Chapter 5 Baseline Information

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

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

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

5.1 Valleywide Hydrology, Geology, and Geomorphology

5.1.1 Historical and Existing Surface Water Hydrology

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

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

5.1.1.1 Precipitation and Stream Discharge

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

Streamflow data were collected from the U.S. Geological Survey (USGS) river gage in the Outlet Creek Basin near Longvale on Outlet Creek (USGS ID 11472200) from 1956–94; and a new gage installed at Lake Emily on Willits Creek in 2003 (USGS ID 11472160). Table 5-1 lists average monthly discharges recorded at these two gages from the 1950s–1990s and 2003–2005.

Table 5-1. Average Monthly Discharges at the Outlet Creek Gage near Longvale (USGS ID 11472200) from 1956 through 1994 and at the Willits Creek Gage near Lake Emily (USGS ID 11472160) from 2003 through 2005

Water Year	Nov	Dec	Jan	Jun	Jul	Aug	Sep
Outlet Creek near Longvale Measuring Flow for the Entire Basin (cfs)							
1950s	1,367	407	1,115	19	7	2	6
1960s	306	1,304	1,304	20	4	2	1
1970s	417	700	1,397	12	4	2	2
1980s	485	834	907	13	2	1	2
1990s	28	393	811	12	6	1	1
Willits Creek near Lake Emily Measuring Flow for One Creek Only (cfs)							
2003	0.5	22.9	ND	ND	ND	ND	ND
2004	0.4	9.61	17.7	0.555	0.247	0.095	0.029
2005	ND	ND	13.9	7.26	1.43	0.399	0.158

cfs = cubic feet per second.
ND = none detected.
Source: LeDoux-Bloom and Downie (2008).

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

5.1.1.2 Flooding

The North Coast of California is dominated by intense, short-duration rainstorms in winter, with peak flows that are among the highest on record for the western United States (Sommerfield et al. 2002 as cited in LeDoux-Bloom and Downie 2008). Outlet Creek flooded in 1907, 1938, 1950, 1955, and 1964, with the latter two floods causing severe damage. The 1955 flood deposited large amounts of debris and sediment that aggraded creeks throughout Little Lake Valley. During winter 1964, rain fell on the local snow pack and caused the release of a tremendous amount of water during a relatively short duration, resulting in a significant increase in streamflow and velocity. High water in Outlet Creek washed away the railroad embankments along several sections of track during the 1964 flood. This flood was very damaging to the Eel River, its estuary, and smaller headwater basins, such as Outlet Creek (LeDoux-Bloom and Downie 2008).

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

5.1.2 Historical and Existing Geology and Geomorphology

5.1.2.1 General Physiography—Outlet Creek Basin

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

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

5.1.2.2 Geology

The dominant geology in the Outlet Creek Basin is the Tertiary-Jurassic Central Belt,[2] which is very soft to soft geology that is highly erodible. In Little Lake Valley, Quaternary alluvium is dominant. On the southern boundary of Little Lake Valley, where alluvial fans are present, Pliocene-Pleistocene fill[3] is present. Fine sediment is consistently contributed from Outlet Creek Basin into the Eel River.

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

5.1.2.3 Outlet Creek Basin Watershed Classification

Watershed Overview

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

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

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

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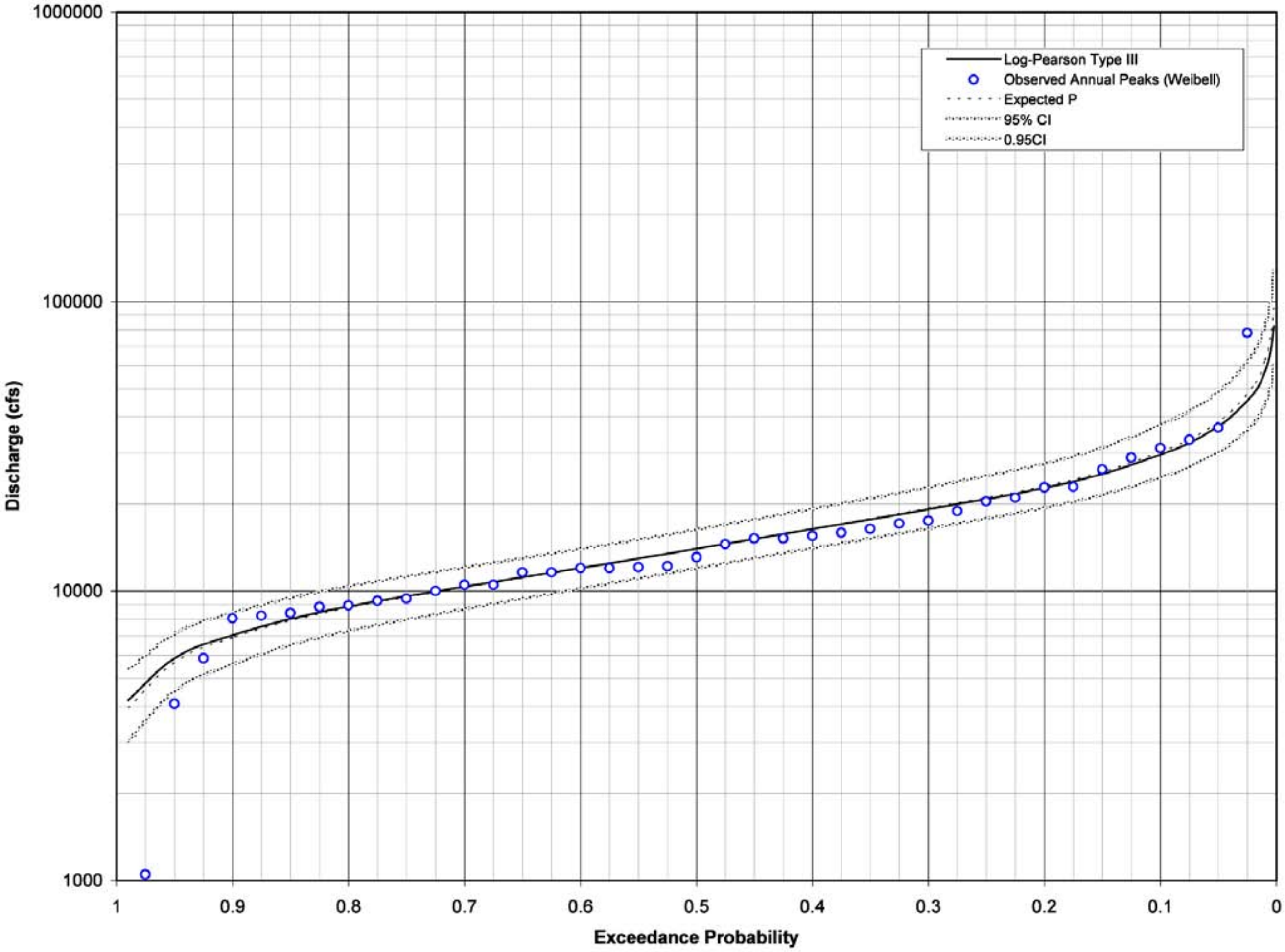
[2] Geologists have subdivided the Franciscan Complex into larger map units called belts and smaller map units called terranes. The Tertiary-Jurassic Central Belt of the Franciscan Complex contains mélange (an accretionary assemblage) consisting of arkosic and lithic metasandstone and meta-argillite of pumpellyite and lawsonite metamorphic grade (high-pressure and relatively low-temperature blueschist facies) (McLaughlin et al. 2000). Metasandstone is locally interleaved with chert and metabasalt. Carbonate concretions and local chert beds contain microfossils that are Late Jurassic to Late Cretaceous in age.

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

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



Source: LeDoux-Bloom and Downie 2008.

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

Source: LeDoux-Bloom and Downie 2008.

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

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

Channel Form in Little Lake Valley

Based on field observations (Appendix H) and the stream classification methodology of Montgomery and Buffington (1998), the various watercourses in Little Lake Valley occur in an alluvial valley segment dominated by plane-bed and pool-riffle reaches. Plane-bed and pool-rifle reaches are transport-limited;[5] therefore, the various watercourses in Little Lake Valley behave as response (or storage) channels, constantly adjusting their bed morphologies to water or sediment.

5.1.2.4 Historical Alterations to Hydrology and Geomorphology in Little Lake Valley

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

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

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

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

moved to the east to accommodate the railroad tracks (J. Ford, Ford Ranch, personal communication as cited in LeDoux-Bloom and Downie 2008).

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

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

5.1.2.5 Upstream Land Uses Affecting Geomorphic Characteristics of Little Lake Valley

Dams

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

Roads, Culverts, Bridges, and Weirs

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

Timber Harvesting

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

Vegetation Removal

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

5.1.2.6 Geomorphic Characteristics of Little Lake Valley

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

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

Substrate Composition and Embeddedness

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

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

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

Bank Instability and Bank Characteristics

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

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

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

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

Pool, Riffle, and Run Frequency (Habitat Complexity)

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

Channel Pattern

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

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

Degree of Incision and Stage of Channel Evolution

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

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

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

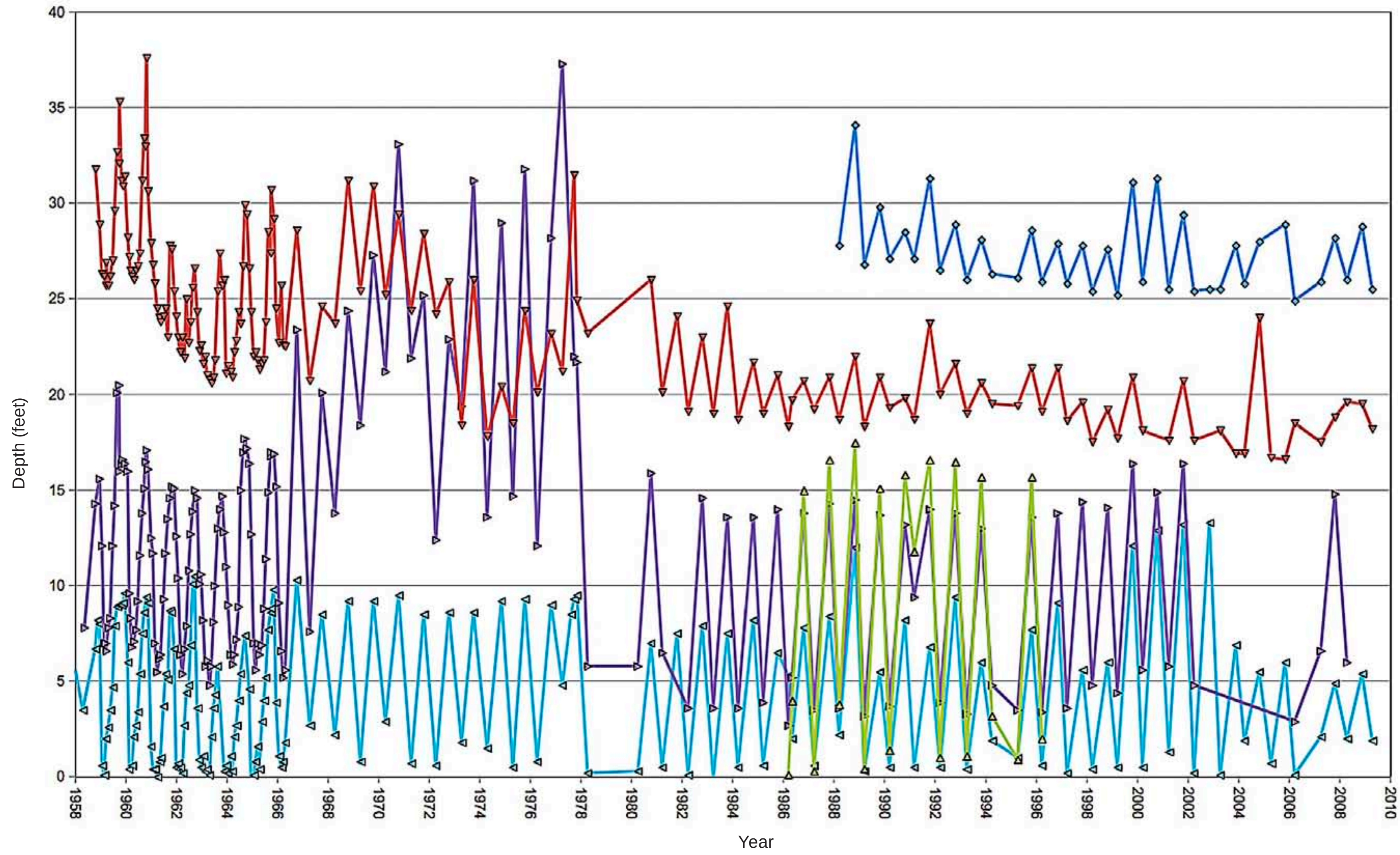
5.1.3 Groundwater Hydrology

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

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

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

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



Data source: California Department of Water Resources 2010.

