

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

¹The 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

¹The 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	<ul style="list-style-type: none"> No rehabilitation opportunities 	<ul style="list-style-type: none"> Remove unnecessary fencing Preserve unenhanced wetland and upland
Benbow	007-020-03	<ul style="list-style-type: none"> Allow successional unmanaged vegetation development in rehabilitation wetland Remove minor stock loafing pile 	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Allow successional unmanaged vegetation development in rehabilitation wetland 	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Allow successional unmanaged vegetation development in rehabilitation wetland 	<ul style="list-style-type: none"> Remove unnecessary fencing Remove debris Plant riparian vegetation where appropriate Preserve unenhanced wetland, upland, and other waters
Benbow	108-030-07	<ul style="list-style-type: none"> Allow successional unmanaged vegetation development in rehabilitation wetland 	<ul style="list-style-type: none"> Remove unnecessary fencing Remove water trough and piping Preserve upland

Parcel	APN	Best Opportunities Identified	Other Actions Identified
Benbow	108-020-06	<ul style="list-style-type: none"> • Allow successional unmanaged vegetation development in rehabilitation wetland • Remove small upland levee to adjacent wetland grade to establish new wetland area 	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • No rehabilitation opportunities; parcels are fallow and have developed successional vegetation communities 	<ul style="list-style-type: none"> • Preserve wetlands, uplands, and other waters • Remove debris • Remove unnecessary fencing • Remove nonnative blackberry and teasel
Ford	108-010-05	<ul style="list-style-type: none"> • Allow unmanaged successional development in nonmarsh rehabilitation wetland 	<ul style="list-style-type: none"> • Remove unnecessary fencing • Preserve unenhanced wetland, upland, and other waters • Plant riparian vegetation where appropriate
Ford	108-010-06	<ul style="list-style-type: none"> • Allow unmanaged successional vegetation development in nonmarsh rehabilitation wetland • Establish wetland in previously identified areas 	<ul style="list-style-type: none"> • Remove unnecessary fencing • Preserve unenhanced wetland, upland, and other waters • Plant riparian vegetation where appropriate
Ford	108-020-04	<ul style="list-style-type: none"> • Allow unmanaged successional vegetation development in nonmarsh rehabilitation wetland 	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Allow unmanaged successional vegetation development in rehabilitation wetlands 	<ul style="list-style-type: none"> • Remove debris • Remove nonnative blackberry • Remove unnecessary fencing • Preserve unenhanced wetlands, other waters, and upland • Plant riparian vegetation where appropriate
Ford	108-030-05	<ul style="list-style-type: none"> • Allow unmanaged successional vegetation development in rehabilitation wetlands 	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Allow unmanaged successional vegetation to develop on rehabilitation wetland 	<ul style="list-style-type: none"> • Remove debris • Plant riparian vegetation where appropriate • Fix erosion along tributary • Remove unnecessary fencing • Preserve upland and other waters
Goss	103-230-02	<ul style="list-style-type: none"> • Allow unmanaged successional vegetation to develop on rehabilitation wetland • Establish wetland in previously identified area 	<ul style="list-style-type: none"> • Remove unnecessary fencing • Preserve unenhanced wetland and upland

Parcel	APN	Best Opportunities Identified	Other Actions Identified
Huff	037-240-RW	<ul style="list-style-type: none"> • No rehabilitation opportunities 	<ul style="list-style-type: none"> • Remove debris • Preserve wetlands, uplands, and other waters • Access restrictions for off-road vehicles
Lusher	108-030-03 108-060-08	<ul style="list-style-type: none"> • Allow unmanaged successional vegetation to develop on rehabilitation wetland 	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Allow unmanaged successional vegetation to develop on rehabilitation wetland 	<ul style="list-style-type: none"> • Remove unnecessary fencing • Remove nonnative blackberry • Preserve unenhanced wetland, upland, and other waters • Plant riparian vegetation where appropriate
MGC North	103-230-06	<ul style="list-style-type: none"> • Allow unmanaged successional vegetation to develop on rehabilitation wetland • Establish wetland in previously identified area 	<ul style="list-style-type: none"> • Remove unnecessary fencing • Preserve upland
MGC Middle	103-250-14	<ul style="list-style-type: none"> • Allow unmanaged successional vegetation to develop on rehabilitation wetland • Establish wetland in previously identified area 	<ul style="list-style-type: none"> • Remove unnecessary fencing • Preserve unenhanced wetlands and upland
Nance	108-050-06	<ul style="list-style-type: none"> • Allow unmanaged successional vegetation to develop on rehabilitation wetland 	<ul style="list-style-type: none"> • Remove debris • Remove unnecessary fencing • Plant riparian vegetation where appropriate • Preserve unenhanced wetland, upland, and other waters
Niesen	108-040-02	<ul style="list-style-type: none"> • Allow unmanaged successional vegetation to develop on rehabilitation wetland • Establish wetland in previously identified area 	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> Allow unmanaged successional vegetation development on rehabilitation wetland 	<ul style="list-style-type: none"> Remove unnecessary fencing Preserve unenhanced wetlands, uplands, and other waters Plant riparian vegetation where appropriate
Wildlands	108-020-07	<ul style="list-style-type: none"> Allow unmanaged successional vegetation development on rehabilitation wetlands Establish wetland in previously identified area 	<ul style="list-style-type: none"> Remove unnecessary fencing Preserve unenhanced wetlands, upland, and other water Plant riparian vegetation where appropriate
Wildlands	108-030-08	<ul style="list-style-type: none"> Allow unmanaged successional vegetation to develop on rehabilitation wetland 	<ul style="list-style-type: none"> Remove unnecessary fencing Remove debris Preserve unenhanced wetlands, upland, and other waters Plant riparian vegetation where appropriate
Wildlands	108-060-01	<ul style="list-style-type: none"> Allow unmanaged successional vegetation to develop on rehabilitation wetland Establish wetland in previously identified area 	<ul style="list-style-type: none"> Remove unnecessary fencing Remove debris Plant riparian vegetation where appropriate Preserve unenhanced upland and other water
Wildlands	108-060-02	<ul style="list-style-type: none"> Allow unmanaged successional vegetation to develop on rehabilitation wetland 	<ul style="list-style-type: none"> Remove unnecessary fencing Preserve unenhanced wetland, upland, and other water Plant riparian vegetation where appropriate
Wildlands	108-070-08	<ul style="list-style-type: none"> Allow unmanaged successional vegetation to develop on rehabilitation wetland 	<ul style="list-style-type: none"> Remove unnecessary fencing Remove debris Preserve unenhanced wetlands, upland, and other waters Plant riparian vegetation where appropriate
Wildlands	108-070-09	<ul style="list-style-type: none"> Allow unmanaged successional vegetation to develop on rehabilitation wetland 	<ul style="list-style-type: none"> 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
	Other waters	Temporary	Onsite
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

