5.3.4.5 Protected Fisheries

There is no protected fisheries habitat on the Goss parcel.

5.3.4.6 Riparian Habitats

A total of 3.19 acres of riparian habitat was mapped on the parcel. This riparian habitat is an extension of the riparian habitat on the Arkelian property to the west and beyond. Although there is no stream channel on the Goss parcel, this vegetation is contiguous with the riparian corridor along the channel northwest of the parcel. This riparian vegetation was classified as valley oak riparian woodland.

5.3.4.7 State-Listed Plants

Special status–plant surveys were performed on the Goss parcel in April 2009 and March 2010. The April 2009 surveys identified 0.004 acre of Baker's meadowfoam, and the March 2010 surveys identified 4.32 acres of North Coast semaphore grass. Baker's meadowfoam and North Coast semaphore grass were mapped in the wet meadows and woodlands on the parcel.

5.3.5 Lusher (APN 108-030-04)

The 66-acre Lusher parcel is along the western edge of Little Lake Valley just east of US 101. The Lusher property currently is used for grazing horses and cattle and shows signs of heavy grazing. There is no evidence to suggest that the Lusher parcel currently is irrigated or that it has been irrigated in the past. No evidence of cultivation or mowing in the grazed area was observed during the wetland delineation (California Department of Transportation 2009a). A railroad line is located on the west side of the property adjacent to Mill Creek.

5.3.5.1 Historical and Existing Vegetation

Aerial photographs from 1952, 1978, 1988, and 2005 depict the Lusher parcel largely as it appears today, except for a decrease in the extent of woodlands since 1952 (Wildlands 2008; Google, Inc. 2009).

Lusher parcel 038-060-08 consists mostly of upland grassland dominated by medusa-head grass, vulpia, soft chess, white clover, and perennial ryegrass. Wet meadow vegetation, including tall fescue, Harding grass, reed canary grass, meadow foxtail, spreading rush, camas, buttercup, and perennial ryegrass, dominates the remainder of parcel 038-060-09 and most of parcel 108-030-03. Pennyroyal, broadleaf water-plantain, and semaphore grass (not identified to species) dominate swale features and depressions subject to longer inundation. An open stand of mature valley oaks and Oregon ash occupies the center of parcel 108-030-03. A large coast redwood is among this stand of trees. Riparian woodlands along the northern boundary of the western parcels and along the eastern boundary of parcel 108-030-03 comprise the following vegetation communities: Oregon ash riparian woodland, valley oak riparian woodland, and willow riparian scrub (California Department of Transportation 2009a; U.S. Army Corps of Engineers 2011).

Riparian woodland and upland grassland, along with a few areas of wet meadow, dominate the Lusher parcel. Willows, cottonwoods, valley oak, and Oregon ash dominate the overstory of the areas of mixed riparian woodland, and Himalayan blackberry and poison-oak dominate the understory (California Department of Transportation 2009a; U.S. Army Corps of Engineers 2011). Upland grassland is dominated by medusa-head grass, vulpia, soft chess, white clover, and perennial ryegrass. Wet meadow vegetation includes tall fescue, Harding grass, reed canary grass, camas, buttercup, and perennial ryegrass. Pennyroyal, broadleaf water-plantain, and semaphore grass (not identified to species) dominate swale features and depressions subject to longer inundation.

5.3.5.2 Historical and Existing Hydrology/Topography

Soil survey information from 1920 (Dean 1920) indicates that a lake historically formed at the northern end of Little Lake Valley during the rainy season, even during very low rainfall years. At the end of a series of heavy rainfall events in February 1915, the lake encompassed 1,875 acres and was 12 ft deep over a 300-acre area. At that time, the high water mark of the lake was at the 1,330-ft contour, which roughly corresponds to the north-south midsection of the Lusher parcel. A review of a 1942 15-minute series USGS topographic map (included in Wildlands 2008) shows two intermittent streams and two perennial streams flowing onto the Lusher parcel. Two perennial streams flowed into the Lusher parcel from the southeast and converged shortly thereafter; these appear to be Outlet and Mill Creeks. The other intermittent stream flowed to the northeast of Outlet Creek and continued northwest to its confluence with Outlet Creek on the Ford parcel.

The Lusher parcel is drained by Outlet Creek, Old Outlet Creek, and Mill Creek. As described above, Outlet and Mill Creeks historically flowed onto the Lusher property to the south and merged in the southern half of the parcel. The location of this former confluence is evidenced by the presence of remnant riparian vegetation. Mill Creek since has been realigned and now flows west along the southern boundary of the parcel, crossing onto parcel 108-030-03 as described above. The Outlet Creek channel since has been split into two channels, now called Old Outlet Creek and Outlet Creek. Old Outlet Creek flows in the historical channel, and Outlet Creek flows in an artificial channel that flows north along the boundary of the Lusher and Ford parcels.

During fieldwork in May 2010 for an erosion site assessment of the offsite mitigation properties (California Department of Transportation 2010), one depressional wetland erosion site and two upland headcut sites were identified on the Lusher parcel (Figure 3-1 in Appendix H). The depressional wetland site is in a swale and has slumping banks; however, it does not have an associated headcut and now is undergoing headward migration in either direction, and thus it appears to be stable. This erosion site is in a well-vegetated Oregon ash riparian woodland with sandy loam soils (*Gielow sandy loam 0–5% slopes*; see Section 5.3.8.3), and adjacent areas are vegetated with wet meadow with similar soils. The upland headcuts are on a small swale to Old Outlet Creek and are well-vegetated with mixed riparian woodland with Fluvaquent soils (*Fluvaquents, 0–1% slopes*; see Section 5.3.8.3) with adjacent areas vegetated with a mixture of oak woodland grassland, Oregon ash riparian woodland, mixed riparian woodland, and wet meadow with similar soils (Figure 4-3 in Appendix H). The upland headcut sites appear unstable, with a high potential for sediment to enter Old Outlet Creek. These two headcuts will be rehabilitated as part of wetland rehabilitation actions (Chapter 7, Sections 7.3.1.18, 7.3.1.19, and 7.3.1.20) to reduce the potential for sedimentation to Old Outlet Creek. See Appendix H for rehabilitation concepts for these headcuts. Water quality monitoring data will be collected for several parameters, including parameters related to sediment levels. If the data show that increased sedimentation is occurring in the vicinity of the offsite mitigation properties, these erosion features will be inspected to determine whether they are becoming unstable again and contributing excessive sediment to the parcel and valley streams (Chapter 11).

During USACE studies in January 2011, the following hydrologic indicators were observed: surface water, high water table, saturation, algal matting, and sediment and drift deposits. USACE further defined the hydrology on the Lusher parcel as having very long–duration subsurface saturation, areas of long-duration ponding in depressions, and areas of surface water in swales and depressions, and the parcel is subject to occasional flooding.

5.3.5.3 Soils/Substrates

The *Mendocino County, Eastern Part and Southwestern Part of Trinity County Soil Survey* (Natural Resources Conservation Service 2009) depicts the Lusher parcel as having the following soil map units.

- **Fluvaquents, 0–1% slopes:** These soils are formed from alluvium weathered from sedimentary rock and are found on floodplains. They are characterized by very little to no horizon development and the presence of aquic conditions within 20 inches of the soil surface at some time during normal years, and are formed in fluvial environments. Typical surface horizons consist of gravelly sandy loam, while subsurface horizon textures may vary.

- **Cole clay loam, 0–2% slopes:** Very deep, somewhat poorly drained soils that typically occur on river terraces, basins, and floodplains or on alluvial fans. This soil is formed from alluvium from mixed sources. Surface horizon textures consist of loam, clay loam, silt loam, or silty clay loam. Subsurface horizon textures consist of silty clay loam, clay loam, silty clay, or clay.

- **Gielow sandy loam, 0–5% slopes:** Deep, somewhat poorly drained soils that typically occur on alluvial plains and fans. This soil is formed from alluvium from sedimentary rocks. Surface horizon textures consist of sandy loam or loam. Subsurface horizon textures consist of stratified loam, fine sandy loam, sandy loam, or sandy clay loam.

Soil data were collected on the Lusher parcel during wetland delineation efforts and the USACE January 2011 study (California Department of Transportation 2009a; U.S. Army Corps of Engineers 2011). Observed surface soil textures range from gravelly sandy loam to clay loam. Hydric soil indicators were observed during the wetland delineation and the USACE January 2011 study on the Lusher parcel (California Department of Transportation 2009a; U.S. Army Corps of Engineers 2011). None of the soil profiles contains a claypan or a duripan. Subsequent soil surveys were performed in support of the Group 2 wetland design. The survey results are presented in Appendix J.

5.3.5.4 Jurisdictional Wetlands and Other Waters of the United States

According to the wetland delineation on the Lusher parcel, there are 36.06 acres of jurisdictional wetlands and 2.02 acres of other waters. Wetland types mapped on these parcels include wet meadow and riparian woodland wetland. The other waters mapped on the Lusher parcel include three intermittent streams: Mill Creek, Old Outlet Creek, and Outlet Creek.

Dominant vegetation in the wet meadows consisted of tall fescue, Harding grass, meadow foxtail, spreading rush, camas, and perennial ryegrass. Riparian woodland wetland and riparian scrub wetland vegetation types consisted of Oregon ash riparian woodland, valley oak riparian woodland, willow scrub riparian, and mixed riparian woodland.

A total of 2.02 acres of other waters was mapped on the Lusher parcel. Other waters mapped on the Lusher parcel comprise three intermittent streams: Mill, Old Outlet, and Outlet Creeks. These creeks have low-gradient channels with a mix of silt, sand, and gravel substrates. All these channels have been modified at some time to facilitate the drainage of the adjoining properties for agricultural uses. Old Outlet and Outlet Creeks have well-developed mature riparian vegetation along their banks. During USACE studies in January 2011, the following hydrologic indicators were observed: surface water, high water table, saturation, algal matting, and sediment and drift deposits. USACE further defined the hydrology on the Lusher parcel as having very long–duration subsurface saturation, areas of long-duration ponding in depressions, and areas of surface water in swales and depressions, and the parcel is subject to occasional flooding.

5.3.5.5 Protected Fisheries

There is a total of 11.76 acres of riparian habitat associated with protected fisheries on the Lusher parcel. The riparian corridors occur in association with Mill Creek, Old Outlet Creek, and Outlet Creek.

5.3.5.6 Riparian Habitats

A total of 12.15 acres of riparian habitat was mapped on the Lusher parcel. These areas are associated with Mill Creek, Outlet Creek, and Old Outlet Creek and also occur along fence rows and in isolated clusters in areas of wet meadow. These areas are vegetated with mixed riparian woodland, valley oak riparian woodland, and Oregon ash riparian woodland.

5.3.5.7 Listed Plants

Special status–plant surveys were performed on the western Lusher parcel in March 2010. Baker's meadowfoam was not observed on the parcel.

A new occurrence of North Coast semaphore grass was observed during the March 2010 surveys. The occurrence was mapped in the southeast corner of the parcel near the junction of Outlet Creek and Old Outlet Creek, and comprised approximately 9,437 individuals within an area of 0.59 acre.

5.3.6 MGC Plasma North and Middle (APNs 103-230-06 and 103-250-14)

The MGC Plasma parcels are at the southeast end of Little Lake Valley and total 45 acres. The north and middle MGC Plasma parcels 103-230-06 (18 acres) and 103-250-14 (27 acres), respectively, are contiguous. A review of recent aerial photographs and recent site visits indicates that both parcels currently are hayed; MGC Plasma middle also is used for light cattle and/or horse grazing and MGC Plasma north for cattle grazing .

5.3.6.1 Historical and Existing Vegetation

A 1956 aerial photograph shows the MGC Plasma parcels were in use for crop production at that time (Cartwright Aerial Surveys 1956); conditions at that time were much as they are today—mostly supporting herbaceous vegetation with a few scattered trees. Upland grassland is the dominant vegetation community on the MGC Plasma parcels. Vegetation in these areas is dominated by an introduced mix of grasses and includes four solitary valley oaks and a black oak. Dominant vegetation in these grasslands includes Mediterranean barley, Harding grass, clovers, perennial ryegrass, cranesbill, and rough cat's-ear. There are areas of wet meadow and swales throughout these parcels. Dominant vegetation in these areas consists of California oatgrass, pennyroyal, meadowfoam, downingia, tufted hairgrass, coyote thistle, dense sedge, and spreading rush (California Department of Transportation 2009a; U.S. Army Corps of Engineers 2011).

5.3.6.2 Historical and Existing Hydrology/Topography

Based on evidence observed in the field, it is presumed that a stream at one time flowed through the MGC Plasma parcels. This evidence includes the remnants of a channel and riparian vegetation on the Goss (103-230-02) and Arkelian (103-230-04) parcels west of the MGC parcels. Based on the direction of this remnant channel on those parcels, the historical channel likely passed through the two MGC Plasma parcels from southeast to northwest. A 1956 aerial photograph (Cartwright Aerial Surveys 1956) shows the MGC Plasma parcels having the same topography as they do today.

Hydrology on the MGC Plasma parcels appears to be dominated by the presence of a seasonal high water table, and pooling and surface flows in swales along the perimeter of the parcels.

During fieldwork in May 2010 for an erosion site assessment of the offsite mitigation properties (California Department of Transportation 2010), one instream headcut was identified on the MGC Plasma north parcel (Figure 3-1 in Appendix H). The instream headcut is in a swale/drainage ditch on the western end of the parcel. The areas of and adjacent to the erosion site are well-vegetated wet meadow with clay soils (*Clear Lake clay*, *0–2% slopes*; see Section 5.3.9.3). This instream headcut appears relatively stable and does not appear to pose a threat to nearby streams because it has a very small drop (0.9 foot), and any associated sediment derived from this headcut is minimal and gets spread out and deposited in the local wetland complex to the north. Water quality monitoring data will be collected for several parameters, including parameters related to sediment levels. If the data show that increased sedimentation is occurring in the vicinity of the offsite mitigation properties, this erosion feature will be inspected to determine whether the headcut is becoming unstable and contributing excessive sediment to the parcel and valley streams (Chapter 11).

5.3.6.3 Soils/Substrates

The *Mendocino County, Eastern Part and Southwestern Part of Trinity County Soil Survey* (Natural Resources Conservation Service 2009) depicts the MGC Plasma parcels with the following soil map units.

- **Cole clay loam, 0–2% slopes:** Very deep, somewhat poorly drained soil on alluvial plains and in basins that formed in recent alluvium derived primarily from sedimentary rock. This soil is formed from alluvium from mixed sources. Surface horizon textures consist of loam, clay loam, silt loam, or silty clay loam with a representative clay content of 30%. Subsurface horizon textures consist of silty clay loam, clay loam, and silty clay.
- **Clear Lake clay, 0–2% slopes:** Very deep, poorly drained soils that typically occur in basins and in swales of drainageways. The soils are derived from fine textured alluvium from sandstone and shale. Surface and subsurface horizon textures consist of silty clay or clay.
- **Gielow sandy loam, 0–5% slopes:** Deep, somewhat poorly drained soils that typically occur on alluvial plains and fans. This soil is formed from alluvium from sedimentary rocks. Surface horizon textures consist of sandy loam. Subsurface horizon textures consist of stratified loam, fine sandy loam, sandy loam, or sandy clay loam.

Soil data were collected on the MGC Plasma parcels during wetland delineation efforts and the USACE January 2011 study (California Department of Transportation 2009a; U.S. Army Corps of Engineers 2011). Surface soil textures ranged from sandy to clay loams. Hydric soil indicators were observed throughout the low-lying areas of these parcels (California Department of Transportation 2009a; U.S. Army Corps of Engineers 2011).

5.3.6.4 Jurisdictional Wetlands and Other Waters of the United States

According to the wetland delineation on the MGC Plasma parcels, there are 6.55 acres of jurisdictional wetlands. Wetland types mapped on these parcels include swale and wet meadow. No other waters of the United States were mapped on these parcels.

A total of 0.57 acre of swale was mapped on MGC Plasma parcels 103-230-06 (0.40 acre) and 103-250-14 (0.16 acre). Most of these features appear to be largely artificial to facilitate drainage on these parcels. Dominant vegetation in these areas consists of California oatgrass, downingia, tufted hairgrass, coyote thistle, dense sedge, and spreading rush.

A total of 5.991 acres of wet meadow were mapped on MGC Plasma parcels 103-230-06 (3.64 acres) and 103-250-14 (2.35 acres). Dominant vegetation in the meadows consisted of vegetation similar to that of the aforementioned swales.

During USACE studies in January 2011, the following hydrologic indicators were observed: surface water, high water table, and saturation. USACE further defined the hydrology on the MGC parcels as having long- to very long–duration subsurface saturation, shallow surface ponding in depressions, and sheet flow across the wetland from a hillside seep and into a broad wetland swale on MGC Plasma middle, and there is sheet flow across MGC Plasma north that collects into shallow drainage ditches that flow onto the Goss property.

5.3.6.5 Protected Fisheries

There are no protected fisheries on the MGC Plasma parcels.

5.3.6.6 Riparian Habitats

There is a small area of riparian woodland on MGC Plasma parcel 103-230-06 (0.08 acre) that extends from the Goss parcel (103-230-02) to the west. This riparian habitat was classified as valley oak riparian woodland.

5.3.6.7 Listed Plants

Special status–plant surveys were performed on the MGC Plasma parcels in April 2009 and March 2010. These surveys identified Baker’s meadowfoam and North Coast semaphore grass on the MGC Plasma north parcel (103-230-06). Baker’s meadowfoam encompassed a total of 0.10 acre and North Coast semaphore grass encompassed a total area of 0.04 acre. The area occupied by North Coast semaphore grass is composed of two stands. Although these two stands appear to occur on the Goss parcel according to electronic parcel data, field observations made during the March 2010 surveys determined that these two stands were on the MGC Plasma north parcel.

5.3.7 Nance (APN 108-050-06)

The 74-acre Nance parcel (108-050-06) is in the northeastern portion of Little Lake Valley. It extends west from near Reynolds Highway to Ford parcel 108-010-05. The Nance parcel currently is used for grazing cattle. There is no evidence to suggest that the parcel is irrigated.

5.3.7.1 Historical and Existing Vegetation

Historical aerial photographs from 1952, 1978, and 1988 show linear patterns in the areas west of Berry Creek, indicating that the Nance parcel once was used for farming (Wildlands 2008; Cartwright Aerial Surveys 1956). The channelized portion of Berry Creek that passes through the parcel from south to north was not vegetated in these historical photos. A wetted area east of Berry Creek, which is assumed to support marsh vegetation, is visible in all these aerial photographs. Sparse trees are visible along fence rows to the north of the parcel and along one fence row crossing the western half of the parcel from south to north.

The Nance parcel currently is vegetated predominantly with wet meadow, with areas of riparian woodland along the fence rows and Berry Creek and a large area of mixed marsh east of Berry Creek. There is a small area of upland grassland east of the marsh. Sedges, rushes, pennyroyal, lythrum, tall fescue, meadow foxtail, fowl bluegrass, rough bluegrass, camas, straight-beaked buttercup, alisma-leafed buttercup, Davy’s semaphore grass, and Baker’s meadowfoam dominate the wet-meadow areas. Broadleaf cattail and broadleaf water-plantain dominate the mixed marsh community. Oregon ash, arroyo willow, and Himalayan blackberry dominate the riparian woodlands (California Department of Transportation 2009a; U.S. Army Corps of Engineers 2011).

5.3.7.2 Historical and Existing Hydrology/Topography

A 1942 USGS 15-minute series topographic map (included in Wildlands 2008) depicts an intermittent stream passing through the Nance parcel from southeast to northwest in the location of the current marsh. A 1956 aerial photograph does not depict a stream channel in this location but does show several small drainages/swales feeding into the marsh (Cartwright Aerial Surveys 1956). The channelized portion of Berry Creek is visible in this photograph flowing across the parcel from south to north.

Berry Creek enters the parcel from the south and bisects the parcel. During prolonged periods of inundation, Berry Creek overflows its banks onto the parcel. Water also enters the parcel from the northwest corner as the waters of Outlet, Berry, and Davis Creeks join and backfill onto the parcel during prolonged periods of inundation throughout the rainy season. During the wetland delineations in January 2007, no indication of the stream depicted in the 1942 USGS topographic map (included in Wildlands 2008) was observed on the Nance parcel or to the north or south of the parcel. Overbanking of Berry Creek likely has filled in the stream channel in this area to create the marsh described in Section 5.3.10.1.

5.3.7.3 Soil/Substrates

The *Mendocino County, Eastern Part and Southwestern Part of Trinity County Soil Survey* (Natural Resources Conservation Service 2009) depicts the Nance parcel as having the following soil map units.

- **Cole clay loam, 0–2% slopes:** Very deep, somewhat poorly drained soils that typically occur on river terraces, basins, and floodplains or on alluvial fans. This soil is formed from alluvium from mixed sources. Surface horizon textures consist of loam, clay loam, silt loam, or silty clay loam. Subsurface horizon textures consist of silty clay loam, clay loam, silty clay, or clay.
- **Haplaquepts, 0–1% slopes:** Poorly drained soil formed from alluvium derived from sedimentary rock. These soils consist of clay loam underlain by gravelly clay loam. They have minimal horizon development and evidence of aquic conditions within 24 inches of the soil surface. Depth to a restrictive feature is more than 80 inches.

Soil data were collected on the Nance parcel during wetland delineation efforts and the USACE January 2011 study (California Department of Transportation 2009a; U.S. Army Corps of Engineers 2011). Surface soil textures observed ranged from sandy clay loam to clay loam and gravelly clay loam. Hydric soil indicators were found in these soils during the wetland delineation for the parcel and during the USACE January 2011 study (California Department of Transportation 2009a; U.S. Army Corps of Engineers 2011).

5.3.7.4 Jurisdictional Wetlands and Other Waters of the United States

According to the wetland delineation on the Nance parcel, 72.50 acres of jurisdictional wetlands and 0.20 acre of other waters occur there. Wetland types mapped include wet meadow and mixed marsh.

A total of 61.56 acres of wet meadow was mapped on the Nance parcel. The wet meadow areas appear to flood and saturate during the wet season as streams overflow and groundwater levels rise. Dominant vegetation in these areas consists of meadow foxtail, fowl bluegrass, rough bluegrass, camas, straight beaked buttercup, alisma-leafed buttercup, Davy’s semaphore grass, and Baker’s meadowfoam.

A total of 10.93 acres of mixed marsh was mapped on the Nance parcel. This area appears to flood during the wet season as areas to the east and south drain onto the parcel. Dominant vegetation in this area consists of broadleaf cattail and broadleaf water-plantain.

A total of 0.20 acre of other waters was mapped on the Nance parcel. This acreage is entirely attributable to Berry Creek, which flows through an artificial channel across the parcel from south to north.

During USACE studies in January 2011, the following hydrologic indicators were observed: surface water, high water table, and saturation. In the areas of wet meadow, USACE further defined the hydrology as having very long–duration surface ponding and subsurface saturation, sheet flow over the surface, and occasional flooding. In the areas of marsh, the Corp defined the hydrology as having very long–duration to perennial ponding, which includes portions of the seasonal lake; very long–duration to perennial subsurface saturation; and storage of upslope onflow and surface sheet flow from along the seepage zone.

5.3.7.5 Protected Fisheries

A total of 0.54 acre of riparian habitat associated with protected fisheries was mapped on the Nance parcel. This riparian corridor is associated with Berry Creek, which has been typed as Oregon ash riparian woodland.

5.3.7.6 Riparian Habitats

There is a total of 0.88 acre of riparian habitat along a north-south fence line in the western half of the parcel. This vegetation community was classified as Oregon ash riparian woodland.

5.3.7.7 Listed Plants

Special status–plant surveys were conducted on the Nance parcel in April 2007. These surveys identified Baker's meadowfoam occurring throughout the wet meadow areas of the parcel. Areas of potential Baker's meadowfoam habitat also were mapped on the Nance parcel.

A total of 73.90 acres of Baker's meadowfoam habitat (observed and potential) was identified on the Nance parcel: 27.43 acres of observed Baker's meadowfoam and 46.47 acres of potential Baker's meadowfoam habitat.

5.3.8 Niesen (APN 108-040-02)

The 27-acre Niesen parcel (108-040-02) is on the western side of Little Lake Valley immediately east of US 101 and west of the railroad. The Niesen parcel appears to be used for grazing horses and cattle; the intensity of the grazing appears to be moderate to light. There is no evidence to suggest that the parcel currently is irrigated. No evidence of cultivation or mowing in the grazed area was observed during the wetland delineation field survey. A residence and other structures are present along the western boundary of the Niesen parcel, accessible from US 101. Poorly defined dirt roads provide access to parts of the parcel.

5.3.8.1 Historical and Existing Vegetation

Historical aerial photographs from 1952, 1978, and 1988 show the Niesen parcel roughly similar to current conditions (Wildlands 2008). A 1956 aerial photograph (Cartwright Aerial Surveys 1956) shows linear patterns running generally north-south, suggesting that the site might have been leveled and bermed to facilitate hay production or pasture grazing. The 1956 aerial photograph depicts the fence row along the southern boundary less vegetated with trees than it is today. The remainder of the site appears to support meadow vegetation.

Wet meadow vegetation, including tall fescue, dense sedge, spreading rush, pennyroyal, lythrum, clover, reed canary grass, birdfoot trefoil, western buttercup, Mediterranean barley, meadow barley, meadow foxtail, and clustered dock, dominates the Niesen parcel. Pennyroyal mint and semaphore grass (not identified to species) dominate depressional features subject to longer inundation (California Department of Transportation 2009a; U.S. Army Corps of Engineers 2011).

Oregon ash and valley oak dominate the riparian woodland along the southern fence boundary.

5.3.8.2 Historic and Existing Hydrology/Topography

According to a 1956 (Cartwright Aerial Surveys 1956) aerial photograph, the topography, and presumably the hydrology, on the Niesen parcel appears to have been altered some time during or just before 1956 for the production of hay or irrigated pasture, as evidenced by linear patterns that appear to be berms.

Hydrology on the Niesen parcel appears dominated by the presence of a seasonal high water table. Depressions are subject to ponding. In addition, the Niesen parcel is bounded on the east by the fill embankment of the railroad line. A linear drainage ditch flows from south to north along the western toe of the fill embankment but is outside the Niesen parcel boundary.

5.3.8.3 Soils/Substrates

The *Mendocino County, Eastern Part and Southwestern Part of Trinity County Soil Survey* (Natural Resources Conservation Service 2009) depicts the Niesen parcel as having the following soil map units.

- **Cole clay loam, 0–2% slopes:** Very deep, somewhat poorly drained soil on alluvial plains and in basins that formed in recent alluvium derived primarily from sedimentary rock. This soil is formed from alluvium from mixed sources. Surface horizon textures consist of loam, clay loam, silt loam, or silty clay loam with a representative clay content of 30%. Subsurface horizon textures consist of silty clay loam, clay loam, and silty clay.
- **Gielow sandy loam, 0–5% slopes:** Deep, somewhat poorly drained soils that typically occur on alluvial plains and fans. This soil is formed from alluvium from sedimentary rocks. Surface horizon textures consist of sandy loam or loam. Subsurface horizon textures consist of stratified loam, fine sandy loam, sandy loam, or sandy clay loam.
- **Fluvaquents, 0–1% slopes:** These soils are formed from alluvium weathered from sedimentary rock and are found on floodplains. They are characterized by very little to no horizon development and the presence of aquic conditions within 20 inches of the soil surface at some time during normal years, and are formed in fluvial environments. Typical surface horizons consist of gravelly sandy loam, while subsurface horizon textures can vary.

Soil data were collected on the Niesen parcel during wetland delineation efforts and the USACE January 2011 study (California Department of Transportation 2009a; U.S. Army Corps of Engineers 2011). Observed surface soil textures were clay loams. Hydric soil indicators were observed in the wet-meadow areas during the delineation and during the USACE January 2011 study (California Department of Transportation 2009a; U.S. Army Corps of Engineers 2011). None of the soil profiles contains a claypan or a duripan.

5.3.8.4 Jurisdictional Wetlands and Other Waters of the United States

According to a wetland delineation on the Niesen parcel, 19.26 acres of jurisdictional wetlands occur there. Wetland types include wet meadow and riparian woodland wetland.

A total of 18.80 acres of wet meadow was mapped on the Niesen parcel. Wet meadow occurs throughout most of the parcel. Dominant vegetation in the wet meadows includes tall fescue, dense sedge, spreading rush, western buttercup, Mediterranean barley, meadow barley, meadow foxtail, and clustered dock. Pennyroyal mint and semaphore grass (not identified to species) dominate depressional features subject to longer inundation.

A total of 0.46 acre of riparian woodland wetland was mapped along the northern and southern boundaries of the Niesen parcel. The riparian woodland wetlands were classified as Oregon ash riparian woodland and were dominated by Oregon ash and valley oak.

During USACE studies in January 2011, the following hydrologic indicators were observed: surface water, high water table, and saturation. USACE further defined the hydrology on the parcel as having very long–duration subsurface saturation, standing water in depressions and swales, and sheet flow.

5.3.8.5 Protected Fisheries

A total of 0.09 acre of riparian habitat associated with protected fisheries was mapped on the Niesen parcel. This riparian corridor is associated with Mill Creek, which has been typed as Oregon ash riparian woodland.

5.3.8.6 Riparian Habitats

A total of 0.05 acre of riparian woodlands was mapped on the Niesen parcel. These riparian woodlands were typed as valley oak riparian woodland.

5.3.8.7 Listed Plants

Special status–plant surveys were conducted on the Niesen property, and observed and potential habitat for Baker’s meadowfoam was identified.

A total of 21.19 acres of Baker’s meadowfoam habitat (observed and potential) was identified on the Niesen parcel: 2.15 acres of observed Baker’s meadowfoam and 19.04 acres of potential habitat.

5.3.9 Watson (APN 037-221-30 and 037-250-05)

The Watson property comprises two adjoining parcels. The approximately 51-acre western parcel (037-250-05) is on the west side of Little Lake Valley adjacent to US 101, and the approximately 116-acre eastern parcel (037-221-30) is on the eastern edge of Little Lake Valley just west of Reynolds Highway. Both parcels currently are used for cattle grazing and hay production; however, they do not appear to be actively irrigated for those purposes. The eastern parcel contains a residence and associated outbuildings along Reynolds Highway near the center of the eastern parcel boundary.

5.3.9.1 Historical and Existing Vegetation

Historical information about the Watson parcels was obtained from a historical aerial photograph taken in 1956 (Cartwright Aerial Surveys 1956). The primary land use at that time appeared to be cattle grazing. There appeared to be substantially fewer trees in 1956 than at present, and the density of trees associated with the drainage ditch that traverses the eastern parcel from north to south is noticeably less than in present-day photographs.

Existing vegetation on the Watson parcels consists of mixed marsh, wet meadow, riparian woodland, lowland oak woodland grassland, and valley oak woodland. The mixed marsh occurs on the west side of the eastern parcel and throughout the western parcel. American slough-grass, coyote thistle, and water-plantain dominate vegetation in the mixed marsh. Wet meadow occurs throughout the eastern half of the eastern parcel. Tall fescue, pennyroyal, spreading rush, brown headed rush, Mediterranean barley, clovers, and perennial ryegrass dominate the areas of wet meadow. Coyote thistle, sedge, spreading rush, and hedge nettle dominate low-lying areas of wet meadow subject to longer periods of inundation. The riparian woodland areas are associated with the unnamed drainage on the eastern parcel, along Outlet Creek on the western parcel, and near the center of the western parcel. The riparian woodlands are vegetated almost exclusively with Oregon ash. Soft chess, Harding grass, perennial ryegrass, chicory, field bindweed, and clovers dominate the lowland oak woodland grassland areas generally occurring along the eastern half of the eastern parcel. An area of valley oak woodland along the eastern boundary of the eastern parcel, just off Reynolds Highway, also contains several black oaks and a few fruit trees (California Department of Transportation 2009a; U.S. Army Corps of Engineers 2011).

5.3.9.2 Historical and Existing Hydrology/Topography

A 1942 USGS 15-minute series topographic map (included in Wildlands 2008) depicts an intermittent stream passing through the eastern parcel from east to west toward a large marsh west of the parcel. The 1956 aerial photograph depicts this channel dissipating on the eastern parcel just short of the drainage ditch that runs south to north on the eastern parcel (Cartwright Aerial Surveys 1956). The intermittent stream identified from historical topographic maps and aerial photographs still flows onto the eastern parcel and eventually dissipates before reaching the ditch that runs east to west along the parcel’s southern boundary.

The main hydrologic features on the eastern and western parcels are Berry Creek and Outlet Creek, respectively. Berry Creek dissipates into an alluvial fan at the southwest boundary of the eastern parcel. Flows from Berry Creek also are routed into a ditch where Berry Creek crosses near the northeastern portion of the western parcel. Outlet Creek flows from south to north near the western boundary of the western parcel. Two intermittent streams were mapped on the eastern half of the eastern Watson parcel. One of these streams drains onto the Watson parcel from the east and eventually dissipates into a wet meadow area. The other intermittent stream was mapped in the northeast corner of the parcel and flows from an area east of Reynolds Highway onto the eastern Watson parcel before dissipating into a wet meadow. A third intermittent stream enters the eastern Watson parcel from the north (draining the Taylor parcels) and runs south along the north-south ditch that is along the western boundary (and fence line) of the eastern parcel. Flow eventually dissipates into the wet meadow on the western Watson parcel. The western portion of the eastern parcel and the entire western parcel are subject to frequent and long-duration ponding, flooding, and/or a seasonally high water table during the winter months.

5.3.9.3 Soils/Substrates

The *Mendocino County, Eastern Part and Southwestern Part of Trinity County Soil Survey* (U.S. Department of Agriculture 2009) depicts the Watson parcels as having the following soil map units.

- **Cole clay loam, 0–2% slopes:** Very deep, somewhat poorly drained soil on alluvial plains and in basins that formed in recent alluvium derived primarily from sedimentary rock. This soil is formed from alluvium from mixed sources. Surface horizon textures consist of loam, clay loam, silt loam, or silty clay loam with a representative clay content of 30%. Subsurface horizon textures consist of silty clay loam, clay loam, and silty clay.
- **Fluvaquents, 0–1% slopes:** These soils are formed from alluvium weathered from sedimentary rock and are found on floodplains. They are characterized by very little to no horizon development and the presence of aquic conditions within 20 inches of the soil surface at some time during normal years, and are formed in fluvial environments. Typical surface horizons consist of gravelly sandy loam, while subsurface horizon textures may vary.
- **Pinole gravelly loam, 2–8% slopes:** Very deep, well-drained soils that typically occur on terraces formed from alluvium from sedimentary and other rock sources. Surface horizon (below 10 inches) consists of clay loam or sandy clay loam.
- **Feliz loam, 0–2% slopes:** Very deep, well-drained soils that typically occur on floodplains formed from alluvium from mixed sedimentary rocks. Surface horizon textures consist of loam. Subsurface horizon textures consist of clay loam.
- **Haplaquepts, 0–1% slopes:** Poorly drained soil formed from alluvium derived from sedimentary rock. These soils consist of clay loam underlain by gravelly clay loam. They have minimal horizon development and evidence of aquic conditions within 24 inches of the soil surface. Depth to a restrictive feature is more than 80 inches.
- **Feliz clay loam, gravelly substratum, 2–8% slopes:** Well-drained soils that typically occur on alluvial fans derived from sedimentary rock. Surface horizon textures consist of clay loam. Subsurface horizon textures consist of very gravelly clay loam.

Soil data were collected on the Watson parcels during wetland delineation efforts and the USACE January 2011 study (California Department of Transportation 2009a; U.S. Army Corps of Engineers 2011). Hydric soil indicators were found in these soils during the USACE January 2011 study (U.S. Army Corps of Engineers 2011).

5.3.9.4 Jurisdictional Wetlands and Other Waters of the United States

According to a wetland delineation on the Watson parcels, 130.40 acres of jurisdictional wetland and 0.45 acre of other waters occur there. Wetland types mapped include wet meadow, mixed marsh, and riparian woodland wetland.

A total of 42.56 acres of wet meadow was mapped on the eastern parcel. The wet meadow areas appear to flood and saturate during the wet season as streams overflow and groundwater levels rise. Dominant vegetation in these areas consists of tall fescue, pennyroyal, spreading rush, brown headed rush, Mediterranean barley, and perennial ryegrass. Coyote thistle, sedges, spreading rush, and hedge nettle dominate low-lying areas of wet meadow subject to longer periods of inundation. There are no wet meadows on the western parcel.

A total of 62.95 acres of mixed marsh was mapped on the Watson parcels (23.26 acres on the eastern parcel and 39.69 acres on the western parcel). The marsh areas are subject to frequent and long-duration ponding, flooding, or a seasonal high water table during the winter months. Dominant vegetation in these areas consists of American slough-grass, coyote thistle, and water-plantain.

A total of 24.70 acres of riparian woodland wetland was mapped on the Watson parcels (15.13 acres on the eastern parcel and 9.57 acres on the western parcel). These woodland areas are vegetated almost exclusively with Oregon ash. These areas occur in association with a drainage ditch that runs south to north through the eastern parcel, in an area northeast of the drainage ditch; in association with a ditch that runs east to west along the parcel's southern boundary; and in association with Outlet Creek on the western parcel.

A total of 0.45 acre of other waters was mapped on the Watson parcels (0.26 acre on the eastern parcel and 0.19 acre on the western parcel). Two intermittent streams were mapped on the eastern half of the eastern parcel. One of these streams drains onto the eastern parcel from the east and eventually dissipates into a wet-meadow area. The banks of this channel are vegetated with upland grasses. The other stream was mapped in the northeast corner of the eastern parcel. This channel flows from an area east of Reynolds Highway onto the eastern parcel and then dissipates into a wet meadow. Berry Creek and its two drainage ditches were not mapped as other waters of the United States but were captured as part of the riparian woodland wetlands discussed above. Outlet Creek was mapped as other waters of the United States on the western parcel.

During USACE studies in 2011, the following hydrologic indicators were observed: surface water, high water table, algal matting (in ponded areas), and saturation. In the areas of wet meadow/pasture, USACE further defined the hydrology as having very long–duration surface ponding in depressions and swales and very long–duration subsurface saturation. In the areas of wetland woodland, USACE further defined the hydrology as having very long–duration ponding and subsurface saturation, occasional deep flooding, and surface flow. In the areas of wetland used for both hay production and grazing along the lake bed, USACE defined the hydrology as having very long–duration surface ponding and subsurface saturation, and occasional deep flooding for long durations.

5.3.9.5 Protected Fisheries

A total of 11.40 acres of riparian habitat were mapped on the Watson parcels. This riparian habitat is associated with the two drainage ditches that drain Berry Creek on the eastern parcel and along Outlet Creek on the western Watson parcel. Berry Creek and Outlet Creek have been typed as Oregon ash riparian woodland.

5.3.9.6 Riparian Habitats

A total of 16.76 acres of riparian woodlands was mapped on the western and eastern Watson parcels. This habitat occurs in the woodlands that are contiguous with but outside the 100-ft buffer zone of riparian habitat around protected fisheries habitat. These riparian woodlands were classified as Oregon ash riparian woodlands and valley oak riparian woodland.

5.3.9.7 Listed Plants

There have been no formal special status–plant surveys for either of the Watson parcels; however, Baker’s meadowfoam was observed during surveys for the 2009 feasibility study (ICF Jones & Stokes 2009a) on the eastern parcel, and the California Natural Diversity Database lists a record on both Watson parcels. This record is a compilation of several surveys of Little Lake Valley dating back to the 1940s. This record covers 146.09 acres of the Watson parcels.

5.3.10 Wildlands (APNs 108-020-07, 108-030-08, 108-060-01, 108-060-02, 108-070-08, and 108-070-09)

The Wildlands property comprises six contiguous parcels totaling 372 acres in the middle of Little Lake Valley. The Wildlands parcels currently are used for cattle grazing and hay production.

5.3.10.1 Historical and Existing Vegetation

Historical aerial photographs from 1952, 1978, and 1988 show the Wildlands parcels in use for what appears to be grazing and hay production, as evidenced by linear patterns running the length of the parcels (Wildlands 2008; Google, Inc. 2009). Conditions in the photographs appear similar to current conditions, except for the areas along Davis Creek. The 1952 aerial photo shows the original alignment of Davis Creek and depicts a much wider and denser riparian corridor associated with this channel. To the south, on Wildlands parcel 108-070-08, Davis Creek appears to be much less vegetated with riparian vegetation than it is today. The fence rows also appear to have denser woodland vegetation associated with them now than they did in the historical aerial photographs.

The Wildlands parcels currently support wet meadow, mixed marsh, upland grassland, riparian scrub, and riparian woodland. The wet-meadow community covers most of the Wildlands parcels. Meadow foxtail, camas, annual hairgrass, rayless goldfields, Baker’s meadowfoam, pennyroyal, Davy’s semaphore grass, and western buttercup dominate these areas. The mixed marsh community is found along the western boundary of the Ford parcels and is associated with a tributary of Davis Creek, which has been modified to flood the area of mixed marsh along the western boundary of parcel 108-070-08. Dominant vegetation in this area consists of broadleaf water-plantain, water-plantain buttercup, and tule. The upland grassland areas occur along the higher ground adjacent to Davis Creek. Red fescue, Mediterranean barley, creeping ryegrass, Pacific bluegrass, slender fescue, soft chess, bur-clover, and white clover dominate these areas. Riparian scrub was mapped along the north end of Davis Creek on parcel 108-060-01. This community has been classified as willow riparian scrub and is dominated by arroyo willow, red willow, and Himalayan blackberry. Riparian woodland is found along the creeks and fence rows and in isolated stands throughout the Wildlands parcels. These areas have been classified as Oregon ash riparian woodland, valley oak riparian woodland, and mixed riparian woodland. Oregon ash, valley oak, arroyo willow, white alder, and cottonwood dominate the mixed riparian woodlands. Understory vegetation in the three riparian woodland types includes Himalayan blackberry, California blackberry, poison-oak, and dogwood (California Department of Transportation 2009a; U.S. Army Corps of Engineers 2011).

5.3.10.2 Historical and Existing Hydrology/Topography

Soil survey information from 1920 (Dean 1920) indicates that a lake historically formed at the northern end of Little Lake Valley during the rainy season, even during very low rainfall years. At the end of a series of heavy rainfall events in February 1915, the lake encompassed 1,875 acres and was 12 ft deep over a 300-acre area. At that time, the high water mark of the lake was at the 1,330-ft contour; that surface elevation historically would have flooded the northern portion of the Wildlands parcels. The lake no longer forms because the invert of Outlet Creek at the north end of Little Lake Valley has been lowered.

A review of a 1942 15-minute series USGS topographic map (included in Wildlands 2008) shows three streams on the Wildlands parcels: Davis Creek, an unnamed intermittent tributary west of Davis Creek, and Berry Creek flowing into Davis Creek near the southern boundary of Wildlands parcel 108-070-09.

The Wildlands parcels currently are subject to seasonal saturation and inundation in low-lying areas. Davis Creek has been straightened and channelized. The unnamed tributary of Davis Creek has been filled near its confluence with Davis Creek and now floods an area to the west, forming a marsh. However, it appears that during high-flow events this water would reach Davis Creek. Berry Creek has been realigned and currently flows north in a channel along the Wildlands property eastern border.

During fieldwork in May 2010 for an erosion site assessment of the offsite mitigation properties (California Department of Transportation 2010), two instream eroding banks along Davis Creek were identified in the northern portion of Wildlands parcel 108-060-01 (Figure 3-1 in Appendix H). Both of these erosion sites have partially unstable banks on each side that are 4–8 ft high, with a noticeable absence of vegetation. These areas appear to have been scoured during high flows. These sites are in sparsely vegetated willow riparian scrub with the adjacent area well-vegetated with wet meadow with sandy loam soils (*Gielow sandy loam, 0–5% slopes*; see Section 5.3.14.3). These areas were determined not to be of critical concern because erosion there can best be addressed with riparian planting, which currently is being proposed as a mitigation action in this area (see Chapter 7). Water quality monitoring data will be collected for several parameters, including parameters related to sediment levels. If the data show that increased sedimentation is occurring in the vicinity of the offsite mitigation properties, these erosion features will be inspected to determine whether they are becoming unstable and contributing excessive sediment to the parcel and valley streams (Chapter 11).

5.3.10.3 Soils/Substrates

The *Mendocino County, Eastern Part and Southwestern Part of Trinity County Soil Survey* (Natural Resources Conservation Service 2009) depicts the Wildlands parcels as having the following soil map units.

- **Cole clay loam, 0–2% slopes:** Very deep, somewhat poorly drained soil on alluvial plains and in basins, that formed in recent alluvium derived primarily from sedimentary rock. This soil is formed from alluvium from mixed sources. Surface horizon textures consist of loam, clay loam, silt loam, or silty clay loam with a representative clay content of 30%. Subsurface horizon textures consist of silty clay loam, clay loam, and silty clay.
- **Gielow sandy loam, 0–5% slopes:** Deep, somewhat poorly drained soils that typically occur on alluvial plains and fans. This soil is formed from alluvium from sedimentary rocks. Surface horizon textures consist of sandy loam or loam. Subsurface horizon textures consist of stratified loam, fine sandy loam, sandy loam, or sandy clay loam.
- **Feliz loam, 0–2% slopes:** Very deep, well-drained soils that typically occur on floodplains formed from alluvium from mixed sedimentary rocks. Surface horizon textures consist of loam. Subsurface horizon textures consist of clay loam.
- **Fluvaquents, 0–1% slopes:** These soils are formed from alluvium weathered from sedimentary rock and are found on floodplains. They are characterized by very little to no horizon development and the presence of aquic conditions within 20 inches of the soil surface at some time during normal years, and are formed in fluvial environments. Typical surface horizons consist of gravelly sandy loam, while subsurface horizon textures can vary.
- **Haplaquepts, 0–1% slopes:** Poorly drained soil formed from alluvium derived from sedimentary rock. These soils consist of clay loam underlain by gravelly clay loam. They have minimal horizon development and evidence of aquic conditions within 24 inches of the soil surface. Depth to a restrictive feature is more than 80 inches.

Soil data were collected on the Wildlands parcels during wetland delineation efforts and the USACE January 2011 study (California Department of Transportation 2009a; U.S. Army Corps of Engineers 2011). Hydric soil indicators were observed in wet-meadow areas during the wetland delineation and during the USACE January 2011 study (California Department of Transportation 2009a; U.S. Army Corps of Engineers 2011).

5.3.10.4 Jurisdictional Wetlands and Other Waters of the United States

According to a wetland delineation on the Wildlands parcels, there are 301.11 acres of jurisdictional wetlands and 6.91 acres of other waters. Wetland types mapped on these parcels include wet meadow, mixed marsh, and riparian woodland wetland. The other waters mapped on the Wildlands parcels comprise one perennial stream (Davis Creek) and three intermittent streams (Berry Creek, Boy Scout Creek, and an unnamed tributary of Davis Creek).

A total of 0.04 acre of wetland swale was mapped on Wildlands parcel 108-070-09. This swale is found in the eastern portion of the parcel just west of the Frost property from which the swale originates. Dominant vegetation consisted of California semaphore grass and pennyroyal.