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

(perched water versus main aquifer), the abundance of wetlands in Little Lake Valley indicates shallow groundwater levels occur and are available to support existing and proposed established wetlands.

The DWR well data indicate that groundwater elevations can fluctuate seasonally from 5 to 15 feet (California Department of Water Resources 2010; Figure 5-3). Seasonal fluctuations in groundwater level result primarily from pumping and precipitation (Farrar 1986), although other factors such as groundwater movement to and from streams, evapotranspiration, and recharge from irrigation play a role. Wells 2, 3, and 4 are no longer in use, so the fluctuations in their levels (Figure 5-3) are not a result of pumping of these wells, although pumping at other wells could be affecting the levels in wells 2, 3, and 4. The well data also indicate that groundwater levels in Little Lake Valley can decrease slightly during periods of drought. For example, well-level recovery was slightly reduced in some wells during some dry winters such as 1977. However, in general there has been little change in well levels from year to year, suggesting that to the extent that the main aquifer supports wetlands, groundwater is usually available to support wetland hydrology.

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

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

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

Groundwater Monitoring

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

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

Many of the shallow groundwater wells indicated that the soil profiles were nearly saturated within 6 inches of the surface. A few indicated relatively dry conditions on the first survey in mid-December. Although the cumulative rainfall was about 20 inches by December 15, the shallow groundwater had not yet saturated the soils in most of the wells on the Benbow parcels. All wells on the Ford parcels were generally saturated in mid-December. Nearly all of wells showed saturated soil conditions in the late March and early April surveys. All of the Benbow parcel wells indicated that the shallow groundwater had declined to below the well depth (30 inches) by the end of April. All Benbow parcel wells are along the Baechtel Creek and Outlet Creek channel. The creek channel is relatively deep (incised) along these parcels, and the shallow groundwater would have a relatively easy time draining several feet as seepage to the creek channels after the high creek flows decreased to baseflow conditions.

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

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

Wet Meadow Inundation Monitoring

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

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

5.2 Bypass Alignment Footprint Impact Area

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

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

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

5.2.1 Historical and Existing Vegetation

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

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

5.2.2 Historical and Existing Hydrology/Topography

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

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

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

5.2.3 Soils/Substrates

The Natural Resources Conservation Service (NRCS) *Eastern Mendocino County Soils Survey* was used to analyze soils in the bypass alignment footprint (Figures 5-4a through 5-4h). Hydric status for map units ranged from nonhydric to partially hydric, while the dominant drainage class ranged from very poorly drained to well drained. Soils drain better and are less likely to be hydric along the southern third of the bypass alignment footprint (from the Haehl Creek interchange to East Hill Road). Soils are also well drained and not likely to be hydric in the Oil Well Hill area. Soils along the remaining portion of the alignment footprint (north of East Hill Road) are less well drained (ranging from somewhat poorly drained to very poorly drained) and are more likely to have areas that meet hydric conditions. North Coast semaphore grass and Baker's meadowfoam were found in these northern areas and were primarily associated with the Cole Clay Loam, 0–2% slopes map unit and the Fluvaquents, 0–1% slopes map unit. Sections 5.2.3.1 through 5.2.3.14 provide brief descriptions of the map units that intersect the bypass alignment footprint boundaries.