TASK	2013												2014												2015												2016												2017											
	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Bypass Project Construction (Phase 1)																																																												
Offsite Mitigation																																																												
Benbow Offsite Mitigation Parcels																																																												
Site preparation																																																												
Wetland establishment																																																												
Wetland rehabilitation																																																												
Other waters rehabilitation/ Wetland rehabilitation type 5																																																												
Ford Offsite Mitigation Parcels																																																												
Site preparation																																																												
Other waters rehabilitation/ Wetland rehabilitation type 5																																																												
Wetland establishment																																																												
Frost Offsite Mitigation Parcel																																																												
Site preparation																																																												
Other waters rehabilitation (erosion site rehabilitation)																																																												
Goss/MGC Plasma North and Middle Offsite Mitigation Parcels																																																												
Site preparation																																																												
Wetland establishment																																																												
Lusher Offsite Mitigation Parcel																																																												
Site preparation																																																												

Figure 7-1. Mitigation Implementation Schedule

TASK	2013												2014												2015												2016												2017											
	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Wetland establishment																																																												
Wetland rehabilitation																																																												
Nance Offsite Mitigation Parcel																																																												
Wetland rehabilitation																																																												
Niesen Offsite Mitigation Parcel																																																												
Site Preparation																																																												
Wetland establishment																																																												
Wetland rehabilitation (includes managing grazing)																																																												
Watson Offsite Mitigation Parcel																																																												
Site Preparation																																																												
Wetland establishment																																																												
Wetland rehabilitation																																																												
Wildlands Offsite Mitigation Parcels																																																												
Site preparation																																																												
Wetland establishment																																																												
Wetland rehabilitation																																																												

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.