A total of 287.01 acres of wet meadow was mapped on Wildlands parcels 108-020-07 (2.913 acres), 108-030-08 (4.55 acres), 108-060-01 (40.60 acres), 108-060-02 (100.86 acres), 108-070-08 (43.24 acres), and 108-070-09 (94.86 acres). Wet meadows are found throughout the Wildlands parcels and constitute the dominant vegetation community. Dominant vegetation in the wet meadows included meadow foxtail, camas, annual hairgrass, rayless goldfields, Baker's meadowfoam, pennyroyal, Davy's semaphore grass, and western buttercup.

A total of 6.98 acres of mixed marsh was mapped on Wildlands parcels 108-070-08 (4.27 acres), 108-030-08 (2.34 acres) and 108-070-09 (0.37 acre). Mixed marsh is found along the western boundary of these parcels. Dominant vegetation in the mixed marsh included broadleaf water-plantain, water-plantain buttercup, and tule.

A total of 7.08 acres of riparian woodland wetland was mapped on Wildlands parcels 108-030-08 (0.13 acre), 108-060-01 (0.43 acre), 108-060-02 (0.62 acre), 108-070-08 (3.63 acres), and 108-070-09 (2.26 acres). Riparian woodland wetland is found along the creeks, fence rows, and in isolated stands throughout the Wildlands parcels. These areas have been classified as Oregon ash riparian woodland, valley oak riparian woodland, and mixed riparian woodland. Oregon ash, valley oak, arroyo willow, white alder, and cottonwoods dominate the mixed riparian woodlands. Understory vegetation in the three riparian woodland types includes Himalayan blackberry, California blackberry, poison-oak, and dogwood.

A total of 6.91 acres of other waters was mapped on Wildlands parcels 108-020-07 (0.16 acre), 108-060-01 (1.39 acres), 108-060-02 (1.19 acres), 108-070-08 (1.49 acres), and 108-070-09 (2.68 acres). As mentioned above, these other waters comprise one perennial stream (Davis Creek) and three intermittent streams (Berry Creek, Boy Scout Creek, and an unnamed tributary of Davis Creek).

During USACE studies in January 2011, the following hydrologic indicators were observed: surface water, high water table, saturation, and some areas of oxidized rhizospheres. In the areas of wet meadow managed for pasture and hay, USACE further defined the hydrology as having very long–duration subsurface saturation, surface water in depressions, surface sheet flow, and occasional flooding. At the northern end of parcel 108-060-02, USACE defined the hydrology as having very long–duration ponding and subsurface saturation and frequent flooding.

5.3.10.5 Protected Fisheries

This is riparian habitat associated with protected fisheries on all the Wildlands parcels. These riparian corridors occur along Davis Creek and Berry Creek and are vegetated with Oregon ash riparian woodland, mixed riparian woodland, willow riparian scrub, and valley oak riparian woodland. A total of 29.25 acres of riparian habitat associated with protected fisheries was mapped on the Wildlands parcels.

5.3.10.6 Riparian Habitats

A total of 29.48 acres of riparian habitat was mapped on the Wildlands parcels. These habitats occur along Boy Scout Creek, an unnamed tributary of Davis Creek, along fence rows, and in isolated stands. These areas have been typed as valley oak woodland, mixed riparian woodland, willow riparian scrub, and Oregon ash riparian woodland.

5.3.10.7 Listed Plants

Special status–plant surveys were conducted on the Wildlands parcels in April 2007 and 2008. These surveys observed Baker’s meadowfoam on all the Wildlands parcels. Areas of potential Baker’s meadowfoam habitat also were mapped on all Wildlands parcels.

A total of 322.13 acres of Baker’s meadowfoam habitat (observed and potential) was identified on the Wildlands parcels: 50.98 acres of observed Baker’s meadowfoam on parcels 108-020-07 (0.04 acre), 108-030-08 (0.01 acre), 108-060-01 (0.93 acre), 108-060-02 (42.38 acres), 108-070-08 (4.40 acres), and 108-070-09 (3.22 acres); and 271.15 acres of potential Baker’s meadowfoam habitat on parcels 108-020-07 (5.68 acres), 108-03-08 (5.26 acres), 108-060-01 (57.14 acres), 108-060-02 (61.85 acres), 108-070-08 (47.96 acres), and 108-070-09 (93.26 acres).

Chapter 6 Determination of Credits

This chapter discusses how Caltrans will provide compensatory mitigation for temporary and permanent impacts on jurisdictional wetlands and other waters resulting from construction of the bypass and from mitigation implementation. It summarizes the project impacts, identifies the mitigation credits (in terms of acreage) provided by the MMP, and describes the rationale for their determination.

As discussed in Chapter 3, Caltrans faced several challenges in identifying potential mitigation parcels. Because of these challenges, the size and complexity of the project, and a lack of uplands suitable for establishment and rehabilitation of wetlands and other waters of the United States on the mitigation parcels, USACE determined that Caltrans' August 2010 Draft MMP was incomplete, and therefore USACE could not determine whether the standard of no net loss of waters of the United States for the project was met. In fall 2010, USACE approached Caltrans with a plan for a directed assessment to identify best available mitigation actions on each mitigation parcel, and subsequently to determine the project's potential to achieve no net loss and to develop a sustainable permit decision.

As a result of this assessment, the mitigation strategy and the project's wetland mitigation crediting system were reevaluated and revised from what was presented in the 2010 draft MMP. The USACE wetland mitigation assessment, subsequent discussions, and the determination of available credits toward no net loss are summarized and discussed in this chapter. Much of the discussion in this chapter was drafted by the USACE San Francisco District to better explain their assessment method and how the number of mitigation credits (in the form of a wetland functional equivalency index) was determined to offset the project's wetland impacts.

6.1 Summary of Impacts on Waters of the United States

Permanent and temporary impacts on wetlands and other waters associated with Phase 1 of the project are summarized in Table 2-3. Phase 1 of the project will result in 40.47 acres of permanent impacts on wetlands, 20.52 acres of temporary impacts on wetlands, 2.29 acres of permanent impacts on other waters, and 2.37 acres of temporary impacts on other waters. Based on the impact assessment of Phase 1, the required mitigation is 64.57 acres of wetland for permanent wetland impacts and 22.81 acres of wetland for temporary wetland impacts. The required mitigation acreages are summarized in Table 2-4.

Construction of Phase 2 of the project currently is not funded. Additional impacts associated with the future construction of Phase 2 are anticipated; however, Phase 2 activities and their required mitigation are not included in this MMP.

Caltrans proposes wetland mitigation credits in the form of offsite wetland establishment and rehabilitation. The following sections describe the methods for determining the wetland mitigation credit ratios for the various mitigation actions. A summary of the total mitigation credits using USACE's functional equivalent indices for the mitigation actions is provided at the end of this chapter.

USACE also determined that Phase 1 of the project would affect 4.7 acres of other waters. USACE's impact assessment for the project determined that approximately 18.00 acres of other waters compensatory mitigation is needed to offset those impacts. USACE acknowledged that the other waters rehabilitation, which includes riparian plantings, bank stabilization, and fish passage improvements, also would help improve water quality and other aquatic resources in the watershed. However, these related watershed benefits would not result in additional mitigation credits.

6.2 Summary of Mitigation Actions for Wetlands and Other Waters

This section summarizes the mitigation actions for wetlands and other waters for the onsite mitigation area and offsite mitigation properties. Additional information on the mitigation implementation methods is presented in Chapter 7. Information pertaining to wetland mitigation area maintenance, management, and performance monitoring is presented in Chapters 8 to 12. The location of the onsite mitigation area are shown in Appendix D. The locations of the offsite mitigation properties are shown in Appendix C and on Figures 2-1a and 2-1b.

Mitigation of impacts on wetlands and other waters of the United States will be accomplished through a combination of re-establishment, establishment, and rehabilitation (Figures 2-1a and 2-1b). Wetland re-establishment will be located onsite in the footprint of the temporary wetland impact areas but is not credited as compensation toward no net loss. Wetland establishment and rehabilitation will be located on the offsite mitigation properties. Other waters re-establishment, also not credited as compensatory mitigation, and rehabilitation will include the following actions.

- 19.03 acres of other waters rehabilitation on portions of Davis Creek and Outlet Creek on the mitigation parcels (Figures 2-1a and 2-1b).
- Fish passage improvements on Haehl Creek and Upp Creek.
- Erosion and headcut repair on the offsite mitigation parcels.
- Financial contributions to/and development of the Ryan Creek culvert project outside the project footprint and Little Lake Valley.

Caltrans will implement mitigation actions on and protection, and long-term management of other jurisdictional wetlands that will not be counted toward USACE compensatory wetland mitigation and are not included as part of this plan. These other jurisdictional wetlands will be managed for Baker's meadowfoam, which requires grazing. Although these habitats will not generate USACE mitigation credits, USACE has stated that they do add to the overall quality of the proposed mitigation for Little Lake Valley.

6.3 Determination of Mitigation Credits

USACE generally recommends areal replacement of affected wetlands through restoration of former wetlands or establishment of wetlands from suitable uplands to compensate for lost wetland functions. Compensation ratios are a minimum of 1:1 areal replacement. Typically, compensation ratios are increased for speculative or complex proposals or to account for temporal losses of functions when desired goals require prolonged development. Since the implementation of USACE's and EPA's 2008 *Compensatory Mitigation for Losses of Aquatic Resources* (2008 Mitigation Rule [73 FR 19594–19705]), rehabilitation of existing wetlands can be considered as part of a mitigation plan. Generally, when accepted as mitigation credit, rehabilitation is used to replace wetland functions or area and results in a decrease of the total wetland area.

The USACE San Francisco District has avoided using rehabilitation as a general compensatory mitigation tool in the past because of the net loss of wetland acreage and has stressed site-specific analysis of wetland establishment and/or re-establishment as the most informed way to approach no net loss. Therefore, no formal district policy has been produced or developed to accommodate the current situation.

Although wetland rehabilitation and establishment mitigation actions will occur concurrently with construction of the bypass, the project will cause a loss of wetland area for 5 to 10 years. Lost wetland area will result in a temporal loss of wetland functions until such time as they are replaced on the mitigation wetlands. Because wetland rehabilitation is the major compensatory option for the project under existing constraints, the district prefers to use a numerical index to ensure that replacement of wetland functions is proportional to the level of impact. The numerical index was developed by using best professional judgment to assess current wetland characteristics on the rehabilitation parcels and comparing them to the best attainable state to produce a discrete index.

6.3.1 Determination of Wetland Mitigation Credits

As stated previously, Caltrans has faced a number of challenges in identifying and acquiring potential mitigation parcels. As a result of these constraints, USACE determined that Caltrans would receive credit for offsite wetland establishment and that the remainder of the credits would be derived from offsite wetland rehabilitation. Table 6-1 summarizes the mitigation credits for each mitigation action, by parcel. Specific information on how the mitigation credits were determined is provided in the remaining sections.

USACE made the final determination for what was needed to meet no net loss of function for the impacts on the aquatic resources due to the project. No net loss of function was determined to have been achieved when the credit amounts received for the various established and rehabilitated wetlands equaled or exceeded the impact acreage. USACE did not grant 1:1 credit ratio for all mitigation actions because of what was considered the speculative nature of the actions, temporal loss of functions, and other pertinent considerations, as described below. For example, for every 1 acre of Group 2 wetlands that are established, Caltrans will receive only 0.3 acre of credit toward meeting the no net loss acreage requirement.

Establishment acreage will be accorded at a 1:1 or 0.3:1 credit ratio, depending on the level of detail used to develop the mitigation design. Rehabilitation credit will be accorded one of several credit values based on the wetland rehabilitation type (Types 1–5) to be implemented on a given mitigation unit (mitigation parcel or subparcel) and the targeted performance standards and success criteria that must be attained to achieve the credit value. The rehabilitation types and associated mitigation ratios are described in Section 6.3.1.3.

Table 6-1. Summary of Wetland and Other Waters Mitigation Actions

Mitigation Type	Total Acreage of Established Wetlands (less area of temporary impact)	Total Acreage of Rehabilitated Wetlands	Credit Ratio[1]	Mitigation Credits
Wetland Establishment—Group 1	20.09	-	1:1	20.09
Wetland Establishment—Group 2	29.49	-	0.3:1	8.85
Wetland Rehabilitation—Type 1	72.79	72.79	0.05:1	3.64
Wetland Rehabilitation—Type 2	-	30.02	0.1:1	3.00
Wetland Rehabilitation—Type 3	-	179.01	0.2:1	35.80
Wetland Rehabilitation—Type 4	-	41.71	0.3:1	12.51
Wetland Rehabilitation—Type 5	-	21.10	0.3:1	6.33
Total	**-**		**-**	**90.22**

[1]The credit ratio is applied to the total acreage of established and rehabilitated wetlands to determine the wetland mitigation credits.

6.3.1.1 Wetland Re-establishment

From its assessment, Caltrans determined that the proposed project will result in 20.52 acres of temporary impacts on wetlands. Wetland re-establishment is not considered compensatory mitigation so does not have a credit ratio associated with it.

6.3.1.2 Wetland Establishment Credits

Caltrans will mitigate the permanent loss of 40.47 acres of jurisdictional wetlands by establishing 49.58 acres of wetlands on the offsite mitigation properties in areas that are currently upland (Table 6-2). This amount of areal wetland replacement acreage will more than offset the acreage of permanent loss, and is a significant contribution to approaching no net loss. The total amount of proposed wetland establishment equates to 28.94 credits. Wetland establishment is divided into two groups. Group 1 wetland establishment sites for 20.09 acres of wetland area were identified in the 2010 MMP. Group 2 wetland establishment sites for 29.49 acres of wetland area consist of those sites identified in summer 2011. Construction-level plans have been developed for the Group 1 sites and Group 2 sites (Appendix E).

USACE will credit the wetland establishment in Group 1 at a 1:1 ratio and in Group 2 at a 0.3:1 ratio. The wetland establishment credits are summarized in Table 6-2. Despite the lower credit ratio for Group 2, once all the wetland establishment sites are successful, Caltrans will have created more surface area of mitigation wetlands than what will be affected by Phase 1.

Group 1 wetland establishment sites share the same performance standards and length of monitoring period as re-established wetlands. USACE requires a 10-year monitoring period for Group 2 wetland establishment sites (Chapter 9).

Table 6-2. Summary of Wetland Establishment Credits

Parcel	APN	Group 1 Wetland Establishment			Group 2 Wetland Establishment			Total
		Total Acreage of Established Wetlands (less area of temporary impact)	Credit Ratio[1]	Mitigation Credits	Total Acreage of Established Wetlands (less area of temporary impact)	Credit Ratio[1]	Mitigation Credits	
Benbow	108-040-13	-	-	-	1.34	0.3:1	0.40	0.40
	108-020-06	-	-	-	1.65	0.3:1	0.50	0.50
Ford	108-010-06	2.14	1:1	2.14	-	-	-	2.14
	108-020-04	0		-	6.48	0.3:1	1.94	1.94
	108-030-02	0		-	1.86	0.3:1	0.56	0.56
Goss	103-230-02	0.23	1:1	0.23	-	-	-	0.23
Lusher	108-030-04	-	-	-	5.22	0.3:1	1.57	1.57
MGC North	103-230-06	5.34	1:1	5.34	-	-	-	5.34
MGC Middle	103-250-14	0.23	1:1	0.23	-	-	-	0.23
Niesen	108-040-02	5.12	1:1	5.12	-	-	-	5.12
Watson	037-221-30	7.03	1:1	7.03	1.69	0.3:1	0.51	7.54
Wildlands	108-020-07	-	-	-	4.80	0.3:1	1.44	1.44
	108-060-01	-	-	-	2.18	0.3:1	0.65	0.65
	108-070-09	-	-	-	4.27	0.3:1	1.28	1.28
Total		**20.09**	**-**	**20.09**	**29.49**		**8.85**	**28.94**

[1]The credit ratio is applied to the total acreage of established and rehabilitated wetlands to determine the wetland mitigation credits.

6.3.1.3 Wetland Rehabilitation Credits

The determination of wetland rehabilitation credits was based on an assessment performed by USACE in winter 2010–2011. USACE approached Caltrans with a proposal for a directed assessment to identify best available mitigation actions on each of the mitigation parcels, and subsequently to determine the project's potential to achieve no net loss of wetland functions and services. Based on the outcome of this assessment, it was determined that a credit ratio of 0.1:1 or 0.05:1 would be accorded to each of the mitigation parcels based on the functions and services that the USACE assessment determined could be attained on each parcel.

USACE identified removal of grazing as the primary tool available to achieve lifts in wetland functions and services. The 0.1:1 and 0.05:1 described above were identified based on anticipated benefits from successional unmanaged wetland vegetation communities. Further discussions with USACE revealed that credits between 0.1:1 and 0.3:1 could be obtained by aggressively planting the wetlands in order to reduce the time needed for the wetland vegetation communities to develop.

After revising the credit ratings listed above, the project's mitigation strategy was revised by increasing the intensity of "active" mitigation (planting vegetation) in the rehabilitation areas. The original strategy, with its lower credit ratios, involved more "passive" successional development. This passive approach meant that properties would be allowed to reach a climax community over a much longer time than if there were human intervention. The current approach, with its higher levels of credit ratios, includes aggressively planting those areas to jumpstart the successional development process and therefore reduce temporal losses and assure the climax community is reached

U.S. Army Corps of Engineers Wetland Mitigation Assessment

On November 19, 2010, USACE met with Caltrans to explore the options for issuing a CWA Section 404 permit for the proposed project. In that meeting, USACE proposed a direct assessment to identify the best available mitigation actions for the available parcels and a no-net-loss assessment for the overall project, to which Caltrans agreed. USACE designed and led the assessment and took responsibility for interpreting the results. This assessment is summarized below. Caltrans participated in-the-field assessments of the mitigation parcels during winter 2011 and agreed with the parcel characterizations of current condition and accepted the best available mitigation actions.

Mitigation Assessment Objectives

USACE initiated and developed the assessment following the guidance provided in the 2008 Mitigation Rule. The 2008 Mitigation Rule expanded the types of actions that could be accepted as compensatory mitigation, but provided minimal guidance on how to assess or evaluate no net loss. USACE's assessment invoked broad references in the 2008 Mitigation Rule to applying best professional judgment in the absence of approved and reliable assessment techniques. The assessment evaluated existing wetland conditions and identified discrete actions that could be taken to rehabilitate existing wetlands and advance to no net loss. The assessment also was intended to guide USACE in assigning functional equivalent indices on an acreage basis to rehabilitation actions to determine whether no net loss could be achieved.

Mitigation Assessment Assumptions and Conventions

The USACE assessment was developed and implemented with the following assumptions and conventions.

1. **On the mitigation parcels being proposed for wetland rehabilitation, wetland functions will have an overall increase over existing functions in the current circumstances by changes to physical and biologic structure for sustainable changes directed toward the wetland's best attainable state.**

   To approach no net loss of wetland function for the overall project, a combination of offsite wetland establishment and rehabilitation of existing wetlands would be necessary. On the existing wetland components of the mitigation parcels where USACE considers rehabilitation to be an improvement in overall wetland function, USACE assumed that wetland functions associated with the best attainable wetland state would be an incremental increase from the existing circumstances of the wetland.

2. **The best attainable state is the long-term unmanaged successional climax condition for soil, vegetation, or hydrology within the wetlands' landscape position. USACE will compare the observed existing state of wetlands to the inferred best attainable state and determine what management or modification action(s) can be identified to achieve an improvement in wetland function.**

   In the absence of any proven assessment techniques that can be practically implemented within Caltrans' project deadline, USACE proposed a site-specific evaluation on the mitigation parcels. USACE observed and evaluated the existing state of previously delineated wetlands with regard to hydric soil, hydrophytic vegetation, and wetland hydrology on each mitigation parcel. Departures from the best attainable wetland condition for each homogenous wetland unit were proposed by USACE and generally accepted by Caltrans. The best attainable wetland state was assumed to be the long-term unmanaged successional climax condition for soil, vegetation, and hydrology within the landscape position of the wetland unit. Departures from the best attainable state were identified for each wetland characteristic, and based on discernible observed or inferred alterations caused by long-term, periodic, or ongoing management. Rehabilitation actions that would advance the wetland unit toward the best attainable state were identified. Rehabilitation credits on an areal basis (functional equivalent index [FEI]) were determined based on the degree of departure from the best attainable state and the actions that Caltrans proposes to implement to recover the best attainable state. Wetland units already in the best attainable state are not candidates for rehabilitation and will be considered preservations. Preservation is encouraged as part of the total mitigation package, but no credit for preservation is granted because of a lack of development pressure within the local area.

3. **Acreage lost through project impacts will determine the minimum replacement necessary to approach no net loss of wetland function.**

   Discrete rehabilitation actions that increase wetland functions will contribute to replacing the functions in the acreage of wetlands affected by the project. Wetland functions generally are considered necessary for sustainable ecosystem support for physical, chemical, and biological integrity of aquatic systems. The kind and extent of wetland functions depend in part on the wetland type, landscape position, and degree of disruption from the wetland's best attainable state. Generalized wetland functions likely occurring in both the impact wetlands and rehabilitation wetlands include flood storage, flood desynchronization, groundwater recharge, sediment sequestration, nutrient retention and removal, toxicant transformation, fish and wildlife habitat, and food chain support. Because assessment techniques to measure loss and replacement of wetland functions do not exist or cannot be applied practically to this project, USACE implemented the proposed assessment, which incorporated field observations of wetland criteria and best professional judgment to determine whether approximation of no net loss was attainable under the current constraints.

4. **Current circumstances for the mitigation parcels are the state of soil, vegetation, and hydrology at the time of the delineation. Current circumstances may or may not be the same as the best attainable state.**

   Since settlement, numerous changes to the hydrology, vegetation, and soil conditions in Little Lake Valley have occurred that are believed to be the result of resource extraction, natural events, development, and management in and outside the Outlet Creek watershed.

Past actions may not have been recorded or coordinated. It is generally believed that the pool surface of the seasonal lake has been lowered permanently, native vegetation was cleared, pasture grasses were introduced over wide areas, creeks were realigned and straightened, fields were fenced, upper watersheds were logged and grazed, and large amounts of sediments were alluviated onto the valley floor. Currently, grazing and vegetative management are practiced widely throughout the wetlands on the mitigation parcels. Since inception of the CWA, established ongoing farming activities are exempt from Section 404 regulation when they do not result in a change in the use, reach, flow, and circulation of waters of the United States. As a result of past actions, wetlands in the valley have been altered, and it is no longer possible or desirable to attempt to return to presettlement unaltered conditions. For purposes of the USACE assessment, the wetland state with respect to soil, vegetation, and hydrology at the time of the wetland delineation was considered the existing circumstances. The current circumstances may not be the same as the best attainable state. Rehabilitation actions that allow permanent unmanaged successional climax conditions; implementation of a mitigation planting and seeding program for soil, vegetation, or hydrology; or improvement toward those states would be eligible for credit toward reducing the loss of wetland functions associated with the project impacts. Rehabilitated wetlands will always be subject to future natural events and climatic changes.

5. **Three classes of departure between the current circumstances and the best attainable state will be identified. These are: (1) minor—little to no identifiable effect on sustainable wetland qualities; (2) moderate—discernible effect on at least one wetland characteristic resulting in sustainable wetland qualities; and (3) major—major/multiple reorganization of sustainable wetland qualities.**

   Decision thresholds were created to evaluate the departure of an existing wetland to its best attainable state, based on observation and best professional judgment. Attempting to describe the degree of every modification to the current condition of wetland functions with respect to soil, vegetation, and hydrology was not possible and could result in subjective disputes. The degree of disruption between the existing wetland and projected best attainable state was described as one of three classes:

   – **Class 1** departures would be actions that correct minor disruptions to wetlands that would have very limited or no expected changes as a result of an action (e.g., a very long–duration subsurface saturated hydrologic regime is manipulated to extend condition but not change hydroperiod class or type).

   – **Class 2** departures would be actions that result in discernible structural or temporal changes of wetland characteristics to the extent that there would be a projected change in class or type (e.g., a palustrine emergent, seasonally saturated system has grazing removed and succeeds into a palustrine forested or scrub-shrub, seasonally saturated system).

   – **Class 3** departures would be actions that result in a major, multiple-factor reorganization of wetland characteristics for soil, vegetation, and hydrology (e.g., marginal subsurface saturated grazed wetlands can be returned to a very long–duration ponded/saturated system with resulting modifications to soil morphology and a vegetation shift from facultative pasture to emergent obligate marsh).

6. **USACE will determine enhancement [rehabilitation] credits in functional equivalent units based on best professional judgment as described in the 2008 Mitigation Rule. Rehabilitation credits for sustainable change to existing wetlands are minor but proportional to the increase in projected functional increase.**

   The final decision on the attainment of approaching no net loss of function for the impacts on the aquatic environment due to project impacts would be made by USACE. The approximation of no net loss of function would be determined to have been achieved when an areal replacement of establishment acreage and rehabilitation credit acreage approach or exceed the impact acreage and required additional ratios determined necessary to account for speculative actions, temporal loss of functions, and other pertinent considerations.

   Rehabilitation credits would be assessed on a functional equivalent acreage basis. The determination of rehabilitation credits would be linked to the existing circumstances of the wetland and its departure from its best attainable state. Actions or management decisions that allow existing wetlands to transition toward stable sustainable states for soil, vegetation, and hydrology within their landscape position would be considered for accruing credit toward no net loss. The credit would be proportional to the departure from the stable sustainable state as determined by USACE. The FEI was based on an acre basis and expressed in parts of acreage units. For example, if a rehabilitation action on a 20-acre parcel was determined to increase the functional capacity by 0.05 unit per acre, the 20-acre parcel would contribute 1 acre toward no net loss.

   The 2008 Mitigation Rule offers no recommended or procedural way to assess credits and defaults to best professional judgment. In general, USACE believes credits from rehabilitation of existing wetlands to replace lost functions and wetland acreage offer minor fractions of functional equivalents in most situations. The greater the departure from the best attainable state, the greater the fraction of functional equivalents, but in no cases will the FEI be greater than 0.3 for existing wetlands.

Mitigation Assessment Methods

The method to evaluate changes from the existing wetland state to the best attainable state for the wetland unit within its landscape context was based on comparative differences between the two states. The existing wetland state was identified and described as a composite characterization of its existing wetland characteristics for soil, vegetation, and hydrology. Other pertinent information from previous studies, the project’s delineations, and other reliable sources were considered in the current condition characterization. Management activities or structural modifications that affected the condition of the wetland criteria were identified (i.e., observed or inferred) using site-specific information, narrative history, or aerial photo interpretations. The best attainable state was inferred by identifying modifications or management actions that appear to influence physical manifestations of soil, vegetation, and hydrology. Mitigation credits were assigned to management activities or structural modifications that promote the development and ultimately sustainable long-term successional climax state for soil, vegetation, and hydrology. Parcels with no or minor indeterminate changes were accepted as preservation parcels, but were not given credit toward approaching no net loss. The amount of credit was proportional to the degree of observable or inferred effective change that can be applied to the wetland and promote a stable long-term successional climax state. The index for functional replacement on existing wetlands was minor fractions, and final determination was applied when all studies were completed.

The assessment involved conducting the following activities for each parcel to create a record and documentation of investigations used to assess the existing wetland state and to help create functional equivalents for each best attainable state for each parcel unit.

1. Conducted reconnaissance of the parcel.
2. Identified signature differences based on aerial photos or ground observations of the parcel. Determined whether differences are related to major wetland type changes (e.g., palustrine emergent wetland to palustrine forested, or subsurface saturation to very long–duration ponding/flooding) or to changes in landscape position. Within large homogenous units, areas of minor size or change were included within the larger unit. The minimum size to separate units was at least 1 acre or an obvious major difference (e.g., fill pile, building).
3. Within each major parcel unit, characterized the existing wetland criteria for soil, vegetation, and hydrology. The characterization was not meant to be a discrete sample point, but rather a generalized statement or baseline for the parcel's overall wetland description. Used regional data sheet to record information. Identified problematic or atypical situations associated with the parcel.
4. In the comment section of regional data sheet used to characterize the wetland unit, identified observed or inferred departures from the best attainable state for the wetland. Identified related management practices or physical manipulations/modifications believed to be affecting the wetland parcel.
5. USACE filled out as much of the parcel summary sheet as possible while onsite.
6. USACE made final decisions for characterization and departures recorded on data sheets. USACE entertained considerations or alternative observations or interpretations from Caltrans and its consultants.
7. A parcel worksheet was filled out and appended to the parcel summary sheet to expand information related to an informed decision on the parcel. Caltrans and its consultants were encouraged to retrieve as much information as possible during field investigations to acquire data necessary to construct goals and performance standards for a mitigation plan. The final proposed mitigation plan would be subject to USACE review and approval.

Mitigation Assessment Results and Initial Credit System

The assessment field work was completed for the offsite mitigation properties in December 2010 and January 2011. USACE used the results of these studies to provide Caltrans with an analysis of the best attainable rehabilitation credits for the mitigation parcels. The USACE data sheets are presented as Appendix I. USACE advised Caltrans that the recommendations were considered the best opportunity for Caltrans to amass credits toward approaching no net loss of wetland function. A summary of USACE's mitigation action recommendations for each parcel is presented in Table 6-3. It should be noted that the recommendations were largely integrated into the mitigation work plan (Chapter 7), although some of the mitigation actions have been modified as a result of Caltrans' obligation to balance the mitigation requirements of Baker's meadowfoam with the USACE mitigation requirements. Table 7-1 presents the revised mitigation actions for each mitigation parcel.

As discussed previously, credit (functional lift) associated with rehabilitation of existing wetlands depended on the opportunity for wetland units to achieve their best sustainable wetland state. Based on unit-specific field data to identify departures from the best attainable state of wetland components, USACE determined vegetation composition and structure as the best opportunity to achieve functional lift. Originally, pastures that were heavily hayed or grazed, on which haying or grazing would be eliminated, would be credited at 0.1:1 (e.g., 10 acres of rehabilitated wetland for 1 acre of affected wetland, and pastures with less intense haying or grazing, on which haying or grazing would be eliminated, would be credited at 0.05:1 (e.g., 20 acres of rehabilitated wetland for 1 acre of affected wetland). Based on this crediting method, it originally was thought that much of the no net loss could be attained by removing grazing from the mitigation parcels. It later became evident that based on Baker's meadowfoam mitigation requirements some parcels that initially were proposed for USACE wetland mitigation became incompatible with the successional development approach. In order to avoid impacts on Baker's meadowfoam on these incompatible parcels, they were eliminated as potential USACE mitigation. As a result of the reduction in available parcels, USACE required more intensive mitigation actions beyond passive successional development and employing a modified credit system. The modified credit system is described in the section below called Modified Mitigation Credit System.

Table 6-3. Summary of USACE Initial Parcel Recommendations

Parcel	APN	Best Opportunities Identified	Other Actions Identified
Arkelian	103-230-04	• No rehabilitation opportunities	• Remove unnecessary fencing • Preserve unenhanced wetland and upland
Benbow	007-020-03	• Allow successional unmanaged vegetation development in rehabilitation wetland • Remove minor stock loafing pile	• Remove debris • Remove unnecessary fencing • Plant riparian vegetation where appropriate • Remove nonnative blackberry patch • Implement minor erosion control • Preserve unenhanced wetland, upland, and other waters
Benbow	007-010-04	• Allow successional unmanaged vegetation development in rehabilitation wetland	• Remove debris • Remove unnecessary fencing • Remove nonnative blackberry patch • Plant riparian vegetation where appropriate • Preserve unenhanced wetland, upland, and other waters
Benbow	108-040-13	• Allow successional unmanaged vegetation development in rehabilitation wetland	• Remove unnecessary fencing • Remove debris • Plant riparian vegetation where appropriate • Preserve unenhanced wetland, upland, and other waters
Benbow	108-030-07	• Allow successional unmanaged vegetation development in rehabilitation wetland	• Remove unnecessary fencing • Remove water trough and piping • Preserve upland

Parcel	APN	Best Opportunities Identified	Other Actions Identified
Benbow	108-020-06	• Allow successional unmanaged vegetation development in rehabilitation wetland • Remove small upland levee to adjacent wetland grade to establish new wetland area	• Remove unnecessary fencing • Plant riparian vegetation where appropriate • Preserve unenhanced wetland and upland
Brooke	108-030-01 038-040-09 108-020-03 108-030-01	• No rehabilitation opportunities; parcels are fallow and have developed successional vegetation communities	• Preserve wetlands, uplands, and other waters • Remove debris • Remove unnecessary fencing • Remove nonnative blackberry and teasel
Ford	108-010-05	• Allow unmanaged successional development in nonmarsh rehabilitation wetland	• Remove unnecessary fencing • Preserve unenhanced wetland, upland, and other waters • Plant riparian vegetation where appropriate
Ford	108-010-06	• Allow unmanaged successional vegetation development in nonmarsh rehabilitation wetland • Establish wetland in previously identified areas	• Remove unnecessary fencing • Preserve unenhanced wetland, upland, and other waters • Plant riparian vegetation where appropriate
Ford	108-020-04	• Allow unmanaged successional vegetation development in nonmarsh rehabilitation wetland	• Remove unnecessary fencing • Preserve unenhanced wetlands, other waters, and upland • Plant riparian vegetation where appropriate • Plug or fill constructed drainage ditch running to the north
Ford	108-030-02	• Allow unmanaged successional vegetation development in rehabilitation wetlands	• Remove debris • Remove nonnative blackberry • Remove unnecessary fencing • Preserve unenhanced wetlands, other waters, and upland • Plant riparian vegetation where appropriate
Ford	108-030-05	• Allow unmanaged successional vegetation development in rehabilitation wetlands	• Remove debris • Remove unnecessary fencing and posts • Remove nonnative blackberry • Preserve unenhanced wetland, upland, and other waters • Plant riparian vegetation where appropriate
Frost	108-070-04	• Allow unmanaged successional vegetation to develop on rehabilitation wetland	• Remove debris • Plant riparian vegetation where appropriate • Fix erosion along tributary • Remove unnecessary fencing • Preserve upland and other waters
Goss	103-230-02	• Allow unmanaged successional vegetation to develop on rehabilitation wetland • Establish wetland in previously identified area	• Remove unnecessary fencing • Preserve unenhanced wetland and upland

Parcel	APN	Best Opportunities Identified	Other Actions Identified
Huff	037-240-RW	• No rehabilitation opportunities	• Remove debris • Preserve wetlands, uplands, and other waters • Access restrictions for off-road vehicles
Lusher	108-030-03 108-060-08	• Allow unmanaged successional vegetation to develop on rehabilitation wetland	• Remove unnecessary fencing • Remove debris • Remove nonnative blackberry • Preserve unenhanced wetland, upland, and other waters • Plant riparian vegetation where appropriate • Plug culvert at end of ineffective drainage ditch
Lusher	108-030-04	• Allow unmanaged successional vegetation to develop on rehabilitation wetland	• Remove unnecessary fencing • Remove nonnative blackberry • Preserve unenhanced wetland, upland, and other waters • Plant riparian vegetation where appropriate
MGC North	103-230-06	• Allow unmanaged successional vegetation to develop on rehabilitation wetland • Establish wetland in previously identified area	• Remove unnecessary fencing • Preserve upland
MGC Middle	103-250-14	• Allow unmanaged successional vegetation to develop on rehabilitation wetland • Establish wetland in previously identified area	• Remove unnecessary fencing • Preserve unenhanced wetlands and upland
Nance	108-050-06	• Allow unmanaged successional vegetation to develop on rehabilitation wetland	• Remove debris • Remove unnecessary fencing • Plant riparian vegetation where appropriate • Preserve unenhanced wetland, upland, and other waters
Niesen	108-040-02	• Allow unmanaged successional vegetation to develop on rehabilitation wetland • Establish wetland in previously identified area	• Remove unnecessary fencing • Remove nonnative blackberry • Regrade access road to original ground contour • Preserve unenhanced wetland, upland, and other waters • Plant riparian vegetation where appropriate
Watson	037-221-30	• Allow unmanaged successional vegetation to develop on rehabilitation wetland • Cease haying of recruited obligate vegetation in seasonally ponded unit • Establish wetland in previously identified area	• Remove unnecessary fencing • Remove debris • Stabilize soil trampled by cattle with vegetative cover • Preserve unenhanced wetland, upland, and other waters • Plant riparian vegetation where appropriate

Parcel	APN	Best Opportunities Identified	Other Actions Identified
Watson	037-250-05	• Allow unmanaged successional vegetation development on rehabilitation wetland	• Remove unnecessary fencing • Preserve unenhanced wetlands, uplands, and other waters • Plant riparian vegetation where appropriate
Wildlands	108-020-07	• Allow unmanaged successional vegetation development on rehabilitation wetlands • Establish wetland in previously identified area	• Remove unnecessary fencing • Preserve unenhanced wetlands, upland, and other water • Plant riparian vegetation where appropriate
Wildlands	108-030-08	• Allow unmanaged successional vegetation to develop on rehabilitation wetland	• Remove unnecessary fencing • Remove debris • Preserve unenhanced wetlands, upland, and other waters • Plant riparian vegetation where appropriate
Wildlands	108-060-01	• Allow unmanaged successional vegetation to develop on rehabilitation wetland • Establish wetland in previously identified area	• Remove unnecessary fencing • Remove debris • Plant riparian vegetation where appropriate • Preserve unenhanced upland and other water
Wildlands	108-060-02	• Allow unmanaged successional vegetation to develop on rehabilitation wetland	• Remove unnecessary fencing • Preserve unenhanced wetland, upland, and other water • Plant riparian vegetation where appropriate
Wildlands	108-070-08	• Allow unmanaged successional vegetation to develop on rehabilitation wetland	• Remove unnecessary fencing • Remove debris • Preserve unenhanced wetlands, upland, and other waters • Plant riparian vegetation where appropriate
Wildlands	108-070-09	• Allow unmanaged successional vegetation to develop on rehabilitation wetland	• Remove unnecessary fencing • Remove debris • Preserve unenhanced wetlands, upland, and other waters • Plant riparian vegetation where appropriate

Modified Mitigation Credit System

Following the USACE assessment, the project’s mitigation strategy and mitigation crediting system were reevaluated and revised based on the competing need to maintain and enhance Baker’s meadowfoam habitat on much of the mitigation lands. Because substantial credits did not appear attainable from the USACE San Francisco District for managed grazing, no 404 wetland rehabilitation credits have been proposed for grazed parcels. As a result, the project would not meet no net loss based on the approach first identified in the USACE assessment.

To attain no net loss, USACE and Caltrans developed alternative rehabilitation actions, each with its own specific mitigation actions, performance standards, and success criteria, that would need to be implemented by Caltrans to obtain the targeted credit value and attain no net loss. Wetland rehabilitation will include clearing existing patches of nonnative wetland vegetation and replanting and seeding with native hydrophytic species. In addition to planting and seeding, each rehabilitation type includes some level of successional development in untreated areas on which native vegetation currently exists. Each rehabilitation type also has specific performance standards and success criteria (Chapter 9).

Five types of wetland rehabilitation actions were developed based on the existing state of the wetland, the amount of habitat manipulation needed to increase wetland functions, and the ability to attain the rehabilitation type–specific performance standards and success criteria. As a management practice common to each of the following wetland rehabilitation types, grazing will be removed in order for successional plant development to occur. The five rehabilitation types are summarized below, and additional detail is provided in Chapter 7.

- **Type 1 Rehabilitation—0.05 credit/ac (0.05:1 ratio)**

  This type promotes passive successional development by removing management activities (i.e., grazing and haying) that influence vegetation development. This type applies to areas that: (1) are existing marsh/forest communities; (2) have an existing relative cover of at least 60% of species from the target hydrophytic species list at the time of baseline studies; or (3) are dominated (top 50th percentile) by FacW and Obl species (Watson West parcel) at the time of baseline studies. The low credit reflects the existing high-functioning wetland condition (soil/vegetation/hydrology) and lack of substantial opportunity to bring about change because of the existing degree of vegetative development. This type of wetland rehabilitation occurs only on the Watson West parcel (APN 037-250-05). Because this parcel already has high-quality wetland habitat over most of the parcel, no mitigation actions will be implemented. The parcel will be monitored during the plant establishment period to ensure that there is no decrease in native plant cover or an influx of noxious plant species.

  Type 2 Rehabilitation—0.10 credit/ac (.1:1 ratio)

  This type promotes passive successional development by removing management activities (grazing and haying) that influence vegetation development. This type may be applied to areas that have existing relative cover of up to 59% of species from the target hydrophytic species list at the time baseline studies are conducted.

  To receive the .1:1 acre credit, a minimum 10% increase of relative cover above baseline of the species from the target hydrophytic species list at monitoring year 10 is required. The increase in cover may be provided by the planted and seeded areas or the untreated areas on which native vegetation currently occurs. The credit reflects the amount of functional lift inferred through the measurable changes in vegetation structure and composition that occurs over time. It is a reflection of the level of opportunity to bring about change, which is dependent on the existing condition of the site at the time of baseline studies. Because successional development by itself is a slow process, the amount of time it takes to obtain the maximum functional lift is considerable. This temporal limitation was taken into consideration when assigning the credit ratio. Type 2 does not include initial planting, but if the performance standards are not met, remedial actions, including plantings or seeding, may be required.

- **Type 3 Rehabilitation—0.20 credit/ac (.2:1.0 ratio)**

  This type includes the active conversion of existing vegetation by removing management activities (grazing or haying) that influence vegetation development, and planting woody and herbaceous native vegetation suitable to the particular site. This type may be applied to areas that have existing relative cover of up to 40% of species from the target hydrophytic species list at the time of baseline studies.

  To receive the .2:1 acre credit, a minimum 40% increase of relative cover above baseline of the species from the target hydrophytic species list at monitoring year 10 is required. The increase in cover may be provided by the planted and seeded areas, or the untreated areas on which native vegetation currently occurs. Active conversion would require introduction and survival of propagules/plantings/seedings of species from the target hydrophytic species list. Plant volunteers from the list also would be included when calculating the percent increase. The credit reflects the amount of functional lift inferred through the measurable changes in vegetation structure and composition that occur over time. It is a reflection of the level of opportunity to bring about change, which is dependent on the existing condition of the site at the time of baseline studies. Because of the level of initial planting, Type 3 has less temporal limitation than Type 2, and this is reflected in the higher credit ratio. If the performance standards are not met, remedial actions, including additional plantings or seeding, may be required. Type 3 rehabilitation areas will be seeded and planted with native herbaceous and woody wetland species.

- **Type 4 and Type 5 Rehabilitation—0.30/ac (.3:1 ratio)**

  Type 4 and Type 5 rehabilitation requires aggressive conversion of existing vegetation by removing management activities (grazing or haying) that influence vegetation development, and planting woody and herbaceous native vegetation suitable to the particular site. This type may be applied to areas that have existing relative cover up to 20% of species from the target hydrophytic species list at the time of baseline studies.

  To receive the 0.3:1 acre credit, a minimum 70% increase of relative cover above baseline of the species from the target hydrophytic species list (Table 7-5) at monitoring year 10 is required. The increase in cover may be provided by the planted and seeded areas, or the untreated areas on which native vegetation currently occurs. Aggressive conversion would require introduction and survival of propagules, container plants, and seeded species from the target hydrophytic species list (Table 7-5). Plant volunteers from the list also would be included when calculating the percent increase. The credit reflects the amount of functional lift inferred through the measurable changes in vegetation structure and composition that occur over time. It is a reflection of the level of opportunity to bring about change, which is dependent on the existing condition of the site at the time of baseline studies. Because of the level of initial planting, Types 4 and 5 have less temporal limitation than Type 2, and this is reflected in the higher credit ratio. If the performance standards are not met, remedial actions, including additional plantings or seeding, may be required. Type 5 has the same requirements as Type 4, except the Type 5 planting plan includes a higher percentage of woody vegetation along riparian corridors and has a lower species richness performance standard than Type 4.

Wetland rehabilitation will occur on all or portions of most of the offsite mitigation properties, and more than one rehabilitation type may occur on a given parcel. The locations of the wetland rehabilitation types prescribed for each parcel are depicted on Figure 2-1 and in Appendix C. The wetland rehabilitation credit determination is summarized in Table 6-4.

Mitigation Assessment Summary and Conclusions

During mitigation plan development, the interagency review group working on the NEPA analysis for the project restricted the compensatory mitigation efforts to the general vicinity of Little Lake Valley, although some parcels outside the valley also were assessed. No mitigation banks or in-lieu fee programs are available to fulfill the mitigation requirement of approaching no net loss on a national basis for this project. The mitigation parcels acquired by Caltrans are in the Little Lake Valley watershed and were acquired from willing sellers. Some of the parcels were purchased before publication of the 2008 Mitigation Rule; most of these are located in the central and northern portions of the valley. At the time of their purchase, the mitigation parcels were largely in use as agricultural hayland or pasture on existing wetlands.

The opportunities for wetland establishment on the mitigation parcels are limited but are the preferred mitigative action to approach no net loss on a national programmatic basis. Rehabilitation of existing managed wetlands on the mitigation parcels appears to be the major practical compensatory mitigation opportunity available for the Willits Bypass. Rehabilitation generally is not encouraged by USACE as a principal mitigative action but is allowed in the 2008 Mitigation Rule. In general, rehabilitating degraded wetlands on the available mitigation parcels would improve the functions of aquatic resources in the watershed.

The degree of departure from the best attainable state of the wetland within its landscape position with respect to hydric soil, wetland hydrology, and hydrophytic vegetation identifies what rehabilitative actions would result in wetland improvements (i.e., functional lift). From the results of the assessment, USACE assumed that wetland functions would increase through unmanaged changes to the physical and biological components that would progress the wetlands toward the best attainable state. Rehabilitating the wetlands to their best attainable state will alter the expression of existing functions, and their functional capacities will be replaced with different functional types and amounts. However, overall functions should be sustainable and maximized within the unmanaged wetland state and suitable for its landscape position. For example, it is presumed that ground thatch accumulation would detain surface sheet flow during moderate to small hydrologic events and promote increased subsurface infiltration, which could support groundwater recharge, base flow discharge, and flood desynchronization. Because these functions already are occurring to some extent in the existing wetlands, USACE concluded it would not be possible to practically measure the change as a performance standard.

Anticipated changes to wetland functions between the current wetland state and sustainable successional wetland state on the rehabilitation parcels that would benefit the aquatic resources of the watershed include:

- Increased general habitat suitability for wetland plant species (thatch accumulation, biotic structure complexity, increase in native perennial plants).
- Uniqueness (rare wetland type [palustrine forested–graben] in part).

- Floodflow alteration (incremental increase in surface infiltration, slower-moving surface sheet runoff).
- Nutrient and toxicant removal (remove source of pollutant accumulation, increase water contact time and surface for transformation).
- Sediment (remove source of soil disturbance, increase surface roughness to allow sequestration).

The assessment determined that the current circumstances of the rehabilitation wetlands are primarily fully functional for hydric soil and wetland hydrology within their landscape positions, and that there is no discernible functional lift that can be obtained by manipulating either of those wetland characteristics.

The hydrophytic plant community was determined to be affected by current (premitigation) agricultural practices over most of the parcels. The most direct expression of the management is pervasive nonnative perennial pasture grasses (e.g., perennial ryegrass, fescue, meadow foxtail, Harding grass) and restriction of woody growth forms from hayed and heavily grazed areas. Fields with lower levels of management activities (e.g., not hayed, lightly grazed, fallow) had more native perennials, such as rushes and sedges, than heavily managed fields. Across the rehabilitation parcels, native trees and saplings, such as Oregon ash and valley oak, exist sporadically along fence lines or in areas where there is decreased or no management.