5.2.3.1 Casabonne-Wohly Loams, 30–50% Slopes

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

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

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

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

5.2.3.2 Cole Clay Loam, 0–2% Slopes

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

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

5.2.3.3 Feliz Loam, 0–2% Slopes

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

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

5.2.3.4 Feliz Loam, 2–5% Slopes

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

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

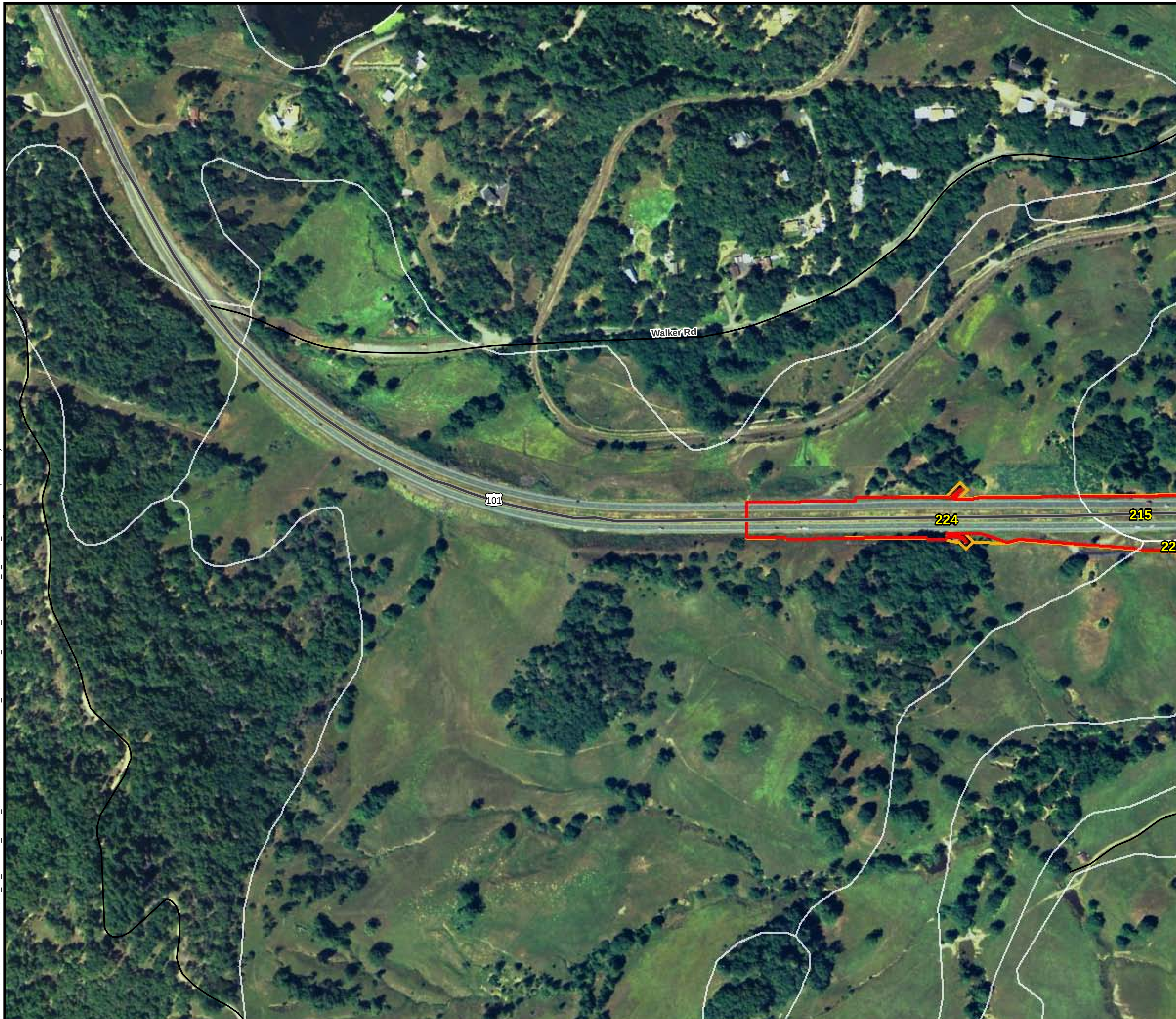
5.2.3.5 Fluvaquents, 0–1% Slopes

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

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

5.2.3.6 Gielow Sandy Loam, 0–5% Slopes

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

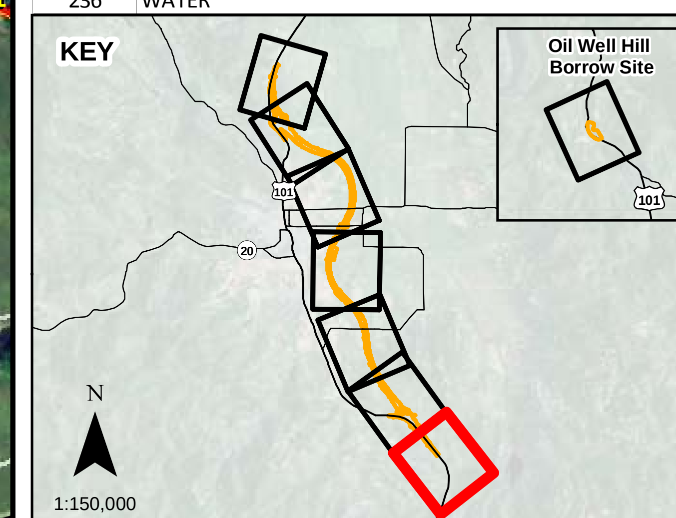


SSURGO Map Unit
Permanent Impact Boundary
Temporary Impact Boundary
Road

SSURGO Map Unit Label Description

178 Map Unit Symbol

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



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Scale in Feet

Figure 5-4a

Soil Types within the Proposed Bypass Project Footprint

Proposed Willits Bypass Project

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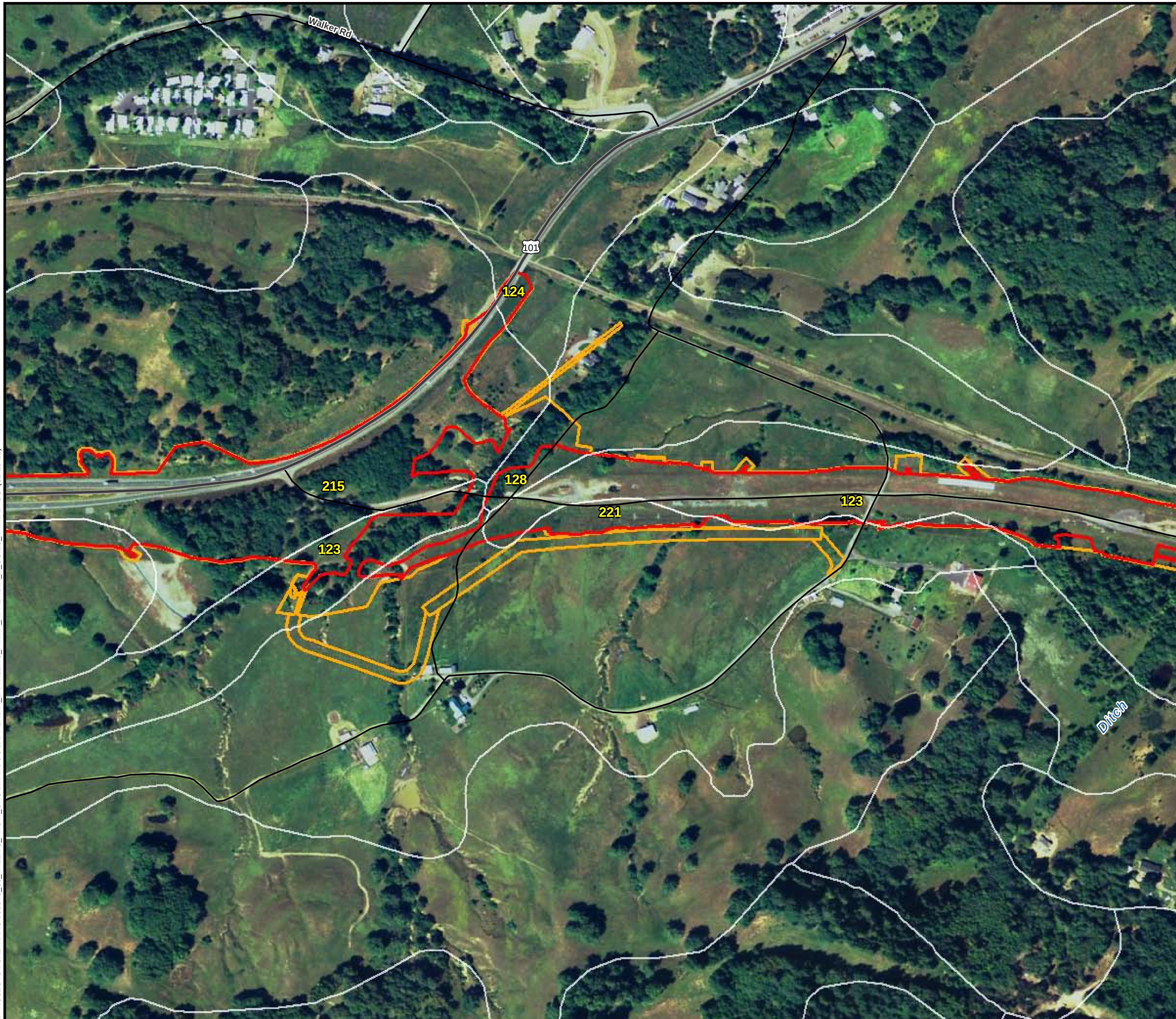
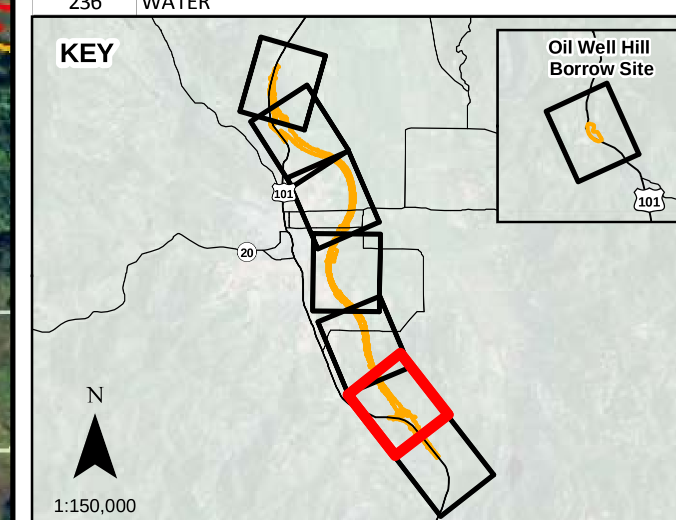


SSURGO Map Unit
Permanent Impact Boundary
Temporary Impact Boundary
Road

SSURGO Map Unit Label Description

178 Map Unit Symbol

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



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Scale in Feet

Figure 5-4b

Soil Types within the Proposed Bypass Project Footprint

Proposed Willits Bypass Project

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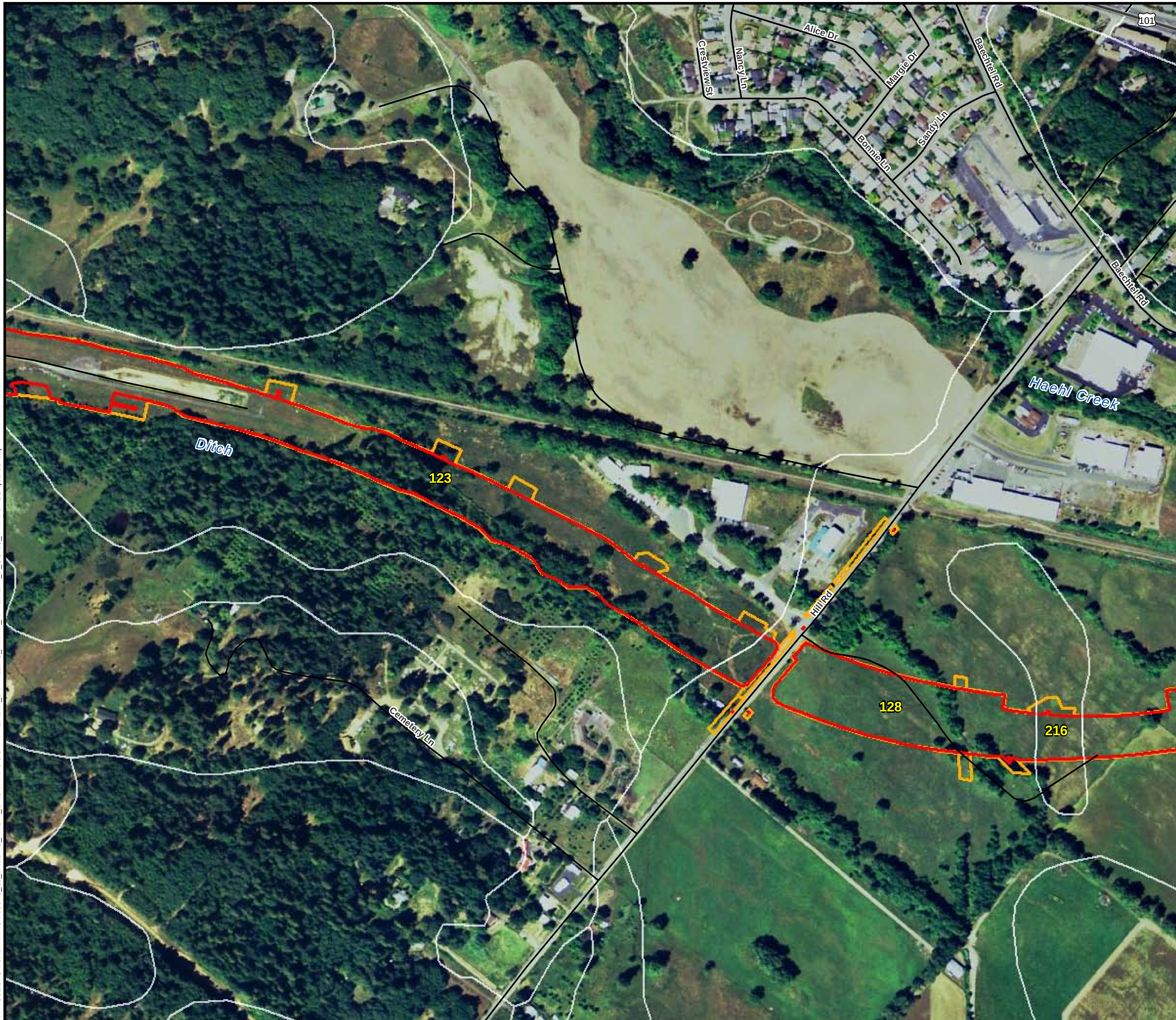


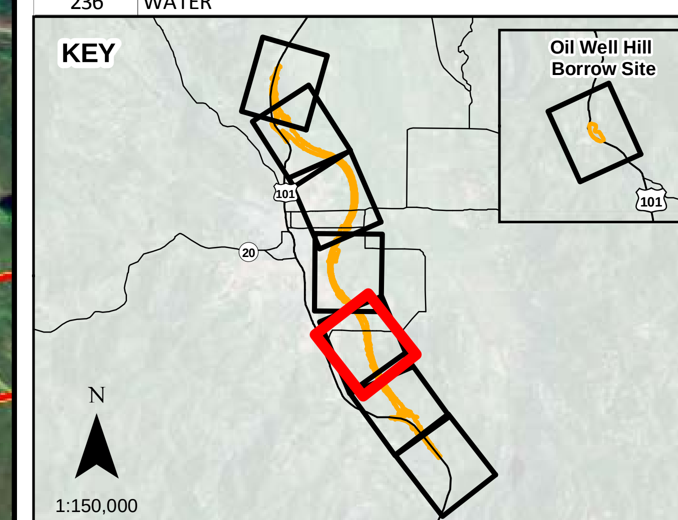
SSURGO Map Unit
Permanent Impact Boundary
Temporary Impact Boundary
Road

SSURGO Map Unit Label Description

178 Map Unit Symbol

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

KEY



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Scale in Feet

Figure 5-4c

Soil Types within the Proposed Bypass Project Footprint

Proposed Willits Bypass Project

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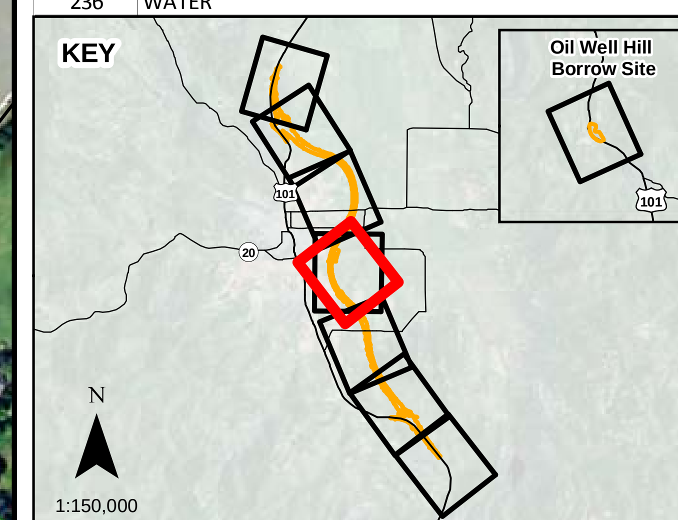
SSURGO Map Unit
Permanent Impact Boundary
Temporary Impact Boundary
Road