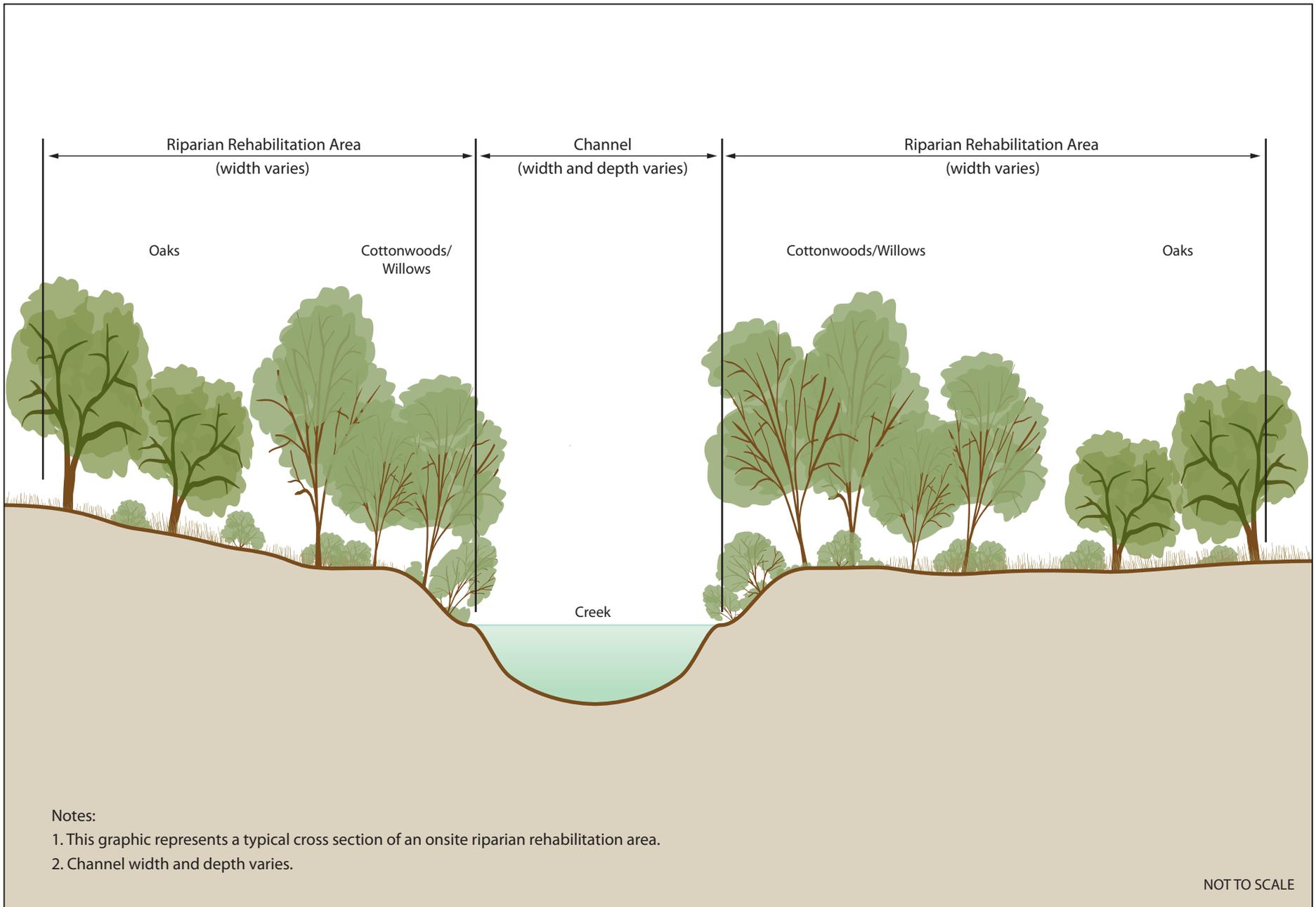


Figure 7-2
Typical Onsite Riparian Rehabilitation Area

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)
<i>Agrostis exarata</i>	Spike bentgrass	FAC	1.1
<i>Alopecurus aequailis</i>	Short-awned foxtail	OBL	1.1
<i>Alopecurus saccatus</i>	Pacific foxtail	OBL	4.5
<i>Carex densa</i>	Dense sedge	OBL	1.1
<i>Carex nebrascensis</i>	Nebraska sedge	OBL	1.1
<i>Danthonia californica</i>	California oatgrass	FACW	2.2
<i>Deschampsia danthoniodes</i>	Annual hairgrass	FACW	2.2
<i>Euthamia occidentalis</i>	Western goldenrod	OBL	2.2
<i>Hordeum brachyantherum</i> ssp. <i>Californicum</i>	California barley	FACW	13.4
<i>Juncus bolanderi</i>	Bolander's rush	OBL	2.2
<i>Juncus effusus</i>	Bog rush	OBL	1.1
<i>Juncus patens</i>	Spreading rush	FAC	1.1
<i>Juncus xiphioides</i>	Iris-leaved rush	OBL	2.2
<i>Lasthenia glaberrima</i>	Smooth goldfields	OBL	2.2
<i>Leymus triticoides</i>	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)
<i>Achillea millefolium</i>	Common yarrow	FACU	3.4
<i>Bromus carinatus</i> var. <i>carinatus</i>	California brome	UPL	10.1
<i>Clarkia purpurea</i> ssp. <i>quadrivulnera</i>	Four-spot	UPL	1.1
<i>Danthonia californica</i>	California oatgrass	FACW	1.1
<i>Elymus glaucus</i> ssp. <i>glaucus</i>	Blue wildrye	FACU	5.6
<i>Eschscholzia californica</i>	California poppy	UPL	1.1
<i>Festuca californica</i>	California fescue	FACU	3.4
<i>Hordeum brachyantherum</i> ssp. <i>californicum</i>	California barley	FACW	10.1
<i>Lotus purshianus</i> var. <i>purshianus</i>	Spanish lotus	UPL	4.5
<i>Lupinus bicolor</i>	Miniature lupine	UPL	5.6
<i>Nassella pulchra</i>	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)
<i>Carex athrostachya</i>	Slender beak sedge	Tree band	5	FACW
<i>Carex densa</i>	Dense sedge	Tree band	10	OBL
<i>Carex nebrascensis</i>	Nebraska sedge	Tree band	5	OBL
<i>Carex praegracillis</i>	Field sedge	Tree band	5	FACW
<i>Carex subbracteata</i>	Small bract sedge	Tree band	5	FACW
<i>Carex tumulicola</i>	Foothill sedge	Tree band	5	FAC
<i>Hordeum brachyantherum</i> var. <i>brachyantherum</i>	Meadow barley	Tree band	10	FACW
<i>Juncus bolanderi</i>	Bolander's rush	Tree band	5	OBL
<i>Juncus effusus</i>	Soft rush	Tree band	10	OBL
<i>Juncus balticus</i>	Baltic rush	Tree band	10	OBL
<i>Juncus xiphioides</i>	Iris-leaved rush	Tree band	10	UPL
<i>Leymus triticoides</i>	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	<i>Acer negundo</i>	Box elder	Treepot	15	FACW
	<i>Alnus rhombifolia</i>	White alder	Treepot	10	FACW
	<i>Fraxinus latifolia</i>	Oregon ash	Treepot	15	FACW
	<i>Populus fremontii</i> ssp. <i>Fremontii</i>	Fremont cottonwood	Treepot, cutting	10	FACW
	<i>Quercus garryana</i>	Oregon white oak	Treepot, acorn	10	UPL
	<i>Quercus lobata</i>	Valley oak	Treepot, acorn	20	FAC
	<i>Salix laevigata</i>	Red willow	Treepot, cutting	10	FAC
	<i>Salix lasiolepis</i>	Arroyo willow	Treepot, cutting	10	FACW
Shrub	<i>Cornus sericea</i>	Red-twig dogwood	Treepot	10	FACW
	<i>Rosa californica</i>	California rose	1 gallon	20	FAC
	<i>Ribes sanguineum</i>	Red-flowering currant	1 gallon	10	UPL
	<i>Rubus leucodermis</i>	White bark raspberry	1 gallon	10	FAC
	<i>Rubus parviflorus</i>	Thimbleberry	1 gallon	10	FAC
	<i>Rubus spectabilis</i>	Salmonberry	1 gallon	10	FAC+
	<i>Rubus ursinus</i>	Wild blackberry	1 gallon	10	FACW
	<i>Sambucus mexicana</i>	Blue elderberry	Treepot	10	FAC
	<i>Vitis californica</i>	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 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 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