6.3.2 Determination of Other Waters Mitigation

The 4.71 acres of permanent and temporary impacts on jurisdictional other waters of the United States will be mitigated through rehabilitation of similar habitat on the offsite mitigation properties, and stream rehabilitation and fish passage improvements to Haehl and Upp Creeks where they cross the bypass alignment footprint (Appendix F) and Ryan Creek north of the project. Approximately 18 acres of riparian zone rehabilitation is proposed as mitigation to offset impacts on other waters of the United States. In addition to the proposed other waters mitigation, the project will implement erosion control and headcut repairs on some of the offsite mitigation parcels. Table 6-5 summarizes the impacts and mitigation requirements for other waters mitigation.

Table 6-4. Summary of Wetland Rehabilitation Credit Determination

Parcel	APN	Total Acreage of Rehabilitation Unit	Credit Ratio[1]					Total Wetland Rehabilitation Credits Available
			Type 1 (0.05 Credit)	Type 2 (0.1 Credit)	Type 3 (0.2 Credit)	Type 4 (0.3 Credit)	Type 5 (0.3 Credit)	
Benbow	108-030-07	19.57			3.91			3.91
Benbow	108-040-13	32.23			6.45			6.45
Benbow	007-010-04	18.57		1.86				1.86
		4.70			0.94			0.94
Benbow	007-020-03	11.45		1.15				1.15
		5.68			1.14			1.14
Ford	108-010-06	1.32					0.40	0.40
Ford	108-020-04	16.56			3.31			3.31
		10.31				3.09		3.09
		0.17					0.05	0.05
Ford	108-030-02	13.05			2.61			2.61
		14.66				4.40		4.40
Ford	108-010-05	6.44					1.93	1.93
Ford	108-030-05	61.75			12.35			12.35
Lusher East	108-030-04	18.04			3.61			3.61
MGC Plasma Middle	103-250-14	1.28				0.38		0.38
Nance	108-050-06	3.49					1.05	1.05
Niesen	108-040-02	1.47				0.44		0.44
Watson	037-250-05	49.53	2.48					2.48
Watson East	037-221-30	23.26	1.16					1.16
		1.80			0.36			0.36
Wildlands	108-060-01	2.97				0.89		0.89

Table 6-4. Continued

Parcel	APN	Total Acreage of Rehabilitation Unit	Credit Ratio[1]					Total Wetland Rehabilitation Credits Available
			Type 1 (0.05 Credit)	Type 2 (0.1 Credit)	Type 3 (0.2 Credit)	Type 4 (0.3 Credit)	Type 5 (0.3 Credit)	
Wildlands	108-060-02	7.33					2.20	2.20
Wildlands	108-070-09	3.44			0.69			0.69
		4.04				1.21		1.21
		2.35					0.71	0.71
Wildlands	108-030-08	2.08			0.42			0.42
Wildlands	108-070-08	0.11			0.02			0.02
		6.98				2.09		2.09
Totals		**344.63**	**3.64**	**3.00**	**35.80**	**12.51**	**6.33**	**61.29**
Note: The credit ratio is applied to the total acreage of established and rehabilitated wetlands to determine the wetland mitigation credits.								

Table 6-5. Summary of Impacts on Other Waters of the United States

Permanent		**Impact**	**Ratio**	**Mitigation Requirement**
Cat I	Channelized ephemeral streams excavated on dry land with highly manipulated bed/banks (rip-rapped)	0.28	5.3	1.48
Cat II	Channelized intermittent streams with some vegetation on bed/banks	0.32	5.6	1.79
Cat III	Intermittent streams, not channelized	0.62	5.6	3.47
Cat IV	Rutledge Pond	1.07	0	0
Cat V	Perennial streams	0.02	2.8	0.06
	Total Permanent Impacts and Mitigation Requirement	**2.31**		**6.80**
Temporary				
Cat I	Channelized ephemeral streams excavated on dry land with highly manipulated bed/banks (rip-rapped)	0.17	4.3	0.73
Cat II	Channelized intermittent streams with some vegetation on bed/banks	0.6	5.6	3.36
Cat III	Intermittent streams, not channelized	0.9	5.6	5.04
Cat IV	Rutledge Pond	0	0	0
Cat V	Perennial streams	0.73	2.8	2.04
	Total Temporary Impacts and Mitigation Requirement	**2.4**		**11.18**
	Total Mitigation Requirement			**17.98**

The rehabilitation of other waters on the offsite mitigation properties will be achieved by planting riparian species adjacent to or near streams to provide bank stabilization, stream shading, and a source of organic material for benthic invertebrates and salmonids, all of which will improve instream habitat. Rehabilitation also includes stabilization of other waters that are undergoing bank erosion or have large headcuts. These areas were identified in an erosion assessment conducted by Caltrans in 2010 (Appendix H). The rehabilitation efforts for other waters also will improve protected fisheries habitat in Little Lake Valley, especially along Outlet Creek.

Chapter 7 Mitigation Work Plan

This chapter describes the MMP mitigation work plan and its implementation. The chapter provides information pertaining to the mitigation strategies for the onsite and offsite mitigation areas, the general mitigation implementation techniques, and specific information related to mitigation techniques for the onsite and offsite mitigation areas.

The mitigation work plan covers both onsite and offsite mitigation efforts. Caltrans will implement and manage mitigation at the onsite mitigation area. Caltrans will implement mitigation at the offsite mitigation parcels and MCRCD will manage mitigation at the offsite mitigation parcels.

7.1 Mitigation Strategy

Mitigation for project construction impacts will occur at onsite and offsite mitigation areas. A general summary of the mitigation strategies by resource and impact category is provided in Table 7-1. The locations of the onsite mitigation areas are shown in Appendix D. The locations of the offsite mitigation areas are shown in Appendix C and on Figures 2-1a and 2-1b. Figure 7-1 shows the mitigation implementation schedule.

Project construction will result in temporary and permanent impacts on jurisdictional wetlands and other waters of the U.S. Mitigation will include the following actions.

- Temporary impacts on wetlands will be mitigated through onsite wetland re-establishment (Appendix D) and offsite wetland establishment and rehabilitation (Appendices C and E and Figures 2-1a and 2-1b).
- Permanent impacts on wetlands will be mitigated through offsite wetland establishment and rehabilitation (Appendices C and E and Figures 2-1a and 2-1b).
- Temporary impacts on other waters will be mitigated through onsite re-establishment (Appendix D) and offsite rehabilitation of riparian corridors (Appendices C and E and Figures 2-1a and 2-1b).
- Permanent impacts on other waters will be mitigated through rehabilitation of riparian corridors on the offsite mitigation parcels (Appendices C and E and Figures 2-1a and 2-1b), fish passage improvements at Haehl and Upp Creeks in the project footprint (Appendix F), offsite headcut and erosion repair (Appendix E), and financial contribution to and development of the Ryan Creek culvert project outside the project footprint and Little Lake Valley.

Wetland mitigation construction at the offsite mitigation parcels is planned to occur in areas near or adjacent to existing wetlands and will result in temporary impacts on wetlands. Temporary impacts on offsite wetland mitigation parcels will be mitigated through re-establishment, and the re-established acres will not be credited toward mitigating project impacts.

Table 7-1. Summary of Onsite and Offsite Mitigation Strategies

Resource	Impact Category	Location of Mitigation	Mitigation Strategy
Wetlands (wet meadow)	Temporary	Onsite	Re-establishment of temporary impact areas
		Offsite	Wetland establishment
			Wetland rehabilitation
	Permanent	Offsite	Wetland establishment
			Wetland rehabilitation
Wetland (forested wetland)	Temporary	Onsite	Re-establishment of temporary impact areas
			Wetland rehabilitation
	Permanent	Offsite	Wetland rehabilitation
Other waters	Temporary	Onsite	Re-establishment of temporary impact areas
		Offsite	Rehabilitation of offsite riparian corridors adjacent to other waters
	Permanent	Onsite	Fish passage improvements on Haehl and Upp Creeks
		Offsite	Rehabilitation of offsite riparian corridors adjacent to existing other waters
			Erosion and headcut repair
			Financial contribution to and development of the Ryan Creek culvert project

Onsite mitigation will be implemented in the project footprint. Temporarily affected wetland and other waters in the project footprint will be re-established and seeded or planted with native species appropriate for the habitat type. Design drawings for the onsite mitigation actions described in this chapter are presented in Appendix D. Appendix D includes a plan view of the planting plan, plant lists by habitat type, and planting details for the onsite mitigation areas. The plant and seed palette species are presented in Section 7.2.4.

For the purpose of this document, a mitigation unit is defined as a geographic area in which a particular mitigation action will occur. Mitigation units occur in the onsite and offsite mitigation areas. For example, on Ford 108-020-04, areas of wetland establishment (one) and Type 3 (one) and Type 4 (one) wetland rehabilitation are proposed. Each of these areas will be assessed as an individual unit (mitigation unit). A single mitigation unit can span multiple parcel boundaries. For onsite re-establishment areas, each individual geographical polygon will be assessed separately.

Table 7-2 summarizes habitat establishment and rehabilitation actions at the offsite mitigation parcels. Appendices C–F show wetland establishment, re-establishment, and rehabilitation areas and other waters re-establishment and rehabilitation areas.

As part of this MMP, Caltrans prepared construction-level grading plans and planting plans for the onsite and offsite mitigation areas. The grading plans include information on existing and

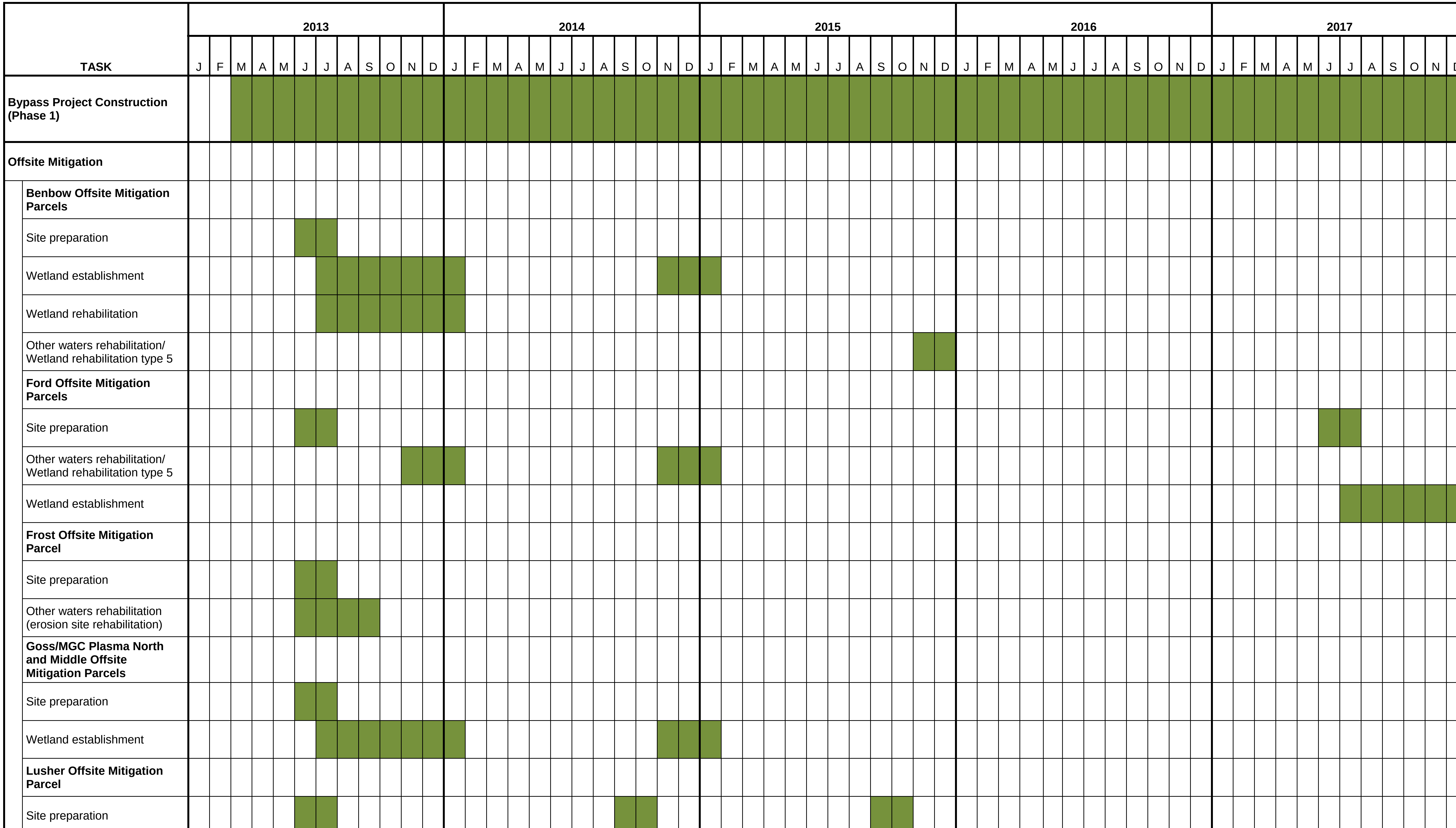


Figure 7-1. Mitigation Implementation Schedule

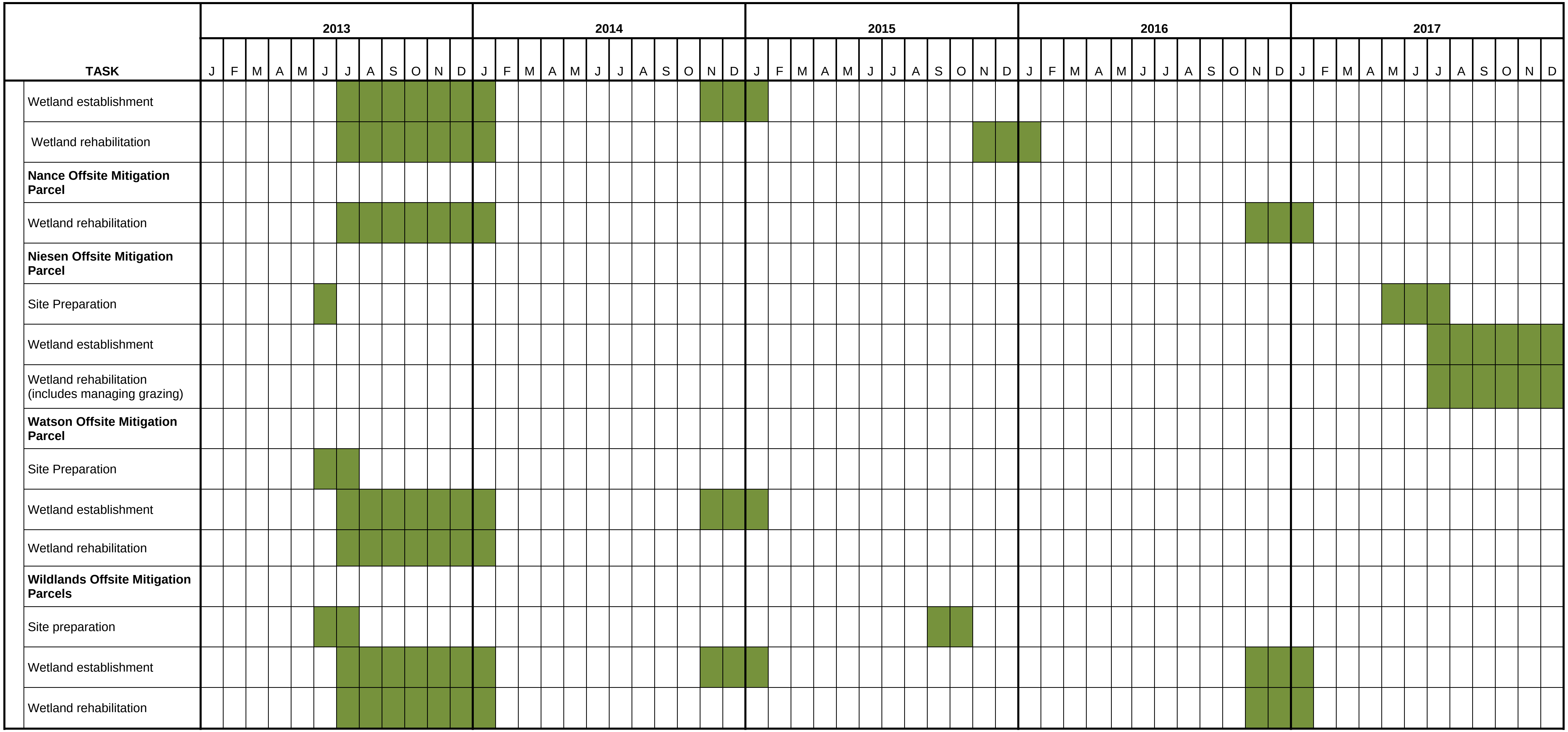


Figure 7-1. Mitigation Implementation Schedule[a] (continued)

proposed contours, representative cross sections, and construction details. The planting plans include plan view planting plans, plant and seed palettes, and planting details. These plans will form the basis for the mitigation construction plans and special provisions package that will be developed for contractor use in bidding and implementing the mitigation plans. The construction-level plans included in this MMP are shown in the following appendices.

- Appendix D presents planting plans for the onsite re-establishment areas.
- Appendix E presents grading and planting plans and for the offsite wetland establishment areas, planting plans for the wetland rehabilitation areas, and planting plans for the other waters rehabilitation mitigation areas.
- Appendix F presents grading and planting plans for the fish passage improvement projects on Haehl and Upp Creeks and the offsite headcut and erosion repair projects.

Note that units of measure (metric or English) vary in Appendices D–F for the grading and planting plans for offsite mitigation parcels.

7.1.1 Offsite Mitigation Design Approach

When determining the wetland mitigation potential at the offsite mitigation parcels, the following local habitat conditions at each parcel were evaluated in the field and from related literature.

- Jurisdictional and nonjurisdictional habitat types and characteristics—species composition and plant densities/cover information from existing habitat types were considered part of mitigation design efforts, including development of mitigation seed mixes and plant palettes and performance standards (Chapter 9).
- Soils and topography—soils information from wetland delineation reports, soil surveys, and field observations was used to identify appropriate wetland establishment and rehabilitation actions.
- Hydrology—in most cases, drainages on the offsite mitigation parcels are a combination of historical flow paths and modified alignments for improved drainage and simplified maintenance practices to control parcel hydrology, vegetation, and sediment accumulation. Modifying the hydrology of the parcels through the grading of some of these existing drainages will allow a longer residence time of surface water on the parcel to support wetland and riparian establishment efforts.
- Land use—the offsite mitigation parcels historically supported agriculture (e.g., livestock grazing, haying). Grazing and haying will be discontinued on the USACE-designated mitigation parcels.

7.1.1.1 Wetland Establishment Design Approach

Specifically, with respect to wetland establishment, the above information was used to develop the following design criteria.

- Establish a minimum of 49.58 acres of wet meadow wetlands on offsite mitigation parcels with appropriate soils and hydrology, as indicated by existing jurisdictional wet meadow wetlands located in the immediate vicinity of the proposed established wetlands. Tables 6-1 and 6-2 identify the wetland establishment acreage for each offsite mitigation parcel.
- Establish wet meadow wetlands that support similar native wetland plants and have a species richness and native species cover on par with existing jurisdictional wet meadow wetlands in the immediate vicinity of the proposed established wetlands.
- Establish wet meadow wetlands with a hydroperiod similar to that of existing jurisdictional wet meadow wetlands in the immediate vicinity of the proposed established wetlands.
- Minimize effects on sensitive biological resources (e.g., special-status plants, riparian habitat, jurisdictional wetlands, oak woodland) from wetland establishment activities.

7.1.1.2 Wetland Rehabilitation Design Approach

Specifically, with respect to wetland rehabilitation, the above information was used to develop the following design criteria.

- Rehabilitate a minimum of 344.63 acres of existing wetlands on offsite mitigation parcels. Tables 6-1 and 6-4 identify the wetland rehabilitation acreage for each offsite mitigation parcel.
- Develop plant palettes appropriate for each wetland rehabilitation mitigation unit based on unit-specific soils and hydrology.
- Rehabilitate wetlands with native wetland plants that occur in each rehabilitation mitigation unit or with other site-appropriate species.
- Minimize effects on sensitive biological resources (e.g., special-status plants, riparian habitat, jurisdictional wetlands, oak woodland) from wetland rehabilitation activities.

7.1.1.3 Other Waters Rehabilitation Design Approach

Specifically, with respect to other waters rehabilitation, the above information was used to develop the following design criteria.

- Rehabilitate a minimum of 18.0 acres of other waters on offsite mitigation parcels. Table 6-5 identifies the other waters rehabilitation acreage requirements.
- Implement other waters rehabilitation on three parcels (Figures 2-1a and 2-1b). Figure 7-2 presents a representative cross section of the other waters rehabilitation areas.
- Develop plant palettes for each other waters rehabilitation mitigation unit based on unit-specific soils and hydrology.
- Rehabilitate other waters with native wetland plants that occur in adjacent mitigation units or with other site-appropriate species.
- Minimize effects on sensitive biological resources (e.g., special-status plants, riparian habitat, jurisdictional wetlands, oak woodland) from other waters rehabilitation activities.

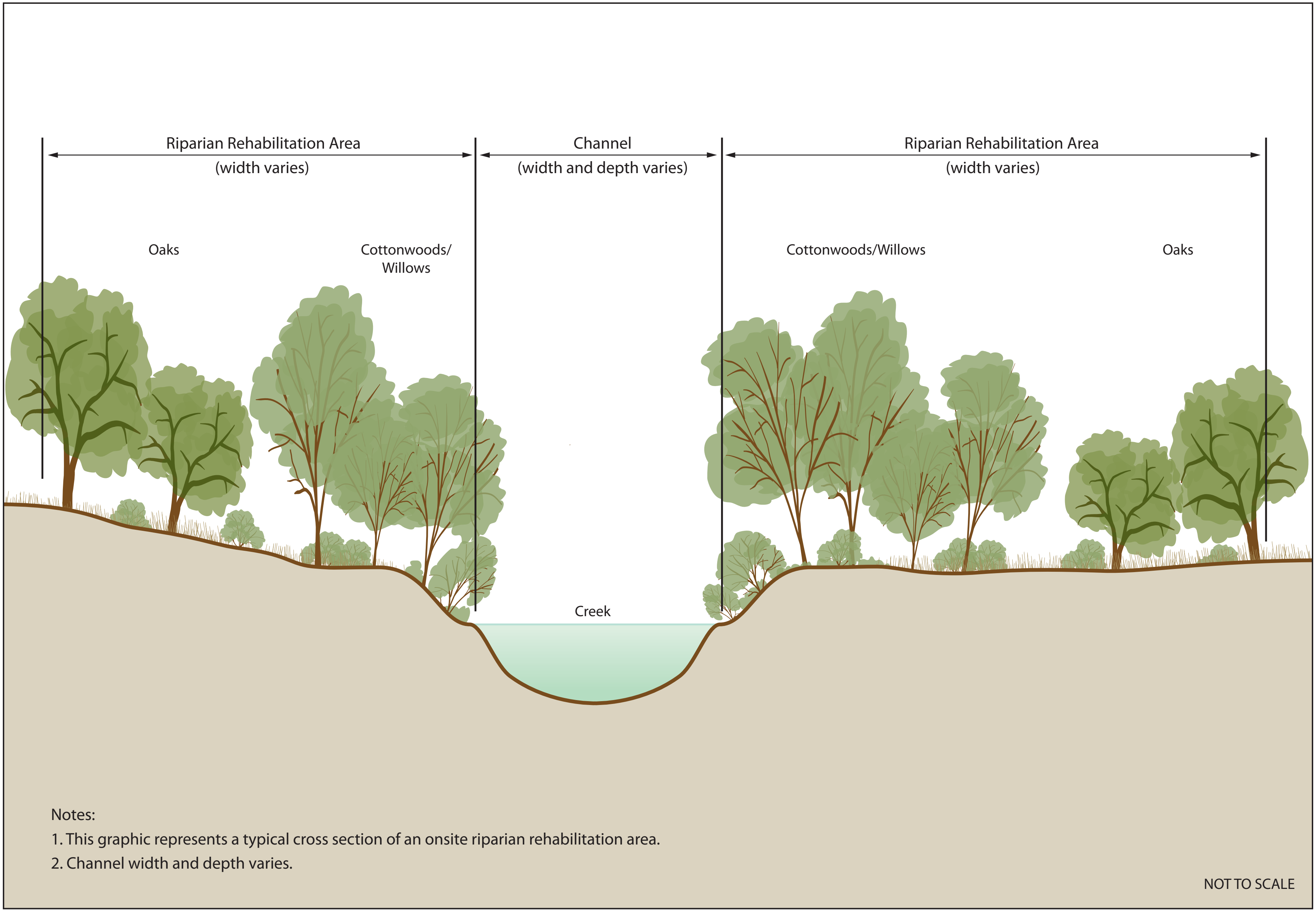


Figure 7-2
Typical Onsite Riparian Rehabilitation Area

7.1.2 Mitigation Implementation Schedule

Because of funding constraints, the project will be constructed in two phases. Phase 1 will construct a functional interim facility consisting of a two-lane highway and the interchanges at the south and north ends of the bypass. These two lanes will run the entire length of the project limits and will serve as the southbound lanes in the ultimate configuration under Phase 2. Phase 1 is expected to begin in fall 2012 and end in fall 2017, although major ground-disturbing activities are not expected to begin until spring 2013.

Phase 2 will construct the remaining two lanes—creating a full four-lane facility—when sufficient funding becomes available. Because only the two southbound lanes and interchanges will be constructed in Phase 1, per this MMP Caltrans will implement mitigation for the temporary and permanent impacts of Phase 1; mitigation for impacts resulting from Phase 2 will be identified at the time Phase 2 is permitted. Mitigation for Phase 1 of the project will be implemented concurrently with the beginning of Phase 1 construction.

Figure 7-1 shows the mitigation implementation schedule. It should be noted that the schedule stems from commencement of construction; if construction is delayed, the remainder of the schedule will be adjusted accordingly. Also, because of the size of the mitigation project and a finite availability of planting stock per season, planting schedules may be adjusted and phased as necessary, which will alter the schedule.

Construction of onsite mitigation will begin following completion of Phase 1 project construction and will be completed well before the start of Phase 2 project construction. Construction of onsite mitigation will occur in the footprint of the temporary disturbances and will not result in additional impacts on wetland habitat and sensitive biological resources.

Construction of offsite mitigation (mobilization and site preparation) will begin simultaneously with Phase 1 project construction and will be completed well before the start of Phase 2. Construction of offsite mitigation will be planned to minimize impacts on wetland habitat and sensitive biological resources (e.g., vegetation clearing associated with mitigation construction will be scheduled to reduce disruption of breeding and nesting birds). Excess overburden material from the Niesen offsite mitigation parcel will be removed and used for fill in the bypass alignment. Because the Niesen parcel will serve as a Phase 1 construction staging area, mitigation at this offsite parcel will be implemented near the end of Phase 1 construction.

7.2 Onsite Mitigation Implementation

Onsite mitigation implementation will focus on re-establishing temporarily affected wetland and other waters within the project footprint (Appendix D). In addition, onsite minimization efforts related to state-listed plant species and other sensitive resources will be required. Onsite mitigation actions will entail the following activities, discussed in detail below.

- Site preparation
- Grading

- Seeding
- Collecting and installing planting stock
- Inspecting construction
- Documenting as-built conditions

7.2.1 Site Preparation

Preparation of onsite mitigation sites will consist of these activities, discussed in detail below.

- Installing protective fencing around the perimeter of environmentally sensitive areas (ESAs).
- Clearing vegetation.
- Salvaging state-listed plant populations.

7.2.1.1 Environmentally Sensitive Area Fencing

Prior to construction, Caltrans will install protective fencing and, where necessary, silt fencing around ESAs to be avoided. Protective fencing will consist of orange, plastic-mesh fencing that is secured to metal t-posts and will be installed in accordance with the project construction documents. Silt fencing may be installed around avoided wetlands, both jurisdictional and nonjurisdictional drainages, and riparian habitat to prevent soil or sediment from entering the habitat. Silt fencing may be used in combination with protective fencing and will be installed in accordance with the project SWPPP to be prepared by the contractor and with BMPs specified in the project construction documents (see Section 7.3.2.1, Wetland Establishment, for more information on typical erosion control measures and BMPs).

7.2.1.2 Vegetation Clearing

The onsite mitigation areas occur in the footprint of the project construction temporary impact areas. Vegetation will be cleared by the construction contractor according to the clearing and grubbing specification in the project construction plans. Wetland and other waters will be re-established within the footprint of temporarily affected areas.

7.2.1.3 Preparing Wetland Topsoil Stockpile Areas

Wetland topsoil at a predetermined location (Quail Creek interchange area) where Baker’s meadowfoam occurs within the project footprint will be harvested and stockpiled for later use in topdressing the wetland establishment areas on the Watson East parcel (APN 037-221-30). Wetland topsoil will be stockpiled in upland areas on the MGC Plasma South parcel and moved to the Watson East parcel at the time of wetland construction. This parcel is owned by Caltrans but is not part of the proposed mitigation. The specific location of topsoil stockpile areas will be identified in the construction plans and specifications for contractor use. To prepare stockpile areas, existing ruderal vegetation will be removed and legally disposed of offsite at a landfill or other facility that accepts green waste.

7.2.1.4 Salvage of State-Listed Plant Populations

Baker's Meadowfoam

Prior to the beginning of ground-disturbing project construction activities, observed populations of Baker's meadowfoam to be affected by construction will be salvaged as plant duff and topsoil for relocation to the Watson East parcel (APN 037-221-30), where the harvested material will be used to topdress established wetlands at the parcel that are also potential Baker's meadowfoam habitat. The timing of salvage operations will be determined by a biological monitor.

Boundaries of observed populations will be identified and marked in the field using previously collected GPS data. The uppermost 1–2 inches of topsoil and plant duff will be harvested together and stockpiled at an appropriate site. The amount of salvaged topsoil/duff will not exceed the amount that is needed at the Watson East parcel (approximately 4,483 cubic yards). Topsoil/duff stockpiles will be stored separately from other grading spoils. The topsoil/duff will be stored at ambient temperatures and protected from rainfall. It is expected that salvaged topsoil/duff stockpiles will be reapplied within a season; if the timeframe is longer, additional management of the stockpiles may be necessary to maintain seed viability.

7.2.2 Grading

Temporarily affected locations will be graded as necessary to re-establish appropriate topography and site drainage. The disturbed locations will be configured to replicate preproject conditions as closely as possible, based on topography as described in the bypass project construction documents. These plans contain the preproject elevations that will be used to guide the recontouring effort to establish preproject conditions. These plans will be provided to USACE as a stand-alone submittal at the time the MMP is submitted.

Erosion control seed mixes will be applied after grading is complete but before the onset of wet season rains to prevent loosened material/sediment from entering wetlands or waters near the project footprint.

7.2.3 Seeding

Temporarily affected wetland and other waters locations will be seeded with an erosion control seed mix or a wet meadow seed mix, depending on their position in the project footprint. Based on availability, seed will be collected using the following hierarchy: (1) Little Lake Valley, (2) Outlet Creek Basin, and (3) Eel River watershed. All temporarily affected other waters locations and wetland locations outside the viaduct construction area will be seeded with an erosion control seed mix (Appendix D). Temporarily affected wetlands in the viaduct construction area will be seeded with a wet meadow seed mix (Appendix D). The seed mixes (Tables 7-3 and 7-4) may be revised based on seed availability at the time of mitigation construction and seed application. The seed mixes will comprise those species identified as target species by USACE (Table 7-5) and possibly other native wetland plants suitable for wetland re-establishment.

The erosion control seed mix and wet meadow seed mix will be applied using standard drill seeding or hydroseeding techniques. Drill seeding works best when applying seed to large areas that have a simple shape (e.g., square or rectangle). Hydroseeding can be used in a variety of areas. After hydroseeding, mulch (e.g., sterile rice straw or an approved weed-free equivalent) will need to be applied to protect the seed until it germinates. The mulch material will be of high quality (not musty, moldy, caked, or of otherwise low quality). The use of mulch that contains invasive plants will not be permitted.

Straw mulch material will be stabilized using a mulch crimper or equivalent straw anchoring tool. The crimper will be straight and capable of firmly punching the mulch into the soil. Hand methods will be used to anchor the straw where crimping equipment cannot be operated safely. Straw mulch material also may be stabilized using a suitable tackifier. If a tackifier is used, it will be applied uniformly over the mulch material at the specified rate.

Table 7-3 Wet Meadow Seed Mix for Wetland Re-Establishment Areas

Scientific Name	Common Name	Wetland Indicator Status (Reed 1988)	Application Rate (Kilograms Pure Live Seed/Hectare)
Agrostis exarata	Spike bentgrass	FAC	1.1
Alopecurus aequailis	Short-awned foxtail	OBL	1.1
Alopecurus saccatus	Pacific foxtail	OBL	4.5
Carex densa	Dense sedge	OBL	1.1
Carex nebrascensis	Nebraska sedge	OBL	1.1
Danthonia californica	California oatgrass	FACW	2.2
Deschampsia danthoniodes	Annual hairgrass	FACW	2.2
Euthamia occidentalis	Western goldenrod	OBL	2.2
Hordeum brachyantherum ssp. *Californicum*	California barley	FACW	13.4
Juncus bolanderi	Bolander's rush	OBL	2.2
Juncus effusus	Bog rush	OBL	1.1
Juncus patens	Spreading rush	FAC	1.1
Juncus xiphioides	Iris-leaved rush	OBL	2.2
Lasthenia glaberrima	Smooth goldfields	OBL	2.2
Leymus triticoides	Creeping wildrye	FAC	2.2
		Total	**39.90**

Table 7-4. Erosion Control and Upland Seed Mix for Disturbed Areas Adjacent to Wetland Re-Establishment Areas

Scientific Name	Common Name	Wetland Indicator Status (Reed 1988)	Application Rate (Kilograms Pure Live Seed/Hectare)
Achillea millefolium	Common yarrow	FACU	3.4
Bromus carinatus var. *carinatus*	California brome	UPL	10.1
Clarkia purpurea ssp. *quadrivulnera*	Four-spot	UPL	1.1
Danthonia californica	California oatgrass	FACW	1.1
Elymus glaucus ssp. *glaucus*	Blue wildrye	FACU	5.6
Eschscholzia californica	California poppy	UPL	1.1
Festuca californica	California fescue	FACU	3.4
Hordeum brachyantherum ssp. californicum	California barley	FACW	10.1
Lotus purshianus var. *purshianus*	Spanish lotus	UPL	4.5
Lupinus bicolor	Miniature lupine	UPL	5.6
Nassella pulchra	Purple needlegrass	UPL	10.1
		Total	**56.1**

7.2.4 Planting Stock Collection and Installation

Temporarily affected wetland and other waters locations in the onsite mitigation area will be planted using container stock, cuttings, and/or seeds (i.e., acorns). The seed mixes will be composed of those species identified as target species by USACE (Table 7-5) and possibly other native wetland plants suitable for wetland re-establishment. Container plants will be planted at the re-established wet meadow wetland mitigation sites (Table 7-6). Container plants, cuttings, and acorns will be planted at the re-established other waters and forested wetland mitigation sites (Table 7-7). Trees will not be planted directly under the viaduct or bridges where they will interfere with the structure and require continual tree trimming or removal. Only shrubs and herbaceous vegetation will be planted under the viaduct or bridges.

Planting density for wet meadow wetland re-establishment sites will be at approximately 5 feet on center. Planting density for riparian and forested wetland re-establishment sites will be at approximately 10 feet on center. The plant palettes for the wetland and other waters re-establishment areas are provided in Appendix D.

Table 7-6. Wet Meadow Plant Palette for Wetland Re-Establishment Areas

Scientific Name	Common Name	Plant Material Type and Size	Percent of Planting Mix Per Stratum	Wetland Indicator Status (Reed 1988)
Carex athrostachya	Slender beak sedge	Tree band	5	FACW
Carex densa	Dense sedge	Tree band	10	OBL
Carex nebrascensis	Nebraska sedge	Tree band	5	OBL
Carex praegracillis	Field sedge	Tree band	5	FACW
Carex subbracteata	Small bract sedge	Tree band	5	FACW
Carex tumulicola	Foothill sedge	Tree band	5	FAC
Hordeum brachyantherum var. *brachyantherum*	Meadow barley	Tree band	10	FACW
Juncus bolanderi	Bolander's rush	Tree band	5	OBL
Juncus effusus	Soft rush	Tree band	10	OBL
Juncus balticus	Baltic rush	Tree band	10	OBL
Juncus xiphioides	Iris-leaved rush	Tree band	10	UPL
Leymus triticoides	Creeping ryegrass	Tree band	5	FAC
Note: Plant density will be 5 feet on center.				

Table 7-7. Plant Palette for Other Waters Re-Establishment Areas

Vegetation Stratum	Scientific Name	Common Name	Plant Material Type and Size	Percent of Planting Mix Per Stratum	Wetland Indicator Status (Reed 1988)
Tree	*Acer negundo*	Box elder	Treepot	15	FACW
	Alnus rhombifolia	White alder	Treepot	10	FACW
	Fraxinus latifolia	Oregon ash	Treepot	15	FACW
	Populus fremontii ssp. *Fremontii*	Fremont cottonwood	Treepot, cutting	10	FACW
	Quercus garryana	Oregon white oak	Treepot, acorn	10	UPL
	Quercus lobata	Valley oak	Treepot, acorn	20	FAC
	Salix laevigata	Red willow	Treepot, cutting	10	FAC
	Salix lasiolepis	Arroyo willow	Treepot, cutting	10	FACW
Shrub	*Cornus sericea*	Red-twig dogwood	Treepot	10	FACW
	Rosa californica	California rose	1 gallon	20	FAC
	Ribes sanguineum	Red-flowering currant	1 gallon	10	UPL
	Rubus leucodermis	White bark raspberry	1 gallon	10	FAC
	Rubus parviflorus	Thimbleberry	1 gallon	10	FAC
	Rubus spectabilis	Salmonberry	1 gallon	10	FAC+
	Rubus ursinus	Wild blackberry	1 gallon	10	FACW
	Sambucus mexicana	Blue elderberry	Treepot	10	FAC
	Vitis californica	Wild grape	1 gallon	10	FACU
Note: Planting density for riparian container plants will be approximately 10 feet on center.					

7.2.4.1 Container Plant Propagation and Installation

Caltrans will contract with a plant nursery experienced with the propagation of native herbaceous and woody plants to propagate container plants for mitigation efforts. The type of propagation material collected will depend on the species and may be seeds (e.g., acorns) and/or root stock. Based on availability, seeds and/or root stock will be collected using the following hierarchy: (1) Little Lake Valley, (2) Outlet Creek Basin, and (3) Eel River watershed. Standard horticultural collection procedures will be used.

Container plants will be planted at the re-established wetland mitigation sites and at the re-established other waters mitigation sites (Tables 7-6 and 7-7). Container plants will be planted in fall/winter after rainfall has saturated the soil to a depth of approximately 10 inches. Container plants will be placed in a planting hole that is twice the width of, and no deeper than, the container. Planting holes will be hand excavated or augered. If planting holes are augered, the sides will be scarified to allow roots to more easily penetrate the surrounding soil. Soil removed when the planting hole is created will be used as backfill and in constructing a watering basin. (Appendix D).

Before planting, the container plant's root mass will be inspected, and any matted, dead, diseased, or twisted roots will be pruned. Inspection and pruning will take place quickly because exposure to the air results in loss of root hairs. Care will be taken during pruning to avoid excessive loss of root mass.

Container plants will be placed in the planting hole so that the root collar is slightly above the desired final grade with the top of the first major root barely visible at the surface. Fertilizer will not be applied during container plant installation. As soil is backfilled, it will be worked around the roots so that they are not compressed into a tight mass but are spread out and are supported by the new soil beneath them. After each 3 to 4 inches of soil has been placed in the hole, the soil will be tamped around the roots with foot or hand pressure, with care taken not to damage the roots.

Watering basins will be constructed around all container plants except those planted in the viaduct construction area, and plant protection cages may be installed to minimize herbivory. A 3-inch layer of bark mulch (this mulch could come from chipped woody vegetation removed as part of vegetation clearing activities [Section 7.2.1.2, Vegetation Clearing]) will be placed in each watering basin to reduce soil evaporation rates and help suppress weed growth.

Container plants will be watered immediately after planting. Container plants will be inspected after initial watering to ensure that they have not settled. Any container plants that have settled will be adjusted so the appropriate length is exposed above ground.

7.2.4.2 Riparian Cutting Collection and Installation

Caltrans will collect willow and cottonwood cuttings to be planted at the re-established other waters or forested wetland mitigation sites (Table 7-6). Cuttings will be collected from source material using the following hierarchy: (1) Little Lake Valley, (2) Outlet Creek Basin, and (3) Eel River watershed. Standard horticultural collection procedures will be used in a manner that minimizes impacts on both the source material and the cuttings. Cuttings will be collected from various source materials to ensure the genetic diversity and viability of the cuttings. Diseased or unhealthy source material will be avoided.

Cutting collection and installation will occur in December and/or January. All cuttings will be hardened-off green wood. Cuttings will be a minimum of 3 feet long and will be tapered from a minimum of 0.5 inch to a maximum of 2.5 inches in diameter. Cuttings will be cut at a right angle at the wide end of the cutting (Appendix D).

Immediately after harvesting, the leaves, branches, and twigs will be carefully removed from each cutting to avoid damage to buds on the cutting. The cuttings then will be wrapped in burlap or other approved material that protects them from sunlight and allows air circulation within the bundle. The bundled cuttings will be maintained in cool wet storage until just before planting, and will be planted within 24 hours of collection.

Planting holes will be excavated for all cuttings. Cuttings will be installed vertically, with the narrow end exposed and two thirds of the cutting buried belowground to ensure the development of adequate root mass. Fertilizer will not be applied during cutting installation. Watering basins will be constructed around cuttings, and plant protection cages will be installed to minimize herbivory. A 3-inch layer of bark mulch (this mulch could come from chipped woody vegetation removed as part of vegetation clearing activities [Section 7.2.1.2, Vegetation Clearing]) will be placed in each watering basin to reduce soil evaporation rates and help suppress weed growth.

Cuttings will be watered immediately after planting and will be inspected after watering to ensure that they have not settled. Any cuttings that have settled will be adjusted so the appropriate length is exposed aboveground.

7.2.4.3 Acorn Collection and Installation

Caltrans will collect acorns to be planted at the re-established riparian mitigation sites. Acorns will be collected from source material using the following hierarchy: (1) Little Lake Valley, (2) Outlet Creek Basin, and (3) Eel River watershed. Acorns will be collected from various source materials to ensure the genetic diversity and viability of the acorns. Diseased or unhealthy source material will be avoided.

Acorns will be planted in the fall/winter after rainfall has saturated the soil to a depth of approximately 10 inches. The planting area will be scraped to loosen the top 1 inch of the soil. Three acorns will be planted at each planting area. Acorns will be placed horizontally in the center of the planting area, 0.5 inch to a maximum of 1 inch below finish grade, in a 9-inch equilateral triangle (Appendix D). Fertilizer will not be applied during acorn installation.

Watering basins may be constructed around all acorn plantings, and plant protection cages may be installed to minimize herbivory. A 3-inch layer of bark mulch (this mulch could come from chipped woody vegetation removed as part of vegetation clearing activities [Section 7.2.1.2, Vegetation Clearing]) will be placed in each watering basin to reduce soil evaporation rates and help suppress weed growth. The bark mulch should not be placed directly on top of the acorns (to prevent the acorns from developing mildew and losing their viability).

Acorn plantings will be watered immediately after planting.

7.2.4.4 Plant Watering

The goal of watering will be to provide sufficient water to successfully establish deep-rooted plants that are able to survive without supplemental irrigation. Caltrans will water woody and non-woody plants in the re-established wetland and other waters mitigation sites after planting and during the 3 year post-construction plant establishment maintenance period using an irrigation system, a water truck, or other appropriate method as necessary to ensure survival and meet performance standards. Those areas that received the erosion control seed mix only (i.e., no container plants, cuttings, or acorns were planted) will not be watered. Watering frequency and application rates are discussed in Chapter 8. The need to water individual plants or planting areas will be determined on a case-by-case basis (e.g., if a plant area remains saturated much of the year, plant watering may not be necessary).

Small isolated re-establishment sites may be truck-watered because the installation of an irrigation system might not be practical; larger re-establishment sites may be watered using a temporary drip irrigation system. Potential water sources are existing agricultural wells and City water lines (many of the creeks in Little Lake Valley are intermittent and, as such, cannot be used as a reliable water source). Water may be pulled directly from a well or water line or stored in large plastic tanks and pumped through a delivery system.

7.2.5 Construction Inspections

Caltrans will conduct progress inspections of the habitat re-establishment efforts to ensure that onsite mitigation is fully and properly completed. Areas not meeting the implementation standards outlined above will be reevaluated and replanted as necessary. At a minimum, Caltrans will perform inspections at the following critical stages of mitigation implementation.

- Placement and installation of ESA protective fencing.
- Installation of erosion control measures and use of BMPs.
- Site preparation/vegetation clearing operations.
- Salvage of wetland topsoil and seed material.
- Grading operations, including placement of stockpiled wetland topsoil.
- Seeding and planting operations.
- Irrigation system installation (if applicable) and initial plant watering.

7.2.6 Documentation of As-Built Conditions

Within 45 days from the completion of onsite habitat re-establishment efforts, Caltrans will submit a complete set of as-built drawings to USACE. The as-built drawings will be prepared using MicroStation (version 7 or later) software and will be at the same scale as the construction drawings. The as-built drawings will be prepared following standard landscape architecture protocols and practices. The as-built drawings will depict the features listed below.

- Re-established habitat, including planted and seeded areas.
- Updated plant palettes, including species, plant material type (e.g., tree band, 1 gallon, cutting, acorn), and number of plants planted by species.
- Updated seed mix, including application rates.
- Plant watering method, including water source identification, delivery system design, and application rates.
- Fences, gates, and access roads.
- Final elevations of re-establishment areas that were disturbed during bypass construction (this information may not be available within the 45-day requirement but will be provided when it becomes available).
- Other pertinent mitigation features.

7.3 Offsite Mitigation Implementation

Compensatory mitigation for impacts on wetlands and other waters will be accomplished through a combination of establishment and rehabilitation on the offsite mitigation parcels. These mitigation actions are defined in Chapter 2 and presented again in this section. Offsite mitigation parcels and associated mitigation actions are shown in Appendices C, E, and F. Mitigation actions, by offsite mitigation parcel, are listed in Table 7-2. A narrative summary of the information provided in these Appendices and Table 7-2 is presented below.

As described in Chapter 6, a mitigation credit scale was developed in coordination with USACE. The credit values vary depending on the mitigation action and the level of intensity used to rehabilitate existing wetlands. Section 7.3.1 defines the location and mitigation implementation measures associated with each category, and Section 7.3.2 defines the establishment and rehabilitation actions. The following sections describe the acreage and credit terminology used in Section 7.3.1.