SSURGO Map Unit Label Description

178 Map Unit Symbol

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



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Scale in Feet

Figure 5-4d

Soil Types within the Proposed Bypass Project Footprint

Proposed Willits Bypass Project

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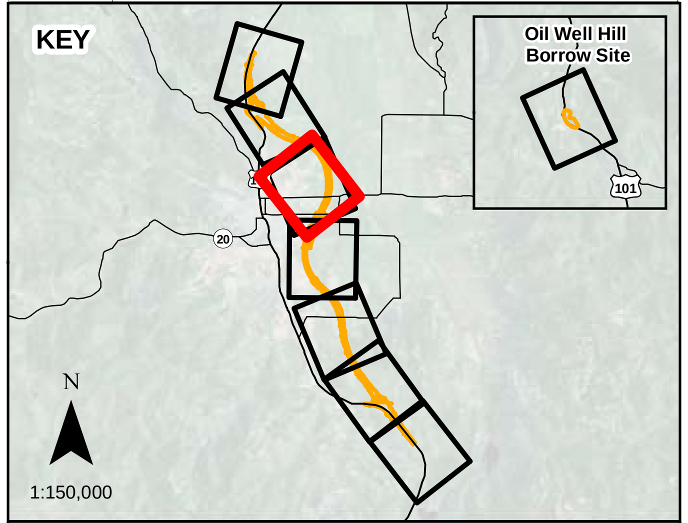
SSURGO Map Unit
Permanent Impact Boundary
Temporary Impact Boundary
Road

SSURGO Map Unit Label Description

178 Map Unit Symbol

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



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Scale in Feet

Figure 5-4e

Soil Types within the Proposed Bypass Project Footprint

Proposed Willits Bypass Project

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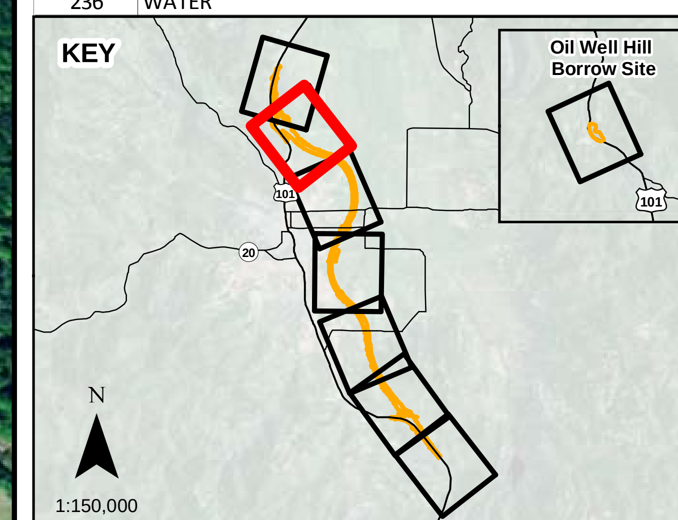
SSURGO Map Unit
Permanent Impact Boundary
Temporary Impact Boundary
Road

SSURGO Map Unit Label Description

178 Map Unit Symbol

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



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0 1000

Scale in Feet

Figure 5-4f

Soil Types within the Proposed Bypass Project Footprint

Proposed Willits Bypass Project

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SSURGO Map Unit
Permanent Impact Boundary
Temporary Impact Boundary
Road

SSURGO Map Unit Label Description

178 Map Unit Symbol

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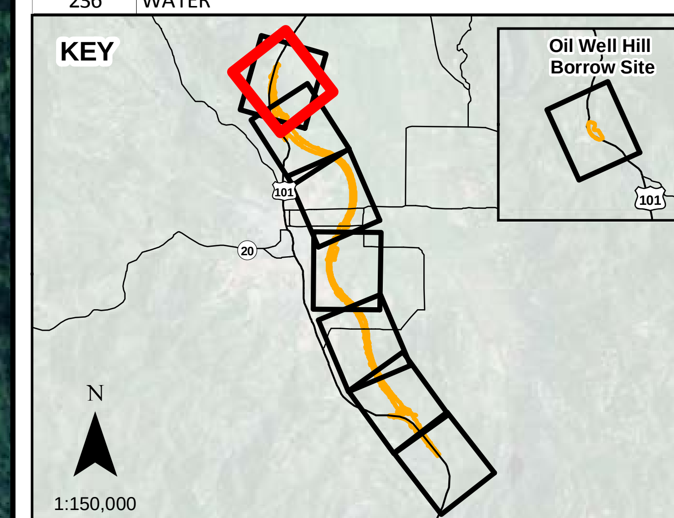
215	XEROCHREPTS-HAPLOXERALFS-ARGIXEROLLS COMPLEX, 9 TO 30 PERCENT SLOPES
216	XEROCHREPTS-HAPLOXERALFS-ARGIXEROLLS COMPLEX, 30 TO 50 PERCENT SLOPES
221	YOKAYO SANDY LOAM, 0 TO 8 PERCENT SLOPES
224	YOKAYO-PINOLE-PINNOBIE COMPLEX, 0 TO 15 PERCENT SLOPES
236	WATER



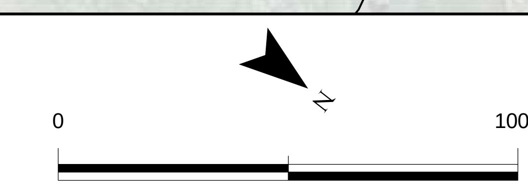


Figure 5-4g

Soil Types within the Proposed Bypass Project Footprint

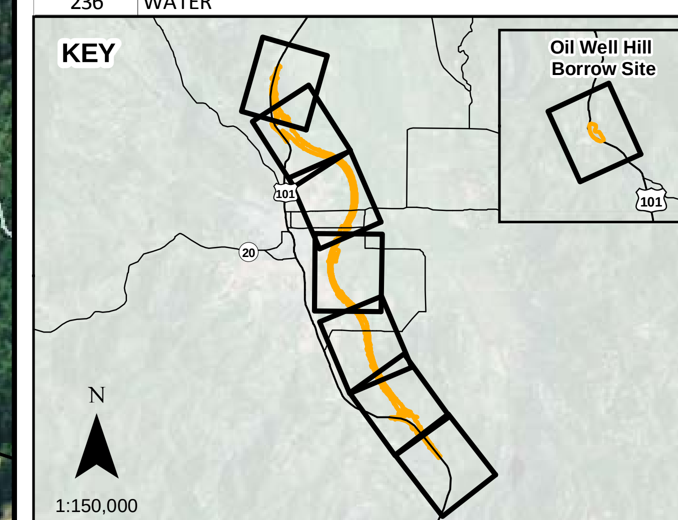
Proposed Willits Bypass Project

SSURGO Map Unit
Permanent Impact Boundary
Temporary Impact Boundary
Road

SSURGO Map Unit Label Description

178 Map Unit Symbol

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



N

0 1000

Scale in Feet

Figure 5-4h

Soil Types within the Proposed Bypass Project Footprint

Proposed Willits Bypass Project

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

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

5.2.3.7 Haplaquepts, 0–1% Slopes

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

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

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

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

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

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

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

5.2.3.9 Urban Land

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

5.2.3.13 Yokayo Sandy Loam, 0–8% Slopes

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

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

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

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

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

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

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

5.2.4 Jurisdictional Wetlands and Other Waters of the United States

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

5.2.5 Protected Fisheries

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

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

5.2.6 Riparian Habitats

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

5.2.7 Listed Plants

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

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

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

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

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

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

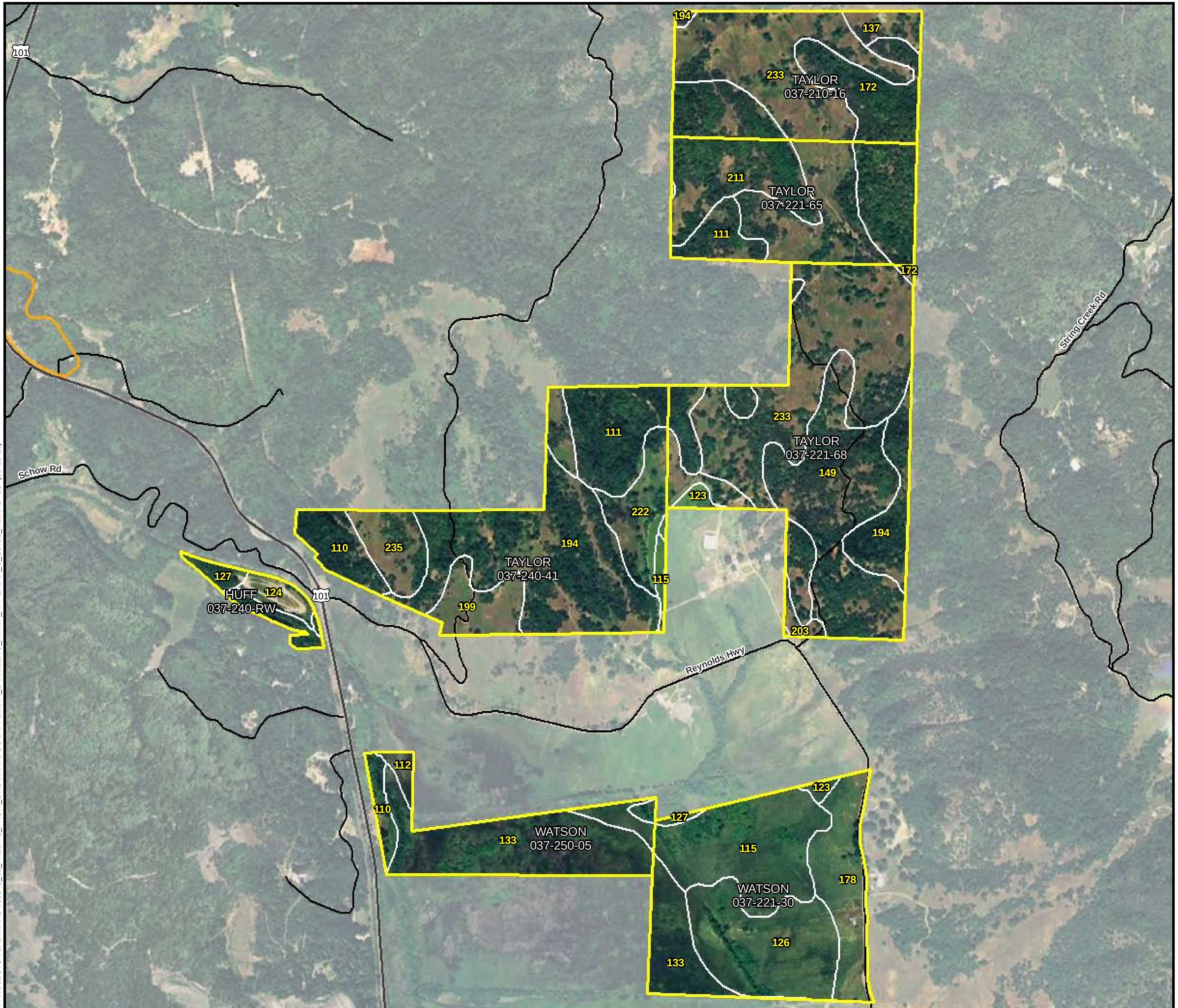
Many remaining populations of North Coast semaphore grass and Baker's meadowfoam are stressed or in decline. The primary threat has been habitat disturbance or conversion. Habitat disturbance arises from vegetation removal, mowing, intensive grazing, and competition from invasive and/or managed agricultural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

5.3 Offsite Mitigation Properties

The offsite mitigation properties are east of the bypass alignment footprint or in some cases (i.e., Benbow, Brooke, Ford, Lusher, and Niesen), on parcels occupied by the bypass alignment footprint (Figure 3-2). Most of the offsite parcels are currently used for livestock grazing and/or hay production, and a few are fallow. The biological resources on the offsite mitigation properties are similar to those in the bypass alignment footprint in that they include North Coast semaphore grass, Baker's meadowfoam, anadromous fish habitat, jurisdictional wetlands and other waters of the United States, riparian habitat, oak woodland, and upland/grassland. These biological resources are discussed in Sections 5.3.1 through 5.3.13, by parcel. Table 5-2 lists the offsite mitigation properties, their size, APN, and the acreage of sensitive biological resources present on each parcel. Figures 5-5a, 5-5b, and 5-5c show the soil types on each offsite mitigation property.