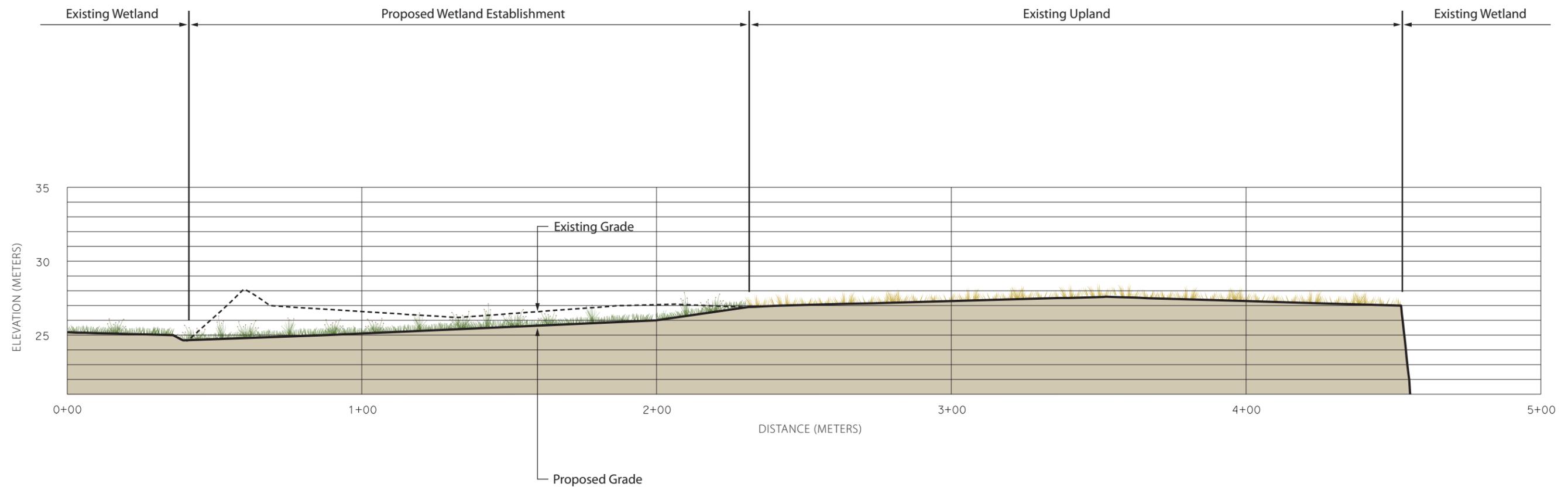
Other waters rehabilitation will be accomplished by removing grazing and implementing 5.05 acres of others waters rehabilitation on the northern portion of Davis Creek (Appendix C). Native riparian vegetation will be planted in the riparian corridor.

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

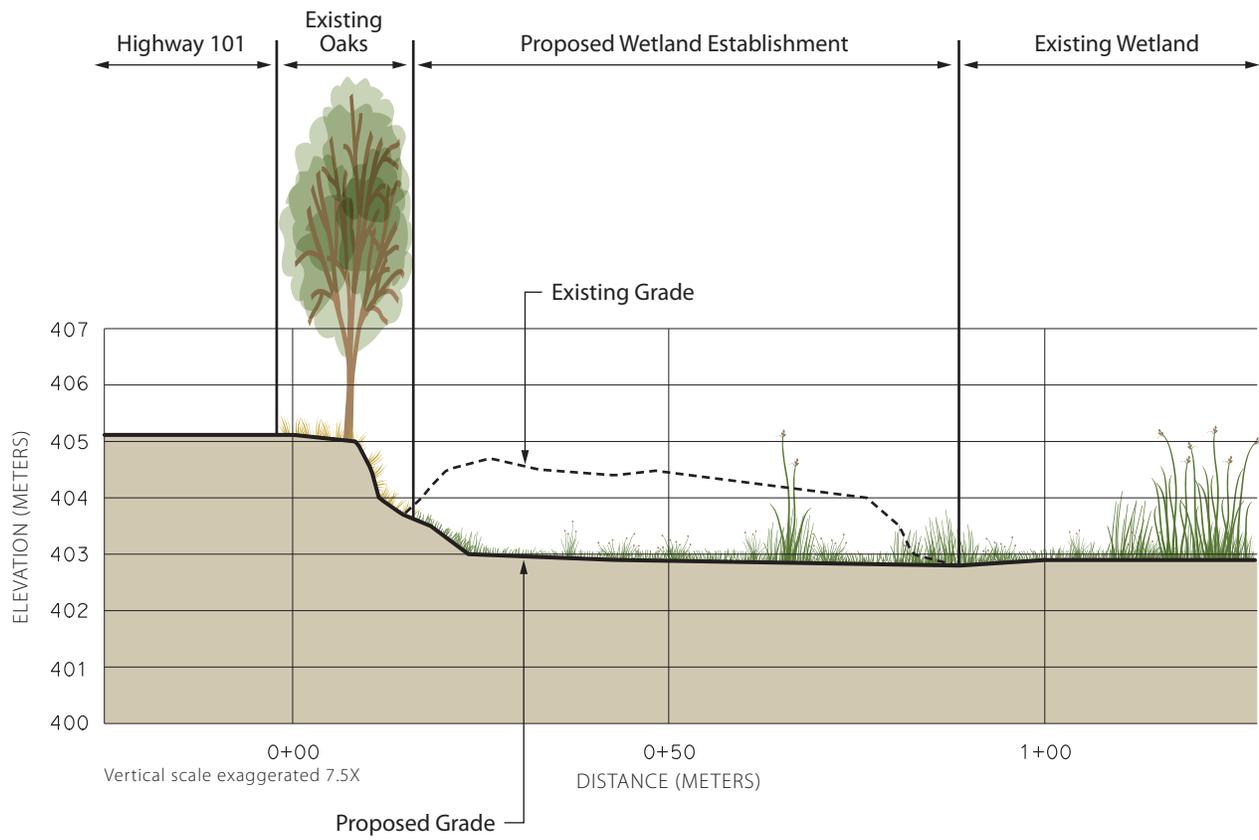
Wetland establishment at this parcel will consist of Group 1 wetland establishment totaling 2.14 acres. The wet meadow unit will be established adjacent to US 101 (Appendix C, Table 6-2). Figure 7-4 provides a graphic representation of wetland establishment efforts at the Ford parcel. The grading and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