For the purpose of the Group 1 and Group 2 wetland establishment discussions in this section, the acreage represents the total footprint of wetland establishment acreage for each parcel, less the acreage of temporary impacts associated with wetland grading. This acreage value is used in this section to identify the total acreage of wetland that will be established, not just the amount of wetland establishment that will be permitted (i.e., wetland construction will result in the establishment of 49.58 acres and Caltrans will receive 28.94 wetland establishment credits [an approximate 1.7:1 credit ratio]). Table 6-2 is a crosswalk table that identifies the calculation used to determine the amount of wetland establishment credit available on each parcel. Appendix C includes a crosswalk table that has the following information regarding wetland acreage and credits.

- The acreage of the total grading footprint (the wetland establishment acreage plus the temporary impact acreage).
- The acreage available for wetland establishment credit (the total grading footprint less the temporary impact acreage).
- The mitigation credit ratio (1:1 or 0.3:1).
- The available wetland establishment credit.

For the purpose of the Type 1–5 wetland rehabilitation discussions in this section, the acreage represents the total footprint of wetland rehabilitation acreage for each parcel. This acreage value is used in this section to identify the total acreage of existing wetland on which rehabilitation will be implemented, not just the amount of wetland rehabilitation that will be permitted (i.e., wetland rehabilitation actions will occur on 344. 63 acres and Caltrans will receive 61.29 wetland rehabilitation credits [an approximate 5.6:1 credit ratio]). Table 6-4 is a crosswalk table that identifies the steps used to determine the amount of wetland rehabilitation credit available on each parcel. Appendix C includes a crosswalk table that includes the following information regarding wetland acreage and credits.

- The acreage of each rehabilitation unit for each parcel.
- The mitigation credit ratio (0.05:1, 0.1:1, 0.2:1, or 0.3:1).
- The available wetland rehabilitation credit.

As stated above, compensatory mitigation for impacts on other waters will be accomplished by implementation rehabilitation actions. Appendices C and E and Figures 2-1a and 2-1b identify the location of Section 404 other waters mitigation areas. Section 404 other waters mitigation will occur on three of the offsite mitigation parcels (i.e., Ford APN 108-010-06, Ford APN 108-010-05, and Wildlands APN 108-060-01). The Section 404 other waters mitigation areas are identified in Appendix C and on Figures 2-1a and 2-1b.

7.3.1 Mitigation Actions by Offsite Mitigation Parcel

This section identifies mitigation actions proposed for each offsite mitigation parcel and the mitigation units associated with each parcel. Additional detail is provided for those offsite mitigation parcels where Group 1 and 2 wetland establishment is proposed. A description of Type 1–5 rehabilitation actions is provided in Chapter 6 (Section 6.3.1.3) and Section 7.3.2.2. Additional information regarding mitigation techniques that will be used to implement the mitigation actions is provided in subsequent sections. The following tables, figures, and appendices provide information on the location of existing resources, mitigation actions, and mitigation acreage.

- Table 6-2 identifies the establishment mitigation acreage for each offsite mitigation parcel.
- Table 6-4 identifies the rehabilitation mitigation acreage for each offsite mitigation parcel.
- Appendix B identifies sensitive biological resources in the bypass alignment and associated impacts.

- Appendix C identifies the location of jurisdictional wetlands and the mitigation actions for the offsite mitigation parcels. Figures 2-1a and 2-1b also identify the location of the mitigation actions for the offsite mitigation parcels.
- Appendix E identifies the design plans for offsite establishment and rehabilitation. The mitigation construction plans and special provisions will include further details.
- Appendix F identifies the design plans for stream repair at Haehl and Upp Creeks in the project footprint and erosion control and headcut repair sites on the offsite mitigation parcels.
- Appendix J provides the hydrology and soil memoranda, dated July 29, 2010, and August 10, 2010, respectively, a follow-up response memo for the Group 1 wetland establishment sites, and the results of a soil survey performed in December 2011 at the Group 2 wetland establishment sites.

7.3.1.1 Benbow (APN 007-020-03)

The mitigation goals for this Benbow parcel are wetland rehabilitation (Figures 2-1a and 2-1b, Appendices C and E).

Wetland Rehabilitation

Wetland rehabilitation will be accomplished by removing grazing from the entire parcel and implementing Type 2 and Type 3 rehabilitation actions totaling 17.13 acres (Appendix C, Table 6-4). Type 2 rehabilitation actions (11.45 acres) will be implemented over the majority of the wet meadow. Type 3 rehabilitation actions (5.68 acres) will be implemented in wet meadow adjacent to the riparian corridor on the east side of the parcel.

7.3.1.2 Benbow (APN 007-010-04)

The mitigation goals for this Benbow parcel are wetland rehabilitation and (Figures 2-1a and 2-1b, Appendices C and E).

Wetland Rehabilitation

Wetland rehabilitation will be accomplished by removing grazing from the entire parcel and implementing Type 2 and Type 3 rehabilitation actions totaling 23.27 acres (Appendix C, Table 6-4). Type 2 rehabilitation actions (18.57 acres) will be implemented over the majority of the wet meadow. Type 3 rehabilitation actions (4.70 acres) will be implemented in wet meadow adjacent to riparian corridor on the east side of the parcel.

7.3.1.3 Benbow (APN 108-040-13)

The mitigation goals for this Benbow parcel are wetland establishment and wetland rehabilitation (Figures 2-1a and 2-1b, Appendices C and E).

Wetland Establishment

Wetland establishment at this parcel will consist of Group 2 wetland establishment totaling 1.65 acres. Three wet meadow units will be established on this parcel (Appendix C, Table 6-2). The grading and planting plans for offsite wetland establishment are presented in Appendix E.

The wetland establishment areas are small inclusions of existing uplands within the wet meadow complex that will be lowered to match, or be slightly lower than, the elevation of adjacent wetland habitat and will be seasonally saturated or inundated by rainfall and/or groundwater. The NRCS soil survey indicates that the soil unit in all three wetland establishment areas is the same as the adjacent wet meadow.

A soil survey was performed in December 2011 for the largest of the three proposed wetlands. The soil survey results, presented in Appendix J, indicate that the soils at this location are suitable for wetland establishment. The detailed soil evaluation assigned a wetland establishment suitability rating of high to this parcel. The soil was inferred to have moderate permeability with loam or light clay loam textures throughout. The soil will be a light clay loam at and just below the planned finish grade and therefore will be suitable for wetland establishment.

The newly graded wetlands will be tied into existing topographic contours. The excess soil from grading will be disposed of offsite. The established wetlands will be seeded and planted with native wetland species. An unstable headcut in a seasonal swale also will be rehabilitated and planted to reduce sedimentation to downstream sources.

Wetland Rehabilitation

Wetland rehabilitation will be accomplished by removing grazing from the entire parcel and implementing 32.23 acres of Type 2 rehabilitation actions on all of the existing wet meadow (Appendix C, Table 6-4).

7.3.1.4 Benbow (APN 108-030-07)

The mitigation goal for this Benbow parcel is wetland rehabilitation (Figures 2-1a and 2-1b, Appendices C and E).

Wetland rehabilitation will be accomplished by removing grazing from the southern portion of the parcel and implementing 19.57 acres of Type 3 rehabilitation actions (Appendix C, Table 6-4). Isolated stands of Himalayan blackberry and other nonnative weeds on the west side of the rehabilitation area will be targeted for control and removal and replaced with native wetland species.

7.3.1.5 Benbow (APN 108-020-06)

The mitigation goal for this Benbow parcel is wetland establishment (Figures 2-1a and 2-1b, Appendices C and E).

Wetland establishment at this parcel will consist of Group 2 wetland establishment totaling 1.34 acres (Appendix C, Table 6-2). Three wet meadow units will be established on this parcel. Figure 7-3 provides a graphic representation of wetland establishment efforts for the largest of the three wet meadow units, which extends onto two adjacent Wildlands parcels. The grading and planting plans for offsite wetland establishment are presented in Appendix E. The majority of the wetland establishment areas are small inclusions of existing uplands within the wet meadow complex that will be lowered to match, or be slightly lower than, the elevation of adjacent wetland habitat and will be seasonally saturated or inundated by rainfall and/or groundwater. The NRCS soil survey indicates that the soil unit in all three wetland establishment areas is the same as the adjacent wet meadow.

A small berm also will be removed. The berm is approximately 1,600 feet long and ranges from 1 to 3 feet in height (Appendix E). Based on anecdotal information provided by John Ford, the berm was constructed by a previous landowner to reduce floodflow onto this parcel by training it back toward Davis Creek. Removal of the berm will not result in adverse effects on existing or established wetlands because the topography from Davis Creek and the west side of this parcel slopes gently to the west and will not result in high velocity overbank events or significant sediment deposition.

A soil survey was performed in December 2011for the largest of the three proposed wetlands. The soil survey results, presented in Appendix J, indicate that the soils at this location are suitable for wetland establishment. The detailed soil evaluation assigned a wetland establishment suitability rating of medium-high to this parcel. The soil was inferred to generally have moderate permeability, but with a moderate to high permeability in part of the depth range of 11 to 19 inches because of the presence of fine loamy sand material. However, the soil will be a moderately permeable loam at and just below finish grade and therefore suitable for wetland establishment.

7.3.1.6 Ford (APN 108-010-05)

The mitigation goals for this Ford parcel are wetland rehabilitation and other waters rehabilitation. These rehabilitation actions will be accomplished in part by removing grazing from the Davis Creek corridor (Appendix C, Table 6-4).

Wetland Rehabilitation

Wetland rehabilitation will be accomplished by removing grazing and implementing 6.44 acres of Type 5 rehabilitation actions on the southern portion of Davis Creek.

Other Waters Rehabilitation

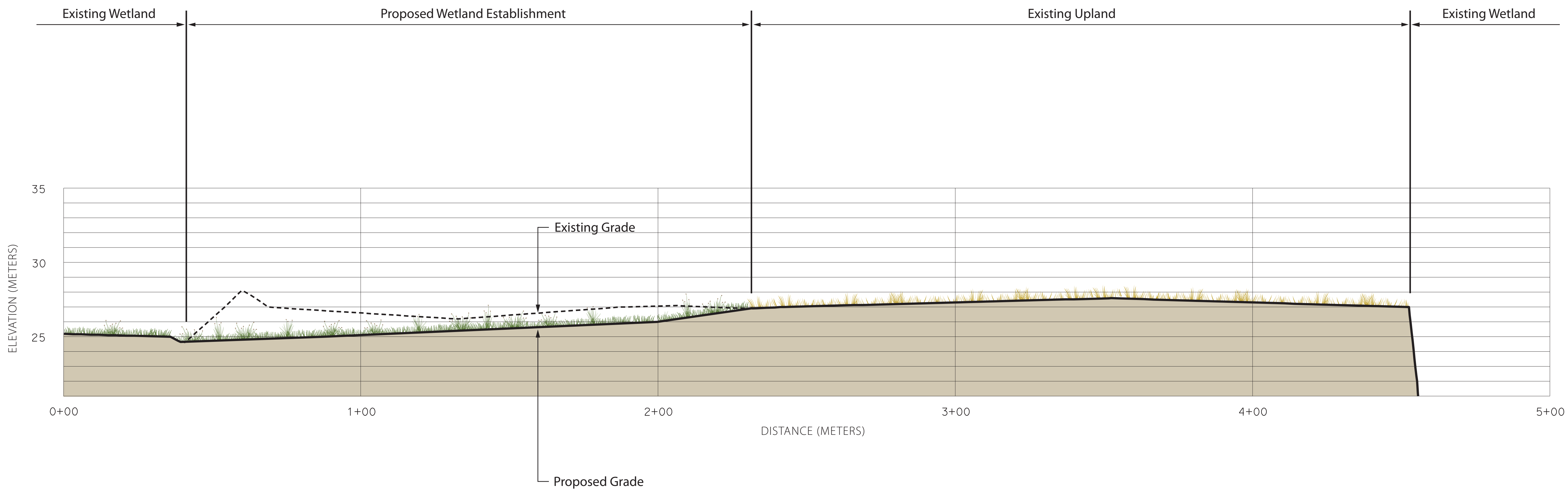
Other waters rehabilitation will be accomplished by removing grazing and implementing 5.05 acres of others waters rehabilitation on the northern portion of Davis Creek (Appendix C). Native riparian vegetation will be planted in the riparian corridor.

7.3.1.7 Ford (APN 108-010-06)

The mitigation goals for this Ford parcel are wetland establishment, wetland rehabilitation, and other waters rehabilitation.

Wetland Establishment

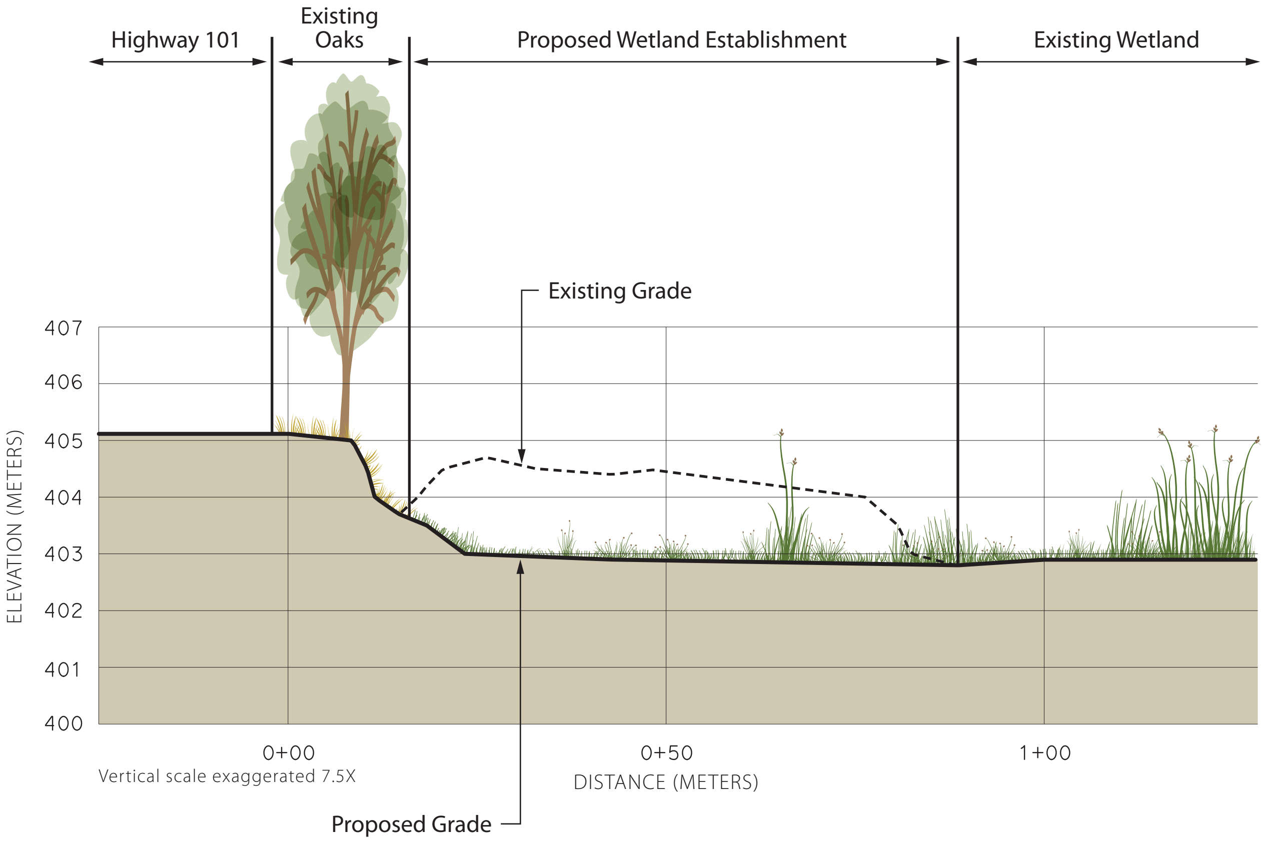
Wetland establishment at this parcel will consist of Group 1 wetland establishment totaling 2.14 acres. The wet meadow unit will be established adjacent to US 101 (Appendix C, Table 6-2). Figure 7-4 provides a graphic representation of wetland establishment efforts at the Ford parcel. The grading and planting plans for offsite wetland establishment are presented in Appendix E.



Notes:

1. Existing grade will be lowered to proposed grade to establish wetland.
2. This graphic is based on grading plans prepared by Caltrans included as Appendix E.

Figure 7-3
Wetland Establishment at Benbow (APN 108-020-06) and Wildlands Parcel (APNs 108-020-07 and 108-060-01)
Willits Bypass Project



Notes:

1. Existing grade will be lowered to proposed grade to establish wetland.
2. This graphic is based on grading plans prepared by Caltrans included as Appendix E.

Figure 7-4
Wetland Establishment at Ford Parcel (APN 108-010-06)
Willits Bypass Project

As described in Section 5.3.4.5 in Chapter 5, Baseline Information, the existing soil at this parcel and in the area to be graded is composed mostly of Haplaquepts (0–1% slopes) and a small area of Pinole gravelly loam (2–8% slopes) alongside US 101. Haplaquepts are very poorly drained soils that are typically clay loam and silt clay loam throughout the profile. Pinole gravelly loam is a well-drained soil made up of gravelly loam from 0 to 10 inches, gravelly clay loam from 10 to 37 inches, and sandy clay loam and gravelly sandy clay loam from 37 to 61 inches depth. Based on a review of the NRCS soil survey and the wetland delineation results for this Ford parcel, existing wet meadow and mixed marsh occur on both the Haplaquept and Pinole soil map units (Wildlands 2008). The Pinole map unit also supports upland habitat. The wetland delineation did not include site-specific soil data points at the wetland establishment site. This parcel remains ponded into the late spring and has saturated soil conditions that provide wetland hydrology. This is evidenced by the existing jurisdictional wetlands that surround the wetland establishment site.

As described in Section 5.1.3 in Chapter 5, Baseline Information, groundwater hydrology in Little Lake Valley is related to the aquifer underlying the valley. The upper portion of the aquifer occurs in alluvium that is composed of silt, clay, gravel, and sand (Farrar 1986). The presence of sheets of fine-grained sediments causes much of the aquifer to be confined or semiconfined. Based on well elevations and the presence of the large marsh at the northern end of Little Lake Valley, it is very likely that the upper portion of the water table is close to the ground surface. Overall, in Little Lake Valley, including this parcel, it is difficult to determine with certainty that the water is not perched on impermeable layers located above the main aquifer. If the water is perched, the primary source of water to support the wetlands on this Ford parcel is rainfall (average annual precipitation of 50 inches per year) and surface runoff. If the water represents the upper portion of the main aquifer, the wetlands on the Ford parcel are supported by the aquifer as a whole. In either case, the presence of seasonally ponded wetlands adjacent to the wetland establishment site indicates that water is available for wetland establishment.

Wetland Rehabilitation

Wetland rehabilitation will be accomplished by implementing 1.32 acres of Type 5 rehabilitation actions on portions of Outlet Creek.

Other Waters Rehabilitation

Other waters rehabilitation will be accomplished by implementing 11.10 acres of others waters rehabilitation on Outlet Creek (Appendix C), as well as repairing the eroding bank sections along Outlet Creek (Appendix C, Table 6-4).

Surface hydrology at this Ford parcel appears to be influenced by rainfall, overflow from adjacent drainages, and seasonal high groundwater. Old Outlet Creek and Wild Oat Canyon Creek form the eastern and southern boundaries, respectively, of the existing wetland complex. High flows in the creeks seasonally inundate the wetlands. This wetland complex also occurs in the northern portion of Little Lake Valley where a lake historically formed during the rainy season, even during very low rainfall years (Dean 1920). As part of wetland establishment actions at the Ford parcel, current hydrology will be altered to allow greater overland flow from an artificial drainage adjacent to the wetland establishment site.

Wetland establishment will be accomplished by grading an upland overburden area adjacent to existing wet meadow and mixed marsh habitat in the northeast corner of the parcel to establish additional wet meadow habitat. The established wetland will be tied into existing topographic contours and will be excavated (by 0 to 6.17 feet) to a grade comparable to adjacent wetlands to provide seasonal inundation to a depth of 6–12 inches. No topsoil importation is planned for the wetland as existing topsoil from the graded area will be harvested (approximately the top 4 inches) and stockpiled for later use in topdressing the established wetland. The use of existing topsoil to topdress the established wetland, which currently is dominated by upland species, will not result in the reintroduction of nonnative upland species because the established wetland hydrology will preclude establishment of nonnative upland species. Topsoil will be stockpiled in upland areas outside ESA boundaries.

7.3.1.8 Ford (APN 108-020-04)

The mitigation goals for this Ford parcel are wetland establishment, wetland rehabilitation, and other waters rehabilitation (Figures 2-1a and 2-1b, Appendices C and E).

Wetland Establishment

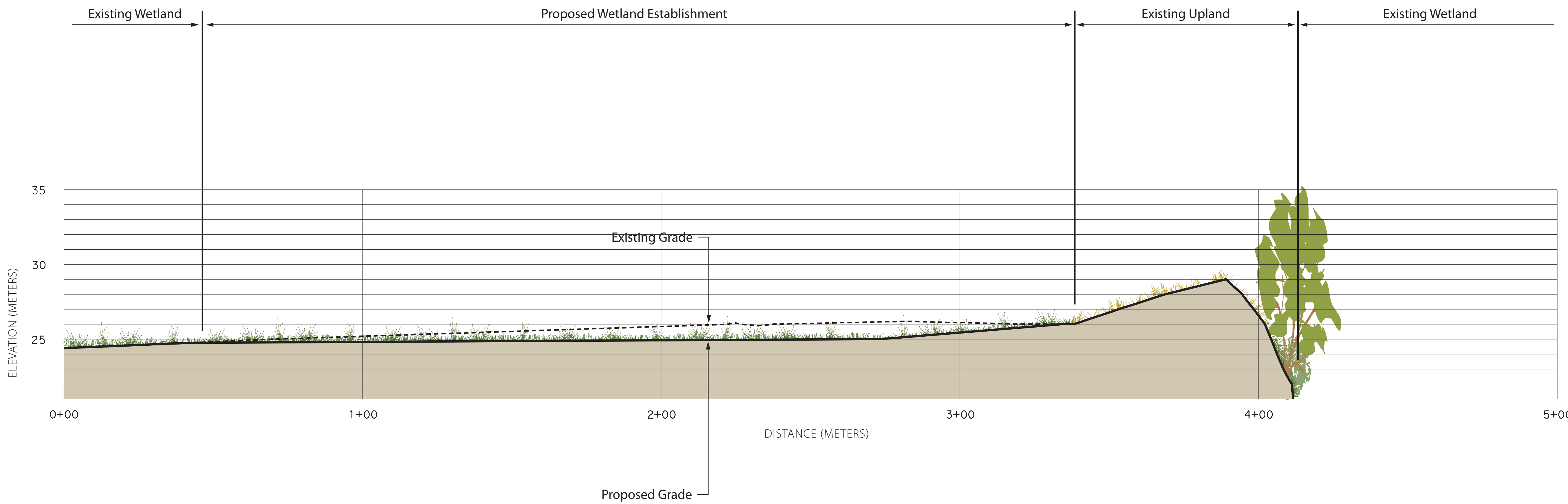
Wetland establishment at this parcel will consist of Group 2 wetland establishment totaling 6.48 acres (Appendix C, Table 6-4). The established wetland footprint will extend from the north end of this parcel south onto the adjacent Ford parcel (APN 108-030-02). The grading and planting plans for offsite wetland establishment are presented in Appendix E. Figure 7-5 provides a graphic representation of wetland establishment efforts at these parcels.

The wetland establishment area is an area of existing upland between a wet meadow complex and the riparian corridor. The upland appears to be composed of both a low, natural levee and fill material placed to widen the natural levee. The established wetland footprint will extend from the north end of this parcel south onto the adjacent Ford parcel (APN 108-030-02).

Wetland grading will consist of lowering a portion of this upland to match, or be slightly lower than, the elevation of the adjacent wet meadow located to the west. The wetland establishment area is expected to support wet meadow because the established wetland will share surface and groundwater characteristics similar to those of the existing wet meadow (i.e., it will be seasonally saturated or inundated by rainfall and/or is subject to a seasonal shallow groundwater table). The newly graded wetlands will be tied into existing topographic contours. The excess soil from grading will be disposed of offsite. The established wetlands will be seeded and planted with native wetland species.

Preliminary and detailed soil evaluations were performed on this parcel by a soil scientist in August and December 2011, respectively. A geomorphologist also participated in the survey to evaluate the condition of the existing land surface and its feasibility to establish wetlands.

Seven shallow pit soil profiles (preliminary soil evaluation) were described, four of which were placed in existing uplands, and the remaining three soil pits were located in the adjacent wet meadow to serve as reference areas. The soil profile and site description forms are provided in Appendix J. The evaluation results indicated that the soil type and range of soil characteristics in



Notes:

1. Existing grade will be lowered to proposed grade to establish wetland.
2. This graphic is based on grading plans prepared by Caltrans included as Appendix E.

Figure 7-5
Wetland Establishment at Ford Parcel (APN 108-020-04)
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the proposed wetland establishment area are similar to the range of soils in the adjacent wet meadow.

Seven backhoe pit profiles (detailed soil evaluation) were described, all of which were placed in existing uplands. The soils in this parcel were assigned a wetland establishment suitability rating ranging from low-medium to high. Some of the soils were inferred to have moderate permeability at or just below finish grade (for example, profile Q), and therefore suitable for wetland establishment. However, profiles N and O contained loamy sand or very gravelly sand layers that would exist at or just below the planned finish grade elevation. Such layers were determined to be excessively permeable, such that wetlands established in and near these locations could be subject to excessive lateral movement of in-profile water toward Outlet Creek.

Consequently, the grading plan that covers this parcel was revised to exclude areas in the vicinity of profiles N and O from the proposed mitigation.

Wetland inundation surveys were performed at the offsite mitigation parcels during December 2010 through May 2011. Based on preliminary inundation survey results, reported in a baseline report prepared by Caltrans (2011), the majority of the adjacent wetland was inundated for at least 1 month with some areas ponded for 2 months. Approximately one half of the uplands proposed for wetland establishment also were inundated for at least 1 month. The wetland inundation surveys did not assess soil saturation, but it is presumed that some of the upland soils also may have been saturated for an extended period of time during the winter of 2010–2011. The wetland inundation maps for the offsite mitigation parcels are presented in Appendix M.

The proposed establishment site also was surveyed by a geomorphologist to evaluate the condition of the existing land surface and its feasibility to establish wetlands. The eastern extent of this established wetland will be approximately 75 feet from the top of bank on Outlet Creek. Based on the proposed grading limit it was determined that the proposed grading area would not encroach on, lower, or impair the existing natural levee. The geomorphologist also evaluated the area for the potential for overbank flow and sediment deposition. Based on this assessment, the extreme north end of the proposed wetland area was dropped from consideration. The proposed wetland boundary reflects this assessment.

Wetland Rehabilitation

Wetland rehabilitation will be accomplished by removing grazing from portions of the parcel and implementing Type 3, Type 4, and Type 5 rehabilitation actions totaling 17.13 acres (Appendix C, Table 6-4). Type 3 rehabilitation actions (16.56 acres) will be implemented at two locations. Type 4 rehabilitation actions (10.31 acres) will be implemented in wet meadow in the southwest portion of the parcel. Type 5 rehabilitation actions (0.71 acre) will be implemented on a portion of Outlet Creek.

7.3.1.9 Ford (APN 108-030-02)

The mitigation goals for this Ford parcel are wetland establishment and wetland rehabilitation (Figures 2-1a and 2-1b, Appendices C and E).

Wetland Establishment

Wetland establishment at this parcel will consist of Group 2 wetland establishment totaling 1.18 acres (Appendix C, Table 6-4). The established wetland footprint will extend from this parcel to the north end of the adjacent Ford parcel (APN 108-020-04). Figure 7-5 provides a graphic representation of wetland establishment efforts at these parcels. The wetland establishment area is an area of existing upland between a wet meadow complex and the riparian corridor. The grading and planting plans for offsite wetland establishment are presented in Appendix E.

Preliminary and detailed soil evaluations were performed on the parcel by a soil scientist in August and December 2011, respectively. A geomorphologist also participated in the survey to evaluate the condition of the existing land surface and its feasibility to establish wetlands.

Five shallow soil pit profiles (preliminary soil evaluation) were described, four of which were placed in existing uplands, and the remaining pit was located in the adjacent wet meadow to serve as a reference area. The soil profile and site description forms are provided in Appendix J. The evaluation results indicated that with the exception of pits 1b, 2b, and 4b, the soil type and range of soil characteristics in the proposed wetland establishment area are similar to the range of soils in the adjacent wet meadow.

Five backhoe pit profiles (detailed soil evaluation) were described, all of which were placed in existing uplands. Soils in this parcel were assigned wetland establishment suitability ratings ranging from low to high. Some of the soils were inferred to have moderate permeability at or just below finish grade (for example, profile V) and therefore suitable for wetland establishment. However, profiles Y, 1b, 2b, and 4b contained loamy sand and pebbly layers that would exist at or just below the planned finish grade elevation. Such layers were determined to be excessively permeable, such that wetlands established in and near these locations could be subject to excessive lateral movement of in-profile water toward Outlet Creek.

Consequently, the grading plan that covers this parcel was revised to exclude areas in the vicinity of profile Y, 1b, 2b, and 4b from the proposed mitigation.

The proposed establishment site also was surveyed by a geomorphologist to evaluate the condition of the existing land surface and its feasibility to establish wetlands. The eastern extent of this established wetland will be approximately 75 feet from the top of bank on Outlet Creek. Based on the proposed grading limit, it was determined that the proposed grading area would not encroach on, lower, or impair the existing natural levee. The geomorphologist also evaluated the area for the potential for overbank flow and sediment deposition; no concerns were identified.

Wetland inundation surveys were performed at the offsite mitigation parcels during December 2010 through May 2011. Based on preliminary inundation survey results, reported in a baseline report prepared by Caltrans (2011), the majority of the adjacent wetland was inundated for at least 1 month with some areas ponded for 2 months. Approximately one half of the uplands proposed for wetland establishment also were inundated for at least 1 month. The wetland inundation surveys did not assess soil saturation, but it is presumed that some of the upland soils also may have been saturated for an extended period of time during the winter of 2010–2011. The wetland inundation maps for the offsite mitigation parcels are presented in Appendix M.

Wetland Rehabilitation

Wetland rehabilitation will be accomplished by removing grazing from most of the parcel and implementing Type 3 and Type 4 rehabilitation actions totaling 27.17 acres (Appendix C, Table 6-4). Type 3 rehabilitation actions (13.05 acres) will be implemented in wet meadow on the west side of the parcel, and Type 4 rehabilitation actions (14.66 acres) will be implemented in wet meadow on the east side of the parcel.

7.3.1.10 Ford (APN 108-030-05)

The mitigation goal for this Ford parcel is wetland rehabilitation (Figures 2-1a and 2-1b, Appendices C and E).

Wetland Rehabilitation

Wetland rehabilitation will be accomplished by removing grazing from the entire parcel and implementing 61.75 acres of Type 3 rehabilitation actions (Appendix C, Table 6-4).

7.3.1.11 Frost (APN 108-070-04)

The mitigation goal for the Frost parcel is other waters rehabilitation. Other waters rehabilitation will be accomplished by repairing a complex of headcuts to reduce sedimentation to Berry Creek (Appendix C). The headcut repair area will be permanently fenced to exclude cattle. Rehabilitation actions include grading channel banks to lessen the slope and installing in-channel grade control structures. The rehabilitation areas will be seeded and planted with native species. The grading and planting plans for the headcut repair areas are presented in Appendix E.

7.3.1.12 Goss (APN 103-230-02)

The mitigation goal for the Goss parcel is wetland establishment. A Group 1 wetland, totaling 7.47 acres, will be established that will span portions of three parcels: Goss, MGC Plasma Middle, and MGC Plasma North. Wetland establishment for this mitigation unit is discussed in detail in Section 7.3.1.14, MGC Plasma Middle. The grading and planting plans for offsite wetland establishment are presented in Appendix E.

7.3.1.13 Lusher (APN 108-030-04)

The mitigation goals for this parcel are wetland establishment and wetland rehabilitation (Figures 2-1a and 2-1b and Appendices C and E).

Wetland Establishment

Wetland establishment at this parcel will consist of Group 2 wetland establishment totaling 5.22 acres (Appendix C, Table 6-2). The grading and planting plans for offsite wetland establishment are presented in Appendix E. Figure 7-6 is a graphic representation of wetland establishment efforts at this parcel. The wetland establishment area is an area of existing upland between a wet meadow complex and the riparian corridor.

Wetland grading will consist of lowering a portion of this upland to match, or be slightly lower than, the elevation of the adjacent wet meadow located to the west. The wetland establishment area is expected to support wet meadow because the established wetland will share surface and groundwater characteristics similar to those of the existing wet meadow (i.e., it will be seasonally saturated or inundated by rainfall and/or is subject to a seasonal shallow groundwater table). The newly graded wetlands will be tied into existing topographic contours. The excess soil from grading will be disposed of offsite. The established wetlands will be seeded and planted with native wetland species.

Preliminary and detailed soil evaluations were performed on the parcel by a soil scientist in August and December 2011, respectively. A geomorphologist also participated in the survey to evaluate the condition of the existing land surface and its feasibility to establish wetlands.

Four shallow soil pit profiles were described, three of which were placed in existing upland, and the remaining pit was located in the adjacent wet meadow to serve as reference area. The soil profile and site description forms are provided in Appendix J. The survey results indicate that the soil type and range of soil characteristics in the proposed wetland establishment area are similar to the range of soils in the adjacent wet meadow.

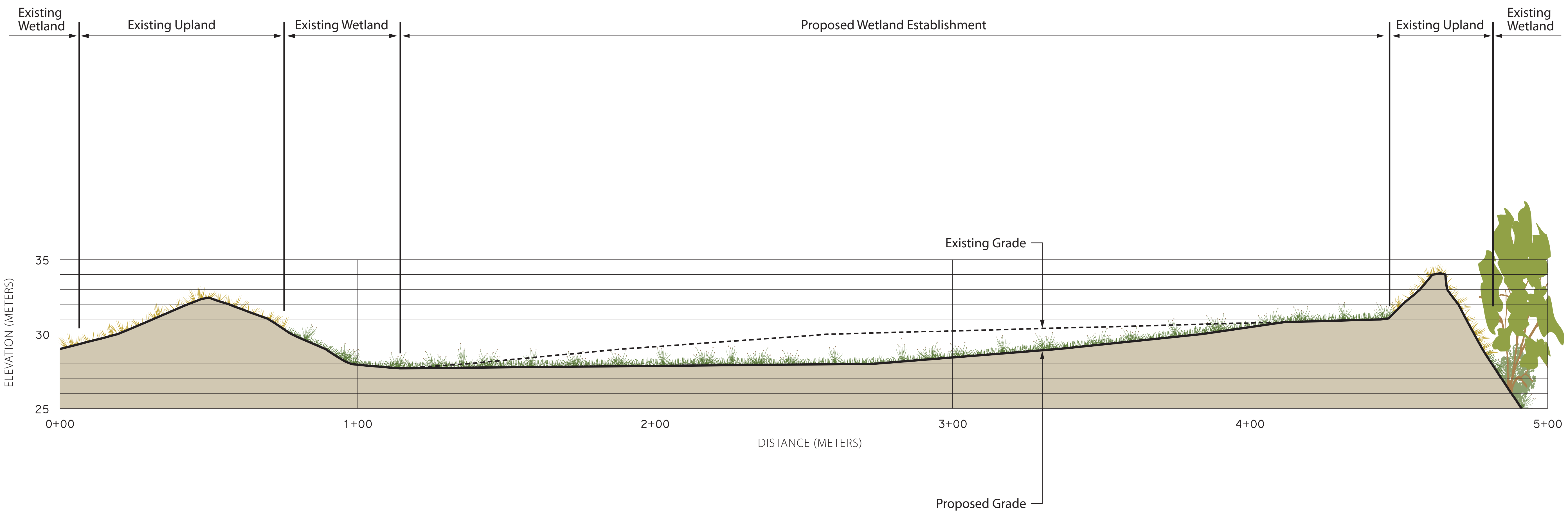
Five backhoe pit profiles (detailed soil evaluation) were described, four of which were placed in existing uplands and the remaining pit (CC) was located at the base of the natural levee along Outlet Creek to provide information on the continuity with highly permeable layers observed in pit BB. Soils in this parcel were assigned suitability ratings ranging from low-medium to high. Some of the profiles were inferred to have moderate permeability at or just below finish grade (for example, profile Z) and therefore suitable for wetland establishment. However, profiles AA and BB contained continuous gravelly sand, fine loamy sand, and very gravelly sand layers that would exist at or just below the planned finish grade elevation. Such layers were determined to be excessively permeable, such that wetlands established in and near these locations could be subject to excessive lateral movement of in-profile water toward Outlet Creek.

Consequently, the grading plan that covers this parcel was revised to exclude areas in the vicinity of profiles AA and BB from the proposed mitigation. Wetland inundation surveys were performed for the offsite mitigation parcels during December 2010 through May 2011. Based on preliminary inundation survey results, reported in a baseline report prepared by Caltrans (2011), the portions of the adjacent wetland were inundated for 2 to 4 months. Portions of the uplands proposed for wetland establishment were inundated for at least 1 to 2 months. The wetland inundation surveys did not assess soil saturation, but it is presumed that some of the upland soils also may have been saturated for an extended period of time during the winter of 2010–2011. The wetland inundation maps for the offsite mitigation parcels are presented in Appendix M.

The proposed establishment site also was surveyed by a geomorphologist to evaluate the condition of the existing land surface and its feasibility to establish wetlands. It was determined that the proposed grading area would not encroach on, lower, or impair the existing levee. The geomorphologist also evaluated the area for the potential for overbank flow and sediment deposition; no concerns were identified.

Wetland Rehabilitation

Wetland rehabilitation will be accomplished by removing grazing from portions of the parcel and implementing 18.04 acres of Type 3 rehabilitation actions (Appendix C, Table 6-4).



Notes:

1. Existing grade will be lowered to proposed grade to establish wetland.
2. This graphic is based on grading plans prepared by Caltrans included as Appendix E.

Figure 7-6
Wetland Establishment at Lusher Parcel (APN 108-030-04)
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Other Waters Rehabilitation

Other waters rehabilitation will be accomplished by removing grazing and repairing headcuts. Two unstable headcuts in a seasonal swale also will be re-established and planted to reduce sedimentation to downstream sources. Appendix E presents the grading and planting plans for the headcut repair areas.

7.3.1.14 MGC Plasma Middle (APN 103-250-14)

The mitigation goal for the MGC Plasma Middle parcel is wetland establishment and rehabilitation.

Wetland Establishment

Wetland establishment at MGC Plasma (includes both Middle and North parcels) and Goss offsite mitigation parcels will consist of Group 1 wetland establishment totaling 7.47 acres. This wetland will span portions of all three parcels (1:1 mitigation credit will be applied to this established wetland). Figure 7-7 is a graphic representation of wetland establishment efforts at the MCG Plasma/Goss parcels. The grading and planting plans for offsite wetland establishment are presented in Appendix E.

As described in Section 5.3.9.3 in Chapter 5, Baseline Information, the soils at these parcels and in the area to be graded are composed of Gielow sandy loam (0–5% slopes), Cole clay loam (0–2% slopes), and Clear Lake clay (0–2% slopes). Gielow sandy loam is a somewhat poorly drained soil with sandy loam from 0 to 4 inches, loam from 4 to 11 inches, and stratified sandy to clay loam from 11 to 60 inches deep. Cole clay loam is a somewhat poorly drained soil with clay loam from 0 to 8 inches, silty clay from 41 to 60 inches, and silty clay loam from 41 to 60 inches depth. Clear Lake clay is a poorly drained soil with clay from 0 to 49 inches and clay loam from 49 to 65 inches depth. The soil’s moderate or slow permeability and poor drainage allow seasonal inundation and saturated soil conditions during the rainy season, thereby providing conditions for wetland hydrology. This is evidenced by the existing jurisdictional wetlands that surround the wetland establishment site.

As described in Section 5.1.3, groundwater hydrology in Little Lake Valley is related to the aquifer underlying the valley. The upper portion of the aquifer occurs in alluvium that is composed of silt, clay, gravel, and sand (Farrar 1986). The presence of sheets of fine-grained sediments causes much of the aquifer to be confined or semiconfined. Overall in Little Lake Valley, including these parcels, it is difficult to determine with certainty that the water is not perched on impermeable layers located above the main aquifer. If the water is perched, the primary source of water to support the wetlands on these parcels is rainfall (average annual precipitation of 50 inches per year) and surface runoff. If the water represents the top of the main aquifer, the wetlands on these parcels are supported by the aquifer as a whole. In either case, the presence of seasonally saturated wetlands adjacent to the established wetland site indicates that water is available for wetland establishment.

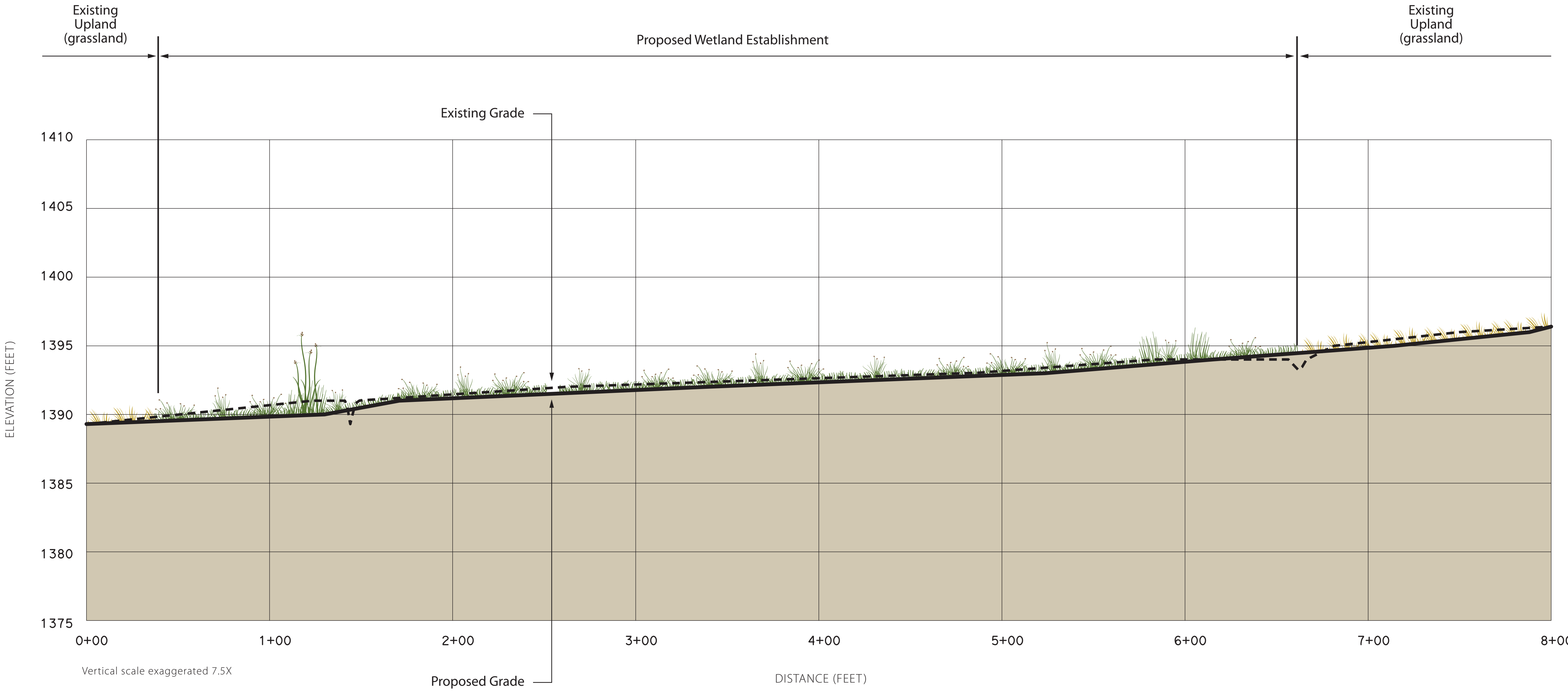
Test pits were dug, and groundwater monitoring wells have been installed at the MCG Plasma North/Goss parcels as part of studies related to North Coast semaphore grass (Caltrans 2010). The test pits, dug during March 2010, generally found water within 10 inches of the soil surface. The monitoring wells at the wetland establishment sites found water within 12 inches of the soil surface during April 2010 and within 29 inches of the soil surface during May 2010, indicating that water levels remain close to the soil surface through a large portion of the spring. The results from the test pits and groundwater monitoring wells indicate that water likely would be present in the wetlands through May during wet years. Results from the wetland delineation surveys indicate that during drier years the wetlands may be dry as early as May. This timeframe is appropriate for hydrology to support wet meadow.

Surface hydrology at these parcels and in the area to be graded includes artificial drainages that drain water from the parcels into adjacent streams and other drainages. On the Goss parcel, hydrology currently is influenced by a series of artificial drainages apparently intended to drain sufficient surface water away from the center of the parcel to enable hay production and livestock grazing. These drainages form the western, southern, and eastern boundaries of the parcel, generally directing surface water flows from south to northwest. An additional artificial drainage bisects the parcel, draining surface water from southeast to northwest, and includes a corrugated metal culvert that allows equipment to access the south end of the parcel for mowing. It appears that excavation of this feature has allowed the northeast corner of the Goss parcel to develop into or to remain upland.

As part of wetland establishment actions at the Goss parcel, the surface water hydrology will be altered. Artificial drainages, ranging from approximately 6 inches to1 foot deep, will be regraded into wider, shallower swales. The swales will continue to drain water in the same direction, but will reduce runoff times and increase the residence time of water on the parcel. Additionally, some of the surface flow in the swales will be redirected into established depressional wetlands that will be located adjacent to the swales and to the existing wet meadow complex. Areas of slightly higher elevations will be lowered to tie together the existing swales and established swales. One large swale wetland complex will be established.

On the MGC Plasma parcels, a remnant stream channel is apparent that likely flowed through the two MGC Plasma parcels from southeast to northwest. As part of wetland establishment actions at the MGC Plasma parcels, the current hydrology will be altered. Artificial drainages, ranging from approximately 6 inches to 1 foot deep, occur at several locations on these parcels and will be regraded into wider, shallower swales or converted to wet meadow. The swales will continue to drain water in the same direction, but will reduce runoff times and increase the residence time of water on the parcel.

Wetland establishment will be accomplished by grading uplands adjacent to existing wet meadow to establish additional wet meadow habitat. The newly graded wetland will be tied into existing topographic contours. The established wetland will be excavated to a depth comparable to adjacent wetlands (average range of 0 to 1.16 feet). No topsoil importation is planned for the wetland because existing topsoil from the graded area will be harvested (approximately the top 4 inches) and stockpiled for later use in topdressing the established wetland. Topsoil will be stockpiled in upland areas outside ESA boundaries. The excess soil from grading will be disposed of offsite.



Notes:

1. Existing grade will be lowered to proposed grade to establish wetland.
2. This graphic is based on grading plans prepared by Caltrans included as Appendix E.