Note that the acreage numbers provided in Table 5-2 and the parcel descriptions in Sections 5.3.1 through 5.3.13 reflect the *existing* resources on the parcel. This differs from the resource amounts reported in Chapters 2 and 6. The numbers in Chapter 6 are lower because the bypass alignment footprint and the areas of new wetland establishment that overlap with existing resources are not included.

Some of the offsite mitigation properties support riparian vegetation not associated with Protected Fisheries, and designated as *other riparian* in this document. This riparian habitat is associated with streams not identified as habitat for listed salmonids and in areas often located along fencelines or in low areas; in some cases the riparian habitat occurs along abandoned channels where flow has been diverted upstream into other channels. Many of these isolated areas of riparian habitat appear to have been created during land clearing for agricultural



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

SSURGO Map Unit Label Description

178 Map Unit Symbol

Study Area Label Description

Frost Property Owner
108-07-04 Assesor Parcel Number

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

N

0 1000

Scale in Feet

Figure 5-5a

Soil Types within the Offsite Mitigation Parcels

Proposed Willits Bypass Project

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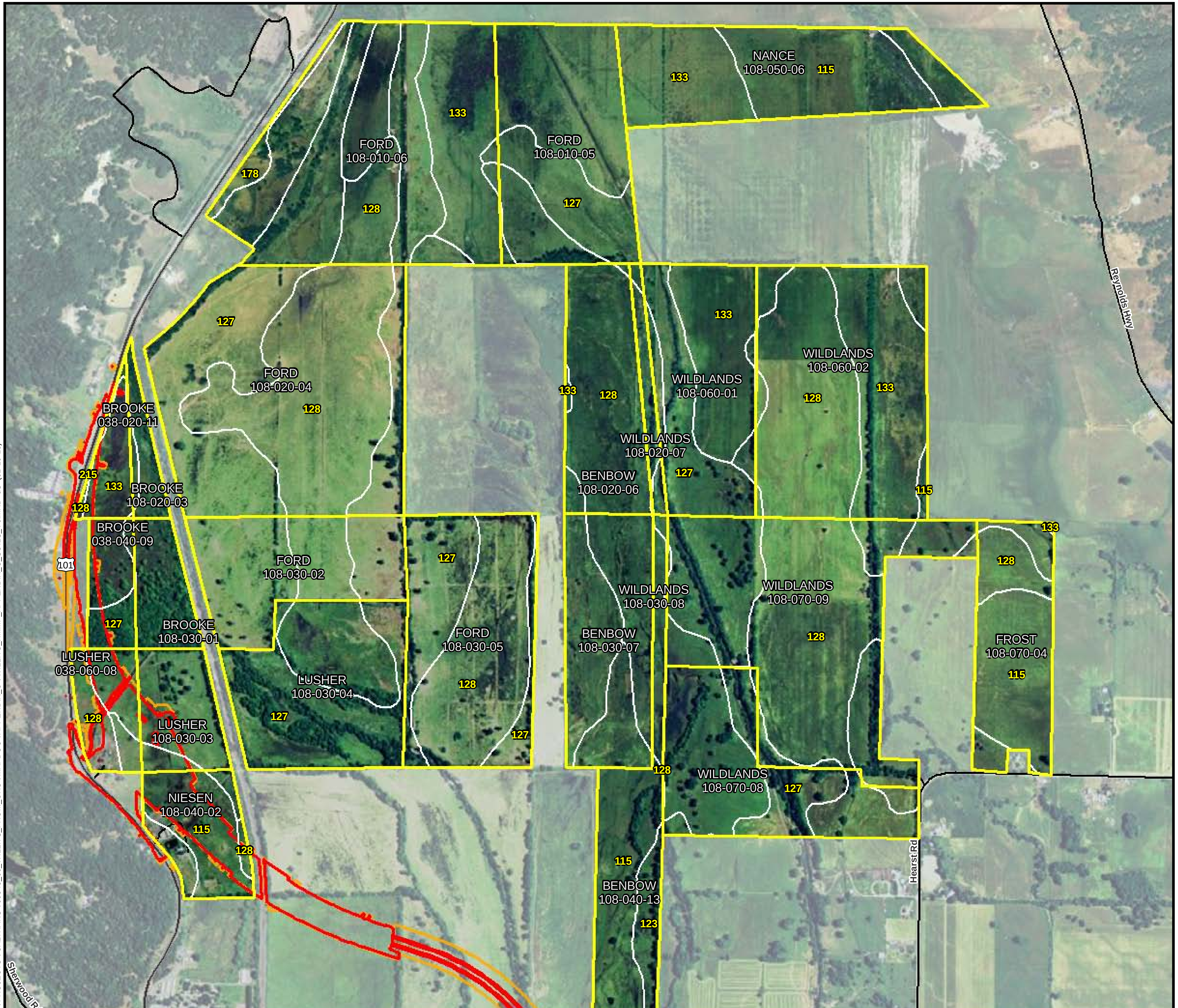

Offsite Mitigation Parcels

SSURGO Map Unit

Permanent Impact Boundary

Temporary Impact Boundary

Road

SSURGO Map Unit Label Description

178 Map Unit Symbol

Study Area Label Description

Frost Property Owner

108-07-04 Assesor Parcel Number

Map Unit Symbol	Map Unit Name
110	CASABONNE-WOHLY LOAMS, 30 TO 50 PERCENT SLOPES
111	CASABONNE-WOHLY-PARDALOE COMPLEX, 50 TO 75 PERCENT SLOPES
112	CLEAR LAKE CLAY, 0 TO 2 PERCENT SLOPES
115	COLE CLAY LOAM, 0 TO 2 PERCENT SLOPES
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124	FELIZ LOAM, 2 TO 5 PERCENT SLOPES
126	FELIZ CLAY LOAM, GRAVELLY SUBSTRATUM, 2 TO 8 PERCENT SLOPES
127	FLUVAQUENTS, 0 TO 1 PERCENT SLOPES
128	GIELOW SANDY LOAM, 0 TO 5 PERCENT SLOPES
133	HAPLAQUEPTS, 0 TO 1 PERCENT SLOPES
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149	HOPLAND-WITHERELL-SQUAWROCK COMPLEX, 30 TO 50 PERCENT SLOPES
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194	SANHEDRIN-KEKAWAKA-SPEAKER COMPLEX, 30 TO 50 PERCENT SLOPES
199	SHORTYORK-YORKVILLE-WITHERELL COMPLEX, 15 TO 30 PERCENT SLOPES
203	TALMAGE GRAVELLY SANDY LOAM, 0 TO 2 PERCENT SLOPES
211	WITHERELL-HOPLAND-SQUAWROCK COMPLEX, 50 TO 75 PERCENT SLOPES
215	XEROCHREPTS-HAPLOXERALFS-ARGIXEROLLS COMPLEX, 9 TO 30 PERCENT SLOPES
222	YOKAYO SANDY LOAM, 8 TO 15 PERCENT SLOPES
224	YOKAYO-PINOLE-PINNOBIE COMPLEX, 0 TO 15 PERCENT SLOPES
233	YORKVILLE-SQUAWROCK-WITHERELL COMPLEX, 30 TO 50 PERCENT SLOPES
235	YORKVILLE-YORKTREE-SQUAWROCK COMPLEX, 30 TO 50 PERCENT SLOPES
236	WATER

N

0 1000

Scale in Feet

Figure 5-5b

Soil Types within the Offsite Mitigation Parcels

Proposed Willits Bypass Project

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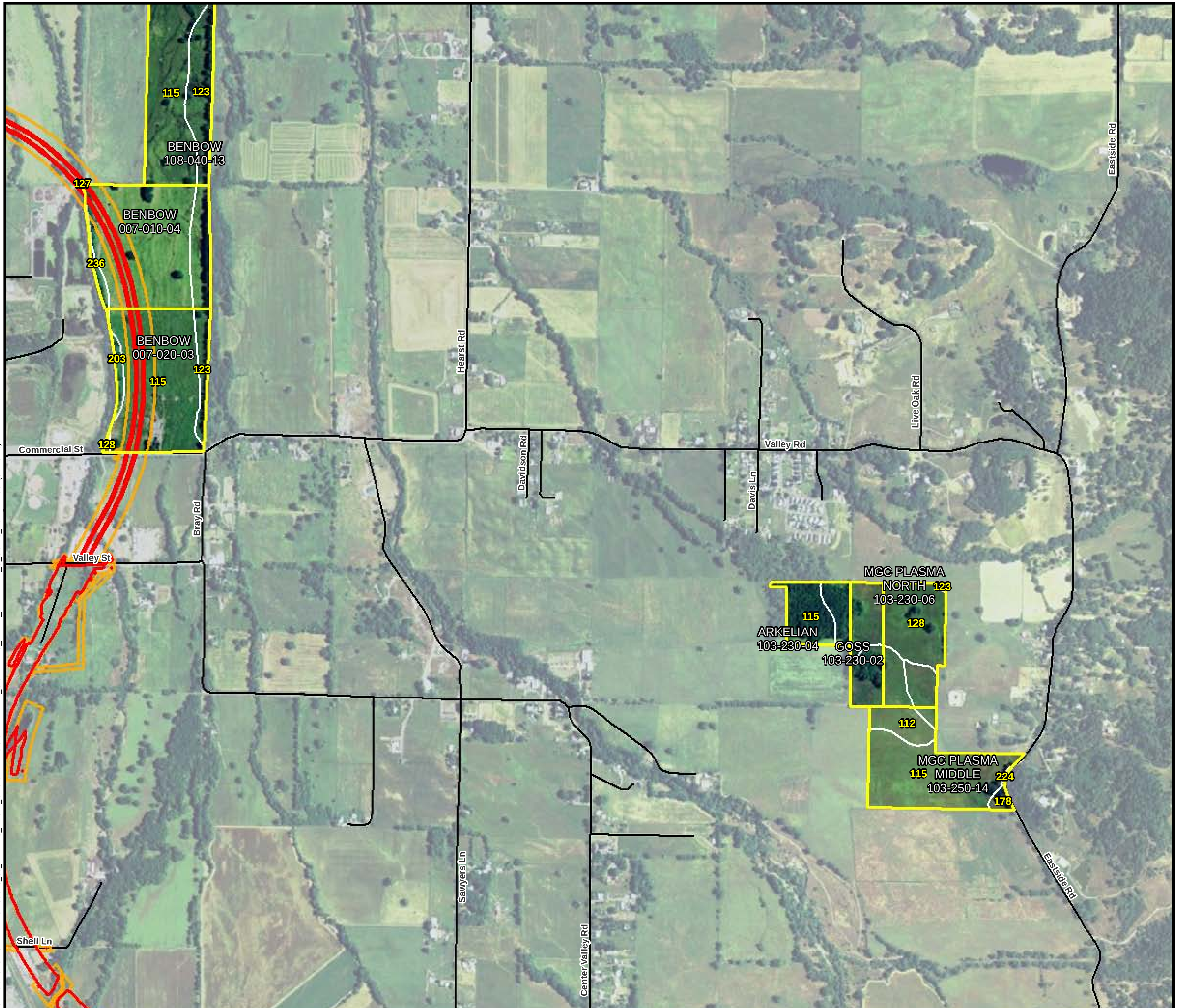

Offsite Mitigation Parcels
SSURGO Map Unit
Permanent Impact Boundary
Temporary Impact Boundary
Road