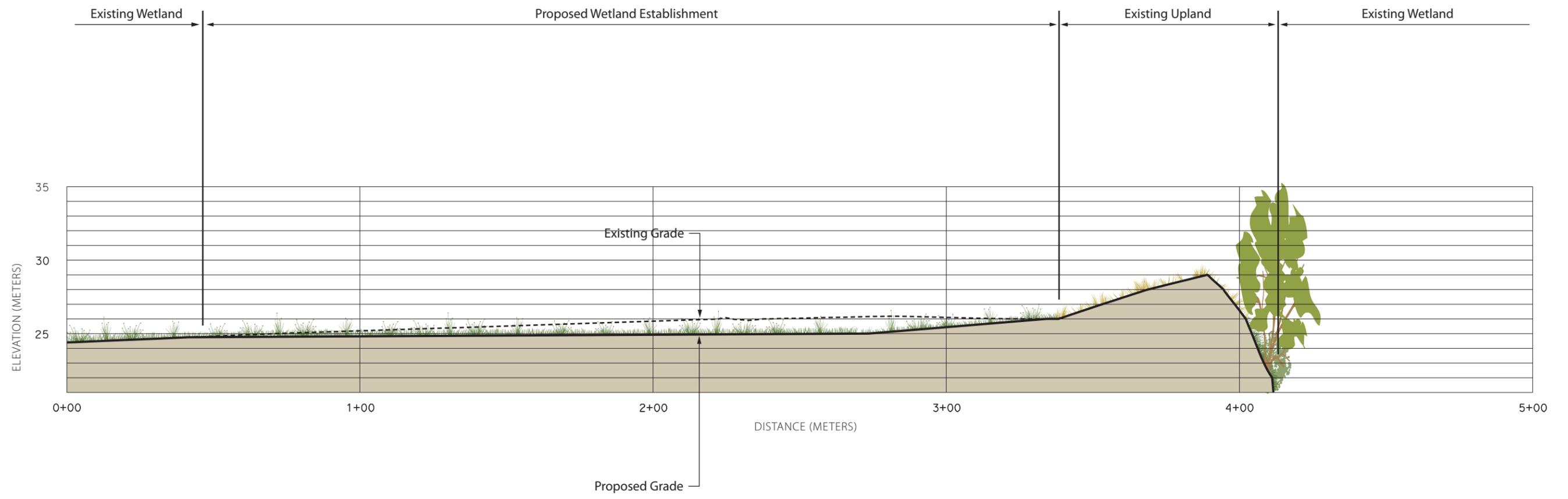
Wetland establishment at this parcel will consist of Group 2 wetland establishment totaling 6.48 acres (Appendix C, Table 6-4). The established wetland footprint will extend from the north end of this parcel south onto the adjacent Ford parcel (APN 108-030-02). The grading and planting plans for offsite 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.

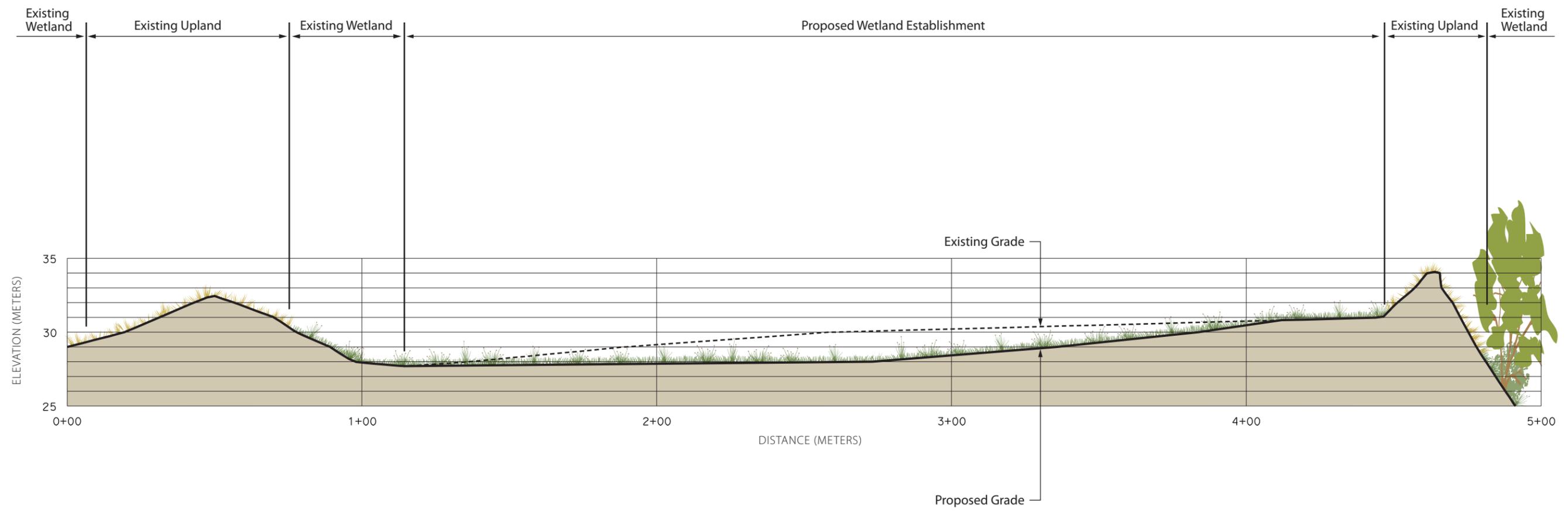
Five backhoe pit profiles (detailed soil evaluation) were described, four of which were placed in existing uplands and the remaining pit (CC) was located at the base of the natural levee along Outlet Creek to provide information on the continuity with highly permeable layers observed in pit BB. Soils 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