Figure 7-7
Wetland Establishment at MGC Plasma Middle and North Parcels (APN 103-230-06) and Goss Parcel (APN 103-230-02)

Wetland Rehabilitation

Wetland rehabilitation will be accomplished by removing grazing from two existing wet meadows on the east side of the parcel and implementing 1.28 acres of Type 4 rehabilitation actions (Appendix C, Table 6-4).

7.3.1.15 MGC Plasma North (APN 103-230-06)

The mitigation goal for the MGC Plasma North parcel is wetland establishment. The mitigation goal for this parcel is wetland establishment. A Group 1 wetland, totaling 7.47 acres, will be established that will span portions of three parcels: Goss, MGC Plasma Middle, and MGC Plasma North. Wetland establishment for this mitigation unit is discussed in detail in Section 7.3.1.14, MGC Plasma Middle. The grading and planting plans for offsite wetland establishment are presented in Appendix E.

7.3.1.16 Nance (APN 103-230-06)

The mitigation goals for the Nance parcel are wetland rehabilitation.

Wetland Rehabilitation

Wetland rehabilitation will be accomplished by removing grazing from and widening the riparian corridors adjacent to Berry Creek and implementing 3.49 acres of Type 5 rehabilitation (Appendix C, Table 6-4). Native riparian vegetation will be planted in the riparian corridor.

7.3.1.17 Niesen (APN 108-050-06)

The mitigation goal for the Niesen parcel is wetland establishment and wetland rehabilitation.

Wetland Establishment

Wetland establishment at the Niesen parcel will consist of Group 1 wetland establishment totaling 5.12 acres. The wet meadow will be established adjacent to US 101. The grading and planting plans for offsite wetland establishment are presented in Appendix E. Figure 7-8 provides a graphic representation of wetland establishment efforts at this parcel.

Wetland establishment will be accomplished by grading an upland overburden area to match the elevation of adjacent wet meadow habitat and establish additional wet meadow habitat. The newly graded wetland will be tied into existing topographic contours. The established wetland will be excavated to a depth comparable to adjacent wetlands to provide seasonal soil saturation. The average depth of excavation will range from 0 to approximately 12 feet.

A soil scientist conducted a soil evaluation to determine proposed wetland establishment site suitability in July 2010. Soil pits were excavated at the wetland establishment site, the adjoining existing wetlands, and near the wetland reference monitoring site. Soil pits at the wetland establishment site were excavated to a depth below the proposed wetland soil surface elevation. Appendix J includes a memorandum (dated August 10, 2010) that presents the results of the soil evaluation for the Niesen parcel, as well as the other Group1 wetlands establishment areas.

The evaluation of existing wetlands that occur adjacent to the wetland establishment site indicates that the existing wetlands occur on an overall planar alluvial fan and alluvial plain. The wetlands exist below the elevated “bench” of the establishment site. Based on the five pit excavations made in the existing wetlands, the subsoils are mostly clay loam; one had a clay subsoil in which the upper boundary is 12 inches beneath the surface. All of the soils had redox features beginning within 3 inches of the surface (Appendix J) and all had redox features in the subsoil, suggesting the presence of a seasonal high water table. The existing wetlands appear to be sustained primarily by a high water table.

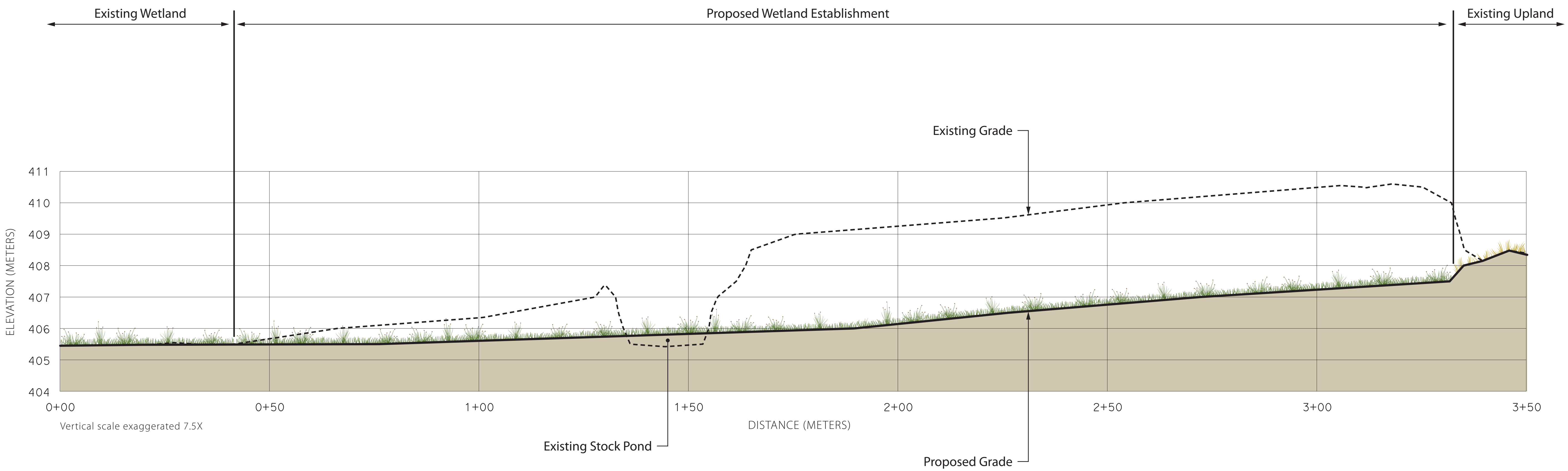
Gravelly to loamy fill material, ranging from 6 to 99 inches thick, was observed in most of the pits excavated in the upland overburden present at the wetland establishment site (Appendix J). Two pits had fill material mixed into the surface layer of the native soil, and in two pits no fill material was detected. The native soil beneath the fill material ranged from silt loam to silty clay loam. The depth to the upper boundary of the native soil appeared to be roughly level with that of the surrounding existing wetlands. Redox features were observed in most of the native soils below the fill material. In the pit located downslope of the stock pond, groundwater was observed at 40 inches depth. It is assumed that this water was a result of seepage from the pond.

All the sites were rated as having a medium or higher suitability, because native alluvial, marsh-type soil exists at the elevation of the proposed finish grade, and most have redox features in the buried topsoil layer. It is expected that once wetland construction is complete, the established wetland will be sustained primarily by a high water table.

No topsoil importation is planned for the wetland because existing topsoil from the graded area will be harvested (approximately the top 4 inches) and stockpiled for later use in topdressing the established wetland. The use of existing topsoil for the established wetland, which is dominated by upland species, will not result in the reintroduction of nonnative upland species because the established wetland hydrology will preclude establishment of nonnative upland species. Topsoil will be stockpiled in upland areas outside ESA boundaries. Caltrans has determined that the excess soil from grading will be suitable for fill material within the project footprint.

As described in Section 5.1.3, groundwater hydrology in Little Lake Valley is related to the aquifer underlying the valley. The upper portion of the aquifer occurs in alluvium that is composed of silt, clay, gravel, and sand (Farrar 1986). The presence of sheets of fine-grained sediments causes much of the aquifer to be confined or semiconfined. Overall in Little Lake Valley, including this parcel, it is difficult to determine with certainty that the water is not perched on impermeable layers located above the main aquifer. If the water is perched, the primary source of water to support the wetlands on this parcel is rainfall (average annual precipitation of 50 inches per year) and surface runoff. If the water represents the top of the main aquifer, the wetlands on this parcel are supported by the aquifer as a whole. In either case, the presence of seasonally saturated wetlands adjacent to the established wetland site indicates that water is available for wetland establishment.

Surface hydrology at the Niesen parcel and in the area to be graded is variable. In general, rainfall either percolates into the soil or occurs as surface runoff that flows downslope to an adjacent wet meadow. The hydrology will be altered as part of wetland establishment actions. As described below the land surface will be lowered to match the elevation of the existing adjacent



Notes:

1. Existing grade will be lowered to proposed grade to establish wetland.
2. This graphic is based on grading plans prepared by Caltrans included as Appendix E.

Figure 7-8
Wetland Establishment at Niesen Parcel (APN 108-040-02)
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wet meadow. The land surface will slope gently to the north from the southern property boundary. An existing swale will be modified so that some of the drainage flows overland to support the established wet meadow. Additional surface hydrology will be provided by rainfall and surface runoff from the slope area east of existing US 101.

Wetland Rehabilitation

Wetland rehabilitation will be accomplished by removing grazing from the parcel and implementing 1.47 acres of Type 4 rehabilitation actions at two locations adjacent to the established wetland (Appendix C, Table 6-4).

7.3.1.18 Watson East (APN 037-221-30)

The mitigation goal for the Watson East parcel is wetland establishment and wetland rehabilitation.

Wetland Establishment

Wetland establishment at the Watson East parcel will include the establishment of Group 1 and Group 2 wet meadow. Group 1 wetland establishment will include the establishment of 7.03 acres of wet meadow. Group 2 wetland establishment at the Watson East parcel will consist of the establishment of 1.69 acres of wet meadow. The Group 2 wetlands are in existing upland in a wet meadow complex, and the wetland design will be similar to the design for the Group 1 wetlands. These areas will be lowered to match, or be slightly lower than, the elevation of adjacent wetland habitat and will be seasonally saturated or inundated by rainfall and/or groundwater. Figure 7-9 provides a graphic representation of the Group 1 wetland establishment efforts at the Watson East parcel. The grading and planting plans for offsite wetland establishment are presented in Appendix E.

A soil scientist conducted a soil evaluation to determine proposed Group 1 wetland establishment site suitability in July 2010. Soil pits were excavated at the wetland establishment site, the adjoining existing wetlands, and near the wetland reference monitoring site. Soil pits at the wetland establishment site were excavated to a depth below the proposed wetland soil surface elevation. Appendix J includes a memorandum (dated August 10, 2010) that presents the results of the soil evaluation for the Niesen parcel, as well as the other Group1 wetlands establishment areas. A soil evaluation was not performed for the two small Group 2 wetlands. Wetland establishment at these sites consists of lowering two small linear upland features that are presumed to have been artificially created based on their size and the surrounding land form. Soil suitability is inferred based on the wetland delineation results that identified the land surrounding these berms as wetland.

The Group 1 wetlands were presented in the 2010 MMP. As described in Section 5.3.13.3, existing soil at this parcel and in the area to be graded is composed of Feliz clay loam, gravelly substratum (2–8% slopes) and Cole clay loam (0–2% slopes). Feliz clay loam gravely substratum is a well-drained soil comprising clay loam from 0 to 46 inches and very gravelly clay loam from 46 to 63 inches depth. Cole clay loam is a somewhat poorly drained soil with clay loam from 0 to 8 inches, silty clay from 41 to 60 inches, and silty clay loam from 41 to 60 inches depth. Although the Feliz clay loam is well-drained, soil survey information from 1920 (Dean 1920) indicates that this Feliz soil was within the area of the lake that historically formed at the northern end of Little Lake Valley during the rainy season, even during very low rainfall years. This area of Little Lake Valley remains wet into the late spring and has saturated soil conditions that provide wetland hydrology, as evidenced by the existing jurisdictional wetlands that surround the two wetland establishment sites.

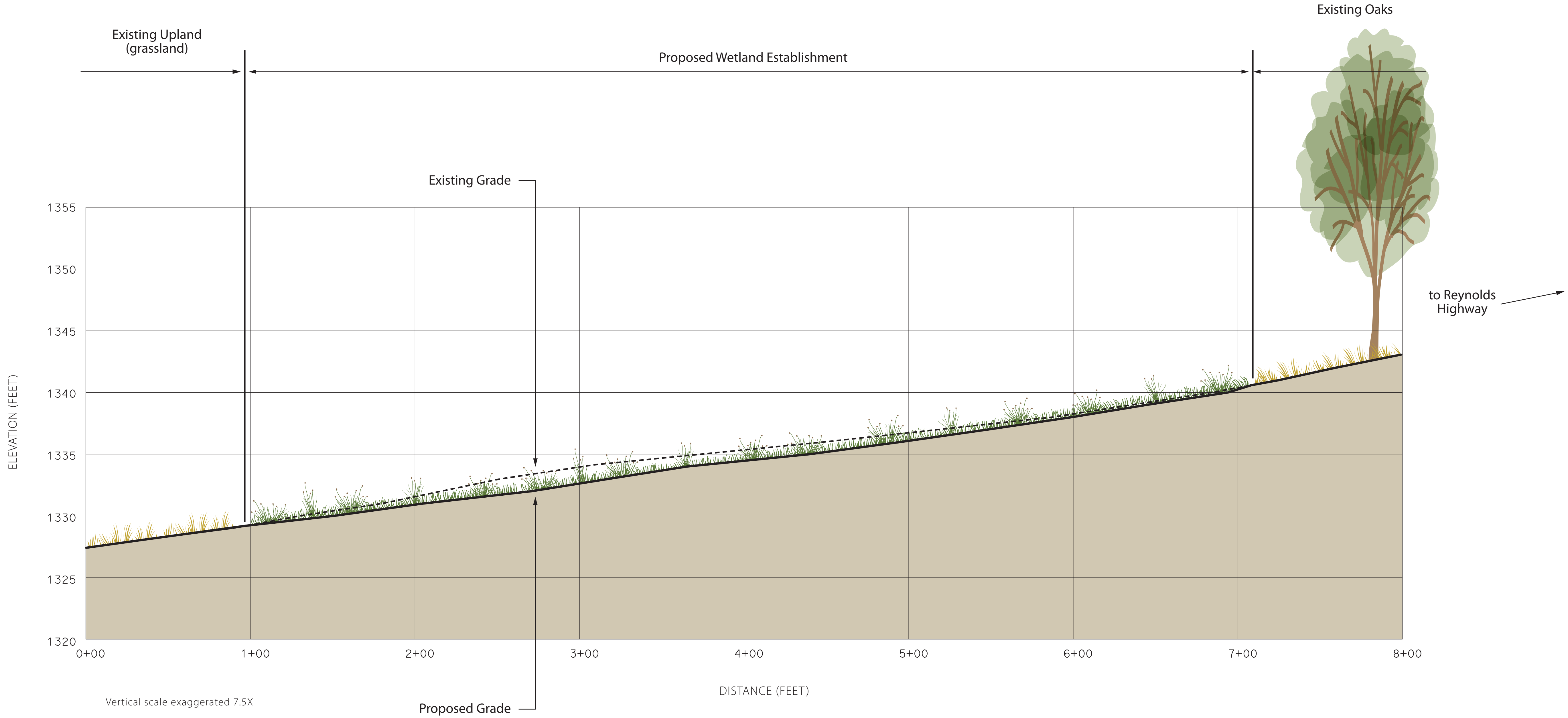
As described in Section 5.1.3, groundwater hydrology in Little Lake Valley is related to the aquifer underlying the valley. The upper portion of the aquifer occurs in alluvium that is composed of silt, clay, gravel, and sand (Farrar 1986). The presence of sheets of fine-grained sediments causes much of the aquifer to be confined or semiconfined. Overall in Little Lake Valley, including these parcels, it is difficult to determine with certainty that the water is not perched on impermeable layers located above the main aquifer. If the water is perched, the primary source of water to support the wetlands on these parcels is rainfall (average annual precipitation of 50 inches per year) and surface runoff. If the water represents the top of the main aquifer, the wetlands on these parcels are supported by the aquifer as a whole. In either case, the presence of seasonally saturated wetlands adjacent to the established wetland sites indicates that water is available for wetland establishment.

Surface hydrology at the Watson East parcel and in the area to be graded is influenced by Berry Creek, which dissipates into an alluvial fan at the southwest boundary of the parcel. Two intermittent streams occur on the eastern half of the parcel. The southernmost of these streams drains onto the parcel from the east and eventually dissipates into a wet meadow area. This drainage is channelized from the point where it enters the Watson East parcel to its terminus in the wet meadow. The other intermittent stream is located in the northeast corner of the parcel and flows from an area east of Reynolds Highway onto the parcel before dissipating into a wet meadow. The western portion of the parcel is subject to frequent and prolonged ponding, flooding, and/or a seasonally high water table during the winter months. As part of wetland establishment actions at the Watson East parcel, the current hydrology will be altered by grading the northern drainage so that the flow is spread out into the center of the parcel.

Wetland establishment will be accomplished for the north wetland by grading uplands adjacent to existing wet meadow to establish additional wet meadow habitat. The newly graded wetlands will be tied into existing topographic contours. The north established wetland will be excavated (average range of 0 to 1.59 feet) to a depth comparable to adjacent wetlands. Wetland establishment will be accomplished for the south wetland by grading to lower the grade to create a larger wet meadow at the base of the new slope. The south established wetland will be excavated (range of 0 to 1.45 feet) to a depth comparable to adjacent wetlands (average range of 0 to 1.45 feet). The wetlands will be over-excavated to accommodate topsoil/plant duff containing Baker’s meadowfoam seed and plant material. This topsoil/plant duff will be placed as an approximately 4-inch topdressing in both established wetlands. The excess soil from grading will be disposed of offsite.

Wetland Rehabilitation

Wetland rehabilitation will be accomplished by implementing 1.80 acres of Type 3 rehabilitation actions adjacent to the Group 2 wetlands (Appendix C, Table 6-4).



Notes:

1. Existing grade will be lowered to proposed grade to establish wetland.
2. This graphic is based on grading plans prepared by Caltrans included as Appendix E.

Figure 7-9
Wetland Establishment at Watson (Eastern) Parcel (APN 037-221-30)
Willits Bypass Project

7.3.1.19 Watson (APN 037-250-05)

The mitigation goal for this Watson parcel is wetland rehabilitation (Figures 2-1a and 2-1b, Appendices C). Wetland rehabilitation will be accomplished by removing grazing and haying from the entire parcel and implementing Type 1 rehabilitation actions (Appendix C, Table 6-4).

7.3.1.20 Wildlands (APN 108-070-08)

The mitigation goals for this Wildlands parcel are wetland rehabilitation (Figures 2-1a and 2-1b, Appendices C and E).

Wetland Rehabilitation

Wetland rehabilitation will be accomplished by removing grazing from a portion of the parcel and implementing Type 3 and Type 4 rehabilitation actions totaling 7.09 acres (Appendix C, Table 6-4). Type 3 rehabilitation actions (0.11 acre) will be implemented on the north side of the parcel and will be connected to a larger Type 3 rehabilitation unit on an adjacent parcel. Type 4 rehabilitation actions (6.98 acres) will be implemented in wet meadow adjacent to Davis Creek and an unnamed drainage.

7.3.1.21 Wildlands (APN 108-070-09)

The mitigation goals for this Wildlands parcel are wetland establishment and wetland rehabilitation (Figures 2-1a and 2-1b, Appendices C and E).

Wetland Establishment

Wetland establishment at this parcel will consist of Group 2 wetland establishment totaling 4.27 acres (Appendix C, Table 6-2). The established wetland footprint will extend from this parcel north onto the adjacent Wildlands parcel (APN 108-060-01). The grading and planting plans for offsite wetland establishment are presented in Appendix E. Figure 7-10 provides a graphic representation of wetland establishment efforts at these parcels.

Wetland grading will consist of lowering a portion of this upland to match, or be slightly lower than, the elevation of the adjacent wet meadow located to the east. The wetland establishment site is expected to support wet meadow because the established wetland will share surface and groundwater characteristics similar to those of the existing wet meadow (i.e., it will be seasonally saturated or inundated by rainfall and/or is subject to a seasonal shallow groundwater table). The newly graded wetlands will be tied into existing topographic contours. The excess soil from grading will be disposed of offsite. The established wetlands will be seeded and planted with native wetland species.

Preliminary and detailed soil evaluations were performed on the parcel by a soil scientist in August and December 2011, respectively. A geomorphologist also participated in the survey to evaluate the condition of the existing land surface and its feasibility to establish wetlands. Four shallow soil pit profiles were described, three of which were placed in existing uplands, and the remaining soil pit was located in the adjacent wet meadow to serve as a reference area. The soil profile and site description forms are provided in Appendix J. The survey results indicate that the soil type and range of soil characteristics in the proposed wetland establishment area are similar to the range of soils in the adjacent wet meadow.

Three backhoe pit profiles (detailed soil evaluation) were described, all of which were placed in existing uplands. Soils in this parcel were assigned wetland establishment suitability ratings of medium-high or high. The profiles were inferred to have moderate permeability at or just below finish grade and therefore suitable for wetland establishment. Profile C will have a stratified silt loam and loamy sand layer 15 inches below finish grade and a continuous, 1-inch-thick loamy sand layer 18 inches below finish grade. A clay loam Bg horizon below these stratified layers should prevent excessive deep percolation losses. Because the soil will be a moderately permeable loam at and just below finish grade, it will be suitable for wetland establishment.

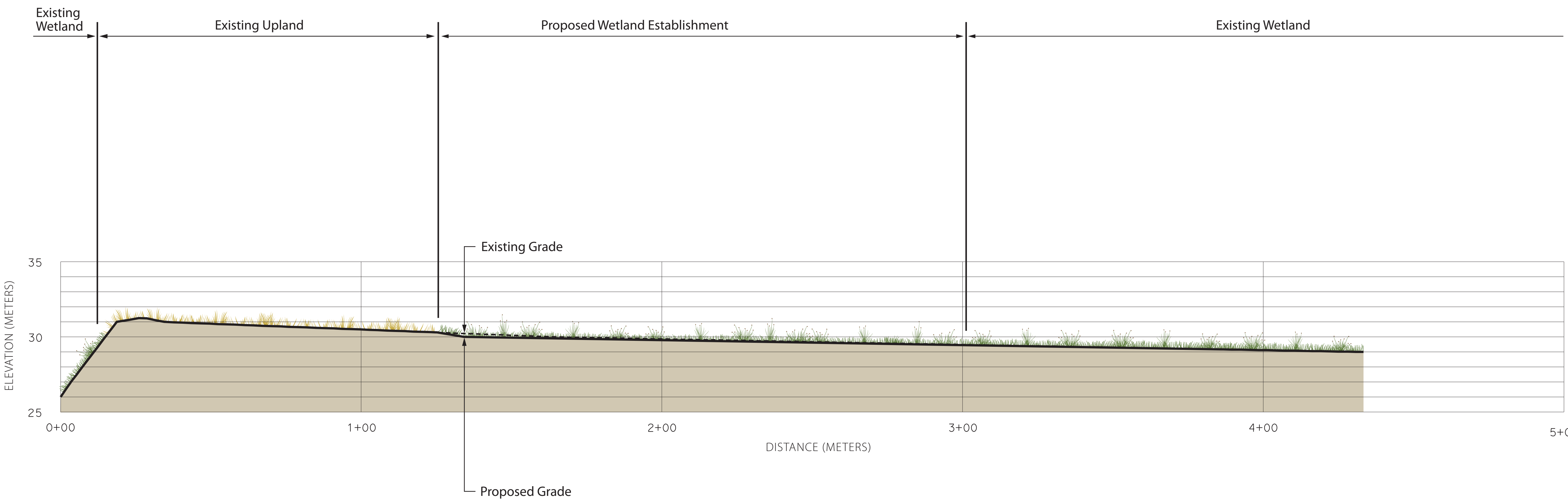
As identified on the soil profile and site description forms in Appendix J, as mapped by the NRCS, the existing soil map unit in all of the upland and wetland soil pits was Fluvaquents. The slope gradient in the upland pit locations was variable, ranging from 0 to 2% depending on location. The slope gradient in the wetland sample locations also ranged from 0 to 2% depending on location. The soil evaluation results, as expected, were variable between the uplands and wetland reference sites; however, the upland and wetland reference sites shared similar soil texture, soil structure, redoximorphic features, and permeability (inferred).

Wetland inundation surveys were performed for the offsite mitigation parcels during December 2010 through May 2011. Based on preliminary inundation survey results, reported in a baseline report prepared by Caltrans (2011), the majority of the adjacent wetland was inundated for up to 2 months. Approximately one half of the uplands proposed for wetland establishment also were inundated for a period of 1 to 2 months. The wetland inundation surveys did not assess soil saturation, but it is presumed that some of the upland soils also may have been saturated for an extended period of time during the winter of 2010–2011.

The proposed establishment site also was surveyed by a geomorphologist to evaluate the condition of the existing land surface and its feasibility to establish wetlands. The western extent of this established wetland will be approximately 100 feet from the top of bank on Davis Creek. It was determined that the proposed grading area would not encroach on, lower, or impair the existing natural levee. The geomorphologist also evaluated the area for the potential for overbank flow and sediment deposition. Based on this assessment, the south end of the proposed wetland area was dropped from consideration. The proposed wetland boundary reflects this assessment.

Wetland Rehabilitation

Wetland rehabilitation will be accomplished by removing grazing from a portion of the parcel and implementing Type 3, Type 4, and Type 5 rehabilitation actions totaling 9.83 acres (Appendix C, Table 6-4). Type 3 rehabilitation actions (3.44 acres) will be implemented on the west side of Davis Creek. Type 4 rehabilitation actions (4.04 acres) will be implemented in wet meadow adjacent to the Group 2 wetland location. Type 5 wetland rehabilitation (2.35 acres) will be accomplished by removing grazing from and widening the riparian corridors adjacent to Berry Creek. Native riparian vegetation will be planted in the riparian corridor.



Notes:

1. Existing grade will be lowered to proposed grade to establish wetland.
2. This graphic is based on grading plans prepared by Caltrans included as Appendix E.

Figure 7-10
Wetland Establishment at Wildlands Parcel (APN 108-070-09)
Willits Bypass Project

7.3.1.22 Wildlands (APN 108-060-01)

The mitigation goals for this Wildlands parcel are wetland establishment, wetland rehabilitation, and other waters rehabilitation (Figures 2-1a and 2-1b, Appendices C and E).

Wetland Establishment

Wetland establishment at this parcel will consist of Group 2 wetland establishment totaling 4.80 acres (Appendix C, Table 6-2). Two wetlands will be established. The established wetland on the west side of Davis Creek extends onto an adjacent Wildlands parcel and an adjacent Benbow parcel (Figure 7-3). The established wetland on the east side of Davis Creek will extend from this parcel south onto the adjacent Wildlands parcel (APN 108-070-09). Figure 7-10 provides a graphic representation of wetland establishment effort on the east side of Davis Creek. The grading and planting plans for offsite wetland establishment are presented in Appendix E.

Wetland grading will consist of lowering a portion of this upland to match, or be slightly lower than, the elevation of the adjacent wet meadow located to the east. The wetland establishment site is expected to support wet meadow because the established wetland will share surface and groundwater characteristics similar to those of the existing wet meadow (i.e., it will be seasonally saturated or inundated by rainfall and/or is subject to a seasonal shallow groundwater table). The newly graded wetlands will be tied into existing topographic contours. The excess soil from grading will be disposed of offsite. The established wetlands will be seeded and planted with native wetland species.

Preliminary and detailed soil evaluations were performed on the parcel by a soil scientist in August and December 2011, respectively. A geomorphologist also participated in the survey to evaluate the condition of the existing land surface and its feasibility to establish wetlands.

One shallow soil pit was described (preliminary soil evaluation) and was located in the upland. This pit evaluation indicated that the soil type in the wetland establishment area is similar to that of the soils in the adjacent wet meadow.

Three backhoe pit profiles (detailed soil evaluation) were described, all of which were placed in existing uplands. Soils in this parcel were assigned wetland establishment suitability ratings of medium or high. With the exception of profile E, the profiles were inferred to have moderate permeability at or just below finish grade and therefore suitable for wetland establishment. Profile E will have a gravelly loam layer at finish grade, but because that layer has only 20% gravel content, it is expected to be moderately permeable. The profile also contains a sand lens between 15 and 16 inches depth, but because it appears not to be continuous, it is not expected to cause significant losses of water from the profile. Because the soil will be a moderately permeable loam at and just below finish grade, it will be suitable for wetland establishment.

The proposed establishment site also was surveyed by a geomorphologist to evaluate the condition of the existing land surface and its feasibility to establish wetlands. The western extent of this established wetland will be approximately 100 feet from the top of bank on Davis Creek. It was determined that the proposed grading area would not encroach on, lower, or impair the existing natural levee. The geomorphologist also evaluated the area for the potential for overbank flow and sediment deposition. Based on this assessment, the south end of the proposed wetland area was dropped from consideration. The proposed wetland boundary reflects this assessment.

A small area of wetland establishment also will occur on the west side of Davis Creek. This area is adjacent to and is part of the wetland establishment area on an adjacent Wildlands parcel (APN 108-020-07) and a Benbow parcel (108-020-06). Soil and topographic information is provided in Section 7.3.1.5. This newly graded wetland will be tied into existing topographic contours. The excess soil from grading will be disposed of offsite. The established wetlands will be seeded and planted with native species.

Wetland Rehabilitation

Wetland rehabilitation will be accomplished by removing grazing from a portion of the parcel and implementing Type 4 rehabilitation actions totaling 2.97 acres on Davis Creek (Appendix C, Table 6-4).

Other Waters Rehabilitation

Other waters rehabilitation will be accomplished by implementing 3.26 acres of others waters rehabilitation on the northern portion of Davis Creek (Appendix C).

7.3.1.23 Wildlands (APN 108-020-07)

The mitigation goal for this Wildlands parcel is wetland establishment (Figures 2-1a and 2-1b, Appendices C and E).

Wetland Establishment

Wetland establishment at this parcel will consist of Group 2 wetland establishment totaling 4.80 acres (Appendix C, Table 6-2). Two wetlands will be established. The established wetland on the west side of Davis Creek extends onto an adjacent Wildlands parcel and an adjacent Benbow parcel (Figure 7-3). The established wetland on the east side of Davis Creek will extend from this parcel south onto the adjacent Wildlands parcel (APN 108-070-09). Figure 7-10 provides a graphic representation of wetland establishment effort on the east side of Davis Creek. The grading and planting plans for offsite wetland establishment are presented in Appendix E.

The wetland establishment areas are small inclusions of existing uplands within and adjacent to the wet meadow complex that will be lowered to match, or be slightly lower than, the elevation of adjacent wetland habitat and will be seasonally saturated or inundated by rainfall and/or groundwater. This area is adjacent to and is part of the wetland establishment area on an adjacent Wildlands parcel (APN 108-060-01) and an adjacent Benbow parcel (APN 108-020-06). Soil and topographic information is provided in Section 7.3.1.5.

7.3.1.24 Wildlands (APN 108-030-08)

The mitigation goal for this Wildlands parcel is wetland rehabilitation (Figures 2-1a and 2-1b, Appendices C and E).

Wetland Rehabilitation

Wetland rehabilitation will be accomplished by removing grazing from a portion of the parcel and implementing Type 3 rehabilitation actions totaling 2.08 acres (Appendix C, Table 6-4). The rehabilitation actions will be connected to a smaller Type 3 rehabilitation unit on an adjacent parcel.

7.3.1.25 Wildlands (APN 108-060-02)

The mitigation goal for this Wildlands parcel is wetland rehabilitation (Figures 2-1a and 2-1b, Appendices C and E).

Wetland Rehabilitation

Wetland rehabilitation will be accomplished by removing grazing from and widening the riparian corridor on Berry Creek and implementing 7.33 acres of Type 5 wetland rehabilitation (Appendix C, Table 6-4). Native riparian vegetation will be planted in the riparian corridor.

7.3.2 Offsite Mitigation Techniques

For ease of discussion, information in this section is presented as shown below.

- Establishment techniques for wetland habitat.
- Rehabilitation techniques for wetlands and other waters habitat.

7.3.2.1 Wetland Establishment

As defined in Chapter 2, *establishment* means the manipulation of the physical, chemical, or biological characteristics present to develop an aquatic resource that did not previously exist at an upland site. Establishment results in a gain in aquatic resource area and functions. Wetland habitat will be established on some of the offsite mitigation parcels. The type and location of habitat establishment are shown in Appendices C and E and listed in Table 7-2. Wetland establishment will include grading upland habitats to establish depressions or swales that will be seasonally inundated or saturated. Wetland establishment sites occur in one of two groups. Group 1 wetland establishment sites consist of those establishment sites identified in the 2010 MMP. Group 2 wetland establishment sites consist of those sites identified in summer 2011. Construction-level plans have been developed for Group 1 and 2 sites. The grading and planting plans for offsite wetland establishment areas are presented in Appendix E.

Offsite wetland establishment will consist of the following activities, discussed in detail below.

- Site preparation
- Grading
- Seeding
- Planting
- Construction inspections

- Documentation of as-built conditions

Site Preparation

Preparation of offsite wetland establishment areas will entail the following activities, discussed in detail below.

- Surveying and staking mitigation establishment areas.
- Installing ESA protective fencing.
- Installing erosion control measures and using BMPs.
- Preparing wetland topsoil stockpile areas.
- Clearing vegetation and the site.

Surveying and Staking Wetland Establishment Areas

Prior to mitigation construction, the limits of the mitigation establishment areas, including staging areas, topsoil stockpiling areas, and access roads, will be surveyed and staked. The exact locations will be based on the mitigation construction plans and specifications for contractor use.

Installing Environmentally Sensitive Area Fencing

Prior to construction, Caltrans will install protective fencing and, where necessary, silt fencing around ESAs to be avoided. Protective fencing will consist of orange, plastic-mesh fencing that is secured to metal t-posts, and will be installed in accordance with the project construction documents. Silt fencing may be installed around avoided wetlands, both jurisdictional and nonjurisdictional drainages, and riparian habitat to prevent soil or sediment from entering the habitat. Silt fencing may be used in combination with protective fencing, and will be installed in accordance with the project's SWPPP to be prepared by the contractor and with BMPs specified in the project construction documents (see Wetland Establishment, for more information on possible erosion control measures and BMPs).

Installing Erosion Control Measures and Using Best Management Practices

Implementation of the mitigation will require a SWPPP. Specific erosion control measures and BMPs will be provided in the document. Caltrans will review the contractor-prepared SWPPP for compliance with the mitigation construction plans and special provisions. The SWPPP then will be submitted to the RWB for approval. The following typical erosion control measures and BMPs have been identified in the mitigation construction plans and special provisions. These measures will be employed during site preparation and construction efforts and remain in place until ground-disturbing activities have ended (please note that this is not an exhaustive list):

- Prior to the start of construction activities, all personnel will receive water pollution control training.
- A temporary construction entrance will be installed and maintained to provide temporary access to the mitigation construction areas.
- Temporary fiber rolls will be installed and maintained around areas in which grading activities will occur to reduce sedimentation.

- Hydroseed will be applied to exposed slopes upon completion of construction activities to reduce erosion and sedimentation.
- Materials will be delivered, used, and stored in a way that minimizes or eliminates discharge of material into watercourses.
- Stockpiled materials will be stored at least 100 feet from concentrated flows of stormwater and drainage courses, if within the floodplain, and at least 50 feet from these waters if outside the floodplain.
- Material stockpiles will be covered with plastic sheeting or geosynthetic fabric when not in use and surrounded with a linear sediment barrier, and/or placed on pallets.
- Liquid wastes will be held in leak-proof containers such as roll-off bins and portable tanks, which will be stored at least 50 feet from moving vehicles and equipment and at least 100 feet from stormwater and drainage courses.
- Vehicle and equipment cleaning will be limited to that necessary to control vehicle tracking or hazardous waste.
- When practical, vehicle and equipment maintenance will be conducted offsite. If fueling or maintenance must be done at the construction site, a site or sites will be designated. Containment berms or dikes will be used around these sites.
- Spill and leak prevention procedures will be implemented for chemicals and hazardous substances stored at the mitigation construction site.
- Drip pans and absorbent pads will be used under vehicles or equipment used over water.
- Trash and debris will be removed from the job site at least once per week and will not be allowed to accumulate.
- Non-stormwater visual inspections will be performed on a quarterly basis.

Preparing Topsoil Stockpile Areas

Wetland establishment will take place on 14 of the offsite mitigation parcels (Figures 2-1a and 2-1b). The parcels on which wetland establishment occurs are:

- Benbow (APN 108-040-13)
- Benbow (APN 108-020-06)
- Ford (APN 108-010-06)
- Ford (APN 108-020-04)
- Ford (APN 108-030-02)
- The Goss/MGC Plasma Middle/MGC Plasma North complex (3 parcels)
- Lusher (APN 108-030-04)
- Niesen (APN 108-040-02)
- Watson East (APN 037-221-30)

- Wildlands (APN 108-020-07)
- Wildlands (APN 108-060-01)
- Wildlands (APN 108-070-09)

Topsoil will be stripped from most of the Group 1 and Group 2 wetland establishment areas and stockpiled for later use in topdressing the established wetlands. Topsoil stripping will consist of scraping the top 1–2 inches of soil to remove vegetation. This material will be disposed of offsite. After the initial topsoil stripping, approximately the next 4 inches of topsoil will be stripped and stockpiled for later use. Topsoil will be stockpiled in upland areas outside ESA boundaries. At the Watson East parcel, topsoil/plant duff salvaged from observed populations of Baker's meadowfoam from the project footprint will be used to topdress the Group 1 established wetland. If there is leftover duff after topdressing the Group 1 the excess will be applied to Group 2. At the Ford (APN 108-010-06) and Niesen parcels, topsoil importation might need to be considered based on resource agency concerns regarding the appropriateness of the existing topsoil for topdressing the established wetlands at these parcels. Similar to topsoil that will be used at the Watson East parcel, topsoil for the Ford and Niesen parcels could be imported from within the project footprint prior to construction disturbance.

To prepare stockpile areas, existing ruderal vegetation will be removed and legally disposed of offsite at a landfill or other facility that accepts green waste. Topsoil stockpiles will be stored separately from other grading spoils. The topsoil will be stored at ambient temperatures and protected from rainfall.

Vegetation and Site Clearing

The extent of vegetation and site clearing at the offsite mitigation parcels will depend on the amount of grading required or the amount of debris or structures to be removed. Where extensive grading is necessary (e.g., Niesen parcel), vegetation and site clearing might not be necessary because existing vegetation and/or debris will be removed as part of thee grading activities. Where extensive grading is not necessary and existing topsoil remains largely in place, some vegetation and debris removal may be necessary.

Vegetation clearing at the offsite mitigation parcels will include mowing herbaceous vegetation to a height of 1 to 3 inches in the habitat establishment areas, topsoil stockpiling areas, staging areas, and for temporary access roads. Some clearing or pruning of woody vegetation may be necessary to allow equipment access and could consist of removing the entire aboveground portion of the plant or pruning low-hanging branches. Cut vegetation will be legally disposed of offsite at a landfill or other facility that accepts green waste (because the woody vegetation may include oaks, it will be necessary to confirm with the disposal facility that oak wood is accepted in light of possible disposal quarantines related to sudden oak death disease).

Vegetation clearing associated with invasive plants has been identified at some of the offsite mitigation parcels (e.g., Benbow). Targeted treatment of invasive plants will be performed to reduce the extent of the infestation and to improve the ability to control the species in the future. Invasive plants will be removed from the mitigation areas to the extent feasible. Repeated treatments may be necessary as determined by a qualified biologist. Nonchemical methods (manual and mechanical) for invasive plant control are preferred over chemical methods. If chemical methods are used, chemicals (herbicides) will be applied under the direction of a licensed herbicide applicator and in strict accordance with all applicable regulations for their use. If vegetation clearing is necessary during the migratory bird nesting season, a qualified biologist will conduct preconstruction surveys to identify active nests, and the appropriate species-specific avoidance and minimization measures will be implemented where practical.

Grading

Grading will be necessary to establish wetland depressions and swales and to improve parcel hydrology. Grading will be performed by a licensed contractor who will use appropriately sized construction equipment.

The location of wetland establishment areas is shown in Figures 2-1a and 2-1b. The grading and planting plans for offsite wetland establishment are presented in Appendix E. Wetland establishment will result in the conversion of uplands to wetlands. At all locations wetland establishment will occur adjacent to existing wetland complexes and will result in an increase in wetland habitat patch size. Grading also will be used to provide more natural drainage patterns by capturing flow that currently is channelized in drainage ditches and using it to provide wetland hydrology as part of the grading for established wetlands.

Grading will be limited to the dry season (late spring through early fall), with erosion control seed mixes being applied after grading has been completed to prevent loosened material/sediment from entering wetlands or other waters on and adjacent to the offsite mitigation parcels.

For those locations requiring topsoil application, the subgrade will be excavated to a depth sufficient to accommodate the stockpiled topsoil while providing appropriate finish-grade topography to support wetland hydrology and vegetation. The reapplied topsoil layer will be a minimum of approximately 4 inches deep. The topsoil will not be compacted, except for wheel compaction that occurs as a result of reapplication. It is desirable to keep the topsoil in an uncompacted, friable condition while relying on an erosion control seed mix to hold the soil in place during heavy rains (Section 7.2.3, Seeding).

Seeding

Wetland Seeding

Wetland seed mixes consisting of native grasses and forbs will be used to seed established wetlands. The seed mixes will be composed of those species identified as target species by USACE (Table 7-5) and possibly other native wetland plants suitable for wetland establishment, and will contain an appropriate number of species to meet the species richness performance standards in Chapter 9. Seed mix development will consider wetland delineation vegetation data, August 2010 vegetation surveys at the wetland establishment parcels, baseline surveys to be performed in spring 2012 (to determine existing native wetland plant cover and species composition), and other field observations. The wetland seed mixes are presented in Appendix E.

The seed mixes may be revised based on seed availability at the time of mitigation construction and seed application. Prior to seed application, Caltrans will provide USACE with any changes to the seed mixes so that USACE can confirm that the seed mix contains a minimum of 15 species from the target species list (Table 7-5). For the wetland establishment site at the Ford parcel, a seed mix has not been identified for mixed marsh (only for wet meadow) because this section of the establishment site is not expected to be subjected to erosive flows and will be inundated for prolonged periods during the rainy season.

The wet meadow seed mix will be applied to all created wetland habitat, including created wetland habitat at the Watson East offsite mitigation parcel that will be topdressed with topsoil/plant duff salvaged from the project footprint for Baker's meadowfoam. The seed mixes will be applied during early fall following completion of mitigation grading to reduce erosion. Wetland seeding will occur before installing wetland container plants.

Upland Seeding

An upland seed mix will be used to seed disturbed upland areas in the offsite mitigation parcels. The list of USACE-approved plant species (Table 7-5) does not apply to the upland seed mix. The seed mix may be revised based on seed availability at the time of mitigation construction and seed application. The upland seed mix will consist of native grasses and wildflowers; it will be applied during early fall following completion of mitigation grading to reduce erosion.

Application Methods

The soil surface in the established wetlands and disturbed upland areas will be scarified before seeding to ensure adequate root penetration for seeds. The seed mixes will be applied using standard hydroseeding methods at the see mix rates specified in Section 7.2.3, Seeding. All seeded areas then will be mulched with sterile rice straw or an approved weed-free equivalent to protect the seed until it germinates. The mulch material will be of high quality (not musty, moldy, caked, or otherwise of low quality). The use of mulch that contains invasive weeds will not be permitted. Straw mulch material will be stabilized using a mulch crimper or equivalent straw anchoring tool. The crimper will be straight and capable of firmly punching the mulch into the soil. Hand methods will be used to anchor the straw where crimping equipment cannot be operated safely. Straw mulch material also may be stabilized using a suitable tackifier. If a tackifier is used, it will be applied uniformly over the mulch material at the specified rate.

Planting

The planting palettes will be composed of those species identified as target species by USACE (Table 7-5) and possibly other native wetland plants suitable for wetland establishment and will contain an appropriate number of species to meet the species richness performance standards in Chapter 9. Plant palette development also will consider wetland delineation vegetation data, CRAM data collected in spring 2011, August 2010 vegetation surveys at the wetland establishment parcels, baseline surveys to be performed in spring 2012 (to determine existing native wetland plant cover and species composition), and other field observations (Appendix E).

Caltrans will contract with a plant nursery experienced with the propagation of native herbaceous wetland plants to propagate container plants for mitigation efforts. The locations for individual plantings will be identified using pin flags. Each species will be assigned a specific flag color to ensure that plant material is planted at the proper location. Plant spacing for herbaceous wetland establishment planting areas will be at approximately 5 feet on center.

Wetland Container Plant Installation

Wetland container plants will be planted in the winter after the offsite mitigation parcels have been graded and rainfall has saturated the soil to a depth of approximately 10 inches. Container plants will be propagated and installed as described in Section 7.2.4, Plant Stock Selection and Propagation, and in this section.

Container plants will consist of tree band or equivalent size container stock. Container plants will be installed in clusters in the established wetland depressions and swales. Container plants will be installed in a planting hole that is twice the width of and no deeper than the container. Soil removed when the planting hole is created will be used as backfill. Watering basins or bark mulch will not be required for wetland container plants.

Container plants will be placed in the planting hole so that the root collar is slightly above the desired final grade, with the top of the first major root barely visible at the surface. The plant will be watered immediately after planting and will be inspected after initial watering to ensure that settling has not occurred. Any container plants that have settled will be adjusted so the appropriate length is exposed aboveground.

Plant Watering

The goal of watering will be to provide sufficient water to successfully establish herbaceous wetland plants that are able to survive without supplemental irrigation. Caltrans will water-in wetland establishment plantings after planting. Irrigation will not be applied during the 3-year post-construction plant establishment period because herbaceous wetland species will be supported by seasonal inundation and soil saturation.

Construction Inspections

Caltrans will conduct progress inspections of the mitigation efforts to ensure that offsite wetland establishment mitigation is fully and properly completed. Areas not meeting the implementation standards identified above will be reevaluated and replanted as necessary. At a minimum, Caltrans will perform inspections at the following critical stages of mitigation implementation.

- Layout of proposed mitigation establishment boundaries prior to construction.
- Placement and installation of ESA protective fencing.
- Installation of erosion control measures and use of BMPs.
- Site preparation/vegetation clearing operations.
- Harvesting of wetland topsoil and seed material.
- Grading operations, including placement of stockpiled wetland topsoil.
- Irrigation system installation (if applicable) and initial plant watering.
- Placement of stockpiled wetland topsoil.
- Seeding and planting operations.

Documentation of As-Built Conditions

Within 45 days from the completion of offsite wetland establishment Caltrans will submit a complete set of as-built drawings to USACE. The as-built drawings will be prepared using MicroStation (version 7 or later) software and will be at the same scale as the construction drawings. The as-built drawings will be prepared following standard landscape architecture protocols and practices. The as-built drawings will depict the features listed below.

- Establishment area boundaries and elevations.
- Updated plant palettes, including species, plant material type (e.g., tree band, 1 gallon, cutting, acorn), and number of plants planted by species, if applicable.
- Updated seed mix, including application rates, if applicable.
- Fences, gates, and access roads, if applicable.
- Other pertinent mitigation or parcel features.

7.3.2.2 Wetland Rehabilitation

As defined in Chapter 2, Objectives, *rehabilitation* is the manipulation of the physical, chemical, or biological characteristics of a site with the goal of repairing natural/historical functions of a degraded aquatic resource. Rehabilitation results in a gain in aquatic resource function, but does not result in a gain in aquatic area.

Wetlands will be rehabilitated on 20 of the offsite mitigation parcels using a variety of rehabilitation strategies. The location and type of rehabilitation actions for each parcel are shown in Appendix C and on Figures 2-1a and 2-1b. Table 7-2 lists rehabilitation strategies and corresponding actions to implement these strategies. Table 6-4 summarizes the acreage, by rehabilitation type, for each parcel. In this section, a general description of each rehabilitation type and details for each rehabilitation action are provided.