SSURGO Map Unit Label Description

178 Map Unit Symbol

Study Area Label Description

Frost Property Owner
108-07-04 Assesor Parcel Number

Map Unit Symbol	Map Unit Name
110	CASABONNE-WOHLY LOAMS, 30 TO 50 PERCENT SLOPES
111	CASABONNE-WOHLY-PARDALOE COMPLEX, 50 TO 75 PERCENT SLOPES
112	CLEAR LAKE CLAY, 0 TO 2 PERCENT SLOPES
115	COLE CLAY LOAM, 0 TO 2 PERCENT SLOPES
123	FELIZ LOAM, 0 TO 2 PERCENT SLOPES
124	FELIZ LOAM, 2 TO 5 PERCENT SLOPES
126	FELIZ CLAY LOAM, GRAVELLY SUBSTRATUM, 2 TO 8 PERCENT SLOPES
127	FLUVAQUENTS, 0 TO 1 PERCENT SLOPES
128	GIELOW SANDY LOAM, 0 TO 5 PERCENT SLOPES
133	HAPLAQUEPTS, 0 TO 1 PERCENT SLOPES
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149	HOPLAND-WITHERELL-SQUAWROCK COMPLEX, 30 TO 50 PERCENT SLOPES
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199	SHORTYORK-YORKVILLE-WITHERELL COMPLEX, 15 TO 30 PERCENT SLOPES
203	TALMAGE GRAVELLY SANDY LOAM, 0 TO 2 PERCENT SLOPES
211	WITHERELL-HOPLAND-SQUAWROCK COMPLEX, 50 TO 75 PERCENT SLOPES
215	XEROCHREPTS-HAPLOXERALFS-ARGIXEROLLS COMPLEX, 9 TO 30 PERCENT SLOPES
222	YOKAYO SANDY LOAM, 8 TO 15 PERCENT SLOPES
224	YOKAYO-PINOLE-PINNOBIE COMPLEX, 0 TO 15 PERCENT SLOPES
233	YORKVILLE-SQUAWROCK-WITHERELL COMPLEX, 30 TO 50 PERCENT SLOPES
235	YORKVILLE-YORKTREE-SQUAWROCK COMPLEX, 30 TO 50 PERCENT SLOPES
236	WATER

N
0 1000
Scale in Feet

Figure 5-5c
Soil Types within the Offsite Mitigation Parcels
Proposed Willits Bypass Project

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purposes. In view of the overarching vision of restoring habitat functions and services, protecting other riparian areas that were historically connected to the much more extensive riparian woodlands that occurred in Little Lake Valley is consistent with the mitigation strategy employed on the offsite mitigation properties.

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

Table 5-2. Summary of Sensitive Biological Resources that Presently Occur on the Offsite Mitigation Properties (Existing Resources)

Owner	APN	Size (acres)	NCSG Observed	BM Observed	BM Potential Habitat	Cat I Riparian	Jurisdictional Wetland	Other Waters of the United States	Cat II Riparian	Cat III Riparian	Other Riparian Woodland	Lowland Oak Woodland	Upland Oak Woodland	Lowland Oak Grassland	Upland Oak Grassland
Arkelian	103-230-04	9.96	0.12	0.0	0.0	0.0	8.64	0.0	0.0	0.0	8.78	0.0	0.0	1.18	0.0
Benbow	007-010-04	36.16	0.0	0.0	27.78	1.80	29.36	0.33	0.0	1.08	0.87	0.01	0.0	16.50	0.0
	007-020-03	33.54	0.0	0.0	27.04	1.17	27.02	0.23	0.0	0.53	0.52	0.02	0.0	12.31	0.0
	108-020-06	46.53	0.0	1.37	43.72	0.002	44.91	0.0	0.0	0.0	2.29	0.0	0.0	2.05	0.0
	108-030-07	54.74	0.0	1.01	52.76	0.0	53.86	0.0	0.0	0.0	1.89	0.001	0.0	3.93	0.0
	108-040-13	40.96	0.0	0.01	28.75	0.0	36.00	1.16	0.0	3.86	2.04	0.003	0.0	20.60	0.0
Brooke	038-020-11	11.89	0.0	0.0	0.0	0.33	11.89	<0.001	0.0	0.0	0.15	0.0	0.0	0.01	0.0
	038-040-09	14.99	0.0	0.0	0.0	0.0	14.98	0.0	0.0	0.0	7.50	0.0	0.0	0.45	0.0
	108-020-03	9.20	0.0	0.0	0.0	3.54	8.02	0.85	0.0	0.0	0.58	0.0	0.0	0.10	0.0
	108-030-01	16.90	0.0	0.0	0.0	6.18	16.10	0.57	0.0	0.0	7.34	0.0	0.0	0.44	0.0
Ford	108-010-05	76.57	0.0	13.40	59.68	0.09	75.24	1.22	0.0	0.0	3.47	0.0	0.0	2.95	0.0
	108-010-06	138.87	0.0	18.14	95.28	10.93	113.02	3.38	1.01	0.0	6.36	0.0	0.0	0.48	0.0
	108-020-04	143.75	0.0	4.44	132.37	8.37	113.54	1.75	0.0	0.0	3.57	0.0	0.0	12.81	0.0
	108-030-02	50.99	0.0	0.11	48.38	2.01	37.12	0.49	0.33	0.0	1.98	0.01	0.0	14.05	0.0
	108-030-05	80.39	0.0	0.08	71.99	7.01	60.23	2.15	0.0	0.0	6.95	0.0	0.0	10.70	0.0
Frost	108-070-04	46.53	0.03	2.06	0.0	0.0	41.60	0.26	0.0	0.60	0.07	0.31	0.0	3.85	0.0
Goss	103-230-02	10.08	4.32	0.004	0.0	0.0	8.45	0.0	0.0	0.0	3.19	0.003	0.0	4.90	0.0
Huff	037-240-RW	12.65	0.0	0.08	0.0	5.42	4.18	1.97	0.0	0.0	0.82	0.0	0.0	2.93	0.0
Lusher	038-060-08	18.65	0.0	0.92	10.92	0.91	4.87	0.49	0.0	0.0	0.97	0.01	0.0	4.70	0.0
	108-030-03	23.88	0.0	4.37	17.68	1.82	19.39	0.15	0.0	0.0	2.05	0.01	0.0	13.63	0.0
	108-030-04	66.17	0.59	0.0	0.0	11.76	36.06	2.02	1.06	0.0	12.15	0.003	0.0	24.47	0.0
MGC Plasma North	103-230-06	18.22	0.04	0.10	0.0	0.0	4.04	0.0	0.0	0.0	0.08	0.79	0.0	7.24	0.0
MGC Plasma Middle	103-250-14	27.04	0.0	0.0	0.0	0.0	2.51	0.0	0.0	0.0	0.0	0.42	0.0	3.15	0.0
Nance	108-050-06	73.90	0.0	27.43	46.47	0.54	72.46	0.20	0.0	0.0	0.88	0.0	0.0	0.0	0.0
Niesen	108-040-02	27.43	0.0	2.15	19.04	0.09	19.26	0.46	0.0	0.0	0.05	0.35	0.0	3.52	0.0
Taylor	037-210-16	84.67	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	35.69	0.0	3.70
	037-221-65	79.52	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	13.78	0.0	3.14
	037-221-68	161.29	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	63.96	0.0	10.60
	037-240-41	144.15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	29.65	0.001	9.27
Watson	037-221-30	115.59	0.0	0.0	95.94	5.69	81.14	0.26	0.0	0.0	10.32	0.60	0.0	10.23	0.0
	037-250-05	51.11	0.0	0.0	50.15	5.71	49.26	0.19	0.0	0.0	6.44	0.0	0.0	0.66	0.0

Owner	APN	Size (acres)	NCSG Observed	BM Observed	BM Potential Habitat	Cat I Riparian	Jurisdictional Wetland	Other Waters of the United States	Cat II Riparian	Cat III Riparian	Other Riparian Woodland	Lowland Oak Woodland	Upland Oak Woodland	Lowland Oak Grassland	Upland Oak Grassland
Wildlands	108-020-07	7.77	0.0	0.04	5.68	1.22	2.91	0.16	0.0	0.0	1.07	0.0	0.0	0.0	0.0
	108-030-08	8.00	0.0	0.01	5.26	0.0	7.03	0.0	0.0	0.0	1.09	0.0	0.0	0.0	0.0
	108-060-01	63.39	0.0	0.93	57.14	5.42	41.03	1.39	0.0	0.0	5.24	0.01	0.0	7.29	0.0
	108-060-02	106.81	0.0	42.38	61.85	4.63	101.48	1.19	0.0	0.0	1.37	0.0	0.0	2.62	0.0
	108-070-08	64.06	0.0	4.40	47.96	5.92	51.14	1.49	2.44	1.29	6.99	0.0	0.0	28.17	0.0
	108-070-09	121.87	0.0	3.22	93.26	12.07	97.53	2.68	4.34	0.0	5.66	0.0	0.0	35.59	0.0
Total		**2098.22**	**5.10**	**126.654**	**1,099.11**	**102.632**	**1294.27**	**23.32**	**9.18**	**7.36**	**112.73**	**2.55**	**143.08**	**251.511**	**26.71**

NCSG = North Coast Semaphore Grass
BM = Baker's Meadowfoam
CAT = Category
APN = Assessor's Parcel Number

5.3.1 Arkelian (APN 103-230-04)

The 10-acre Arkelian parcel is relatively undeveloped and is largely covered in a dense stand of riparian forest. A small section at the southern end of the Arkelian parcel and the parcel to the south are used for hay production. The parcel is currently ungrazed.

5.3.1.1 Historical and Existing Vegetation

The presence of a mature riparian forest on most of the Arkelian parcel suggests that the vegetation is very similar to the historical vegetation that occurred there. An aerial photograph taken in 1956 depicts the parcel much the same as its current condition (Cartwright Aerial Surveys 1956).

Vegetation on the Arkelian parcel is dominated by a dense stand of mature riparian forest comprised of valley oak and Oregon ash in the overstory. Understory vegetation includes Himalayan blackberry, California blackberry, poison-oak, tall fescue, nutsedge, sedges, spreading rush, cow parsnip, and false Solomon's seal (California Department of Transportation 2009a; U.S. Army Corps of Engineers 2011).

A small opening on the northeast corner contains wet meadow. The northwest corner and the southern boundary of the parcel support upland meadow vegetation. Wet-meadow areas on the Arkelian parcel are dominated by tall fescue, creeping bentgrass, perennial ryegrass, western buttercup, spreading rush, and pennyroyal (California Department of Transportation 2009a; U.S. Army Corps of Engineers 2011).

5.3.1.2 Historical and Existing Hydrology/Topography

Analysis of the Willits USGS 7.5-minute quadrangle map (U.S. Geological Survey 1991) indicates that an unnamed intermittent tributary of Davis Creek historically traversed the Arkelian parcel from southeast to northwest. This drainage is no longer distinguishable on the parcel, but it begins to form a channel on the adjacent parcel to the northwest.

Hydrology on the Arkelian parcel is currently influenced by the presence of artificial drainage ditches on the eastern boundary (adjacent to the Goss parcel) and the southern boundary. These ditches are intended to drain water from the centers of the adjacent parcels to the east and south to allow hay production. In general, water flowing north from the southern end of the Goss parcel (adjacent parcel to the east) is directed westward into a ditch that defines the southern boundary of the Arkelian parcel. This ditch, or swale, "flattens out," directing water to the northwest, roughly paralleling the former intermittent stream channel indicated on the Willits USGS quadrangle map (U.S. Geological Survey 1991). Water continues to flow northwest, exiting the parcel and eventually forming a stream channel tributary to Davis Creek, as mentioned above. These ditches are also subject to a seasonal high water table.