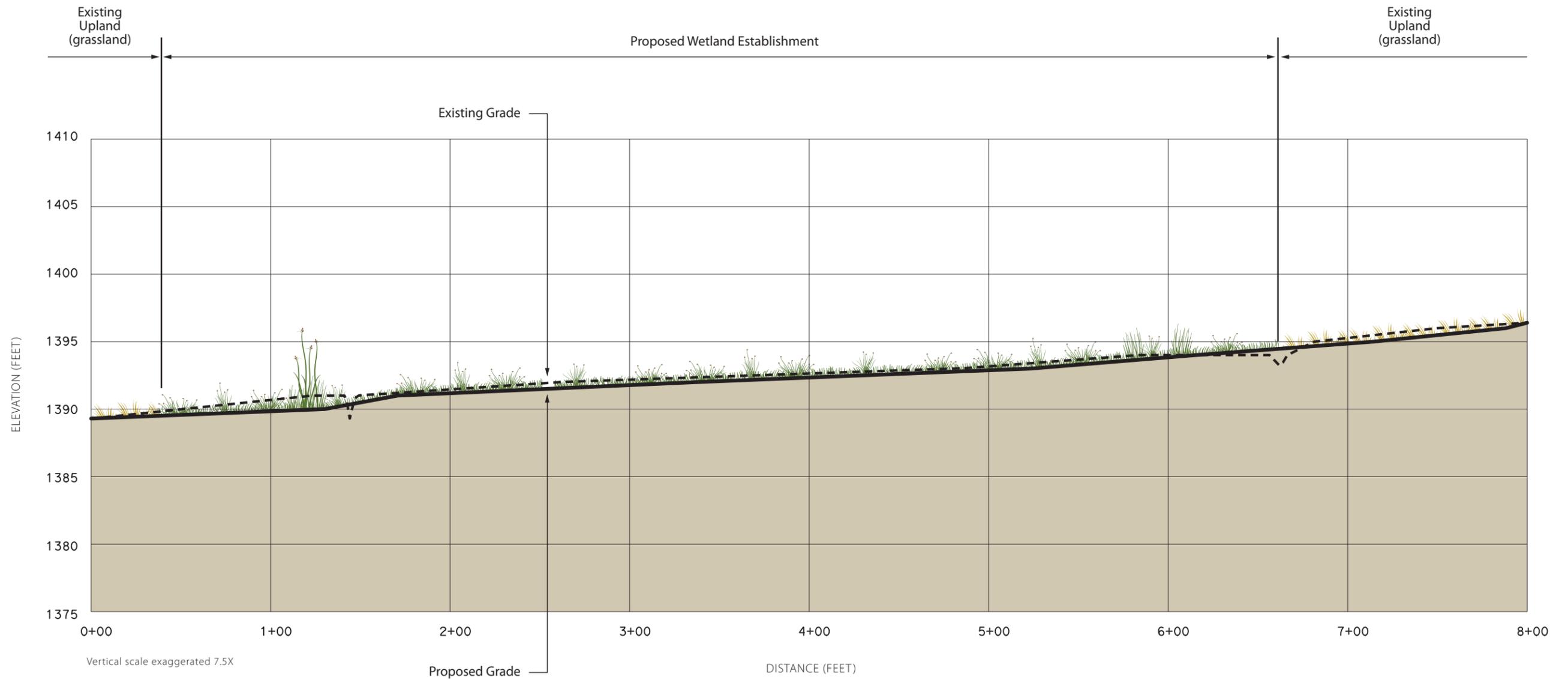
surface during April 2010 and within 29 inches of the soil surface during May 2010, indicating that water levels remain close to the soil surface through a large portion of the spring. The results from the test pits and groundwater monitoring wells indicate that water likely would be present in the wetlands 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 to 1 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)
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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 Group 1 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.

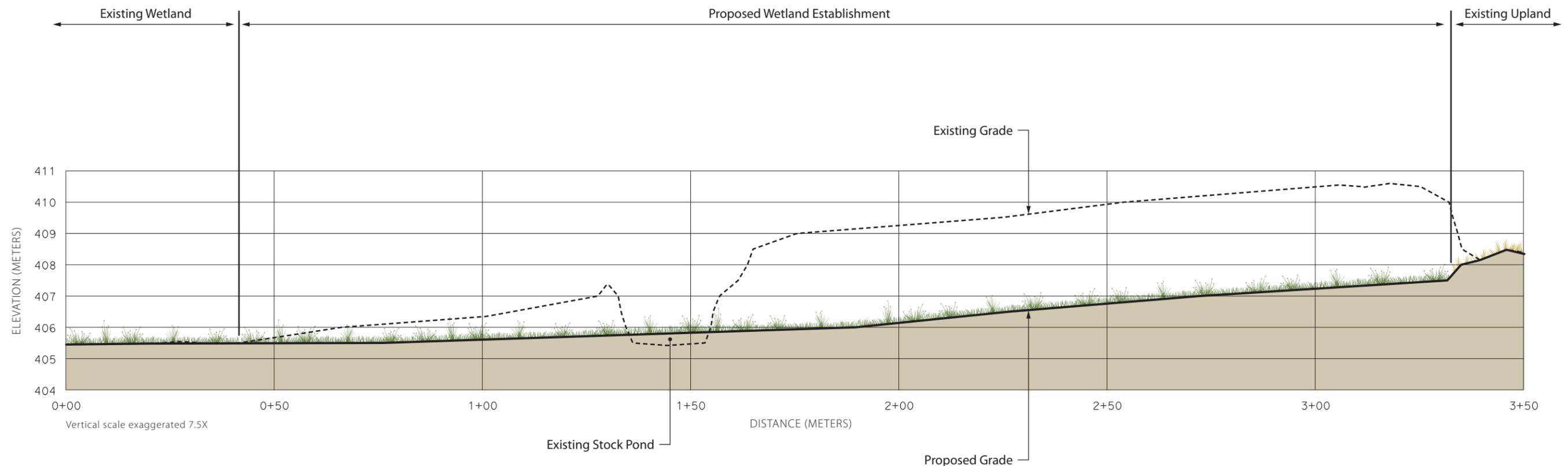
Gravelly to loamy fill material, ranging from 6 to 99 inches thick, was observed in most of the pits excavated in the upland overburden present at the wetland establishment site (Appendix J). Two pits had fill material mixed into the surface layer of the native soil, and in two pits no fill material 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:

- Existing grade will be lowered to proposed grade to establish wetland.
- 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 Group 1 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 gravelly 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.