As described in Chapter 6, Determination of Credits, five types of wetland rehabilitation have been developed. With the more aggressive strategies, wetland rehabilitation will include clearing existing patches of nonnative wetland vegetation and replanting and seeding with native species. In addition to planting and seeding, some level of successional development is part of each rehabilitation type in untreated areas. For all types of wetland rehabilitation, management activities that would inhibit successional vegetative development will be excluded from the rehabilitation sites. Each rehabilitation type also has specific performance standards and success criteria (Chapter 9). The type of wetland rehabilitation and location are shown in Appendices C and E and listed in Table 7-2.

- Type 1 wetland rehabilitation occurs only on the Watson West parcel (APN 037-250-05). Because this parcel already has high-quality wetland habitat over most of the parcel, no mitigation actions will be implemented. The parcel will be monitored to ensure that there is no decrease in native plant cover or an influx of invasive plant species.
- Type 2 wetland rehabilitation requires an increase of at least 10% in relative cover of species from the target hydrophytic species list over baseline conditions (Table 7-5). The increase in cover is anticipated to be provided by successional development. Therefore, the Type 1

mitigation units will not be planted or seeded initially. If during the monitoring period Type 2 mitigation units are not moving toward achieving the Year 10 performance standard, supplemental planting and seeding may be implemented. Any Type 2 rehabilitation areas that are seeded and planted will receive species from the target hydrophytic species list (Table 7-5).

- Type 3 wetland rehabilitation requires an increase of at least 40% in relative cover of species from the target hydrophytic species list over baseline conditions (Table 7-5). The increase in cover may be provided by the planted and seeded areas and/or the untreated areas. Type 3 rehabilitation areas will be seeded and planted with native herbaceous wetland species. Native woody vegetation also will be planted at these locations. Type 3 rehabilitation areas will be planted and seeded with species from the target hydrophytic species list (Table 7-5).
- Type 4 wetland rehabilitation requires an increase of at least 70% in relative cover of species from the target hydrophytic species list over baseline conditions (Table 7-5). The increase in cover may be provided by the planted and seeded areas and/or the untreated areas. Type 4 rehabilitation areas will be seeded and planted with native herbaceous wetland species. Native woody vegetation also will be planted at these locations. Type 4 rehabilitation areas will be planted and seeded with species from the target hydrophytic species list (Table 7-5).
- Type 5 wetland rehabilitation requires a tree density of 50 woody plant species at the Year 10 surveys (Table 7-5).The increase in cover may be provided by the planted and volunteer vegetation. Type 5 rehabilitation areas will be seeded and planted with native herbaceous wetland species. Native woody vegetation also will be planted at these locations. Type 5 rehabilitation areas will be planted and seeded with species from the target hydrophytic species list (Table 7-5).

Offsite wetland rehabilitation will entail the following activities, discussed in detail below.

- Site preparation
- Seeding
- Planting
- Plant watering
- Construction inspections
- Documentation of as-built conditions

Site Preparation

Preparation of offsite wetland rehabilitation areas will entail the following activities, discussed in detail below.

- Surveying and staking mitigation establishment areas
- Installing ESA protective fencing
- Installing erosion control measures and using BMPs
- Clearing vegetation and site

Surveying and Staking Mitigation Rehabilitation Areas

Prior to mitigation construction, the limits of the mitigation rehabilitation areas, including staging areas and access roads, will be surveyed and staked. These locations will be based on the mitigation construction plans and specifications for contractor use.

Installing Environmentally Sensitive Area Fencing

Prior to mitigation construction, protective fencing or silt fencing will be installed around ESAs to be avoided. ESA protective fencing will be installed as described in Section 7.2, Onsite Mitigation Implementation.

Installing Erosion Control Measures and Using Best Management Practices

Erosion control measures and BMPs will be implemented as described in Section 7.2, Onsite Mitigation Implementation.

Vegetation Clearing

The extent of vegetation and site clearing at a given rehabilitation area will vary depending on whether it is designated as a Type 2, Type 3,Type 4, or Type 5 rehabilitation area. The total area of vegetation clearing provided for a given mitigation unit will be dependent on the total acreage of the mitigation unit and the required percent increase in relative cover by native wetland species over baseline conditions for each mitigation unit. For example, if Type 4 rehabilitation is proposed on a 10-acre mitigation unit the unit must demonstrate a 70% increase in relative cover by native wetland species over baseline conditions). Therefore vegetation clearing will need to occur on 70% (7 acres) of the mitigation unit.

The total acreage of vegetation clearing on a parcel will be subdivided into smaller vegetation clearing areas that are distributed across the parcel in small planting units. The planting units may be of varying size and dimension depending on the size, location, and existing conditions in each mitigation unit. For example, the 7 acres of vegetation clearing in the preceding example would be distributed across the parcel and the vegetation clearing unit could be laid out in a patch pattern with areas not cleared interspersed with the cleared areas. Patches of existing native vegetation would be avoided and retained. Type 2 rehabilitation areas will not be cleared initially because successional development is expected to provide the increase in native cover by Year 10. If, during the monitoring period, Type 2 mitigation units are not moving toward achieving the Year 10 success criteria, vegetation clearing may occur in Type 2 mitigation units to allow supplemental planting and seeding may be implemented.

Intensive vegetation and control methods will be implemented to eradicate or reduce the population of nonnative grasses and forbs in each treatment area. Repeated treatments are expected to be necessary and will be provided as needed. Treatment methods may include one or more of the following: mowing, string trimming, manual removal, burning, and herbicide treatments (if permitted). Mulching using a synthetic fabric may be considered if other techniques are not effective in controlling undesirable species. Disking and other soil-disturbing methods will not be used.

Nonchemical methods for invasive plant control are preferred over chemical methods. If chemical methods are used, chemicals (herbicides) will be applied under the direction of a licensed herbicide applicator and in strict accordance with all applicable regulations for their use.

Seeding

Wetland Seeding

Wetland seed mixes consisting of native grasses and forbs will be used, on a site-by-site basis, to seed rehabilitated wetlands. The seed mixes for each wetland rehabilitation parcel are provided in Appendix E. Seed mixes may be applied to all Type 3, Type 4, and Type 5 rehabilitation areas. Type 2 rehabilitation areas will not be seeded initially because successional development is expected to provide the increase in native cover by Year 10. If, during the monitoring period, Type 2 mitigation units are not trending toward achieving the Year 10 success criteria, a seeding program may be implemented in Type 2 mitigation units.

Vegetation surveys will be performed in spring 2012 at each rehabilitation area (prior to implementing mitigation actions) to confirm existing species composition and relative cover values. Based on this information, the parcel-specific seed mixes in Appendix E may be refined for each rehabilitation area. The seed mixes will be applied using a drill seeder during early fall following completion of vegetation clearing.

Planting

Planting of native herbaceous and woody species will occur in Type 3, Type 4, and Type 5 rehabilitation areas. Plant palettes have been developed for each wetland rehabilitation unit based on wetland delineation vegetation data, CRAM data collected in spring 2011, August 2010 vegetation surveys at the wetland establishment parcels, and other field observations. The plant palettes for each wetland rehabilitation parcel are shown in Appendix E. Vegetation surveys will be performed in spring 2012 at each rehabilitation area (prior to implementing mitigation actions) to confirm existing species composition and relative cover values. Based on this information, the plant palettes in Appendix E may be refined for each rehabilitation area.

Type 2 rehabilitation areas will not be planted initially because successional development is expected to provide the increase in native cover by Year 10. If, during the monitoring period, Type 2 mitigation units are not trending toward achieving the Year 10 success criteria, a planting program may be implemented in Type 2 mitigation units.

Herbaceous Wetland Container Plant Installation

Wetland container plants (native wetland herbaceous species) will be planted in the winter after vegetation clearing on the offsite wetland rehabilitation areas has been completed and rainfall has saturated the soil to a depth of approximately 10 inches. Container plants will be propagated and installed as described in Section 7.2.4, Plant Stock Selection and Propagation, and in this section.

Container plants will consist of tree band or equivalent size container stock. Container plants will be installed in clusters. Container plants will be installed in a planting hole that is twice the width of and no deeper than the container. Soil removed when the planting hole is created will be used as backfill. Watering basins or bark mulch will not be required for wetland container plants.

Container plants will be placed in the planting hole so that the root collar is slightly above the desired final grade, with the top of the first major root barely visible at the surface. The plant will be watered immediately after planting and will be inspected after initial watering to ensure that settling has not occurred. Any container plants that have settled will be adjusted so the appropriate length is exposed aboveground.

Woody Plant Species Container Plant Installation

Container plants will be installed in the Type 3, Type 4, and Type 5 wetland rehabilitation areas that are currently vegetated by herbaceous vegetation. Container plants of woody plant species will be planted in the winter after vegetation clearing on the offsite wetland rehabilitation areas has been completed and rainfall has saturated the soil to a depth of approximately 10 inches. Container plants will be installed as described in Section 7.2.4, Plant Stock Selection and Propagation, and in this section. The Type 3, 4, and 5 plant palettes are shown in the design plans for offsite mitigation (Appendix E).

Container plants will consist of trees, shrubs, and vines. The plant forms may vary by wetland rehabilitation unit based on site-specific conditions (e.g., in some units only tree species may be planted). The plants will be installed in a random, naturalistic pattern. Container plants will be installed in a planting hole that is twice the width of and no deeper than the container. Soil removed when the planting hole is created will be set aside for use as backfill. Container plants will be placed in the planting hole so that the root collar is slightly above the desired final grade with the top of the first major root barely visible at the surface. The plants will be watered immediately after planting, and will be inspected after watering to ensure that settling has not occurred. Plants that have settled will be adjusted so that the appropriate length is exposed aboveground.

Watering basins will be constructed around all container plants, and plant protection cages may be installed to minimize herbivory. A 3-inch layer of bark mulch (this mulch could come from chipped woody vegetation removed as part of vegetation clearing activities [Section 7.2.1.2, Vegetation Clearing]) will be placed in each watering basin to reduce soil evaporation rates and help suppress weed growth.

Riparian Cutting Collection and Installation

Willow and cottonwood cuttings will be installed in the Type 5 wetland rehabilitation areas that occur on streambanks or in wet meadows adjacent to streams and drainages (Appendix E). Cutting collection and installation will occur in December and/or January. Cuttings will be collected and installed as described in Section 7.2.4.2, Riparian Cutting Collection and Installation, and in this section.

All cuttings will be hardened-off green wood. Cuttings will be a minimum of 3 feet long and will be tapered from a minimum of 0.5 inch to a maximum of 2.5 inches in diameter. Cuttings will be cut at a right angle at the wide end of the cutting.

Immediately after harvesting, the leaves, branches, and twigs will be carefully removed from each cutting to avoid damage to buds on the cutting. The cuttings then will be wrapped in burlap or other approved material that protects them from sunlight and allows air circulation within the bundle. The bundled cuttings will be maintained in cool wet storage until just before planting and will be planted within 24 hours of collection.

Planting holes will be excavated for all cuttings. Cuttings will be installed vertically, with the narrow end exposed and two thirds of the cutting buried belowground to ensure the development of adequate root mass. Fertilizer will not be applied during cutting installation. Watering basins will be constructed around cuttings, and plant protection cages may be installed to minimize herbivory. A 3-inch layer of bark mulch (this mulch could come from chipped woody vegetation removed as part of vegetation clearing activities [Section 7.2.1.2, Vegetation Clearing]) will be placed in each watering basin to reduce soil evaporation rates and help suppress weed growth.

Cuttings will be watered immediately after planting and will be inspected after watering to ensure that they have not settled. Any cuttings that have settled will be adjusted so the appropriate length is exposed aboveground.

<u>*Acorn Collection and Installation*</u>
Caltrans will collect acorns to be planted at wetland rehabilitation areas. Acorns will be installed as described in Section 7.2.4.3, Acorn Collection and Installation, and in this section.

Plant Watering
Plant watering will be provided for woody and herbaceous plantings in the wetland rehabilitation areas as needed, as determined based on plant vigor during the summer months. Herbaceous wetland plantings will not be watered because these species are adapted to, and will be supported by, seasonal water availability. The goal of watering will be to provide sufficient water to successfully establish deep-rooted plants that are able to survive without supplemental irrigation. Caltrans will water woody plantings as needed during the 3-year plant establishment maintenance period. Possible irrigation methods are described in Section 7.2, Onsite Mitigation Implementation, and watering frequency and application rates are described in Chapter 8, Mitigation Maintenance Plan.

Construction Inspections
Caltrans will conduct progress inspections of the wetland rehabilitation efforts as described in Section 7.3.2, Wetland Establishment.

Documentation of As-Built Conditions

- Caltrans will prepare and submit as-built drawings to USACE as described in Section 7.3.2, Wetland Establishment, and will include mitigation planting and seeding area boundaries and elevations.
- Updated plant palettes, including species, plant material type (e.g., tree band, 1 gallon, cutting, acorn), and number of plants planted by species, if applicable.
- Updated seed mix, including application rates, if applicable.
- Fences, gates, and access roads, if applicable. Other pertinent mitigation or parcel features.

Physical and Management Actions of Wetland Rehabilitation Areas
Wetland rehabilitation consists of physical and management actions that will increase habitat complexity, install native plants, and control invasive and noxious plants (Table 7-2).

Increase Habitat Complexity

Wetland rehabilitation is focused on wet meadow. Wetland rehabilitation actions will provide connectivity with existing wetland habitat, provide increased edge effect with wet meadow and other habitats, and increase habitat complexity and structure. Habitat complexity will be increased by planting native species and controlling nonnative vegetation during the plant establishment period.

Install Native Plants

Existing wetlands will be rehabilitated by planting and seeding native herbaceous wetland species and native woody species. Planting of woody vegetation in existing wet meadow habitat adjacent to streams will result in a type change to riparian wetland or provide structural diversity by creating an open woodland/savanna vegetation community.

Control Invasive and Noxious Plants

Targeted treatment of invasive and noxious plant species will occur if such species are present in the wetland rehabilitation areas. Invasive species, as related to this project, are defined in Chapter 8. Following initial control of these species through manual, mechanical, or chemical control methods, the wetland rehabilitation areas will be planted with wetland and riparian plants.

7.3.2.3 Other Waters Rehabilitation

Other waters habitat will be rehabilitated on several of the offsite mitigation parcels. Other waters rehabilitation will include the following actions.

- 19.03 acres of other waters rehabilitation on portions of Davis Creek and Outlet Creek on the mitigation parcels (Figures 2-1a and 2-1b).
- Fish passage improvements on Haehl Creek and Upp Creek.
- Erosion and headcut repair on the offsite mitigation parcels.
- Financial contributions to/and development of the Ryan Creek culvert project outside the project footprint and Little Lake Valley.

Table 7-2 lists rehabilitation strategies and corresponding actions to implement these strategies. The location of other waters habitat rehabilitation is shown in Appendices C, E, and F.

Offsite other waters rehabilitation will entail the following activities, discussed in detail below.

- Site preparation
- Seeding
- Planting
- Plant watering
- Construction inspections
- Documentation of as-built conditions

Site Preparation

Preparation of offsite other waters rehabilitation areas will entail the following activities, discussed in detail below.

- Surveying and staking mitigation establishment areas
- Installing ESA protective fencing
- Installing erosion control measures and using BMPs
- Vegetation and site clearing

Surveying and Staking Mitigation Rehabilitation Areas

Prior to mitigation construction, the limits of the rehabilitation areas, including staging areas and access roads, will be surveyed and staked. These locations will be based on the mitigation construction plans and specifications for contractor use.

Installing Environmentally Sensitive Area Protective Fencing

Prior to mitigation construction, protective fencing or silt fencing will be installed around ESAs to be avoided. ESA protective fencing will be installed as described in Section 7.2, Onsite Mitigation Implementation.

Installing Erosion Control Measures and Using Best Management Practices

Erosion control measures and BMPs will be implemented as described in Section 7.2, Onsite Mitigation Implementation.

Vegetation Clearing

The extent of vegetation and site clearing at a given rehabilitation area will vary depending on the presence and density of nonnative species. Intensive vegetation and control methods will be implemented to eradicate or reduce the populations of some nonnative species. Repeated treatments are expected to be necessary and will be provided as needed. Treatment methods may include one or more of the following: mechanical removal, manual removal, and herbicide treatments (if permitted). Disking and other soil disturbing methods will not be used.

Nonchemical methods for invasive plant control are preferred over chemical methods. If chemical methods are used, chemicals (herbicides) will be applied under the direction of a licensed herbicide applicator and in strict accordance with all applicable regulations for their use.

Seeding

A riparian seed mix consisting of native grasses and forbs will be used to seed areas disturbed by rehabilitation activities. The seed mix for the other waters rehabilitation areas is shown in Appendix E. The seed mix may be revised based on seed availability at the time of mitigation construction and seed application. The riparian seed mix will be applied during early fall following completion of mitigation grading to reduce erosion. Riparian seeding will occur before installing riparian cuttings and riparian container plants. The seed mix will be applied using a drill seeder or by hydroseeding during early fall following completion of vegetation clearing.

Planting
All other waters rehabilitation areas will be planted with native trees, shrubs, and vines. The plant palettes for the other waters rehabilitation areas are shown in Appendix E. Plantings will be installed as container stock, cuttings, or acorns and will be installed as described in Section 7.2, Onsite Mitigation Implementation. The planting density for riparian rehabilitation planting areas will vary based on soil texture and soil moisture conditions as well as proximity to the nearest creek. Riparian planting areas on relatively high terraces may be composed primarily of oaks that will be planted at approximately 20 feet on center. Riparian plantings on more mesic planting surfaces will be approximately 10 feet on center.

Other waters rehabilitation will include planting riparian vegetation in a band on each side of designated stream corridors. In some locations existing patches of nonnative vegetation will be cleared and the areas replanted and seeded with native species.

Plant Watering
Watering will be provided for woody plantings in the other waters rehabilitation areas as needed, as determined based on plant vigor during the summer months. The goal of watering will be to provide sufficient water to successfully establish deep-rooted plants that are able to survive without supplemental irrigation. Caltrans will water woody plantings as needed during the 3-year plant establishment maintenance period. Possible irrigation methods are described in Section 7.2, Onsite Mitigation Implementation, and watering frequency and application rates are described in Chapter 8, Mitigation Maintenance Plan.

Construction Inspections
Caltrans will conduct progress inspections of the other waters rehabilitation efforts as described in Section 7.2, Onsite Mitigation Implementation.

Documentation of As-Built Conditions
Caltrans will prepare and submit as-built drawings to the resource agencies as described in Section 7.2, Onsite Mitigation Implementation.

Physical and Management Actions of Other Waters Rehabilitation Areas
Other waters habitat rehabilitation consists of the physical and management actions that will improve hydrology, including minimizing sedimentation, expanding habitat, increasing habitat complexity, installing native plants, and controlling invasive plants (Table 7-2).

<u>*Improve Hydrology*</u>
Parcel hydrology will be improved to enhance other waters (riparian) habitat by stabilizing eroding banks and some headcuts. These erosion features may lead to the direct loss of riparian habitat (bank repair sites) and contribute excessive sediment to the stream channel (bank repair and headcut sites).

Bank Erosion Repair
Three instream eroding bank sections on Outlet Creek in the center of the Ford offsite mitigation parcel (APN 108-010-06) will be repaired (Appendices C and E). The grading and planting plans for these locations are presented in Appendix E. All three sites have unstable, mostly vegetated cut banks created by convergence flow on the riffle/gravel bar complex on the opposite side of

the cut bank. The banks are approximately 6 feet tall and actively slumping. These areas will be repaired by grading back the vertical bank (which in turn will decrease shear stress on the bank), planting native riparian vegetation (which will stabilize the banks through increased ground cover and root density), and incorporating instream structures at toe slope (which may establish instream aquatic habitat in the form of lateral scour pools that can support listed fish species and other aquatic organisms). See the erosion site assessment in Appendix H for repair concepts for these eroding banks.

Headcut Repair

Headcut repairs are proposed at the following offsite mitigation parcels: Benbow, Frost, and Lusher. Specific actions related to these drainages and headcuts for each of the parcels are described below. The grading and planting plans for these locations are presented in Appendix E.

At the Benbow offsite mitigation parcel (APN 108-040-13), a large headcut located in a swale that is tributary to an intermittent stream will be repaired by placing soil fill to establish a step-pool grade control structure (see mitigation construction plans and special provisions for grading plans). Sediment derived from this headcut likely enters a discontinuous intermittent stream channel that runs along the eastern edge of the parcel. This channel appears once to have been connected to Davis Creek but no longer has an active hydrologic connection to that creek. As such, potential sedimentation from this headcut essentially enters an active sediment sink (the discontinuous intermittent stream). Hydrology will be improved by the placement of a step-pool grade-control structure to stop the upward migration of the headcut and reduce sedimentation on the parcel.

At the Frost offsite mitigation parcel, five headcuts are located near the northeast corner of the parcel. Three of these are instream headcuts on a small unnamed tributary of Berry Creek and two are upland headcuts. The headcuts appear to be unstable and have high potential to contribute sediment to Berry Creek via the unnamed tributary. These sites will be repaired by placing soil fill to establish a step-pool grade control structure (see mitigation construction plans and special provisions for grading plans). Hydrology will be improved by reducing sedimentation to Berry Creek. At the Lusher offsite mitigation parcel (APN 108-030-04), two instream headcuts are located on a short unnamed tributary to Old Outlet Creek. The instream headcuts appear unstable with high potential for sediment to enter Old Outlet Creek. These two headcuts will be repaired by placing soil fill to establish a step-pool grade control structure (Appendix F). Hydrology will be improved by reducing sedimentation to Old Outlet Creek.

Drainage Improvements at Wetland Establishment Sites

Parcel hydrology also will be improved at the wetland establishment sites by modifying existing incised drainages that drain surface water from these parcels. The incised drainages will be graded as part of grading for the proposed wetland establishment site. The wetlands and drainages will be designed and constructed to retain water and increase the residence time of water on the parcels. As a result, water that previously would have left the site as runoff will have a longer residence time and will be retained as surface flow or as shallow groundwater or saturated soil. This action may also result in an increase in groundwater recharge.

The grading and planting plans for offsite wetland establishment are presented in Appendix E. For example, at the Goss/MGC Plasma Middle/MGC Plasma North offsite mitigation parcels, existing incised drainages that drain surface water from these parcels into other adjacent drainages will be graded as part of grading for the proposed wetland establishment site to retain water and increase the residence time of water on the parcels (Appendix E).

Similar improvements are also associated with some of the other Group 1 and Group 2 wetland establishment sites.

Expand Habitat

Other waters rehabilitation actions—installing riparian plants adjacent to existing riparian habitat along stream corridors and fence lines or in adjacent upland—will result in an increase in riparian habitat patch size. Riparian habitat in Little Lake Valley provides habitat for common and special-status wildlife species. Willow flycatcher, yellow warbler, and yellow-breasted chat are riparian-dependent, special-status species that breed in Little Lake Valley and would benefit from an expansion of riparian habitat.

Increase Habitat Complexity

Most of the other waters rehabilitation actions described in this section will result in an increase in the overall acreage of riparian woodland habitat on the offsite mitigation parcels, provide connectivity with existing riparian and oak woodland habitat, provide increased edge effect with wet meadow and other habitats, and increase habitat complexity and structure. Habitat complexity will be increased by improving hydrology that will lead to prolonged ponding and soil saturation, which is anticipated to promote increased species richness through natural recruitment. Habitat complexity also is anticipated to be increased by discontinuing grazing management practices because discontinuing grazing will allow establishment of native riparian plant communities.

Install Native Plants

The presence of native plants on the mitigation properties will be increased by planting riparian species along riparian corridors. Riparian plantings along streams or adjacent to existing riparian habitat will supplement senescent vegetation, maintain or increase shade, and provide more overhead structure and diversity.

Control Invasive Plants

Targeted treatment of invasive plant species will occur if such species are present in the wetland rehabilitation areas. Invasive species, as related to this project, are defined in Chapter 8. Following initial control of these species through manual, mechanical, or chemical control methods, the wetland rehabilitation areas will be planted with wetland and riparian plants.

Chapter 8 Mitigation Maintenance Plan

Maintenance of mitigation sites will consist of three distinct periods: plant establishment maintenance, short-term maintenance, and long-term maintenance. The first two periods, discussed in this chapter, will occur during the performance-monitoring period. Long-term maintenance, discussed in Chapter 11, will begin after the mitigation parcels achieve their designated performance standards.

Both the onsite mitigation area and offsite mitigation properties will receive maintenance during these periods. The level of maintenance generally decreases with each period, in keeping with the goal to establish self-sustaining natural habitats. On the onsite mitigation area, Caltrans will conduct maintenance in all three periods. At the offsite mitigation properties, Caltrans will implement the offsite mitigation and perform the plant establishment maintenance for the offsite mitigation parcels, but MCRCD will conduct short- and long-term maintenance. MCRCD is also responsible for collecting all biological monitoring during all three maintenance periods at the offsite mitigation properties.

8.1 Plant Establishment Maintenance Period

Plant establishment is the initial and most intensive maintenance period, beginning immediately after mitigation implementation activities are completed (Chapter 7). The plant establishment period is anticipated to last 3 years and will be performed by the Caltrans mitigation contractor for both onsite mitigation area and the offsite mitigation parcels. Plant establishment maintenance generally includes the following tasks, which are described in detail in Section 8.3:

- Water mitigation plantings.
- Control weeds around mitigation plantings and in overall planting areas.
- Control invasive plants, as needed.
- Assess plant protection and health.
- Install replacement plants (as needed, based on monitoring results).
- Conduct general assessment.

8.2 Short-Term Maintenance Period

The short-term maintenance period starts once the 3-year plant establishment period is complete and continues for the rest of the performance-monitoring period. Onsite mitigation areas will be treated as a management unit, and each offsite wetland and other waters mitigation unit will be treated as a maintenance/management unit.

The performance-monitoring period will be 5 years for Group 1 wetland establishment mitigation units, and 10 years for Group 2 wetland establishment and all wetland rehabilitation habitat and other-waters rehabilitation units. The performance-monitoring period will determine the length of the short-term maintenance period for that parcel. For example, Group 1 established wetlands (which have a 5-year performance monitoring period) would have a 2-year short-term maintenance period, whereas the Group 2 established wetlands and wetland rehabilitation areas (which have a 10-year performance-monitoring period) would have a 7-year short-term maintenance period.

Short-term maintenance is a less labor-intensive version of plant establishment maintenance. Most of the activities conducted in the plant establishment phase will continue, but they are performed less frequently than during plant establishment. Short-term maintenance generally includes the following tasks, which are described in Section 8.3.

- Control invasive plants, as needed.
- Assess plant protection and health.
- Conduct general assessment.

8.3 Maintenance Activities

8.3.1 Water Mitigation Plantings

Woody riparian and nonwoody plantings (excluding seeded areas) in the onsite mitigation area and offsite mitigation properties (low through upper banks) will be watered immediately after planting and during the first 3 years following the initial planting (i.e., the plant establishment period) to ensure survival and achieve performance standards.

Depending on the location, plants will be watered using a hose attachment on a water truck or a temporary drip irrigation system. The maintenance contractor will inspect the plantings to determine watering requirements; the approximate anticipated watering schedule is outlined below.

Woody plants will be watered weekly during Year 1 of the plant establishment period and twice monthly during Years 2 and 3. Plants will receive approximately 5 gallons of water per application. Annual watering will begin in mid-spring and continue through mid-fall. Maintenance inspections will be undertaken weekly during Year 1 and twice monthly during Years 2 and 3 to determine whether the annual watering schedule and water application rate require adjustment based on site-specific soil moisture conditions or landscape-level conditions.

It is anticipated that herbaceous wetland plantings in the re-established, established, and rehabilitated wetlands will not be watered because they will be supported by seasonal inundation or soil saturation. Supplemental watering may be provided if the land manager determines that herbaceous wetland plantings are stressed and could be subject to extensive plant loss. Supplemental watering, if needed, likely would be needed only during the first year of the establishment period.

8.3.2 Control Weeds

Periodic removal of nonnative vegetation, including invasive species, will be required during the maintenance periods for the re-establishment, establishment, and rehabilitation areas. Weed control will be provided for three primary reasons: (1) weeds are in direct competition with individual desired plants for nutrients, water, and other resources; (2) weeds can affect the ability of a mitigation unit to meet the performance standards (e.g., relative percent cover by native species); and (3) weeds have the potential to take over a mitigation unit and spread into adjacent habitats.

Standard landscape weed control measures will be used to control weeds in the planting basins. Caltrans prepared an invasive plant management plan (IPMP) (Appendix G) to address the control of species considered invasive which are known to occur and/or have the potential to become introduced into the offsite mitigation parcels. Invasive plants can be defined as plants that invade agricultural crops or infrastructure such as canals, or plants that invade natural communities, displace native species, and alter ecosystem functions (e.g., fire regime, hydrologic functions, nutrient cycling) (Bossard et al. 2000).

For the IPMP, *invasive plants* are defined as those listed by the:

- U.S. Department of Agriculture (USDA) as "noxious" (U.S. Department of Agriculture National Invasive Species Information Center 2008).
- California Department of Food and Agriculture (CDFA) as A, B, or Q (California Department of Food and Agriculture 2009).
- California Invasive Plant Council (Cal-IPC) as "high" (California Invasive Plant Council 2006, 2007).

The IPMP provides additional information on the definition and designation of nonnative plants. In brief, the IPMP identifies the following definitions for weeds, which will be used to define the maintenance and management actions for the control of weeds.

- *Weeds* are plants that grow in sites where they are not wanted and that usually have detectable economic or environmental effects (synonyms include *pest plants*, *plants out of place*, and *prolific plants*).
- The term *nonnative* is used for species that were directly or indirectly introduced by humans, were not present in the region before this introduction, and would not have spread into the area without human interference.
- *Invasive plants* are naturalized plants that produce reproductive offspring, often in very large numbers, at considerable distances from parent plants and thus have the potential to spread over a considerable area.
- *Noxious weed* is a term for plant species or groups of species that have been legally designated as pests by a county, state, or federal agency. Not all such designated noxious weeds are problems in natural areas, and only a small subset of the plant species that are problems in natural areas have been designated noxious.

8.3.2.1 Weed Control in Mitigation Planting Areas

Periodic removal of competing weedy vegetation will be required during the maintenance periods. Weeds that are in direct competition with planted or seeded native vegetation and have the potential to displace or affect the vigor of desired species will be removed from the planting basins or in the immediate vicinity of mitigation plantings. Removal techniques may include manual, mechanical, or chemical methods.

Weeds will be removed inside plant protection screens (for woody plantings), within the planting basins, and around stands of herbaceous plug plants. Weeds occurring at these locations will be removed manually as needed to reduce weed competition throughout the maintenance period, or until such time that the land manager determines that planted and seeded species have become sufficiently established and that no further maintenance is required to ensure that the plantings meet the performance standards (Chapter 9).

Native herbaceous vegetation that is planted, seeded, or naturally colonizes the mitigation/restoration site will be retained, although this herbaceous vegetation will be cleared from the woody plant species planting basins during the maintenance period to ensure establishment of the planted material.

8.3.2.2 Nonnative Plant Control

Nonnative plants will be controlled in the onsite mitigation area and offsite mitigation units. The nonnative species to be controlled will vary depending on site-specific mitigation actions and associated performance standards. Invasive plants in or adjacent to mitigation locations will be controlled using manual, mechanical, or chemical control methods.

Re-established and established wetlands have performance standards for relative percent cover by native wetland species. All nonnative species, regardless of whether they are defined as invasive, in these mitigation units may need to be controlled to ensure that the Year 10 performance standards for relative percent cover by native wetland cover are achieved.

Rehabilitated wetlands have a performance standard for relative percent cover by native wetland species and absolute percent cover by invasive plants. Invasive species, as defined for this performance standard, include the species listed in Table 2.1 of Appendix H. All nonnative species, regardless of whether they are defined as invasive, in these mitigation units may need to be controlled to ensure that the Year 10 performance standards for relative percent cover by native wetland cover are achieved.

The performance standards for invasive species cover for each mitigation type are described in Chapter 9. Invasive species will be controlled as needed to ensure that the performance standards are met.

8.3.2.3 Weed Control Methods

Nonchemical weed control methods (manual and mechanical) are preferred over chemical methods. If nonchemical methods are used, weeds will be removed before they reach their flowering stage or spread (whichever occurs first). Weeds that are cut and cleared will be legally disposed of offsite at a landfill or other facility that accepts green waste. Manual control methods may include hand removal or use of small hand-powered or handheld equipment (e.g., a Weed Wrench or a chainsaw). Mechanical removal may include string-trimming or mowing.

If chemical methods are used, herbicides will be applied in late winter, when leaf rosettes are beginning to appear. This is an effective time to conduct chemical control because the frequency of application is reduced, so less herbicide is needed. Before herbicides are applied, weeds will be string-trimmed to a height of 6–12 inches to further reduce the amount of herbicide needed. Cut materials will be legally disposed of offsite at a landfill or other facility that accepts green waste. Once the cut materials have been cleared, herbicide will be applied to the remaining leaves and stems. Repeated treatments may be necessary, as determined by a qualified biologist/botanist. All herbicide treatments will be conducted by licensed personnel in accordance with the manufacturer's specifications. Herbicide application will comply with federal, state, and local health and water quality regulations.

Invasive plants will be controlled in a manner that minimizes disturbance to desirable native animal and plant species to the extent feasible. Any mitigation plantings or existing woody plants damaged during invasive plant control activities will be replaced in-kind at a 1:1 ratio, consistent with the planting procedures described for initial mitigation plantings. Replacement plants will be propagated from locally native stock if possible and will be as similar in size to the damaged plant as possible. Replacement plants will be planted in fall and winter. Replacement plant locations will be documented on the as-maintained drawings.

8.3.3 Assess Plant Protection and Health

During maintenance inspections, each woody plant will be checked for deer or rodent browse damage; insect damage; signs of disease; wind, water, or drought stress; and other damage. Plants substantially affected (i.e., beyond their ability to recover unaided) will be replaced following the same procedures specified for initial plantings. Locations will be marked, and replanting will occur in fall or winter, as appropriate (Section 8.3.4).

Browse protection will be assessed to ensure that it is in good condition, functioning effectively, and not constricting or becoming embedded in the plant. If plants outgrow their browse protection, the protection will be replaced with larger collars or other measures or will be removed entirely.

Plants that become dislodged, settle excessively, or are otherwise unseated from their natural growing condition will be adjusted. Associated planting items such as plant protection, water basins, and mulch will also be adjusted as necessary.

8.3.4 Replace Plants

8.3.4.1 Replace Woody Plants

Woody plants will be inspected during annual vegetation monitoring surveys to determine whether replacement plants will be necessary to meet the performance. The annual monitoring report (Chapter 10) will identify the causes of any plant mortality and any remedial measures that may be necessary. For example, if a particular species has a high mortality rate, a determination will be made about the cause of plant mortality and whether replacement by another species better suited to the microsite conditions is warranted.

During each annual maintenance period, necessary replacement plants will be provided, installed, and maintained by the land manager. Replacement will include planting a sufficient number of seedlings that the number of living plants meets or exceeds the performance standards. Plants will be replaced following the same procedures specified for initial plantings. Replacement plants will be propagated from locally native stock if possible, and will be as similar in size to the original plant as possible. Replacement plants will be planted in the fall/winter. Replacement plant locations will be documented on the as-maintained drawings.

8.3.4.2 Replace Herbaceous Wetland Plants

Herbaceous plants will be densely planted; therefore, each individual plant will not be inspected during annual vegetation monitoring surveys. Instead, a general assessment of plant survival and vigor will be performed to determine whether replacement plants will be necessary to meet the performance standards. The assessment will focus on identifying relatively large areas that have experienced high plant mortality. The annual monitoring report (Chapter 10) will identify the causes of any plant mortality and any remedial measures that may be necessary. Based on the site assessments, a determination will be made about the cause of plant mortality and whether replacement by another species better suited to the microsite conditions is warranted.

During each annual maintenance period, necessary replacement plants will be provided, installed, and maintained by the land manager. Replacement will include planting a sufficient number of seedlings that the number of living plants meets or exceeds the performance standards. Plants will be replaced following the same procedures specified for initial plantings. Replacement plants will be propagated from locally native stock if possible, and will be as similar in size to the original plant as possible. Replacement plants will be planted in the fall/winter. Replacement plant locations will be documented on the as-maintained drawings.

8.3.5 Conduct Supplemental Seeding

Seeded areas include the wetland and other waters mitigation planting areas, as well as areas disturbed during implementation of mitigation actions. During each performance monitoring survey, a general assessment of seeded area establishment will be performed to determine whether supplemental seeding will be necessary to meet the performance standards. The assessment will focus on identifying relatively large areas that have experienced low seed germination and seedling establishment. The annual monitoring report (Chapter 10) will identify the causes of any plant mortality and any remedial measures that may be necessary. Based on the site assessments, a determination will be made about the cause of plant mortality and whether replacement by another species better suited to the microsite conditions is warranted.

All surfaces disturbed by mitigation implementation also will be seeded after completion of the implementation phase. These seeded areas will be maintained during the maintenance period. It is anticipated that the seeded areas will become vegetated by seeded species and colonized by other herbaceous species that occur in adjacent areas. Seeding area maintenance will include reseeding large bare areas or other areas of concern identified by the land manager. Bare areas will be reseeded with the original seed mix at the rate specified in the construction documents.

8.3.6 Conduct General Assessment

The onsite mitigation area and offsite mitigation properties will be assessed to ensure that site features such as fences, gates, irrigation systems, and access roads are in good working condition and free of debris and trash.

Fences and gates will be maintained in good working condition. Damaged fencing material will be replaced or repaired. Gates will be maintained in an operable condition, including working locks. All excess fence wire, fabric, and other materials will be collected and removed after each repair is completed.

Access roads will be maintained to the following standards.

- Access roads will have a smooth crown to ensure expedient surface water runoff.
- Graveled access roads will be maintained so that gravel covers most of the road surface, with minimal soil showing.
- Unimproved access roads will be maintained with onsite materials only; no new soil or other surface materials will be imported to the offsite mitigation properties.
- Access road culverts and roadside ditches will be maintained free of debris or obstructions.

The onsite mitigation area and offsite mitigation properties will be kept free of all unnatural debris and trash. Debris and trash will be removed promptly. Depending on the materials involved, debris and trash may be raked or removed manually, with care taken not to disturb or damage native vegetation. Collected debris and trash will be legally disposed of offsite at a landfill or other waste facility.

8.4 Recordkeeping

The maintenance activities described above will be documented on the as-maintained drawings during the plant establishment and short-term maintenance periods. The as-maintained drawings will be based on the as-built drawings. The as-maintained drawings will be updated as necessary to reflect current conditions at mitigation parcels, including the annual watering schedule, water application rates, invasive plant control activities, plant replacement, and general maintenance activities.

A record of monthly maintenance performed at the mitigation parcels will be kept during the plant establishment and short-term maintenance periods (i.e., 5 or 10 years). The record will document maintenance activities performed (e.g., purpose, location, method employed, labor and direct costs, effectiveness). A maintenance summary report will be compiled at the conclusion of each monitoring year that summarizes the monthly maintenance information and includes the as-maintained drawings for that maintenance year. This information will be helpful in the preparation of the performance monitoring report (see Section 10.5) and will be useful for long-term management and adaptive management decisions.

8.5 Maintenance Inspections

Schedules of maintenance inspections for the plant establishment maintenance and short-term maintenance periods are presented in Tables 8-1 and 8-2.

Table 8-1. Schedule for Plant Establishment Maintenance Period

Activity	Schedule and Notes
Water woody mitigation plantings	Weekly inspection April 15 through October 31 for Year 1. Inspection twice monthly April 15 through October 31 for Years 2 and 3.
Control invasive plants	Monthly inspection. Small infestations of invasive species removed immediately. Herbicide use typically timed for late winter (appearance of leaf rosettes).
Control other nonnative plants	Monthly inspection. Nonnative species in competition with mitigation plantings and native species cover. Herbicide use typically timed for late winter (appearance of leaf rosettes).
Assess plant protection and health	Monthly inspection. Replacement planting in fall and winter.
Install replacement plants and supplemental seeding	Annual plant replacement (if needed) based on monitoring results. Supplemental seeding as needed.
Conduct general assessment of offsite mitigation parcels	Monthly inspection. Repairs as needed.

Table 8-2. Schedule for Short-Term Maintenance Period

Activity	Schedule
Control invasive plants	Quarterly inspection; small infestations removed immediately; herbicide use typically timed for late winter (appearance of leaf rosettes).
Assess plant protection and health	Quarterly inspection; replacement planting in the fall/winter.
Conduct general assessment of offsite mitigation parcels	Quarterly inspection; repairs as needed.

Chapter 9 Performance Standards

Performance standards have been developed to determine whether the project's compensatory mitigation has successfully mitigated project impacts. Performance standards are observable or measurable physical (including hydrologic), chemical, and/or biological attributes that are used to determine whether a compensatory mitigation project meets its objectives.

Compensatory mitigation for the project will include: (1) re-establishment of temporary project impacts on wetland and other waters; (2) offsite wetland establishment and rehabilitation; and (3) other waters rehabilitation.

Performance standard monitoring will be performed to ensure that the compensatory mitigation is successful and fulfills the project's mitigation requirements. The tables in this chapter summarize performance standards for re-established, established, rehabilitated wetlands and rehabilitated other waters, as well as monitoring schedules.

For the purpose of this document, a mitigation unit is defined as a geographic area in which a particular mitigation action will occur. Mitigation units occur in the onsite and offsite mitigation areas. For example, on Ford 108-020-04, areas of wetland establishment (one) and Type 3 (one) and Type 4 (one) wetland rehabilitation are proposed. Each of these areas will be assessed as an individual unit (mitigation unit). A single mitigation unit can span multiple parcel boundaries. For onsite re-establishment areas, each individual geographical polygon will be assessed separately. The monitoring results will be recorded and assessed separately for each onsite re-establishment unit. The monitoring results for each offsite mitigation unit will be assessed separately. Results will be presented in the annual monitoring report.

Success of the re-established, established, or rehabilitated mitigation areas will be considered achieved if all the performance standards are met or exceeded for the onsite and offsite mitigation units. Written notification of completion of the performance monitoring period and compliance with the performance standards for all mitigation will be provided to USACE by Caltrans. USACE then will confirm whether they are in agreement with the assessment. The corresponding performance monitoring methods for performance standards discussed below are presented in Chapter 10.

9.1 Re-Established or Established Wetland

9.1.1 Wet Meadow Wetland

Wet meadow re-establishment will occur only onsite, while establishment will occur only on the offsite mitigation property. Wet meadow wetland re-establishment and Group 1 establishment share the same performance standards and length of monitoring period. Group 2 establishment will have the same performance standards but will be monitored for 10 years.

The success of re-established or established wet meadow habitat will be measured by performance standards for:

- Relative cover by wetland species.
- Relative cover by wetland species from the list of target species.
- Species richness, hydroperiod.
- Absolute cover by invasive plants (Table 9-1).

Table 9-1. Group C Re-Established or Group 1 Established Wet Meadow Habitat—Performance Standards

Habitat Characteristic	Performance Standards	
	Monitoring Year	Standard
Relative cover by wetland plant species	1	50%
	2	60%
	3	70%
	4	75%
	5	80%
Relative cover by native wetland plant species from list of target species	1	50%
	2	55%
	3	60%
	4	65%
	5	70%
Species richness	1	A minimum of 15 species from the list of target species will be seeded or planted.
Hydroperiod (Group 1 Wetlands)	1–5	The hydroperiod for all established wetland habitats will be within plus or minus 10% of the hydroperiod for monitoring reference sites.
Hydroperiod (Re-Established Wetlands)	1–5	The hydroperiod will be the same cover class as characterized by the USACE assessment of pre-project wetland hydrology.
Absolute cover by invasive plants	1-5	Cover by invasive plants will be less than 2% of the absolute cover of all plants in re-established and established wetlands.

Re-established and Group 1 wetlands will be monitored annually for 5 years. Group 2 wetland establishment will be monitored annually for 10 years.

The monitoring methods and performance standards for onsite re-establishment will be divided into two categories based on temporary impact type.

- Re-establishment of temporary fill areas.
- Re-establishment of temporary no-fill areas (i.e., areas used only for utility access).

The monitoring data and results for the wetland re-establishment sites, both fill and no-fill areas, will be collected and assessed individually. The no-fill areas will be evaluated after construction to ensure that there was no degradation of wetland functions and value and that these locations retain a jurisdictional wetland status. If it is determined degradation has occurred in the no-fill areas, Caltrans will inform and coordinate with USACE on appropriate remedial measures.

The wetland re-establishment sites in areas of temporary fill will be separated by the following size categories, each of which has unique performance standards.

- Group A wetland re-establishment is any that is less than 3,000 square feet (sf) in total area.
- Group B wetland re-establishment is any site between 3,000 sf and 1.00 acre in total area.
- Group C wetland re-establishment is any site that is greater than 1.00 acre in total area.

Table 9-2 identifies the performance standards for Group A and B wetland re-establishment. Table 9-1 identifies the performance standards for each Group C wetland re-establishment and Group 1 wetland re-establishment. Table 9-3 identifies the performance standards for Group 2 wetland re-establishment. The monitoring results will report on the quantity of sites that do and do not meet the performance standards. Additional information related to monitoring methods is provided in Chapter 10.

Table 9-2. Re-Established Wet Meadow Habitat—Performance Standards

Onsite Re-Establishment Area Size Category	Performance Standards	
Group A	Wetland species cover	Wetland species provide the majority of the vegetative cover
	Species richness	Presence of at least 15 species with a wetland indicator status of facultative or wetter
	Invasive species cover	Invasive species not dominant.
	Wetland hydrology	Wetland hydrology present (ponding or soil saturation)
Group B	Wetland species cover	Wetland species provide the majority of the vegetative cover
	Invasive species cover	Invasive species not dominant
	Species richness	Presence of at least 15 species with a wetland indicator status of facultative or wetter

9.1.1.1 Relative Cover by Wetland Plant Species

For Group C re-established and established wetlands, at least 80% relative vegetation cover by wetland plant species will be present at the final monitoring year (Table 9-1). Annual performance standards have been developed to serve as indicators of the trend in the establishment of relative cover by wetland plant species. Wetland species are defined as facultative (FAC), facultative wetland (FACW), or obligate (OBL) after Reed (1988).

For Group A and B re-establishment sites, wetland plant species will provide the majority of the plant cover (Table 9-2). If wetland plant species are not providing the majority of plant cover, further investigations of hydrology and soils will be necessary to determine whether the areas are functioning as a wetland.

9.1.1.2 Relative Cover by Native Wetland Plant Species from List of Target Species

For Group C re-established and established wetlands, native wetland vegetation from the list of target species will provide 70% relative cover at the final monitoring year (Table 9-1). Annual performance standards have been developed to serve as indicators of the trend in establishment of relative percent cover by native wetland plant species. Wetland species are defined as FAC, FACW, or OBL after Reed (1988).

This performance standard does not apply to Group A and B re-establishment.

9.1.1.3 Species Richness

A minimum of 15 species from the list of target species will be planted in Group C re-established wetland habitat and established wetland habitat. The list of USACE-approved wetland plant species is presented in Table 7-5. Site-specific planting lists are provided in Appendix E. These lists may need to be refined based on plant availability prior to planting. Caltrans will provide USACE a copy of any changes to the list prior to planting so that USACE can confirm the minimum number of species are being included. For wetland re-establishment Groups A and B, a mimimum of 15 species that have a wetland indicator status of FAC or wetter must be present in the final monitoring year.