5.3.1.3 Soils/Substrates

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

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

Soil data were collected on the Arkelian parcel during wetland delineation efforts and the USACE January 2011 study (California Department of Transportation 2009a; Appendix I). Soils ranged from loam to clay loam and had hydric soil indicators.

5.3.1.4 Jurisdictional Wetlands and Other Waters of the United States

Based on a wetland delineation for the Arkelian parcel (California Department of Transportation 2009a), 8.64 acres of jurisdictional wetland are present on the parcel. Wetland types mapped on the Arkelian parcel include swale and riparian woodland wetlands. No other waters were identified.

A total of 0.43 acre of wetland swale was mapped on the Arkelian parcel. The wetland swales cross the southwest corner of the parcel generally from southeast to northwest. As described in Section 5.3.1.2, these swales flow into a tributary of Davis Creek. The swales occur within the riparian woodland wetland described in the next paragraph.

A total of 8.21 acres of riparian woodland wetland was mapped on the Arkelian parcel. The riparian woodland wetland is dominated by valley oaks and Oregon ash in the overstory and Himalayan blackberry, California blackberry, and poison-oak in the understory.

During USACE studies in January 2011, the wetland areas where observed to have the following hydrologic indicators: a high water table, saturation, and water-stained leaves. USACE further defined the hydrology on the parcel as having a very long duration subsurface saturation that may pond water in surface depressions for short periods.

5.3.1.5 Protected Fisheries

No protected fisheries habitat was identified on this parcel.

5.3.1.6 Riparian Habitats

A total of 8.78 acres of riparian habitat was mapped on the Arkelian parcel. This riparian habitat is the dominant vegetative cover on the parcel. This vegetation is also classified as valley oak riparian woodland. This area coincides with the wetland riparian woodland described in Section 5.2.1.4; however, because its canopy overlaps the wetland swales, the acreage reported here includes the acreage of the wetland swale covered by the canopy.

5.3.1.7 Listed Plants

Special-status plant surveys were performed on the Arkelian parcel in March 2010. These surveys identified North Coast semaphore grass on the parcel. North Coast semaphore grass was found mostly in the southwest corner of the parcel, with a few smaller stands in the southeast corner of the parcel. A total of 0.12 acre of North Coast semaphore grass was mapped on the Arkelian parcel.

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

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

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

5.3.2.1 Historical and Existing Vegetation

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

The Benbow parcels currently are managed for grazing and contain mostly perennial grassland and wet-meadow plant communities. The dominant upland grassland species include Kentucky bluegrass, clovers, tall fescue, rough cat’s ear, cranesbill, and perennial ryegrass. Dominant species in the wetlands include meadow foxtail, field sedge, straight beaked buttercup, California semaphore grass, spreading rush, penny royal, lythrum, and stipulate popcornflower. Masses of invasive Himalayan blackberry occur in some areas, particularly those that appear to have been disturbed along the western property boundary. Nonnative annual grassland, dominated by

Mediterranean barley and perennial ryegrass, occur in a few very small areas. (California Department of Transportation 2009a; U.S. Army Corps of Engineers 2011)

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

5.3.2.2 Historical and Existing Hydrology/Topography

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

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

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

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

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

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

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

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

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

5.3.2.3 Soils/Substrates

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

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

Soil data were collected on the Benbow parcels during wetland delineation efforts and the Corps January 2011 study (California Department of Transportation 2009a; U.S. Army Corps of Engineers 2011). Surface soil textures range from gravelly sandy loam to clay loam. Hydric soil indicators were found on the parcels (California Department of Transportation 2009a; U.S. Army Corps of Engineers 2011). None of the soil profiles contains a claypan or a duripan.

5.3.2.4 Jurisdictional Wetlands and Other Waters of the United States

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

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

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

A total of 11.93 acres of riparian woodland wetland was mapped on Benbow parcels 007-010-04 (3.661 acres), 007-020-03 (3.15 acres), 108-020-06 (0.89 acre), 108-030-07 (0.01 acre), and 108-040-13 (4.22 acres). Riparian woodland types include valley oak riparian woodland, mixed riparian woodland, Oregon ash riparian woodland, and willow riparian scrub.

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

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

5.3.2.5 Protected Fisheries

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

5.3.2.6 Riparian Habitats

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

5.3.2.7 Listed Plants

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

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

5.3.3 Brooke (APNs 038-020-11, 038-040-09, 108-020-03, and 108-030-01)

The Brooke parcels total 53 acres and are relatively undeveloped. The southern half of the Brooke parcels is covered in a dense stand of mature riparian woodland. The northern half of the Brooke parcels consists of a matrix of wet meadow and mixed marsh. This area is heavily vegetated and does not appear to have been recently grazed. There is no evidence to suggest that is the parcels are currently irrigated or that they have been irrigated in the recent past. No evidence of cultivation or mowing was observed during 2008 and 2009 field surveys.

5.3.3.1 Historical and Existing Vegetation

The mature riparian forest on the southern portion of the Brooke parcels is likely similar to the historical vegetation in Little Lake Valley when it was settled. A 1956 aerial photograph (Cartwright Aerial Surveys 1956) shows most of the Brooke parcels vegetated in what appears to be meadow, with only the very southeast corner vegetated in woodland. The property appears to have been cleared for livestock grazing at that time.

Vegetation on the southern half of the Brooke parcels is currently dominated by a dense stand of mature riparian woodland comprising Oregon ash, valley oak, and some willows in the overstory; and shrubs and herbaceous vegetation including Himalayan blackberry, California blackberry, poison-oak, tall fescue, teasel, sedges, and rushes in the understory (California Department of Transportation 2009a; U.S. Army Corps of Engineers 2011).

Vegetation on the northern half of the Brooke parcels is dominated by a matrix of mixed marsh and wet-meadow vegetation, dominated overall by teasel, poison hemlock, and extensive patches of Himalayan blackberry and California blackberry. Higher-elevation patches of wet meadow are dominated by teasel, creeping bentgrass, western goldenrod, sedges, spreading rush, and Baltic rush. Lower-lying areas, including swales and depressions subject to longer inundation, are dominated by marsh vegetation including tule, broadleaf cattail, western goldenrod, pennyroyal, and cocklebur (California Department of Transportation 2009a; U.S. Army Corps of Engineers 2011).

The Brooke parcels appear to be undergoing a shift toward a more forested wetland, as evidenced by observed recruitment of Oregon ash and oaks (U.S. Army Corps of Engineers 2011).

5.3.3.2 Historical and Existing Hydrology/Topography

Soil survey information from 1920 (Dean 1920) indicates that a lake historically formed at the northern end of Little Lake Valley during the rainy season, even during very low rainfall years. At the end of a series of heavy rainfall events in February 1915, the lake encompassed 1,875 acres and was 12 feet deep over a 300-acre area. At that time, the high water mark of the lake was at the 1,330-foot contour, which would have historically flooded the entirety of the Brooke parcels. The lake no longer forms because the invert of Outlet Creek at the north end of Little Lake Valley has been lowered. A review of a 1942 15-minute series USGS topographic map (included in Wildlands 2008) shows that the northern part of the Brooke parcels was once part of the extensive marshlands that extended south from the area of the historical lake.

Hydrology on the Brooke parcels is influenced by two streams—Upp and Mill Creeks—which merge into an artificial channel along the eastern boundary of the parcels adjacent to the railroad embankment, and a swale that receives runoff from a culvert beneath US 101. The Brooke parcels drain from south to north through Upp Creek, which flows into Outlet Creek immediately northeast of parcel 108-020-03. The Brooke parcels also appear to be heavily influenced by a seasonal high water table.

5.3.3.3 Soils/Substrates

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

- **Fluvaquents, 0–1% slopes:** Formed from alluvium weathered from sedimentary rock; found on floodplains. They are characterized by very little to no horizon development and the presence of aquic conditions within 20 inches of the soil surface at some time during normal years, and are formed in fluvial environments. Typical surface horizons consist of gravelly sandy loam, while subsurface horizon textures can be variable.
- **Haplaquepts, 0–1% slopes:** Poorly drained soil formed from alluvium derived from sedimentary rock. These soils consist of clay loam underlain by gravelly clay loam. They have minimal horizon development and evidence of aquic conditions within 24 inches of the soil surface. Depth to a restrictive feature is more than 80 inches.
- **Gielow sandy loam, 0–5% slopes:** Deep, somewhat poorly drained soils that typically occur on alluvial plains and fans. This soil is formed from alluvium from sedimentary rocks. Surface horizon textures consist of sandy loam or loam with a representative clay content of 20%. Subsurface horizon textures (generally below 15 inches) consist of stratified loam, fine sandy loam, sandy loam, or sandy clay loam ranging from 15–27% clay.

Soil data were collected on the Brooke parcels during wetland delineation efforts and the Corps January 2011 study (California Department of Transportation 2009a; U.S. Army Corps of

Engineers 2011). Surface soil textures observed during the wetland delineation consisted primarily of clay loams. Hydric soil indicators were found on the Brooke parcels (California Department of Transportation 2009a; U.S. Army Corps of Engineers 2011).

5.3.3.4 Jurisdictional Wetlands and Other Waters of the United States

According to a wetland delineation performed on the Brooke parcels, there are 50.98 acres of jurisdictional wetlands and 1.42 acres of other waters (California Department of Transportation 2009a). Wetland types mapped on these parcels include wetland swale, mixed marsh, and riparian woodland wetland. The other waters mapped on the Brooke parcels are two intermittent streams: Upp and Mill Creeks.

A total of 0.49 acre of swale was mapped on the Brooke parcels. This wetland swale directs runoff from a culvert beneath US 101 to Upp Creek through parcels 038-040-09 (0.433 acre) and 108-030-01 (0.06 acre). Vegetation in the swale was dominated by pennyroyal, cocklebur, bulrush, cattail, and western goldenrod.

A total of 27.61 acres of mixed marsh was mapped on the Brooke parcels. Mixed marsh occurs on all the Brooke parcels, but it is the predominant vegetative cover on the northern parcels—038-020-11 (11.33 acres) and 108-020-03 (5.50 acres). Parcels 038-040-09 and 108-030-01 contain 7.493 and 3.28 acres of mixed marsh, respectively. The mixed marsh areas of the Brooke parcels were dominated by teasel, creeping bentgrass, western goldenrod, sedge, and spreading rush.

A total of 22.88 acres of riparian woodland wetland was mapped on the Brooke parcels. Riparian woodland wetland occurs on all the Brooke parcels, but is the predominant vegetative cover on the southern parcels—038-040-09 (7.06 acres) and 108-030-01 (12.75 acres). Parcels 038-020-11 and 108-020-03 contain 0.552 and 2.52 acres of riparian woodland wetland, respectively. Riparian woodland wetland areas were dominated by Oregon ash, valley oak, California blackberry, Himalayan blackberry, and poison-oak.

Other waters of the United States mapped on the Brooke parcels include the realigned channels of Upp and Mill Creeks on parcels 108-020-03 (0.85 acre) and 108-030-01 (0.57 acre). These creeks have low-gradient channels with a mix of silt, sand, and gravel substrates. The banks of these channels are heavily vegetated with the riparian woodland vegetation described above.