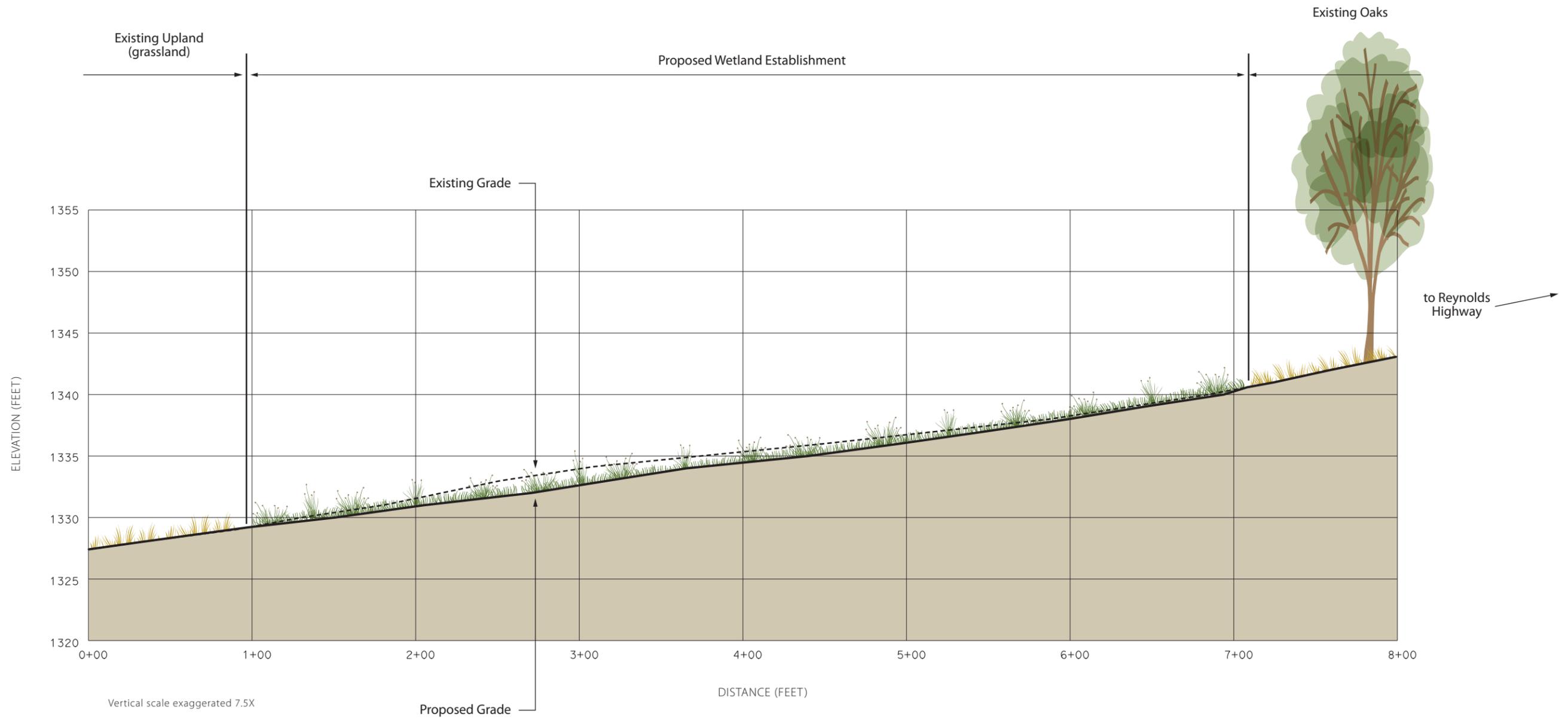
As described in Section 5.1.3, groundwater hydrology in Little Lake Valley is related to the aquifer underlying the valley. The upper portion of the aquifer occurs in alluvium that is composed of silt, clay, gravel, and sand (Farrar 1986). The presence of sheets of fine-grained sediments causes much 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)
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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.

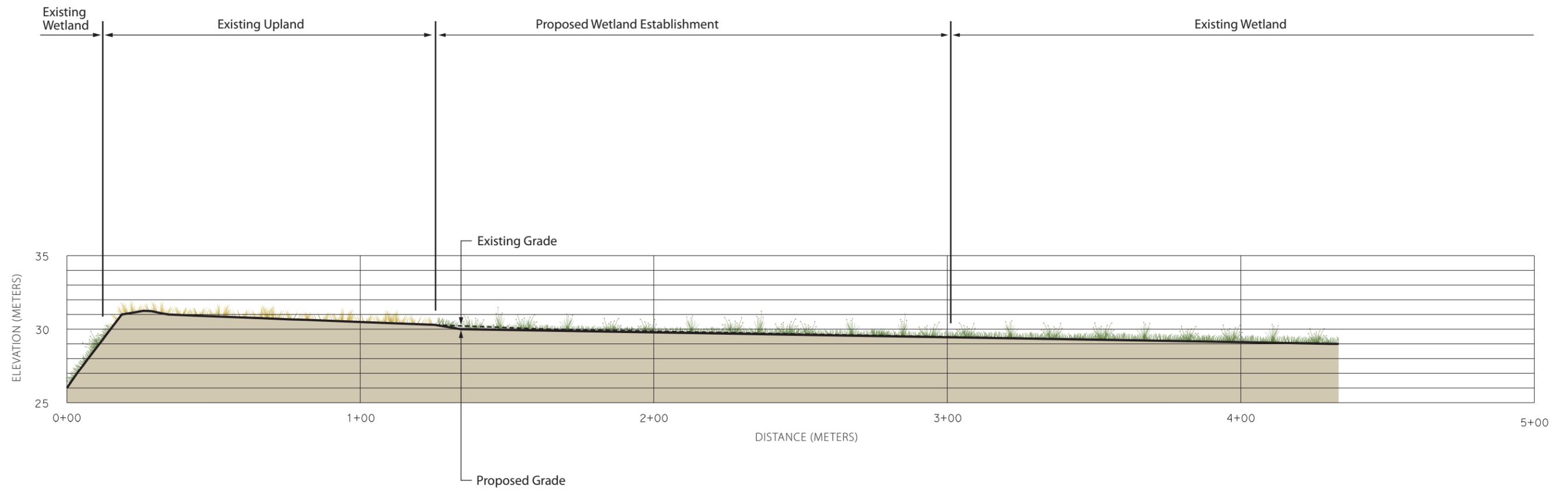
As identified on the soil profile and site description forms in Appendix J, as mapped by the NRCS, the existing soil map unit in all of the upland and wetland soil pits was Fluvaquents. The slope gradient in the upland pit locations was variable, ranging from 0 to 2% depending on location. The slope 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)
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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 the 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 seed 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.