9.1.1.4 Hydroperiod

The hydroperiod for Group C re-established wetlands will be the same cover class as the cover characterized by the USACE assessment of preproject wetland hydrology. The USACE hydrology assessment is provided in Appendix I. Established wetland habitats will be within plus or minus 10% of the hydroperiod for monitoring reference sites at Year 5 for Group 1 and Year 10 for Group 2 (Table 9-1 and Table 9-3).

For Groups A and B wetland re-establishment, the need to investigate the presence of wetland hydrology is triggered only if the relative wetland plant cover performance standard is not met. In this case, Groups A and B must have hydrology present (ponding or saturated) at the time of monitoring (Table 9-2).

9.1.1.5 Absolute Cover by Invasive Plants

Invasive plant cover, as defined in Chapter 8, will be monitored concurrently with absolute percent cover for wetland and native wetland species in the wet meadow re-establishment and establishment sites. For Group C wetland re-establishment and all establishment, cover by invasive plants will be less than 2% of the absolute cover of all plants (Table 9-1). For Groups A and B re-establishment, the invasive species may not be dominant (Table 9-2).

Table 9-3. Group 2 Established Wet Meadow Habitat—Performance Standards

Habitat Characteristic	Performance Standards for Group 2	
	Monitoring Year	Standard
Relative cover by wetland plant species	1	50%
	2	50%
	3	60%
	4	60%
	5	70%
	6	70%
	7	75%
	8	75%
	9	75%
	10	80%
Relative cover by selected native wetland plant species	1	50%
	2	50%
	3	55%
	4	55%
	5	60%
	6	60%
	7	65%
	8	65%
	9	65%
	10	70%
Species richness	1	A minimum of 15 species from the list of target species will be seeded or planted
Hydroperiod	1–10	The hydroperiod for established wetland habitats will be within plus or minus 10% of the hydroperiod for monitoring reference sites
Absolute cover by invasive plants	1–10	Cover by invasive plants will be less than 2% of the absolute cover of all plants in established wetlands

9.1.2 Re-Established Riparian Wetland

Riparian wetland re-establishment will take place only onsite. No riparian wetland establishment is proposed. The success of riparian wetland re-establishment will be measured by performance standards for plant survival, plant vigor, absolute percent vegetation cover by native tree species, absolute percent vegetation cover by native shrub species, and plant density. Re-established riparian wetlands will be monitored in Years 1–10 (Table 9-4).

Table 9-4. Re-Established Riparian Wetlands—Performance Standards

Habitat Characteristic	Performance Standards	
	Monitoring Year	Standard
Plant survival by percentage survival of original number planted (includes replacement plants), by species	1	90%
	2	80%
	3	70%
	4	60%
	5	60%
Plant vigor, average vigor by species (both planted and replacement plants)	1–4	Greater than 1.0
	5	Equal to or greater than 2.0
Absolute cover (i.e., absolute canopy cover) by native tree species	5	10%
	6	20%
	8	40%
	10	50%
Absolute cover (i.e., absolute canopy cover) by native shrub species	5	10%
	6	20%
	8	40%
	10	50%
Hydroperiod	1–10	The hydroperiod will be the same as characterized by the USACE assessment of preproject wetland hydrology
Woody plant density (number of live woody plants; both planted and volunteer plants)	5	260
	6	218
	7	174
	8	130
	9	130
	10	A minimum of 109 live woody plants per acre

9.1.2.1 Plant Survival

All plants planted as part of mitigation efforts (including replacement plants) will be monitored to assess survival rates. Naturally recruited plants will not be included as part of plant survival monitoring because inclusion would skew the monitoring results, which focus on survival of planted material. Planted material must have a minimum of 60% survival at Year 5 (Table 9-4). Annual performance standards have been developed for Years 1–4 to serve as indicators of the trend in plant survival.

The plant survival performance standard will be replaced in Year 5 by absolute cover performance standards, which will be monitored in Years 5, 6, 8, and 10 and will include both planted and naturally recruited vegetation. This shift is appropriate because as riparian habitat develops and plants mature, a canopy begins developing and individual plant assessment becomes less relevant to overall ecological success.

9.1.2.2 Plant Vigor

All plants planted as part of mitigation efforts (including replacement plants) will be monitored during Years 1 through 5 to assess vigor (Table 9-4). Annual performance standards have been developed for Years 1–4 to serve as indicators of the trend in plant vigor. Naturally recruited plants will not be included as part of plant vigor monitoring because inclusion would skew the monitoring results, which focus on vigor of planted material.

The determination of vigor will include disease symptoms, low-density foliage, atypical leaf color, stem and foliar vigor (e.g., signs of desiccation, leaf curl), browsing or other wildlife-related damage, and vandalism. A vigor rating of *good*, *fair*, or *poor* (values of 3.0, 2.0, and 1.0, respectively) will be assigned to each plant. Dead plants will not be assigned a vigor rating. These ratings are defined below.

- **Good (3.0):** A plant with less than 25% of its aboveground growth exhibiting one or more of the factors listed above.
- **Fair (2.0):** A plant with 25–75% of its aboveground growth exhibiting one or more of the factors listed above.
- **Poor (1.0):** A plant with more than 75% of its aboveground growth exhibiting one or more of the factors listed above.
- **Dead:** A plant that does not appear capable of growth.

Plant vigor ratings will be aggregated by species per mitigation unit to determine the average vigor rating, by species, for each monitoring year.

9.1.2.3 Percent Vegetation Cover

The percent vegetation cover (i.e., absolute canopy cover) in the riparian corridor for planted and naturally recruited native tree and shrub species by vegetative stratum must be 50% at Year 10 (Table 9-4).

9.1.2.4 Tree Plant Density

Tree plant density will be monitored in Years 5–10 to determine the density and distribution of tree plants in the re-established riparian wetlands (Table 9-4). Results will be presented individually for each onsite and offsite mitigation unit. Naturally recruited trees will be considered under percent vegetation cover monitoring because they will contribute to native riparian habitat cover.

The performance standard for tree plant density is 109 live trees per acre at Year 10. The initial woody plant density at time of planting is 436 trees per acre. The performance standard for plant survival in Year 5 is 60% (261 live plants). Additional mortality below 60% survival is allowable as long as the Year 10 tree density performance standard is achieved.

9.2 Rehabilitated Wetlands

Wetland rehabilitation will occur in existing wetlands on offsite mitigation properties only. Some rehabilitation will take place in wetlands adjacent to creeks within riparian corridors currently vegetated with only grasses. As described in Chapters 6 and 7, five types of wetland rehabilitation will be implemented.

Type 1 (successional development) rehabilitation has an exclusive set of performance standards (Table 9-5) that require no decrease in relative cover of wetland and native species from the list of target species values below baseline survey values (i.e., spring 2012 surveys).

Types 2–4 share the same performance standards for total relative cover by all wetland plant species; however, each type has its own set of performance standards for total relative cover by native wetland species from the list of target species (Table 9-6).

Type 5 also has its own set of performance standards (Table 9-6). The specific performance standards for each wetland rehabilitation type are presented in the following sections.

9.2.1 Rehabilitated Wetland (Type 1)

Type 1 wet meadow rehabilitation will occur on the Watson parcels. Type 1 rehabilitation will occur on the entirety of Watson (APN 037-250-05) and in the southwest portion of Watson East (APN 037-221-30) and will be accomplished by removing grazing and haying from the entire mitigation unit. Because these parcels already have high-quality wetland habitat over most of the parcel, no mitigation actions will be implemented. Baseline surveys will be performed in spring 2012 and will be used to determine the existing total relative cover by wetland species and relative cover by native wetland species from the list of target species. The mitigation units will be monitored during Years 1–10 to ensure that there is no decrease in relative cover by wetland plant species and native wetland plant cover from the list of target species. Baseline surveys also will be used to determine the presence/absence and absolute percent cover by invasive plant species listed in Appendix H. The performance standard of absolute cover by native species is less than 2% cover by invasive species. The performance standards for Type 1 wetland rehabilitation mitigation units are presented in Table 9-5.

Table 9-5. Type 1 Rehabilitated Wetland Habitat—Performance Standards

Habitat Characteristic	Performance Standards	
	Monitoring Years	Standard
Absolute cover by wetland species	1	No decrease in absolute cover by wetland species below baseline conditions
	2	
	3	
	4	
	5	
	6	
	7	
	8	
	9	
Relative cover by wetland plant species	10	No decrease in relative cover by wetland species below baseline conditions
Relative cover by native wetland plant species from list of target species	1	No decrease in relative cover by wetland species from list of target species below baseline conditions
	2	
	3	
	4	
	5	
	6	
	7	
	8	
	9	
	10	
Absolute percent cover by invasive plant species	2, 3, 4, 5, 7, 9,10	Less than 2%

9.2.2 Rehabilitated Wetland (Type 2)

Type 2 wetland rehabilitation will be accomplished by removing grazing and haying from the entire mitigation unit. No planting or seeding will occur because existing native vegetation is expected to expand and new native populations are expected to colonize the rehabilitation mitigation units. If Type 2 rehabilitation mitigation units are not meeting or trending toward meeting the performance standard by Year 4, Caltrans will assess the need to provide supplemental planting and seeding on a unit-by-unit basis. Any remediation should include native herbaceous and woody wetland plantings, not just broadcast seeding.

Type 2 rehabilitation mitigation units performance standards are similar to those of Types 3 and 4. The success will be measured by performance standards for relative cover by wetland species, relative cover by native wetland species from the list of target species, and absolute cover by invasive plants listed in Appendix H; performance standards for this type are shown in Table 9-6.

9.2.3 Rehabilitated Wetland (Types 3–5)

Types 3–5 wetland rehabilitation will consist of manipulating the biological (vegetation) characteristics of degraded wet meadows by removing nonnative species followed by planting and seeding native herbaceous wetland species (Chapter 7). The success will be measured by performance standards for relative cover by wetland species, relative cover by native wetland species from the list of target species, and absolute cover by invasiveplants listed in Appendix H. The performance standards for these types are presented in Table 9-6.

Table 9-6. Type 2–5 Rehabilitated Wetland Habitat—Performance Standards

Habitat Characteristic	Monitoring Year	Performance Standards			
		Type 2—0.1 Credit Value	Type 3—0.2 Credit Value	Type 4—0.3 Credit Value	Type 5—0.3 Credit Value
Relative cover by wetland plant species over baseline surveys	1	5%	10%	10%	10%
	2	15%	15%	15%	15%
	3	25%	25%	25%	25%
	4	40%	40%	40%	40%
	5	50%	50%	50%	50%
	6	60%	60%	60%	60%
	7	70%	70%	70%	70%
	8	75%	75%	75%	75%
	9	80%	80%	80%	80%
	10	90%	90%	90%	90%
Relative cover increase in native wetland plant species from list of target species over baseline surveys	1	–	–	–	
	2	2%	8%	14%	14%
	3	–	–	–	–
	4	4%	16%	28%	28%
	5	5%	20%	35%	35%
	6	–	–	–	–
	7	7%	28%	49%	49%
	8	–	–	–	–
	9	9%	36%	63%	63%
	10	10%	40%	70%	70%
Species richness of native species from list of target species	10	12	12	15	8
Absolute percent cover by invasive plants	1–10	<2%	<2%	<2%	<2%
Plant survival by percentage survival of original number planted (includes replacement plants), of woody species	1	–	90%	–	
	2	–	80%	–	
	3	–	70%	70%	70%
	4	–	60%	60%	60%
	5	–	60%	60%	60%
Plant vigor by species (both planted and replacement plants)	1–4	–	>1.0	–	
	5	–	≥2.0	–	
Tree plant density per acre (both planted and volunteer plants)	5	–	36	50	120
	6	–	30	50	100
	7	–	24	40	80
	8	–	18	30	60
	9	–	15	25	50
	10	–	A minimum of 15 live woody plants per acre	A minimum of 25 live woody plants per acre	A minimum of 50 live woody plants per acre

9.2.3.1 Relative Cover by Wetland Plant Species

On average, at least 90% relative vegetation cover by wetland plant species will be present in rehabilitated wetland habitat at Year 10 (Table 9-6). Annual performance standards have been developed for Years 1–9 to serve as indicators of the trend in the establishment of relative cover by wetland plant species. Wetland species are defined as FAC, FACW, or OBL after Reed (1988).

9.2.3.2 Relative Cover by Native Wetland Plant Species from the List of Target Species

For Types 2–5, the performance standards applied to a particular type of wetland rehabilitation are listed in Table 9-6. Each type has unique performance standards depending on the aggressiveness of the planting effort and the associated credit.

9.2.3.3 Absolute Cover by Invasive Plants

Invasive species are those plant species listed in Appendix H will be monitored concurrently with relative cover for wetland and native wetland species. Cover by invasive plants will be less than 2% of the absolute cover of all plants in rehabilitated wetlands at Year 10 (Table 9-6).

9.2.3.4 Plant Survival of Woody Plants

Woody plants planted in the Type 3, Type 4, and Type 5 wetland rehabilitation mitigation units will be monitored to assess survival rates (Table 9-6). Naturally recruited plants will not be included as part of plant survival monitoring because inclusion would skew the monitoring results, which focus on survival of planted material. Planted material will have a minimum of 60% survival at Year 5. Annual performance standards have been developed for Years 1–4 to serve as indicators of the trend in plant survival.

9.2.3.5 Plant Vigor

All plants planted as part of mitigation efforts (including replacement plants) will be monitored during Years 1–5 to assess vigor. Annual performance standards have been developed for Years 1–4 to serve as indicators of the trend in plant vigor (Table 9-6). Naturally recruited plants will not be included as part of plant vigor monitoring because inclusion would skew the monitoring results, which focus on vigor of planted material. The determination of vigor will be determined in the same manner as that for re-established riparian habitat (Section 9.1.2.2).

9.2.3.6 Percent Vegetation Cover

The plant survival performance standard will cease after Year 5 (Table 9-6). The status of woody plants will continue to be monitored under the absolute cover performance standards, which will continue in years 6–10. It will include both planted and naturally recruited vegetation. This shift is appropriate because as woody habitats develop and plants mature, a canopy begins developing and individual plant assessment becomes less relevant to overall ecological success.

9.2.3.7 Tree Plant Density

Tree plant density will be monitored in Years 5–10 to determine the density and distribution of woody plants in the Type 5 rehabilitation units. Results will be presented individually for each onsite mitigation location and each offsite mitigation unit. Naturally recruited plants will be considered under percent vegetation cover monitoring because they will contribute to native riparian habitat cover.

The performance standards for tree plant density for Type 3–5 rehabilitation wetlands are a minimum of 15, 25, and 50 live trees per acre (Table 9-6). The initial tree plant density at time of planting is 436 trees per acre. The performance standard for plant survival in Year 5 is 60% (261 live plants). Additional mortality below 60% survival is allowable as long as the tree densities shown in Table 9-6 are achieved.

9.3 Re-Established Other Waters

Other waters re-establishment consists of planting riparian vegetation at temporarily affected sites in the project area. The performance standards are listed below. See Section 9.1.2 for a description of plant survival, vigor, and percent vegetation cover.

Table 9-7. Re-Established Other Waters—Performance Standards

	Performance Standards	
Habitat Characteristic	**Monitoring Year**	**Standard**
Plant survival by percentage survival of original number planted (includes replacement plants), by species	1	90%
	2	80%
	3	70%
	4	60%
	5	60%
Plant vigor, average vigor by species (both planted and replacement plants)	1–4	>1.0
	5	≥2.0
Absolute cover (i.e., absolute canopy cover) by native tree species	5	10%
	6	20%
	8	40%
	10	50%
Absolute cover (i.e., absolute canopy cover) by native shrub species	5	10%
	6	20%
	8	40%
	10	50%
Woody plant density (number of live woody plants [both planted and volunteer plants])	5	260
	6	218
	7	174
	8	130
	9	130
	10	A minimum of 109 live woody plants per acre

9.4 Rehabilitated Other Waters

9.4.1 Riparian Habitat

Other waters rehabilitation of this type includes planting riparian vegetation at the offsite mitigation properties within corridors adjacent to degraded other waters currently covered by herbaceous vegetation and/or by removing woody nonnative species followed by planting native woody riparian species. This includes planting in upland areas adjacent to creeks. It shares the same performance standards and length of monitoring period with re-established other waters (Table 9-7). See Section 9.1.2 for a discussion of plant survival, vigor, and percent vegetation cover.

9.4.2 Erosion Repair and Fish Passage

Fish passage improvements and instream erosion repairs also are attributed to other waters rehabilitation. No credits have been applied to these actions, and no performance standards are proposed.

9.5 Summary of Monitoring Actions

Table 9-8 summarizes the monitoring required for each mitigation unit to determine whether the mitigation is successful.

Table 9-8. Monitoring Requirements for the Onsite and Offsite Mitigation Areas

Parcel	APN	All Monitoring Locations		Re-established and Established Wetlands				Re-established and Established Wetlands					Re-established Riparian Wetlands						Rehabilitated Wetlands											Rehabilitated Other Waters					
				Groups A and B				Group C Re-established Wetlands and Group 1 and 2 Established Wetlands					Onsite Mitigation Areas						Type 1			Types 2 – 5							Offsite Mitigation Areas					
		Qualitative Data on General Site Conditions	Photo Monitoring Stations	Wetland Species Cover	Species Richness	Invasive Species Cover	Hydroperiod	Relative Percent Cover by Wetland Species	Relative cover by native wetland plant species	Species Richness	Hydroperiod	Absolute Cover by Invasive Plants	Plant Survival	Plant Vigor	Percent Vegetation Cover of Native Trees and Shrubs	Absolute Cover by Invasive Plants	Hydroperiod	Tree Plant Density	Relative Percent Cover by Wetland Species	Relative cover by native wetland plant species	Absolute Cover by Invasive Plants	Relative Percent Cover by Wetland Species	Relative cover by native wetland plant species	Species Richness of Wetland Plant Species	Absolute Cover by Invasive Plants	Plant Survival	Plant Vigor	Tree Plant Density	Plant Survival	Plant Vigor	Percent Vegetation Cover of Native Trees and Shrubs	Absolute Cover by Invasive Plants	Hydroperiod	Tree Plant Density
Onsite Wetland and Other Waters Re-establishment Areas	–	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X																
Offsite Mitigation Areas																																		
Benbow	007-020-03	X	X																			X	X	X	X	X	X	X						
	007-010-04	X	X																			X	X	X	X	X	X	X						
	108-040-13	X	X					X	X	X	X	X										X	X	X	X	X	X	X						
	108-030-07	X	X																			X	X	X	X	X	X	X						
	108-020-06	X	X					X	X	X	X	X																						
Ford	108-010-05	X	X																			X	X	X	X	X	X	X	X	X	X	X	X	X
	108-010-06	X	X					X	X	X	X	X										X	X	X	X	X	X	X	X	X	X	X	X	X
	108-020-04	X	X					X	X	X	X	X										X	X	X	X	X	X	X						
	108-030-02	X	X					X	X	X	X	X										X	X	X	X	X	X	X						
	108-030-05	X	X																			X	X	X	X	X	X	X						
Frost	108-070-04	X	X																															
Goss	103-230-02	X	X					X	X	X	X	X																						
Lusher	108-030-04	X	X					X	X	X	X	X										X	X	X	X	X	X	X						
Nance	108-050-06	X	X																			X	X	X	X	X	X	X						
Niesen	108-040-02	X	X					X	X	X	X	X										X	X	X	X	X	X	X						
MGC Plasma North	103-230-06	X	X					X	X	X	X	X																						
MGC Plasma Middle	103-250-14	X	X					X	X	X	X	X										X	X	X	X	X	X	X						
Watson	037-221-30	X	X					X	X	X	X	X							X	X	X	X	X	X	X	X	X	X						
	037-250-05	X	X																X	X	X													
Wildlands	108-020-07	X	X					X	X	X	X	X																						
	108-030-08	X	X																			X	X	X	X	X	X	X						
	108-060-01	X	X					X	X	X	X	X										X	X	X	X	X	X	X	X	X	X	X	X	X
	108-070-08	X																				X	X	X	X	X	X	X						
	108-060-02	X	X																			X	X	X	X	X	X	X						
	108-070-09	X	X					X	X	X	X	X										X	X	X	X	X	X	X						

Chapter 10 Monitoring Requirements

To ensure that re-established, established, and rehabilitated mitigation is progressing toward the performance standards established in this MMP (Chapter 9), qualified biologists will monitor the mitigation using standard, easily reproducible monitoring methods that are known and accepted by the scientific community and regulatory agencies. Two types of monitoring will be conducted: performance standard monitoring and reference site monitoring.

Performance standard monitoring will be used to assess the progress of the onsite and offsite mitigation management units toward meeting performance standards. *Reference site monitoring* will be used to identify environmental trends at the onsite mitigation area and the offsite mitigation properties. These monitoring methods are described below.

As stated in Chapters 7 and 9, Caltrans will perform baseline surveys of the onsite and offsite wetland and other waters mitigation rehabilitation units in spring 2012. The purpose of these surveys is to determine existing native wetland plant cover and species composition. This information will be used to refine the onsite and offsite plant palettes and seed mixes presented in Appendix D and E, respectively. The baseline surveys will follow the monitoring protocols described in this chapter. The line transects established during the baseline surveys will be selected to encompass a representative sample of the wetland plant cover in each rehabilitation unit and will be used for the duration of the performance standard monitoring period. More discussion of the baseline studies can be found in Section 10.1.2.3 Additional information on the selection of line transects is present in Section 10.1.2.

10.1 Performance Standard Monitoring

Performance standard monitoring will be conducted for re-established, established, and rehabilitated wetland and other waters to assess the progress toward meeting the performance standards presented in Chapter 9.

10.1.1 Monitoring Schedule

The performance standard monitoring schedule will vary according to habitat type (Tables 10-1, 10-2, and 10-3). Reference sites will be monitored concurrently with mitigation.

Table 10-1. Performance Standard Monitoring Schedule for Re-Established Wetlands and Other Waters

Habitat Type and Habitat Characteristics	Monitoring Years	Monitoring Period
Group A Re-Established Wet Meadow Wetland		
Wetland species cover	1–5	April–May
Species richness	1–5	April–May
Invasive species cover	1–5	April–May
Group B Re-Established Wetland		
Wetland species cover	1–5	April–May
Species richness	1–5	April–May
Invasive species cover	1–5	April–May
Group C Re-Established Wet Meadow Wetland		
Relative cover by wetland plant species	1–5	April–May
Relative cover by native wetland plant species from the list of target species	1–5	April–May
Species richness	1–5	April–May
Hydroperiod	1-5	November–May
Relative cover by invasive species	1-5	April–May
Re-Established Riparian Wetland		
Plant survival	1–5	April–May
Plant vigor	1–5	April–May
Percent absolute vegetation cover by native tree species	1-10	August–September
Percent absolute vegetation cover by native shrub species	1-10	August–September
Species richness	1–5	April–May
Hydroperiod	1-10	November–May
Woody plant density	1-10	August–September
Re-Established Other Waters		
Plant survival	1–5	August–September
Plant vigor	1–5	August–September
Percent absolute vegetation cover by native tree species	5–10	August–September
Percent absolute vegetation cover by native shrub species	5–10	August–September
Woody plant density	5–10	August–September
Other data	1–10	August–September

Table 10-2. Performance Standard Monitoring Schedule for Established Wetlands

Habitat Type and Habitat Characteristics	Monitoring Years	Monitoring Period
Group 1 Established Wetlands		
Relative cover by wetland plant species	1–5	April–May
Relative cover by native wetland plant species from the list of target species	1–5	April–May
Species richness	1	April–May
Hydroperiod	1–5	November–May
Relative cover by invasive species	1–5	April–May
Group 2 Established Wetlands		
Relative cover by wetland plant species	1–10	April–May
Relative cover by native wetland plant species from the list of target species	1–10	April–May
Species richness	1	April–May
Hydroperiod	1–10	November–May
Relative cover by invasive species	1–10	April–May

Table 10-3. Performance Standard Monitoring Schedule for Rehabilitated Wetlands and Other Waters

Habitat Type and Habitat Characteristics	Monitoring Years	Monitoring Period
Rehabilitated Wetland (Type 1)		
Relative cover by wetland plant species	1–10	April–May
Relative cover by native wetland plant species from the list of target species	1–10	April–May
Absolute percent cover by invasive species	1–10	April–May
Other data	1–10	April–May
Rehabilitated Wetland (Types 2–5)		
Relative cover by wetland plant species	1–10	April–May
Relative cover by native wetland plant species from the list of target species	1–10	April–May
Species richness	1–10	April–May
Absolute percent cover by invasive species	1–10	April–May
Plant survival (woody species)	1–5	August–September
Plant vigor (woody species)	1–5	August–September
Tree plant density	5–10	August–September
Rehabilitated Other Waters		
Plant survival	1–5	August–September
Plant vigor	1–5	August–September
Percent absolute vegetation cover by native tree species	5–10	August–September
Percent absolute vegetation cover by native shrub species	5–10	August–September
Woody plant density	5–10	August–September
Other data	1–10	August–September

10.1.2 Mitigation Monitoring Methods

Monitoring methods will vary according to habitat type and will include landscape photodocumentation at permanent stations. The monitoring methods that will be used during performance standard monitoring are described below by habitat type.

10.1.2.1 Re-Established or Established Wetland

Performance standard monitoring of re-established or established wetlands will focus on vegetation and wetland hydrology monitoring. The habitat characteristics and the monitoring schedule are summarized in Tables 10-1 and 10-2 and are discussed in more detail in subsequent sections.

Re-established or established wetlands will be monitored in the onsite mitigation and offsite mitigation areas where the habitat occurs. Re-established or established wet meadow wetland habitat will be monitored in April–May of each monitoring year to coincide with the flowering periods of most wetland species (Tables 10-1 and 10-2). Re-established forested wetlands will be monitored in August or September of each monitoring year to quantify most of the growth expected to occur each growing season (Table 10-1). In addition, as part of other data to be collected, general site conditions will be assessed and photodocumentation will be conducted in Years 1–5 for re-established wet meadow or Group 1 wetland establishment or Years 1-10 for re-established riparian wetlands, other waters, or Group 2 wetland establishment.

Performance standard monitoring of re-established wet meadow wetlands will vary depending on the size of the individual mitigation unit. Monitoring for all re-established wetlands will occur in Years 1–5. As described in Chapter 9, the re-established wet meadow wetlands are divided into three groups (Groups A–C). Performance standard monitoring of Group A wetlands will focus on wetland species cover, invasives species cover, and wetland hydrology. Each Group A wetland re-establishment site will be assessed for meeting associated wetland performance standards using a visual pass/fail assessment of that particular total wetland re-establishment area. The assessment will be performed at one representative sample point in each Group A wetland re-establishment site. Group A wetlands will be visually inspected for invasive species and obvious problems with re-establishment. Only the Group A sites with invasive species or obvious hydrology problems will need to be identified in the report and remediated. Potential remediation measures, when necessary, also will be recorded.

Performance standard monitoring of Group B wet meadow wetlands will focus on wetland species cover, invasives species cover, and wetland hydrology. Each Group B wetland re-establishment site will be assessed for meeting associated wetland performance standards. The assessment will be performed at one representative sample point in each Group B wetland re-establishment site. The assessment will follow the protocols of a standard USACE wetland delineation and may be recorded on a wetland delineation or like form. If the site meets the parameter for wetland plant species according to the wetland delineation protocol, no further analysis is necessary. If the wetland plant species parameter is not met, an assessment of soils and hydrology, beginning with the wetland delineation protocol, to determine the reason for lack or low wetland species cover is necessary. Potential remediation measures, when necessary, also will be recorded.

Performance standard monitoring of Group C wetlands will focus on relative cover by wetland plant species, relative cover by native wetland plant species from the list of target species, species richness, hydroperiod, and absolute cover of invasive species.

Each Group C wetland re-establishment site will be assessed for meeting associated wetland performance standards. The assessment will be performed using permanently established sampling transect(s) with quadrats for vegetation sampling (including annual monitoring for invasive species) and characterization points for hydrology and soil morphology. The transect/quadrat monitoring method for the wetland re-establishment sites will be the same used for the established wetlands. Remediation measures, when necessary, also will be recorded.

Table 10-4 represents a monitoring sample form for re-established wetlands.

Table 10-4. Sample Data Form for Wetland Re-Establishment

Onsite Re-Establishment Area Size Category	Wetland Number by Category	Wetland Vegetation Dominance (Y/N)	Species Observed in Descending Order of Abundance (facultative or greater indicator status)	Invasive Species Cover Dominant (Y/N)	Invasive Species Observed	Wetland Hydrology Observed (Y/N)	Type of Wetland Hydrology Observed (ponded/ saturated soils)
Group A			Include list of species		Include list of species		
Group B							
Group C			Include list of species		Include list of species		

Performance standard monitoring of Group 1 and Group 2 established wetlands will focus on relative cover by wetland plant species, relative cover by native wetland plant species from the list of target species, species richness, absolute cover of invasive species, and hydroperiod. Group 1 wetlands will be monitoring in Years 1–5. Group 2 wetlands will be monitoring in Years 1–10.

Groups A and B Wetland Re-Establishment

Wetland Species Cover

Wetland species cover will be monitored in Group A and Group B re-established wetlands. Results will be presented individually for each onsite and offsite mitigation unit. Wetland species cover will be estimated at representative sampling points at each sampling location as described above. Wetland species cover will be visually estimated at each sampling location. Wetland plant cover composition is not restricted to the list of target species (Table 7-5).

Species Richness

Species richness will be monitored in Group A and Group B re-established wetlands. Results will be presented individually for each onsite and offsite mitigation unit. Species richness will be visually estimated at each sampling location.

Invasive Species Cover

Invasive species cover will be monitored in Group A and Group B re-established wetlands Results will be presented individually for each onsite and offsite mitigation unit. Invasive species cover will be estimated at the same sampling points used for estimating wetland species cover. Invasive species cover will be visually estimated at each sampling location.

Wetland Hydrology

Wetland hydrology will be monitored at the Group A and Group B re-establishment sites only if an individual site does not meet the parameter for wetland plant species according to the wetland delineation protocol. If the wetland plant species parameter is not met, an assessment of soils and hydrology will be performed, beginning with the wetland delineation protocol, to determine the reason for the absence of or low wetland species cover.

Group C Wetland Re-Establishment and Wetland Establishment

Relative Cover by Wetland Plant Species

Relative cover by wetland plant species will be monitored in Group C re-established and all established wetlands. Results will be presented individually for each onsite and offsite mitigation unit.

Relative cover provided by planted, seeded, and naturally recruited wetland plant species for each re-established or established wetland will be monitored using randomly selected 1–square meter quadrats placed along permanent 100-meter-long transects. If wetland dimensions do not accommodate a 100-meter transect, the transect length will be shortened to the dimensions of the wetland. A maximum of five transects will be field-located for each acre of re-established or established wetland.

The endpoints of each transect will be permanently marked in the field using metal t-posts or other method. Transect endpoints will be documented using global positioning system (GPS) units.

The relative cover of all species will be visually estimated in each quadrat. Only plants rooted within a quadrat will be used to estimate the cover value for that species. The relative value of all hydrophytic species of all quadrats will be summed and divided by the number of quadrats to determine the average relative cover by wetland species for re-established or established wetlands.

Relative Cover by Native Wetland Plant Species from List of Target Species

Relative cover by native wetland plant species from the list of target species will be monitored in Group C re-established and established wetlands. Results will be presented individually for each onsite and offsite mitigation unit.

Relative cover by selected native wetland plant species will be estimated using the same method as that used for estimating relative cover by wetland plant species. Relative cover data for native wetland plant species from the list of target species will be collected concurrently with relative cover data for wetland plant species.

Species Richness

Species richness will be monitored concurrently with relative cover monitoring. Species richness will be monitored in Group C re-established and established wetlands. Results will be presented individually for each onsite and offsite mitigation unit.

Species richness will be monitored using the same transects and quadrats used for determining relative cover as well as by performing a relevé survey in each re-established and established wetland. In the quadrats, species richness will be determined by identifying, to the extent feasible, all plants in each quadrat to the species level and developing a cumulative list for each re-established or established wetland. A list of all species recorded by the relevé survey will be recorded for re-established or established wetlands. The species lists will be combined to identify the number of species observed in each re-established or established wetland. Only those species from the list of target species will contribute to determining species richness.

Hydroperiod

The hydroperiod will be monitored in Group C re-established and established wetlands. Results will be presented individually for each onsite and offsite mitigation unit.

Hydroperiod monitoring will include determining the extent of ponding and soil saturation in re-established and established wetlands once cumulative rainfall has reached approximately 5 inches (typically November). Monitoring will continue to determine whether the re-established and established wetland hydroperiod is within plus or minus 10% of the hydroperiod in the monitored reference site wetlands.

For the onsite mitigation area, inundation depths will be measured at one fixed point for each re-established wetland using a staff gage and/or shallow groundwater monitoring wells. For the offsite mitigation units, inundation depths will be measured at one fixed point for each established wetland) using a staff gage and/or shallow groundwater monitoring well. To the extent possible, digging soil pits to determine shallow groundwater levels will be avoided to minimize disturbance of the re-established and established wetlands.

Absolute Percent Cover by Invasive Species

The absolute cover by invasive plants will be measured in the sampling quadrats as well as by performing relevé surveys throughout each sampling unit. The location and size of invasive plant populations will be recorded using a GPS receiver.

Other Data

In addition to the monitoring described above, general site conditions will be visually assessed during each monitoring visit. Site conditions will be documented using permanent photodocumentation stations.

10.1.2.2 Re-Established and Rehabilitated Other Waters

Re-established other waters will be monitored in the onsite mitigation area where this mitigation habitat occurs. Rehabilitated other waters will be monitored in the offsite mitigation units where this mitigation habitat occurs. Results will be presented individually for each onsite and offsite mitigation unit.

Re-established other waters will be monitored according to the schedule presented in Table 10-1. Performance standard monitoring of riparian plantings initially will focus on plant survival and plant vigor in Years 1–5 and then shift to percent absolute vegetation cover by native tree species, percent absolute vegetation cover by native shrub species, and woody plant density in Years 5–10. This approach is appropriate because as riparian habitat develops and plants mature, a canopy begins developing and individual plant assessment becomes less relevant to overall ecological success.

Performance standard monitoring of rehabilitated other waters will be monitored in the offsite mitigation units where this mitigation habitat occurs. Results will be presented individually for each offsite mitigation unit. Rehabilitated other waters will be monitored according to the schedule presented in Table 10-3. Performance standard monitoring of riparian plantings initially will focus on plant survival and plant vigor in Years 1–5 and then shift to absolute vegetation cover by native tree species, absolute vegetation cover by native shrub species, and woody plant density in Years 5–10. This approach is appropriate because as riparian habitat develops and plants mature, a canopy begins developing and individual plant assessment becomes less relevant to overall ecological success.

Plant Survival

Plant survival monitoring will be conducted at the re-established and rehabilitated other waters planting areas. Results will be presented individually for each onsite and offsite mitigation unit. Each plant that was planted as part of mitigation efforts will be monitored for survival (replacement plants are included in this monitoring). Naturally recruited plants will not be included as part of plant survival monitoring because inclusion would skew the monitoring results, which focus on survival of planted material.

Identifying individual species' survival rates will determine whether any single species is becoming dominant or does not appear to be well-suited for a particular mitigation site. The determination of survival rates will be based on the total number of plants of that species originally planted at each mitigation site. Plants will be recorded as dead if no viable aboveground growth is visible. For example, if all the leaves on a tree are brown, but an examination of the stems and branches shows viable stem tissue, the plant will be considered alive, although it may be given a low vigor rating.

Plant Vigor

Plant vigor will be monitored concurrently with plant survival. Results will be presented individually for each onsite and offsite mitigation unit. Each plant that was planted as part of mitigation efforts will be monitored to assess vigor (replacement plants are included in this monitoring). Naturally recruited plants will not be included as part of plant vigor monitoring because inclusion would skew the monitoring results, which focus on vigor of planted material.

The determination of vigor will entail consideration of disease symptoms, low-density foliage, atypical leaf color, stem and foliar vigor (e.g., signs of desiccation, leaf curl), browsing or other wildlife-related damage, and vandalism. A vigor rating of *good*, *fair,* or *poor* (values of 3.0, 2.0, and 1.0, respectively) will be assigned to each plant. Dead plants will not be assigned a vigor rating. These ratings are defined below.

- **Good (3.0):** A plant with less than 25% of its aboveground growth exhibiting one or more of the factors listed above.
- **Fair (2.0):** A plant with 25–75% of its aboveground growth exhibiting one or more of the factors listed above.
- **Poor (1.0):** A plant with more than 75% of its aboveground growth exhibiting one or more of the factors listed above.
- **Dead:** A plant that does not appear capable of growth.

Percent Vegetation Cover by Native Trees and Shrubs

Percent vegetation cover by native trees and shrubs will be monitored at the re-established and rehabilitated other waters areas. Results will be presented individually for each onsite and offsite mitigation unit. Naturally recruited plants will be considered under percent vegetation cover monitoring because they will contribute to native riparian habitat cover.

The line-intercept method will be used to record the relative vegetation cover by native tree and shrub species, Wherever a native tree or shrub intersects the line transect, the distance the plant (or group of plants) spans on the measuring tape will be recorded. Tree and shrub cover will be recorded separately to determine the percent canopy cover provided by trees and by shrubs. Areas with nonnative tree and shrub cover, as well as areas with no tree or shrub cover, will be recorded. This process will be repeated along the entire length of the transect.

Vegetation strata will be as defined in the *Interim Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys and Coast Region* (U.S. Army Corps of Engineers 2008).

Tree Plant Density

Tree plant density will be monitored in Years 5–10 to determine the density and distribution of trees in the re-established and rehabilitated other waters. Results will be presented individually for each onsite and offsite mitigation unit. Naturally recruited plants will be considered under percent vegetation cover monitoring because they will contribute to native riparian habitat cover.

Tree density will be monitored using the same line transects used for determining percent vegetation cover by native tree and shrub species. The number of individual trees that intercept the line will be quantified. If this value does not meet the performance standard of 109 live trees per acre, a relevé survey will be performed, the number of trees will be recorded, and the total number of trees observed will be added to the total observed on the line transects.

Other Data

In addition to the monitoring described above, total canopy area will be determined in Year 10. Aerial photographs will be taken in the summer of monitoring Year 10 and used in the field to map the edge of riparian trees and shrubs in re-established and rehabilitated other waters mitigation areas. The resulting polygons will be measured to determine the total area of canopy extent.

Qualitative data will be collected during each monitoring visit on general site conditions. Site conditions will be documented using permanent photodocumentation stations.

10.1.2.3 Rehabilitated Wetlands

Performance standard monitoring of Type 1–5 wetland rehabilitation mitigation units will be conducted in the offsite mitigation parcels where they occur, with monitoring results presented individually for each mitigation unit. Rehabilitated wetlands will be monitored according to the schedule presented in Table 10-3.

Performance standard monitoring of Type 1rehabilitated wet meadow wetland habitat will focus on relative cover by wetland plant species, relative cover by native wetland plant species from the list of target species, and absolute cover of invasive species.

Performance standard monitoring of Types 2–5 rehabilitated wetland habitat will focus on relative cover by wetland plant species, relative cover by native wetland plant species from the list of target species, species richness of native species from the list of target species, absolute cover of invasive species, plant survival and vigor of woody plant species, and tree plant density.

Determination of Transect Locations and Sample Size

Vegetation cover values provided by planted, seeded, and naturally recruited wetland plant species, as well as invasive plants, for each re-established or established wetland will be monitored using randomly selected 1–square meter quadrats placed along permanent transects. One or more transects will be located on each mitigation unit. Transects will traverse the entire length and/or width of each mitigation unit. The length of individual transects will vary depending on location. Transect endpoints will be documented using GPS units. The endpoints of each transect will be permanently marked in the field using metal t-posts or other method.

Transect locations and the sample size (i.e., number of transects) for each mitigation unit will be determined during the spring 2012 baseline surveys that will be performed to determine the existing total relative cover by wetland species and relative cover by native wetland species from the list of target species for each mitigation unit. The spring 2012 survey results also will be used to determine whether the proposed wetland rehabilitation unit designation shown in Appendix C is suitable for a given mitigation unit (i.e., the baseline cover values do not exceed the cover percentage constraint outlined in Chapter 6).

The transect locations will be selected at the time of the spring 2012 baseline surveys to ensure that the transect locations will provide a representative sample of the existing vegetation communities and strata for each mitigation unit. The sample size (number of quadrats) required to determine whether a particular performance standard is achieved may be influenced by numerous factors (e.g., diversity of existing vegetation communities and strata). For example, if the variation between quadrat data is high, additional quadrats will be required. As the baseline surveys are being conducted, Caltrans will use a standard sample size equation to estimate how many sample units will be required to meet the performance standards at a an agreed upon level of statistical confidence.

Caltrans will refine the survey methods and provide the proposed monitoring protocols to USACE for review before performing the baseline surveys.

Relative Cover by Wetland Plant Species

Relative cover by wetland plant species will be monitored in rehabilitated wetlands. Results will be presented individually for each offsite mitigation unit. The relative cover of all species, both wetland and upland species, will be visually estimated in each quadrat. Only plants rooted within a quadrat will be used to estimate the cover value for that species. The relative value of all hydrophytic species of all quadrats (for each mitigation unit) will be summed and divided by the number of quadrats to determine the average relative cover by wetland species for rehabilitated wetland.

Relative Cover by Native Wetland Plant Species from List of Target Species

Relative cover by native wetland plant species from the list of target species will be monitored in rehabilitated wetland. Results will be presented individually for each offsite mitigation unit. Relative cover by selected native wetland plant species will be estimated using the same method as that used for estimating relative cover by wetland plant species. Relative cover data for native wetland plant species from the list of target species will be collected concurrently with relative cover data for wetland plant species.

Species Richness

Species richness will be monitored concurrently with relative cover monitoring. Species richness will be monitored in rehabilitated wetlands. Results will be presented individually for each offsite mitigation unit.

Species richness will be monitored using the same transects and quadrats used for determining relative cover as well as by performing a relevé survey in each mitigation unit. In the quadrats, species richness will be determined by identifying, to the extent feasible, all plants in each quadrat to the species level and developing a cumulative list for each re-established or established wetland. A list of all species recorded by the relevé survey will be recorded for re-established or established wetland. The species lists will be combined to determine the number of species observed in each re-established or established wetland. Only those species from the list of target species will contribute to determining species richness.

Invasive Species

Invasive species cover will be monitored in rehabilitated wetlands. Results will be presented individually for each mitigation unit. Invasive species cover will be estimated at the same sampling points used for estimating wetland species cover. Invasive species cover will be visually estimated at each sampling location.

Plant Survival

Plant survival monitoring will be conducted at each mitigation unit. Each woody plant that was planted as part of mitigation efforts will be monitored for survival (replacement plants are included in this monitoring). Plant survival of herbaceous wetland plantings will not be monitored because the success of those planting will be determined by the relative cover sampling. Naturally recruited plants will not be included as part of plant survival monitoring because inclusion would skew the monitoring results, which focus on survival of planted material.

Plant survival will be monitored using the methods described in Section 10.1.2.2.

Plant Vigor

Plant vigor will be monitored concurrently with plant survival. Each woody plant that was planted as part of mitigation efforts will be monitored to assess vigor (replacement plants are included in this monitoring). Plant vigor of herbaceous wetland plantings will not be monitored. Naturally recruited plants will not be included as part of plant vigor monitoring because inclusion would skew the monitoring results, which focus on vigor of planted material.

Plant vigor will be monitored using the methods described in Section 10.1.2.2.

Percent Vegetation Cover by Native Trees and Shrubs

Percent vegetation cover by native trees and shrubs will be monitored at the rehabilitated sites in riparian wetland planting areas. Results will be presented individually for each mitigation unit. Naturally recruited plants will be considered under percent vegetation cover monitoring because they will contribute to native riparian habitat cover.

Percent vegetation cover by native trees and shrubs will be monitored using the methods described in Section 10.1.2.2.

Tree Plant Density

Tree density will be monitored in Years 5–10 to determine the density and distribution of trees in the Type 3–5 rehabilitated wetlands. Results will be presented individually for each mitigation unit. Naturally recruited trees will be considered under percent vegetation cover monitoring because they will contribute to native riparian habitat cover.

Tree density will be monitored using the same line transects used for determining percent vegetation cover by native tree and shrub species. The number of individual trees that intercept the line will be quantified. If this value does not meet the performance standard of 109 live trees per acre, a relevé survey will be performed, the number of trees will be recorded, and the total number of trees observed will be added to the total observed on the line transects.

Other Data

In addition, as part of other data to be collected, general site conditions will be assessed and photodocumentation will be conducted.

10.2 Reference Site Monitoring

Monitoring reference sites will be identified for the re-established wetlands and established wetlands based on their ecological and physical similarity to the monitored habitat; these reference sites will be monitored in conjunction with re-established and established wetlands.

Reference sites will be selected during the baseline monitoring surveys to be performed in spring 2012.

10.2.1 Location of Monitoring Reference Sites

10.2.1.1 Onsite Monitoring Reference Sites

For the onsite mitigation area, four monitoring reference sites will be selected for each of the following mitigation actions.

- Wetland re-establishment sites that will be returned to original grade only (no wetland seed mix and no wetland planting).
- Wetland re-establishment sites that will be returned to original grade, seeded with a wetland seed mix, and planted with wetland plants (Appendix D).
- Wetland and other waters re-establishment sites that will be planted with riparian trees and shrubs and seeded with an erosion control seed mix or seeded with a wetland seed mix (in the viaduct area).

10.2.1.2 Offsite Monitoring Reference Sites

One monitoring reference site will be selected on each offsite mitigation property on which wetland establishment will occur. The wetland establishment reference sites will be located in adjacent wetlands that will not be disturbed by mitigation construction.

10.2.2 Monitoring Schedule

Monitoring reference sites will be monitored concurrently with mitigation habitat.

10.2.3 Monitoring Methods

Monitoring methods for wetland establishment reference sites will be the same as described above for performance standard monitoring of mitigation habitat (Section 10.1.2.1).

10.3 Photodocumentation

The progress of re-established, established, and rehabilitated mitigation will be documented photographically. Permanent photodocumentation stations will be established. The locations of photodocumentation stations will be determined during the first year of the monitoring period, and the locations will be identified in the field and mapped. Most photodocumentation stations will be permanently marked using a metal t-posts or other method. Photodocumentation stations in the vicinity of the roadway, however, will be identified on a map or by using a GPS receiver but will not be permanently marked for safety reasons.

The number of photographs taken at a given photodocumentation station will vary, depending on the area and habitat. A sufficient number of stations will be established to ensure that the photographs provide a complete visual record of mitigation areas. Photographs will be taken during monitoring activities. Additional representative photographs may be taken at other times of the year at the land manager's discretion.

10.4 Monitoring Reports

Caltrans will prepare a monitoring report at the conclusion of each monitoring year and submit it to USACE by December 31. Each monitoring report will include the following information.

- The project CWA Section 404 permit number.
- A description of the project location.
- A summary of the monitoring methods.
- A list of the names, titles, and affiliations of the people who prepared the content of the report and/or participated in monitoring activities that year.
- A summary and analysis of the monitoring results, including an evaluation of site conditions in the context of performance standards.
- A discussion of modifications made to the monitoring methods (if any).
- A discussion of the monitoring results.
- A discussion of maintenance efforts and remedial actions implemented since submittal of the previous monitoring report.
- Management recommendations for the following year, including discussion of areas with inadequate performance and recommendations for remedial action.
- An appendix containing photodocumentation of all re-established, established, and rehabilitated mitigation areas.

Chapter 11 Long-Term Management Plan

11.1 Purpose

The purpose of this long-term management plan is to ensure that the mitigation is maintained and managed in perpetuity in a manner that preserves the project's mitigation goals. It establishes guidance and a framework for management of day-to-day activities. This plan is a binding and enforceable instrument, implemented by CEs covering the mitigation parcels. This plan will take effect after completion of the short-term maintenance period, once USACE has agreed that the mitigation has met the performance standards. The expected activities necessary to manage the offsite mitigation areas are listed below.

- General maintenance activities such as invasive plant species control.
- Cleanup and trash removal.
- Infrastructure management such as gate, fence, road, culvert, signage, and drainage feature repair.
- Other maintenance activities necessary to maintain the mitigated resource habitat quality and resource-specific long-term maintenance and monitoring activities as described in Chapters 8 and 10, respectively.

11.2 Responsible Parties

The responsible parties are listed and described in more detail below. MCRCD is the property owner and land manager. CDFG is the endowment holder, CE holder, and compliance monitor.

11.2.1 Property Owner

Offsite mitigation properties have been purchased in the name of Caltrans. Caltrans will transfer fee title to MCRCD. Caltrans or its designee will place a CE over the parcels. CE documents will be submitted to Mendocino County for recordation.

11.2.2 Land Manager

The land manager will be MCRCD. The land manager, and subsequent land managers, upon transfer, will implement this long-term management plan. Long-term management tasks will be funded through a nonwasting endowment. The land manager's responsibilities include:

- Ensuring that signage and fencing are maintained.
- Coordinating trash removal.
- Conducting noxious plant management when necessary with qualified personnel.

- Reviewing monitoring data and recommending and coordinating remedial action with the regulatory agencies when necessary.
- Maintaining a log for the mitigation properties that will contain a record of all activities, correspondence, and determinations regarding the mitigation.
- Coordinating two general inspections per year of the mitigation properties, as required by this plan.
- Arranging for any corrective action necessary to ensure the performance of the habitat, as required by this plan.
- Submitting an annual general inspection report, in coordination with the monitoring biologists, regarding the compliance and maintenance status of the mitigation.
- Working with the regulatory agencies when necessary to carry out long-term management.

11.2.3 Qualified Personnel, Including Monitoring Biologist

The land manager will retain professional biologists, botanists, and other specialists (i.e., the qualified personnel, including the monitoring biologist) to conduct specialized tasks. The monitoring biologist will be familiar with California flora and fauna and will have knowledge of the various special-status species and their ecology. The qualified personnel's responsibilities may include:

- Monitoring wetland function and erosion.
- Evaluating the presence of newly introduced invasive plant species and recommending management, if needed.
- Conducting all biological monitoring and data collection, and assisting in preparing reports required by this plan.
- Evaluating site conditions and recommending remedial action to the land manager.
- Assisting in reviewing or planning restoration activities, use of the mitigation properties for education, and other tasks such as grant proposals.
- Working with the land manager and the USACE staff.

If there are changes in the land manager or qualified personnel, the outgoing and incoming personnel will tour the mitigation properties together, and the former will advise the latter of trends, problems, and administrative difficulties.

11.2.4 Endowment Holder

CDFG has agreed to act as the endowment holder. The endowment will be transferred to CDFG by June 30, 2013.

11.2.5 Conservation Easement Holder and Compliance Monitor

CDFG has agreed to act as the CE holder and compliance monitor for the offsite mitigation properties. Caltrans or its designee will provide CDFG with copies of the CE documents within 30 days after they have been recorded by Mendocino County.

11.3 Management Approach

The general management approach to long-term maintenance of the mitigation properties will be to maintain the successional development on the mitigation parcels and maintain mitigated other waters. More specifically, an adaptive management approach will be used (if needed) to incorporate changes to management practices, including corrective actions, as determined to be appropriate by the land manager and approved by USACE. Adaptive management includes those activities necessary to address the effects of climate change; fire, flood, or other natural events; force majeure, etc. Before considering any adaptive management changes to this long-term management plan, the land manager will consider whether such actions will help ensure the continued viability of mitigation sites' resources. See Chapter 12 for a detailed discussion of adaptive management.

11.4 Conditions That May Warrant Adaptive Management

11.4.1 Changes in Hydrology

Changes in hydrology could be short- or long-term, could be natural or artificial, and include reductions or increases in duration or volume. The land manager will evaluate each of the circumstances and, where it is reasonable and within the scope of the MMP and the control of the responsible parties, address hydrologic changes with appropriate actions. Some of those foreseeable situations, such as flooding and water supply issues, are discussed below.

Typically, winter and early spring flooding of varying extent occurs in the Little Lake Valley Basin. After large storms, water in the relatively large upper Outlet Creek Basin backs up at the narrow and constricting mouth of Outlet Creek in the north end of Little Lake Valley (CH2M Hill 2006). Additional localized flooding in the valley generally is related to debris or erosion problems in the creeks. The Little Lake Valley Basin, encompassing a 67.26-mi^2 area, is defined by the surrounding mountains. Flooding was recorded in the Outlet Creek Basin in 1907, 1938, 1950, 1955, 1964, 1983, and 1997. The largest recorded flood event in the valley occurred on December 20, 1964, lasting 84 hours with total precipitation of 18.59 inches (CH2M Hill 2006).

In the case of prolonged flooding, specific actions may not be required, but instead may be recorded as a type change within a natural resource habitat. Where flood debris is interfering with the perpetual success of the mitigation, it will be removed; however, in cases where it adds to habitat complexity, it will be retained. Acute sedimentation from large flood events, such as those described in the previous paragraph, will be remediated if it interferes with perpetual success of the mitigation. However, chronic long-term sedimentation, which is a normal condition of Little Lake Valley, will not be removed, and the mitigation will be allowed to adapt naturally in response to that condition, as the existing wetlands have been doing for decades.

In cases where it is clear that an action taken by the land manager (or in some cases a lack of action) in order to comply with the long-term management commitments threatens to flood a neighboring property, immediate action will be taken to prevent such flooding. For example, where flood debris related to mitigation threatens to cause a backup of water and potentially flood a neighboring property or threatens culverts, bridges, or other structures, the debris will be removed. The land manager will take immediate action to protect the interests of the neighboring properties should they be threatened by actions related to Caltrans' mitigation. In emergency situations, human safety and the protection of private property will take priority over complying with mitigation commitments.

The historical natural water supply of the valley has been reduced by the development of Willits, agricultural drainage projects, and a number of reservoirs in the surrounding hills. Furthermore, California currently is experiencing a statewide water crisis, and northern California's water supply is pressured by the demand to supply southern California's water needs. If a future widespread increase in private and public projects in and around the valley continues to decrease the natural water supply to the extent that it begins to effect the mitigation, remediation would require the intervention of regulatory agencies or other governing bodies because this would be a situation beyond the scope of this project and the authority of the land manager or Caltrans.

11.4.2 Fire

Despite wetter conditions and easy access, fire potential on the nongrazed mitigation areas could increase because of thatch accumulation over time. In the event that a fire destroys a wetland rehabilitation site, the site will be evaluated for damage and monitored for regrowth. Similarly, if an establishment site or wetland rehabilitation site that includes plantings is burned during the establishment period, it will be evaluated for damage and monitored for regrowth. Based on the time of year of the fire and extent of damage and plant regeneration, a revegetation or reseeding plan for the planted areas may be drafted and implemented.

11.4.3 Extensive Adjacent Development

Extensive development on adjacent properties may alter current hydrologic regimes supporting the mitigation sites, cause site disturbance that encourages growth and spread of invasive plant species, contribute to fragmentation of sensitive plant populations, involve site alterations that increase erosion or sedimentation on the mitigation site, or introduce grazing or other activities or features that pollute or create barriers in shared streams or creeks, the wetlands, and other waters on these protected lands. Because future developers are subject to the federal and state laws that protect wetlands and other waters, any adjacent projects would require BMPs or other mitigation measures to prevent the developer from indirectly affecting the wetlands or other waters within the boundaries of this mitigation project. In the event that future development or significant land use changes are proposed on adjacent lands, the land manager will coordinate with the adjacent land owner, resource agency personnel assigned to that project, local planning department staff, and others to ensure that the mitigation goals for the mitigation parcels are not threatened or affected. This may be achieved through implementation of buffer zones, stormwater pollution prevention measures, permanent water quality infrastructure, cattle barriers, and other suitable measures.

11.4.4 Other Site Degradation

Other site degradation may include soil erosion and vandalism. Soil erosion that negatively affects established habitats will be dealt with on a case-by-case basis using SWPPP standards. Strategies for dealing with vandalism will include signage, fencing, visual monitoring, and coordination with local law enforcement and other pertinent agencies.

11.5 Education, Public Access and Habitat Restoration/Enhancement

11.5.1 Education and Public Access

The mitigation properties may represent an opportunity to encourage awareness and respect for open space and wildlife habitat in the community. Individuals or groups wishing to use the mitigation properties for educational purposes will obtain the consent of and coordinate with the land manager. If the education activities will be passive, such as a discussion of plants and animals, the consent of the land manager is sufficient. If active use (other than restoration activities) of the mitigation properties is envisioned, or regular but passive use is proposed, review and approval of the relevant regulatory agencies are required. To avoid repeated inquiries with the regulatory agencies, a use plan could be developed by the interested party for one-time approval. The land manager has the right to refuse a request to use the mitigation properties if it is determined that the use may have a negative impact on any habitat or wildlife on the mitigation properties.

11.5.2 Habitat Restoration/Enhancement

In the future, the land manager or Caltrans may want to conduct additional habitat establishment or rehabilitation on the mitigation properties. This could include removing nonnative plant species, planting native plants, and other restoration activities. Restoration activities that involve work in wetlands or waters of the United States may require a CWA Section 404 permit from USACE, a CWA Section 401water quality certification from RWB, a California Fish and Game Code Section 1602 streambed alteration agreement from CDFG, or other water quality permits. An example of a restoration activity that does not require a permit is planting acorns. An example of restoration activity that would require permits is recontouring of a creek bank and planting it with riparian species to stabilize an area of erosion. The land manager will not notify the regulatory agencies if the activities do not require a permit.

11.6 Funding Mechanism and Protection

This section outlines the funding and restrictions on activities on any of the offsite mitigation properties included in the MMP. The annual costs of holding the CE and carrying out the tasks of this long-term management plan have been estimated using a property analysis record (PAR). PARs allow land trust and preserve management foundations and organizations to better define and understand the financial obligations that come with managing natural areas. PARs may be generated using a computer program written by the Center for Natural Lands Management or by developing spreadsheets in another software. For this PAR, cost spreadsheets were developed in Microsoft Excel® and were used to generate short-term and long-term maintenance and management costs. The PAR spreadsheets are provided in Appendix K.

Caltrans will provide the long-term endowment, in the amount of $11,781,165.00 to CDFG, which has agreed to hold it. The long-term endowment will provide the funding necessary for the land manager to manage the mitigation properties in accordance with this plan. The annual ongoing financial requirement is estimated to be $237,826.00. The long-term endowment principal, at a rate of 2%, will provide the income to meet this annual ongoing financial requirement. The long-term endowment does not cover the costs of initial and capital tasks (e.g., construction, short-term maintenance), which are covered under a separate endowment. To see a full breakdown of the endowment estimate, refer to Chapter 13.

11.7 Prohibited Uses

It is understood that the activities discussed below are prohibited, except as needed to accomplish the management and maintenance activities in this plan. In addition, if any of these activities must be undertaken because of special circumstances, they may be reviewed and approved by the regulatory agencies on a case-by-case basis. A CE also defines prohibited uses and will include those defined here. A CE will be placed on the mitigation parcels no later than 1 year after the purchase date of the final mitigation parcel. The CE, once recorded, will supersede the list of prohibitive uses outlined in this plan. The CE will be held by CDFG.

11.7.1 Public Access to Mitigation Area

The intent of this long-term management plan is to maintain the mitigation in perpetuity, and limiting public access to the mitigation area will further this goal. Off-trail pedestrian access to the mitigation area will be discouraged through fencing.

11.7.2 Removal of Native Vegetation

No killing, removal, or alteration of any existing native vegetation will be allowed in the mitigation area except as described in the CE or this plan, or as reasonably necessary for the land manager to conduct land management activities, such as remedial grading associated with necessary adaptive management activities or use of prescribed burns in thatch management.

11.7.3 Burning and Dumping

No burning will be allowed in the mitigation area. This prohibition does not include controlled burning as a method of thatch management when required by fire officials to prevent fire hazards. No dumping of rubbish, garbage, or any other wastes or fill materials will be allowed in the mitigation area. This prohibition excludes fill material, such as clean dirt or gravel, that may be necessary to carry out land management of the property according to this plan or the CE.

11.7.4 Disking

Plowing, disking, cultivating, ripping, planting, sowing, irrigating, or any other conversion or disturbance of the mitigation area is prohibited, except disking for: (1) fire prevention at historical levels and (2) to establish, re-establish, rehabilitate, preserve, or protect the mitigation. Any change in the topography of the mitigation area through the placement of soils, fill, dredging spoils, or other materials is prohibited, except as incidental and necessary to the activities permitted under the CE, or as necessary to establish, re-establish, rehabilitate, preserve, or protect the mitigation. Notwithstanding any provision of the CE and this plan to the contrary, in no event shall any permitted plowing, disking, cultivation, ripping, planting, sowing, irrigation, or any other conversion or disturbance of the mitigation area that impairs the mitigation be allowed.

11.7.5 Changes to Roads and Trails

Existing roads and trails may be maintained in their current location with the same or similar material. Roads and trails not called out in this plan will not be allowed in the mitigation area unless it is determined by the land manager and regulatory agencies that they will not impair the mitigation.

11.7.6 Equipment or Fuel Storage

Storage or disassembly of inoperable automobiles, machinery, equipment, trucks, and similar items for purposes of storage or sale, or rental of space for any such purpose, is prohibited in the mitigation area. The use, dumping, storage, or other disposal of noncompostable refuse, trash, sewer sludge, or unsightly, toxic, or hazardous materials or agrichemicals is prohibited.

Equipment and supplies, such as mowers, fencing supplies, plant stock, and herbicides permitted for use under the CE, necessary to accomplish the management tasks outlined in this plan and the CE may be stored at existing developed sites, such as the house and barns on the southern Benbow parcel. Herbicides permitted under the CE may be stored in the mitigation area, provided all such use and storage comply with applicable health, safety, and environmental laws and regulations, and do not diminish or impair the mitigation.

11.7.7 Changes to Topography

Plowing, disking, cultivating, ripping, planting, sowing, irrigating, or any other conversion or disturbance of the mitigation area is prohibited except as set forth in the CE.

11.7.8 Use of Pesticides and Chemical Agents

Except as needed for management of the habitat as outlined in this plan or the CE, there will be no use of any pesticides, fungicides, insecticides, or any other chemical agents used to kill or suppress plants, animals, or fungi in the mitigation area unless it is determined, after consultation with the regulatory agencies, that it will not impair the mitigation.

11.7.9 Use of Motor Vehicles

No motorized vehicles will be ridden, brought, used, or permitted on any portion of the mitigation area, except as follows. Motorized vehicle use will be restricted to that required for mitigation area maintenance purposes such as monitoring, authorized mosquito abatement, and emergency or law enforcement situations requiring access by medical, fire, or law enforcement vehicles.

11.7.10 Construction Activities

No construction will be allowed in the mitigation area, except for the activities mentioned in this plan or the CE.

11.7.11 Introduction of Nonnative Plants

Except as expressly permitted by the terms of the CE or this plan or to establish, re-establish, or rehabilitate the mitigation area, no seeding, planting, or introduction of nonnative grasses, clovers, or any other plant species is permitted. Nonnative plants include invasive species, as defined in Chapter 8. Intentional or reckless introduction of exotic plant or animal species that may, in the land manager's determination, threaten to impair the mitigation is prohibited.

11.8 Inspection, Monitoring, and Reporting

11.8.1 Schedule

Long-term monitoring begins (Year 1) when USACE has agreed that the mitigation has met the success criteria at the end of the performance (short-term) monitoring period. The following surveys will be conducted during the long-term management period.

- The land manager will conduct two general inspections each year.

- The monitoring biologist will conduct biological monitoring by collecting quantitative data for the mitigation in Years 5, 10, and 15, and every 10 years thereafter.
- Followup inspections of the mitigation properties will occur as often as needed to protect the mitigation.

11.8.2 General Inspections

General inspections will occur in May and November of each year. They will be conducted by the land manager or qualified personnel. The inspections will concentrate on an evaluation of erosion, fire hazard reduction, fencing integrity, trash accumulation, invasive plant species, and evidence of unauthorized use by motor vehicles. The entire perimeter of the mitigation properties will be covered, as well as meandering transects through its interior. The inspection sheet found at the end of this chapter (or a similar one) will be used to evaluate the included criteria during each field visit. Previous inspection sheets will be reviewed before each visit to help ensure that a possible or recurring problem area is not missed.

Photodocumentation also will be collected. Permanent photo points will be established, and a site map showing the photo points will be prepared for the mitigation project file. Representative photos will be taken once per year during the same season.

If any problems are identified, followup inspections will be done to closely track the problem and ensure that remedial actions are effective. Evaluation and corrective actions for each factor are described below.

11.8.2.1 Erosion

If it is determined during the inspection that the adjacent stream or sheet-flow runoff is causing any erosion or other adverse effects on the mitigation, immediate standard erosion control measures (e.g., installation of straw wattles, silt fences, straw bales) will be implemented. If corrective measures are not effective, the land manager will identify the causes of the erosion and develop solutions to prevent further erosion problems. If erosion is the result of lateral channel migration, further assessment would be required to determine appropriate restoration options, such as biotechnical bank stabilization.

11.8.2.2 Fire Hazard

Vegetation will be mowed or hayed in areas required by local and/or state fire control agencies.

11.8.2.3 Fencing and Gates

During general inspections, the condition of fences and gates will be recorded. Fences and gates will be maintained as necessary by replacing posts, wire, gates, or other components as needed. Fences and gates will be maintained to prevent casual trespass, allow necessary access, and prevent livestock access from adjacent pastures.

11.8.2.4 Trash Accumulation

At least twice yearly (once before fall and once after the first heavy rain), trash will be collected from the mitigation areas and disposed of offsite. Vandalism and trespass impacts will be repaired and rectified. Sources of trash and trespass will be monitored.

11.8.2.5 Motor Vehicle Use

The perimeter of the mitigation properties will be inspected for evidence of unauthorized motor vehicle use/access. If necessary, corrective actions such as repairing locks, fences, and gates will be completed by the land manager.

11.8.2.6 Invasive Plant Species Management

The sites currently function with a number of nonnative species, some of which have become naturalized. They are predominantly annual species that occur in grasslands. It is unreasonable to require or expect eradication of established nonnative species at the sites. Therefore, required management of nonnative plants will be limited to management of newly introduced nonnative pest plants and controlling the spread of existing nonnative pest plant populations that are a threat to the offsite establishment and rehabilitation mitigation units or adjacent nonjurisdictional mitigation land. These plants will be managed to the maximum extent practical. The monitoring biologist and land manager can reference sources identified in Section 8.3.2, Control Weeds, to assist them in determining whether a plant is a nonnative plant species of concern, particularly a species designated as invasive or noxious, and which species should be given priority for management. Methods of removing or controlling these species are outlined below. An invasive plant management plan has been developed for the offsite mitigation properties and is found in Appendix H.

- **Hand/mechanical:** Hand removal or use of small hand-powered or handheld equipment (such as a Weed Wrench or chainsaw) always should be the preferred method of removing exotic pest plant species from the mitigation properties. If these methods are found to be ineffective or labor-intensive, or the problem is too widespread for hand removal to be practical, mechanical methods (use of larger equipment with motors, such as mowers) or biological controls can be implemented as described in the next bullet.
- **Biological controls:** The Mendocino County agricultural commissioner would be the point of contact for use of biological controls on the mitigation properties. If biological controls are tried and found to be ineffective, or if they are not available for the target species, herbicides can be used, but only as outlined in the next bullet.
- **Herbicides:** Herbicides will be applied by hand or mechanical means by the land manager or qualified personnel during the time of year and at an application rate that allow the least amount of herbicide use while still eliminating the targeted species. Only herbicides that are approved for aquatic use will be used in or near aquatic areas. Mixing and loading, storing, and rinsing equipment or containers will not take place in aquatic areas. BMPs that may be used to protect aquatic areas include: (1) avoiding application of herbicides under windy conditions; (2) using ground-based applicators, low tank pressures, and equipment calibration

for larger droplet sizes; and (3) avoiding application of herbicides within 24 hours before or during rain.

11.8.2.7 Mosquito Abatement

The additional established wet meadow wetlands located throughout the offsite mitigation properties are not expected to create a mosquito nuisance, primarily because of their seasonal nature and lack of longstanding open water. However, if mosquitoes associated with any aquatic habitat (e.g., the existing tule marsh) in the offsite mitigation properties become a nuisance or health hazard, the land manager and the local and/or regional mosquito and vector control district will develop a plan to address mosquito abatement issues.

11.8.3 Biological Monitoring

Long-term management of the mitigation sites' biological resources involves monitoring selected characteristics in Years 5, 10, and 15, and every 10 years thereafter to determine stability and ongoing trends of the established and rehabilitated wetlands and riparian corridors. This effort will include monitoring aerial canopy cover for Type 5 wetland rehabilitation management units and other waters rehabilitation management units that includes woody plant installation, wetland species plant cover, and photomonitoring.

Although major management actions are not anticipated to be necessary, one objective of this long-term management plan is to monitor and identify issues that arise, and to use adaptive management to determine what actions might be appropriate. If adaptive management actions become necessary, the monitoring schedule may be adjusted to increase the frequency or number of followup inspections to ensure success. The qualified personnel will have the knowledge, training, and experience to accomplish monitoring responsibilities. Biological monitoring reports will be provided to the regulatory agencies during each monitoring year.

11.8.3.1 Established and Rehabilitated Wetlands and Other Waters Rehabilitation

Wetlands will be monitored, preserved, maintained, and managed. As part of biological monitoring for established and rehabilitated wetlands, data will be recorded for relative cover by wetland plant species, relative cover by native wetland plant species from the list of target species, species richness, and absolute percent cover by invasive plant species. Monitoring will take place according to the schedule (Section 11.8.1). General observations of plant community health will be documented during surveys. Notes will include observations of wildlife species encountered.

During long-term management, riparian corridors will be carefully managed, monitored, conserved, and maintained. As part of the biological monitoring, data will be recorded for riparian canopy cover in Type 5 and other waters mitigation areas according to the schedule outlined in Section 11.8.1. Aerial photographs also will be taken during monitoring years and used to determine aerial canopy cover, and will be field-verified. General observations of plant community health and natural recruitment will be documented during field verification. Notes will include observations of wildlife species observed.

Permanent photo points for taking photographs will be established, and a site map showing the photo points will be prepared for the mitigation project file. Reference photographs will be taken of the overall wetland mosaic with the same frequency as the biological monitoring during April. Photos will be included in the monitoring report.

Invasive plants will be no more than 2% of the absolute cover from native plants in established and rehabilitated wetlands.

Data from established and rehabilitated wetlands and other waters will be compared to the data collected in the final year of the short-term performance monitoring period (performance standards). If the habitat has dropped below the performance standard, the land manager will determine whether an adaptive management approach should be used to incorporate changes to management practices, including corrective actions determined appropriate by the land manager.

11.8.4 Reporting and Administration

11.8.4.1 Annual General Inspection Report

At a minimum, the written annual general inspection report will include a map of the mitigation area, representative photos documenting the status of the selected mitigation areas, a description of proposed activities and maintenance or management actions as required by this plan, observations from the general inspections, an inspection sheet (end of this chapter), endowment accounting, and recommendations for altered management practices as needed. This report will be submitted to USACE and Caltrans by December 30 of each year.

11.8.4.2 Biological Monitoring Report

This report will be written and submitted to USACE in Years 5, 10, and 15 and every 10 years thereafter. The report is intended to track whether the mitigation is self-sustaining in perpetuity. The report will be submitted to the resource agencies and Caltrans by December 30 of each year.

11.8.4.3 Erosion

Caltrans assessed the existing erosion sites on the offsite mitigation properties in May 2010; 40 erosion features were identified (Appendix H). Of the 40 sites, five were recommended for restoration as part of the mitigation because this action could immediately improve water quality in the area, among other factors outlined in Appendix H. If it is observed during general inspections that any of the five restored erosion sites is deteriorating and contributing to excessive sediment, the land manager will document this observation as part of the general inspection report and begin adaptive management to rectify the situation.

11.9 Task Prioritization

This section establishes a procedure to prioritize tasks in case unforeseen circumstances or events result in insufficient funding to accomplish all tasks. The land manager and resource agencies will discuss task priorities and funding availability to determine which tasks will be implemented. In general, tasks would be prioritized as follows: (1) those required by a local, state, or federal agency; (2) those necessary to maintain or remediate habitat quality; and (3) those that monitor resources, particularly if past monitoring has not shown downward trends. Equipment and materials necessary to implement priority tasks also will be considered priorities. Final determination of task priorities in any given year of insufficient funding will be determined in consultation with USACE and Caltrans.

11.10 Transfer of Responsibilities and Plan Modification

11.10.1 Transfer of Management Responsibilities

Any subsequent transfer of management responsibilities under this long-term management plan to a different land manager will be requested in writing by the land manager. The request will be made to USACE, which will issue written approval that will be incorporated as an amendment to this long-term management plan. Any subsequent land manager assumes the responsibilities described in this long-term management plan and as required by the CE, unless otherwise amended in writing by the resource agencies.

11.10.2 Replacement of Land Manager

If the land manager fails to implement the tasks described in this long-term management plan and is notified of such failure in writing by USACE, the land manager will have a minimum of 90 days to remediate such failure. A longer timeframe may be granted by the resource agencies depending on the complexity of the specific infraction. If failure is not remediated within 90 days, the land manager may request a meeting with the resource agencies to resolve the failure. This meeting will occur within 30 days or a longer period if approved by USACE. Based on the outcome of the meeting, or if no meeting is requested, the resource agencies may designate a replacement land manager in writing, amending this long-term management plan accordingly.

11.10.3 Amendments to Management Plan

The land manager, property owner, Caltrans, and USACE may meet and confer from time to time, at the request of any of them, to revise the long-term management plan to better meet management objectives and preserve the habitat and mitigation. Any proposed changes to the long-term management plan will be discussed with USACE, Caltrans, and the land manager. Any proposed changes will be designed with input from all parties. Amendments to the long-term management plan will be approved by USACE in writing and will be implemented by the land manager.

Conservation Area Inspection Sheet

Location: ______________________________ **Date:** ______________
Inspector: ______________________________
General Observations: ______________________________

____

Yes	No	Potential Issues
		Erosion
☐	☐	Is there any adjacent sheet-flow drainage causing erosion?
		Fire Hazard Reduction
☐	☐	Are there any fire dangers or hazards at this site?
		Fencing and Gates
☐	☐	Are there any gates or fencing needing to be repaired or replaced?
		Trash Accumulation
☐	☐	Does trash need to be removed from the mitigation lands ?
		Unauthorized Motor Vehicle Use
☐	☐	Is there any unauthorized motor vehicle use identified on the mitigation lands?
		Grazing Management
☐	☐	Are grazing leases in compliance?
		Disking and Topography
☐	☐	Has any land disturbance occurred?
		Additional Roads and Trails
☐	☐	Have any new roads or trails been created?
		Equipment or Fuel Storage
☐	☐	Is there any equipment or fuel being stored on the mitigation lands?
		Pesticides and Chemical Agents
☐	☐	Is there any indication that pesticides, fungicides, insecticides or any other chemical agents have been used on the mitigation lands?
		Construction
☐	☐	Has any construction occurred on the mitigation lands?
		Nonnative Invasive Species
☐	☐	Have any additional invasive plants been introduced?
		Mosquito Abatement
☐	☐	Have mosquitoes become a health hazard?

For every YES, document the noncompliance and identify how the situation is to be resolved. For all compliance issues, record the date the landowner was advised of the situation and the steps taken to resolve the issue. Attach to the mitigation land inspection sheet.

Date of followup site visit to determine compliance:______________________

☐ ☐ Were all issues resolved?

If NO, what additional steps will be taken? Attach to the mitigation lands inspection sheet.

Chapter 12 Adaptive Management Plan

This chapter presents the general framework for using adaptive management to rapidly detect potential threats to project mitigation, implement responses to those threats, and assess the effectiveness of those responses.

Adaptive management is appropriate when there is uncertainty in predicting effects or outcomes, there are clearly defined performance standards, and there is a commitment to monitor. The need for adaptive management could be triggered by changed conditions, such as a natural disaster, or by failure to maintain performance standards because of the uncertainty in predicting effects of mitigation actions.

Reference sites provide a useful tool to help determine when conditions at a mitigation management unit warrant adaptive management. Reference sites will be monitored and used as a gage in determining when adaptive management actions are needed. Qualitative and quantitative information will be used to guide decision-making regarding specific management actions.

The overall adaptive management strategy will be to evaluate and work within the constraints of typical environmental conditions (e.g., ongoing sedimentation due to upstream land use) and natural environmental processes (e.g., meandering creekbeds) at the mitigation management units. Adaptive management will be performed by MCRCD in consultation with Caltrans and USACE. These typical conditions and natural processes create a dynamic environment.

Mitigation will be allowed to conform to the dynamic environment as it responds to the normal conditions and natural processes. Adaptive management actions will avoid creating situations that require recurring intervention to redirect or compete with the valley's typical environmental conditions and natural environmental processes. Natural recruitment, succession, and vegetation-type changes within natural resource habitats will be accepted as part of this approach. For example, if a stream meanders into a planted riparian area and washes out the plants, the reasons for the stream's lateral movement would be determined and an assessment would be made about whether the stream should be allowed to meander. If it is allowed, lost riparian vegetation could be replanted in the abandoned creekbed or another more stable area if one is available. USACE will be consulted prior to any replanting.

12.1 Responsible Parties

MCRCD, as the land manager, will be responsible for implementing adaptive management at the mitigation sites. Any remedial or adaptive management actions that may be necessary will be reviewed and approved by USACE prior to their implementation by the land manager.

12.2 Conditions That May Warrant Adaptive Management

12.2.1 Changes in Hydrology

Changes in hydrology could be short- or long-term, be natural or artificial, and include reductions or increases in duration or volume. USACE and Caltrans will evaluate each of the circumstances, and hydrologic changes would be addressed with appropriate actions where reasonable and within the MMP's scope and the Caltrans' control. Some of those foreseeable situations, such as flooding, drought, and water supply issues, are discussed below.

Winter and early spring flooding of varying extent typically occurs in Little Lake Valley. After large storms, water in the relatively large upper Outlet Creek Basin backs up at the constricting mouth of Outlet Creek in the north end of Little Lake Valley. Additional localized flooding in the valley generally is related to debris or erosion problems in the creeks. Flooding was recorded in the Outlet Creek Basin in 1907, 1938, 1950, 1955, 1964, 1983, and 1997. (CH2M Hill 2006.)

In situations during the establishment period where wetland establishment, wetland rehabilitation, or other waters rehabilitation (riparian) mitigation has been washed away or otherwise damaged during a flood event or realignment of a watercourse, those habitats will be replanted if site conditions allow. The specific location of the planting will be evaluated to determine whether flooding will be an ongoing problem, in which case a more sustainable location may be selected. In the case of prolonged flooding, specific actions may not be required but instead may be recorded as a type change within a natural resource habitat. If the watercourse realignment is determined to be a natural environmental process, no action will be required. Where flood debris interferes with the success of the management units, it will be removed; however, in cases where flood debris adds to habitat complexity, it will be retained. In cases where flood debris adds habitat complexity but causes a neighboring property to flood or dry up (downstream) or threatens culverts, bridges, or other structures, the debris will be removed. In cases where it is clear that an action taken by the land manager (or in some cases a lack of action) in order to comply with the mitigation commitments threatens to flood a neighboring property, immediate action will be taken to prevent such flooding. The land manager will take immediate action to protect the interests of the neighboring properties should they be threatened by actions related to Caltrans' mitigation. In emergency situations, human safety and the protection of private property will take priority over complying with mitigation commitments.

Acute sedimentation from large flood events, such as those described in the previous paragraph, will be remediated if it interferes with mitigation establishment. However, chronic long-term sedimentation, which is a typical condition of Little Lake Valley, will not be removed, and the management units will be allowed to adapt in response to that condition, as the existing habitats have been doing for decades.

12.2.2 Drought

According to the National Integrated Drought Information System (NIDIS), Mendocino County has experienced 106 reported events since 1900 that had negative impacts relating to agriculture, fires, and water/energy reduction, and that compromised environmental and social conditions associated with drought. Given that drought is foreseeable and is expected throughout the establishment period, the following actions will be considered to reduce its detrimental effects.

- During periods of seasonal drought, soil moisture will be checked on a regular basis during the first two to three growing seasons, and planted habitats evaluated for drought stress. The watering regime will be scheduled according to plant needs. Irrigation will provide the minimum amount necessary to keep the plants healthy but prevent them from becoming dependent on supplemental irrigation.
- If a prolonged drought continues beyond the establishment period, additional years of supplemental irrigation may be required.

The historical natural water supply of the valley has been reduced by the development of Willits, agricultural drainage projects, and a number of reservoirs in the surrounding hills. Furthermore, California is currently experiencing a statewide water crisis, and northern California's water supply is pressured by the demand to supply southern California's water needs. Continuation of this trend through future increase in private and public projects in and around the valley that diminish natural water supplies may prevent the mitigation from reaching performance standards. This situation would require the intervention of regulatory agencies or other governing bodies for remediation because it would be beyond the scope of the project and the authority of Caltrans.

12.2.3 Fire

Despite wetter conditions and ease of access, an accumulation of thatch or understory could cause an increased fire risk in nongrazed lowland mitigation areas over time. If the nongrazed mitigation areas become a fire hazard as a result of thatch or understory accumulation, as determined by local fire officials, those areas in question can be thinned, mowed, or control-burned to the minimum extent necessary to alleviate the threat. Alternatively, a firebreak can be placed around the perimeter of the areas, if fire officials consider this efficient, but the potential effects on sensitive resources (e.g., disking in wet meadow) would need to be considered and avoided. In general, the least amount of human management possible should be used to remediate problems in the ungrazed mitigation areas.

If a wetland establishment, wetland rehabilitation, or other waters rehabilitation management unit that includes plantings is burned by a controlled burn or other causes during the establishment period, the management unit will be evaluated for damage and monitored for regrowth. Based on the time of year of the fire and extent of damage and plant regeneration, a revegetation or reseeding plan may be drafted and implemented.

12.2.4 Extensive Adjacent Development

Extensive development on adjacent properties may alter current hydrologic regimes supporting the mitigation management units, cause management unit disturbance that encourages growth and spread of invasive plant species, contribute to fragmentation of sensitive plant populations, involve management unit alterations that increase erosion or sedimentation within the mitigation management unit, or introduce grazing or other activities or features that pollute or create barriers in shared streams or creeks.

Because the mitigation parcels will be held under a CE, future developers will be responsible for developing and implementing mitigation measures to avoid impacts on these protected lands. In the event that future development or significant land use changes are proposed on adjacent lands, the land manager will coordinate with the adjacent landowner, resource agency personnel assigned to the project, local planning department staff, and others to ensure that the goals for the mitigation parcels are not threatened or affected. This may be achieved through implementation of buffer zones, stormwater pollution prevention measures, permanent water quality infrastructure, cattle barriers, and other suitable measures.

12.2.5 Other Site Degradation

Other site degradation may include soil erosion, vandalism, and other as-yet-unknown effects. Soil erosion that negatively affects created habitats will be dealt with on a case-by-case basis using SWPPP standards. Strategies for dealing with vandalism will include signage, fencing, visual monitoring, and coordination with local law enforcement and other appropriate agencies. Other effects will be evaluated and addressed on a case-by-case basis.

12.2.6 Failure to Meet or Retain Performance Standards

All of the conditions discussed previously in this chapter may have an impact on a management unit’s ability to meet the performance standards. There also may be unforeseen factors not captured in this document that can affect a management unit’s ability to meet performance standards. All of these factors can act at a landscape or local level. In any case, the initiating procedures are the same. The land manager will perform the following steps.

1. Identify the problem.
2. Develop a response. Depending on the situation, the response may be as simple as increasing the length of monitoring or as involved as replanting or regrading a site.
3. Recommend a response and seek approval from USACE.
4. Implement the solution.
5. Monitor progress.
6. Recommend adjustments and need, and seek approval from USACE.

The meeting of the performance standards in each mitigation unit will be evaluated by measuring various parameters outlined in Chapter 9. All remedial steps will be documented and included in the annual monitoring reports. In cases where mitigation is not progressing toward meeting final performance standards according to schedule, but progressive improvement is evident, extension of the monitoring period could be appropriate but would be subject to approval from USACE.

Should it be determined that remediation in the form of additional planting is necessary on Type 2 rehabilitation sites, USACE requires that planting be in a form other than broadcast seeding (i.e., plugs, containers, acorns) and woody plantings must make up 25% of the total plants.

12.2.6.1 Wetland Hydrology

Wetland hydrology, specifically the hydroperiod, will be evaluated as part of the performance standards for re-established and established wetland management units. If any of the management units fail to meet performance standards, the land manager will perform the following steps as part of the adaptive management process.

- Review current climate conditions to determine whether the failure could be caused by a drought or flood year(s). If it is determined that climate is a factor, monitoring may need to be increased until conditions normalize.
- Evaluate the grading to determine whether establishment sites need to be regraded to intercept the water table or allow more surface flow interaction.
- Evaluate, to the extent feasible, whether actions on neighboring parcels or factors up- or downstream may be interfering with natural water supplies.
- Review performance standards to determine whether they are appropriate for the wetland in question.

This list of factors is not meant to be exhaustive. The land manager may need to investigate other factors to understand the entire situation before recommending remedial actions. If remedial actions are necessary, the land manager will consult and get prior approval from USACE before implementing the remedial actions. The monitoring schedule should be temporarily lengthened to document the success of the remediation.

12.2.6.2 Vegetation

Vegetation will be evaluated as part of the performance standards for the following mitigation actions: (1) re-established or established wetlands; (2) re-established other waters sites; (3) rehabilitated wetlands; and (4) rehabilitated other waters sites. If any mitigation unit fails to meet performance standards, the land manager will perform the following steps as part of the adaptive management process and seek prior approval from USACE before implementing any action:

- Evaluate hydroperiod to determine whether an absence or overabundance of water is inhibiting plant growth.
  - If a lack of water due to drought is the issue, the irrigation schedule for woody plants may need to be increased or extended until climate conditions normalize. The irrigation systems and watering methods should be evaluated for serviceability and suitability.

  - An overabundance of water caused by temporary, localized flooding (i.e., a wet year) could necessitate increased monitoring and replanting.
  - Obstructions up- or downstream or actions on neighboring properties could require debris removal or educational discussions with neighbors to alleviate the problems.
  - Natural landscape changes may not require remedial action.
  - At wetland establishment sites, regrading might be necessary to intercept the water table or allow more surface flow interaction.
- Evaluate mortality areas for herbivory. Remediation for herbivory could include implementing additional exclusionary devices, such as plant protection cages or fencing. Replanting may be necessary, depending on the extent of mortality.
- Evaluate site for invasive species infestations. Mechanical, chemical, or biological measures or prescribed burns may be necessary to control or eradicate any infestations. Any herbicide use first must be approved as part of an invasive species control plan by RWB, per the project's CWA Section 401 water quality certification.

This list of factors is not meant to be exhaustive. The land manager should investigate other factors to understand the entire situation before recommending remedial actions. If remedial actions are necessary, the land manager will get prior approval from USACE. The monitoring schedule should be temporarily lengthened to document the success of the remediation.

12.2.6.3 Invasive Species

Invasive species, including noxious species, will be evaluated as part of the performance standards for wetland rehabilitation sites. Should any of the sites not meet performance standards, the land manager will investigate the following factors as part of the adaptive management process.

- Previous and current routine management practices that could increase the opportunities to introduce new invasive or noxious species to the mitigation management units.
- Practices on neighboring properties that increase the spread of invasive or noxious species, which may require educational discussions with landowners.
- Landscape-level changes that create bare soil (flood or wildfire) and allow invasive or noxious species to take hold and dominate an area.
- Mechanical, chemical, or biological measures or prescribed burns that may be necessary to control or eradicate the infestation.[1]

This list of factors is not meant to be exhaustive. The land manager may need to investigate other factors to understand the entire situation before recommending remedial actions. If remedial actions are necessary, the land manager will seek prior approval from USACE. The monitoring schedule will be temporarily lengthened to document the success of the remediation.

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[1] Any herbicide use must first be approved as part of an invasive species control plan by RWB, per the project's CWA Section 401 water quality certification.

12.3 Adaptive Management Protocol

12.3.1 Initiating Procedures of Adaptive Management

Annual monitoring reports will be submitted to USACE. If necessary, MCRCD will call for a meeting with USACE and Caltrans on submittal of the annual monitoring report to discuss detrimental changes, or the possibility of detrimental changes, in conditions. Possible occasions that may warrant a meeting include those following.

- MCRCD has exhausted all practical solutions to a problem without positive results.
- There is no obvious solution.
- The problem or solution is beyond the scope of this project.
- The performance standards no longer seem suitable.

Once the protocol is triggered, MCRCD is responsible for leading the effort with USACE and Caltrans to come to a resolution. If the group cannot come to a resolution, the issue requiring adaptive management will be forwarded to the management-level staff for a decision.

12.3.2 Revisions to Maintenance Requirements

During the course of the long-term management program, certain site conditions may change, and some requirements stated in the MMP may be insufficient or have a negative effect on the intent of the mitigation efforts. If MCRCD determines that this has occurred, USACE and Caltrans will be notified, the detrimental conditions will be identified, and maintenance reports will document and suggest alternative actions to remedy the situation and bring the maintenance approach into harmony with site conditions. Actions contrary to the requirements of the MMP will be undertaken only with the permission of Caltrans and USACE.

12.3.3 Revisions to Monitoring Requirements

During the course of the project, certain monitoring procedures in the MMP may become insufficient or redundant. If this occurs, MCRCD will notify Caltrans, identify the deficient or redundant practices, and suggest and document in the annual monitoring reports alternative actions to remedy the situation. Actions contrary to the requirements of the MMP will be undertaken only with the permission of Caltrans and USACE.

12.3.4 Funding

Contingency funds have been established for short- and long-term maintenance and monitoring costs and for the long-term management and monitoring costs. These funds are intended to provide money for unanticipated expenses. Costs associated with adaptive management also would be paid using these funds. The amount of money in the contingency funds is calculated at 10% of the estimated short- and long-term mitigation management and monitoring costs.

Chapter 13 Financial Assurances

Caltrans acknowledges its obligation to comply with the financial assurances requirements of the USACE CWA Section 404 individual permit. Caltrans includes with this MMP documents supporting the establishment of a non-wasting endowment for ensuring that mitigation measures are adequately funded in perpetuity. These documents include calculations and assumptions based on a systematic and thorough process to account for the costs of foreseeable long-term mitigation and maintenance activities, and additionally include a contingency factor to cover unforeseen circumstances.

Mitigation costs set forth below have been calculated for actions related to the USACE permit. In addition, the project will be required to comply with the California Fish and Game Code Section 1602 streambed alteration/Section 2081 incidental take permit, the RWB CWA Section 401 certification, and the NMFS incidental take permit.

The compensatory mitigation proposed in this document is considered part of the scope of the project, and as such will be funded with the same level of obligation as the roadway construction. Funding for the construction, short- and long-term monitoring, management, and maintenance of the mitigation described in this document will originate from the project. Mitigation funding is held in the Willits Bypass Expenditure Authorization (EA) 26200 and earmarked as mitigation dollars. Although it is being managed as a separate project, a portion of the Ryan Creek Fish Passage Project will be funded as compensatory mitigation for impacts on fisheries and waters of the United States resulting from the bypass project; a separate project and EA will be established for the Ryan Creek Fish Passage Project work, and money will be transferred from the Willits Bypass EA into the new Ryan Creek Fish Passage Project EA. This money will then be available to cover the full cost of the design as well as contribute toward the construction costs of the Ryan Creek Fish Passage Project.

The project is programmed in the State Transportation Improvement Program in fiscal year 2009/2010. The project has been granted a 20-month extension by the California Transportation Commission. The extension began July 1, 2010, and runs through February 2012.

The estimated cost for USACE-related mitigation is $59,921,186.00. This estimated cost includes land acquisition, mitigation construction (including the Ryan Creek Fish Passage Project), short- and long-term monitoring, management, and maintenance and reporting. The breakdown of the total cost of mitigation is as follows:

- Land acquisition = $16,000,000.
- Construction costs (minus Ryan Creek) = $17,850,000.
- Ryan Creek Fish Passage Project = $3,000,000.
- Initial and capital task (short-term endowment) = $**11,290,021.00**
- Ongoing tasks (long-term endowment) = $**11,781,165.00**

Current endowment funding for initial and long-term costs associated with offsite mitigation was calculated using a combination of the Property Analysis Record (PAR) program – a tool developed by the Center for Natural Lands Management – and a customized Excel spreadsheet. The PAR is a computerized database method that is extremely effective in helping land managers calculate the costs of land management for a specific project. The PAR helps analyze the characteristics and needs of the property from which management requirements are derived. It helps pinpoint management tasks and estimates their costs as well as the necessary administrative costs to provide the full cost of managing any property. The PAR generates a concise report which serves as a well-substantiated basis for long-term funding including endowments, special district fees, and other sources. The PAR was used to help develop the list of necessary tasks, resources, equipment and unit costs. Unit costs were also adjusted if research or experience indicated that a particular PAR unit cost estimate was not suitable for project specific circumstances. The Excel spreadsheet was used to reorganize, calculate and track the tasks and costs in more intuitive, reader-friendly style.

Caltrans employed the PAR default rate for contingencies at 10%, and a more conservative reinvestment rate of 2% (vs. the PAR default of 5%). The 2% rate reflects the much lower return rate typical of endowments managed by CDFG. The endowment costs for the USACE 404 permit mitigation parcels is as follows

Initial and capital tasks and costs (startup costs)	$8,929,813.00
Add 10 contingency	$892,981.00
Subtotal	$9,822,794.00
Administration 10%	$982,279.00
Total initial cost	**$10,805,073.00**
Ongoing tasks and costs (long-term endowment)	$194,730.00
Add 10% contingency	$19,473.00
Subtotal	$214,203.00
Administration 10%	$21,420.00
Annual long-term cost	**$237,826.00**
Long-term endowment total (at 2% return rate)	**$11,781,165.00**

Based on a return rate of 2%, the long-term endowment totals $11,781,165.00 added to the initial startup cost of $11,290,021.00, for a total endowment cost of **$23,071,186.00**.

The endowments will be held and managed by CDFG.

Chapter 14 References

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