Acorn Collection and Installation

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).

Improve Hydrology

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 reseeded 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 minimum 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 invasive plants 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

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	>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.

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 1 rehabilitated 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. MCRCDD 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 MCRCDD. 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 MCRCDD. 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-mi² 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 401 water 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
<input type="checkbox"/>	<input type="checkbox"/>	Erosion Is there any adjacent sheet-flow drainage causing erosion?
<input type="checkbox"/>	<input type="checkbox"/>	Fire Hazard Reduction Are there any fire dangers or hazards at this site?
<input type="checkbox"/>	<input type="checkbox"/>	Fencing and Gates Are there any gates or fencing needing to be repaired or replaced?
<input type="checkbox"/>	<input type="checkbox"/>	Trash Accumulation Does trash need to be removed from the mitigation lands ?
<input type="checkbox"/>	<input type="checkbox"/>	Unauthorized Motor Vehicle Use Is there any unauthorized motor vehicle use identified on the mitigation lands?
<input type="checkbox"/>	<input type="checkbox"/>	Grazing Management Are grazing leases in compliance?
<input type="checkbox"/>	<input type="checkbox"/>	Disking and Topography Has any land disturbance occurred?
<input type="checkbox"/>	<input type="checkbox"/>	Additional Roads and Trails Have any new roads or trails been created?
<input type="checkbox"/>	<input type="checkbox"/>	Equipment or Fuel Storage Is there any equipment or fuel being stored on the mitigation lands?
<input type="checkbox"/>	<input type="checkbox"/>	Pesticides and Chemical Agents Is there any indication that pesticides, fungicides, insecticides or any other chemical agents have been used on the mitigation lands?
<input type="checkbox"/>	<input type="checkbox"/>	Construction Has any construction occurred on the mitigation lands?
<input type="checkbox"/>	<input type="checkbox"/>	Nonnative Invasive Species Have any additional invasive plants been introduced?
<input type="checkbox"/>	<input type="checkbox"/>	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.

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, MCRCDD 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.

- MCRCDD 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, MCRCDD 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 MCRCDD 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, MCRCDD 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	<u>\$892,981.00</u>
Subtotal	\$9,822,794.00
Administration 10%	<u>\$982,279.00</u>
Total initial cost	\$10,805,073.00
Ongoing tasks and costs (long-term endowment)	\$194,730.00
Add 10% contingency	<u>\$19,473.00</u>
Subtotal	\$214,203.00
Administration 10%	<u>\$21,420.00</u>
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

14.1 Printed References

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Chapter 15 List of Preparers and Reviewers

15.1 California Department of Transportation

- Shanna Zahner—Mitigation Biologist, QA/QC Reviewer
- Carolyn Brown—Stewardship Branch Chief
- Jeremy Ketchum—Senior Environmental Planner, QA/QC Reviewer
- Jason Meigs—Associate Biologist, QA/QC Reviewer
- Mitch Andrus—Project Engineer
- Eva Begley, Ph.D.—Senior Environmental Planner
- Chris Collison—Senior Environmental Planner
- Clare Golec—Revegetation Specialist
- Kathleen Grady—Landscape Associate
- Dave Kelly—Project Manager
- Andrea Williams—Senior Mitigation Coordinator
- Dave Melendrez—Water Quality
- Samantha Hadden—Water Quality
- Jennifer Kurth—Landscape Associate
- Douglas Jones—Design Engineer
- Kao Thao—Transportation Engineer
- Vincent Mitchell—Transportation Engineer
- Scott Foster—Transportation Engineer
- Alex Arevalo—Water Quality, QA/QC Reviewer
- Jeff Pietrzak—Landscape Associate, QA/QC Reviewer

15.2 ICF International

- Karen Leone—Project Director, Restoration Planner
- Harry Oakes—Restoration Planner, Project Manager
- Paul Weller—Project Coordinator, Licensed Landscape Architect
- Peggy Lee—Project Coordinator
- Jonathan Foster—Wetland Ecologist/Regulatory Specialist

- Margaret Lee—Project Coordinator, Regulatory Specialist
- Kristin Lantz—Restoration Designer, Licensed Landscape Architect
- Steve Seville, P.E.—Hydrologist/Civil Engineer
- Jeff Peters—Geomorphologist
- Jeff Kozlowski—Fish Biologist
- Nate Martin—Water Quality Specialist
- Anne Huber—Water Quality Specialist
- Rob Preston, Ph.D.—Botanist/Wetland Ecologist
- Carl Jensen—Restoration Planner
- John Howe—Biologist
- Jessica Hughes—Biologist
- Julia Hooten—Biologist
- Dan Schiff—GIS Specialist
- Matt Ewalt—GIS Specialist
- Alex Angier—CAD Technician
- Tim Messick—Graphics Specialist
- Larry Goral—Senior Technical Writer
- Darle Tilly—Technical Editor
- Chris Small—Technical Editor
- Christine McGeever—Technical Editor
- Judith Shipman—Technical Editor
- Corrine Ortega—Publications Specialist
- Debby Jew—Publications Specialist