During studies by USACE in January 2011, the following hydrologic indicators were observed: surface water in the areas of mixed marsh and a high water table and saturation in the forested areas. USACE further defined the hydrology on the Brooke parcels as having very long duration ponding and subsurface saturation, and occasional flooding (U.S. Army Corps of Engineers 2011).

5.3.3.5 Protected Fisheries

A total of 10.05 acres of riparian corridors associated with protected fisheries is present on Brooke parcels 038-020-11 (0.33 acre), 108-020-03 (3.54 acres), and 108-030-01 (6.18 acres). These riparian corridors are present along Upp and Mill Creeks, which are vegetated primarily with Oregon ash riparian woodland; a small area along Upp Creek is vegetated with valley oak woodland riparian.

5.3.3.6 Riparian Habitats

A total of 15.57 acres of riparian woodlands was mapped on the Brooke parcels. These areas are adjacent to the riparian habitat associated with protected fisheries along Upp and Mill Creeks. These riparian woodlands were classified as Oregon ash riparian woodland, valley oak riparian woodland, and willow riparian scrub.

5.3.3.7 Listed Plants

No listed plants were observed on the Brooke parcels during surveys in April 2007.

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

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

5.3.4.1 Historical and Existing Vegetation

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

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

The remainder of the Ford parcels is vegetated in riparian woodland, described as Oregon ash riparian woodland, valley oak riparian woodland, and mixed riparian woodland. The mixed riparian woodlands are dominated by Oregon ash, valley oak, arroyo willow, white alder, and cottonwoods (California Department of Transportation 2009a; U.S. Army Corps of Engineers

2011). Understory vegetation in the three riparian woodland types includes Himalayan blackberry, California blackberry, poison-oak, and dogwood (California Department of Transportation 2009a).

5.3.4.2 Historical and Existing Hydrology/Topography

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

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

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

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

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

Parcel 108-020-04 was identified as having one instream eroding bank on Outlet Creek in the southeast corner of the parcel (Figure 3-1 in Appendix H). This eroding bank is well vegetated with mixed riparian woodland with fluvaquent soils (*Fluvaquents, 0–1% slopes*; see Section

5.3.4.3) and the adjacent areas are well vegetated with wet-meadow vegetation and similar soils. This 6- to 8-foot tall bank appears to have somewhat stabilized, based on the vegetative growth on and adjacent to the bank. Water quality monitoring data will be collected for several parameters, including parameters related to sediment levels. If the data show that increased sedimentation is occurring in the vicinity of the offsite mitigation properties, this erosion feature will be inspected to determine if it is becoming unstable and contributing to excessive sediment to the parcel and valley streams (Chapter 11).

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

5.3.4.3 Soils/Substrates

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

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

Soil data were collected on the Ford parcels during wetland delineation efforts and the Corps January 2011 study (California Department of Transportation 2009a; U.S. Army Corps of

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

5.3.4.4 Jurisdictional Wetlands and Other Waters of the United States

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

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

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

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

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

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

5.3.4.5 Protected Fisheries

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

5.3.4.6 Riparian Habitats

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

5.3.4.7 Listed Plants

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

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

5.3.5 Frost (APN 108-070-04)

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

5.3.5.1 Historical and Existing Vegetation

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

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

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

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

5.3.5.2 Historical and Existing Hydrology/Topography

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

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

5.3.5.3 Soils/Substrates

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

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

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

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

5.3.5.4 Jurisdictional Wetlands and Other Waters of the United States

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

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

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

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

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

5.3.5.5 Protected Fisheries

No protected fisheries habitat was mapped on this parcel.

5.3.5.6 Riparian Habitats

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

5.3.5.7 Listed Plants

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

5.3.6 Goss (APN 103-230-02)

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

5.3.6.1 Historical and Existing Vegetation

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

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

5.3.6.2 Historical and Existing Hydrology/Topography

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

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

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

5.3.6.3 Soils/Substrates

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

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

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

(California Department of Transportation 2009a; U.S. Army Corps of Engineers 2011). None of the soil profiles contains a claypan or a duripan.

5.3.6.4 Jurisdictional Wetlands and Other Waters of the United States

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

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

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

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

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

5.3.6.5 Protected Fisheries

There is no protected fisheries habitat on the Goss parcel.

5.3.6.6 Riparian Habitats

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

5.3.6.7 Listed Plants

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

5.3.7 Huff (APN 037-240-RW)

The approximately 13-acre Huff parcel is at the very north end of Little Lake Valley, west of US 101 and south of the railroad line. The railroad bridge over Outlet Creek and fill embankment for the railroad line form the northern and eastern boundaries of the Huff parcel. There is no evidence to suggest that the Huff parcel is currently irrigated or that it has been irrigated in the past. No evidence of cultivation or mowing was observed during field surveys in 2008 and 2009. The center of the parcel appears to have been manipulated by heavy machinery and has possibly been used as an area to place excess fill or temporarily stage equipment.

5.3.7.1 Historical and Existing Vegetation

Based on current vegetation conditions surrounding the Huff parcel, it is likely the parcel was historically vegetated with riparian woodland vegetation. A 1956 aerial photograph (Cartwright Aerial Surveys 1956) shows the Huff parcel bounded by the railroad line to the north and east and Outlet Creek to the south and west, much as it is today. This photograph shows an open meadow/grassland that appears to be used for grazing, bordered by riparian vegetation to the west and south.

Upland ruderal vegetation and riparian woodland and wet meadow wetland vegetation dominate vegetation on the Huff parcel. Disturbed upland areas in the center of the parcel and dominating the railroad fill embankment slopes support soft chess, hedgehog dogtail grass, bluestem wildrye, wild oats, vetch, plantain, Italian thistle, and field bindweed. Oregon ash, willows, and Oregon white oak dominate the overstory of riparian woodlands associated with Outlet Creek, and Himalayan and California blackberry, poison oak, and poison hemlock dominate the understory. Perennial ryegrass, Baltic rush, spreading rush, pennyroyal, nutsdedge, sedges, hedge nettle, and teasel dominate wet-meadow wetlands adjacent to Outlet Creek (California Department of Transportation 2009a; U.S. Army Corps of Engineers 2011).

5.3.7.2 Historical and Existing Hydrology/Topography

The Huff parcel is adjacent to Outlet Creek, which flows generally from southeast to northwest in this location, forming the western and southern boundaries of the parcel. Wetland features on the Huff parcel are adjacent to and associated with Outlet Creek, or occur in depressions along the artificial drainage ditch associated with the fill embankment for the railroad line. The 1956 aerial photograph (Cartwright Aerial Surveys 1956) shows the Outlet Creek channel much as it appears today.

5.3.7.3 Soil/Substrates

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

- **Fluvaquents, 0–1% slopes:** These soils are formed from alluvium weathered from sedimentary rock and are found on floodplains. They are characterized by very little to no horizon development and the presence of aquic conditions within 20 inches of the soil surface at some time during normal years, and are formed in fluvial environments. Typical surface horizons consist of gravelly sandy loam, while subsurface horizon textures can be variable.
- **Casabonne-Wohly loams, 30–50% slopes:** Very deep, well-drained soils that typically occur on hills and mountains. The soil is formed from material weathered from sandstone and/or shale. Surface horizon textures consist of loam or gravelly loam. Gravel content ranges from 5–25%. Subsurface horizon textures consist of clay loam, sandy clay loam, or gravelly clay loam.
- **Feliz loam, 0–2% slopes:** Very deep, well-drained soils that typically occur on floodplains formed from alluvium from mixed sedimentary rocks. Surface horizon textures consist of loam. Subsurface horizon textures consist of clay loam.
- **Clear Lake clay, 0–2% slopes:** Very deep, poorly drained soils that typically occur in basins and in swales of drainageways. The soils are derived from fine-textured alluvium from sandstone and shale. Surface and subsurface horizon textures consist of silty clay or clay.

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

5.3.7.4 Jurisdictional Wetlands and Other Waters of the United States

According to a wetland delineation on the Huff parcel, there are 4.16 acres of jurisdictional wetlands and 1.967 acres of other waters there. Wetland types mapped on the Huff parcel include wet meadow, riparian scrub, and riparian woodland wetland. The other waters mapped on the parcel consist of Outlet Creek. Outlet Creek in this portion of Little Lake Valley is a perennial stream based on the type of water year.

There is a total of 0.85 acre of wet-meadow adjacent to Outlet Creek and the railroad embankment on the Huff parcel. Dominant vegetation consists of Baltic rush, spreading rush, pennyroyal mint, sedges, hedge nettle, and teasel. There is a total of 0.21 acre of riparian scrub along the railroad embankment on the Huff parcel. Dominant vegetation in these areas consists of willows and Himalayan blackberry.

There is a total of 3.12 acres of riparian woodland wetland in association with Outlet Creek on the Huff parcel. Dominant vegetation consists of Oregon ash, willows, and Oregon white oak in the overstory and Himalayan and California blackberry in the understory.

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

5.3.7.5 Protected Fisheries

Outlet Creek, a protected fishery, flows west along the southern boundary of this parcel. The riparian vegetation along Outlet Creek is classified as Oregon ash riparian woodland. There are 5.42 acres of riparian habitat associated with protected fisheries on the Huff parcel.

5.3.7.6 Riparian Habitats

A total of 0.82 acre of riparian habitat was mapped on the parcel. The vegetation in these areas is classified as Oregon ash riparian woodland.

5.3.7.7 Listed Plants

Special-status plant surveys were performed on the Huff parcel in April 2009. These surveys identified Baker’s meadowfoam in a wet meadow just north of Outlet Creek. A total of 0.08 acre of Baker’s meadowfoam was observed on the parcel.

5.3.8 Lusher (APNs 038-060-08, 108-030-03, and 108-030-04)

The Lusher property consists of three parcels totaling approximately 109 acres. The parcels are along the western edge of Little Lake Valley just east of US 101. The Lusher property is currently used for grazing horses and cattle. All three parcels showed signs of heavy grazing. There is no evidence to suggest that the Lusher parcels are currently irrigated or that they have been irrigated in the past. No evidence of cultivation or mowing in the grazed area was observed during the wetland delineation (California Department of Transportation 2009a). The railroad line separates the easternmost Lusher parcel (108-030-04) from the two western parcels (108-030-03 and 038-060-08).

5.3.8.1 Historical and Existing Vegetation

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

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

Riparian woodland and upland grassland, along with a few areas of wet meadow, dominate the eastern Lusher parcel (108-030-04). These areas are mostly similar in vegetation composition to those communities described above for the western parcels, except for the addition of mixed riparian woodland and the absence of willow riparian scrub. Willows, cottonwoods, valley oak, and Oregon ash dominate the overstory of the areas of mixed riparian woodland, and Himalayan blackberry and poison oak dominate the understory (California Department of Transportation 2009a; U.S. Army Corps of Engineers 2011).

5.3.8.2 Historical and Existing Hydrology/Topography

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

Hydrology on the western Lusher parcels appears to be dominated by the presence of a seasonal high water table. Swales and depressions are subject to ponding. A long swale in the center of parcel 108-030-04 is linear and might be an artificial drainage feature. A channelized portion of Upp Creek flows across both western parcels from southwest to northeast. This channel is in the approximate location of the channel depicted on the 1942 topographic map (included in Wildlands 2008). Along the eastern boundary of parcel 108-030-03 is the channelized portion of Mill Creek, which crosses under the railroad tracks near the southeast corner of the parcel and continues north along the western embankment of the tracks.

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

During fieldwork in May 2010 for an erosion site assessment of the offsite mitigation properties (Caltrans 2010), one depressional wetland erosion site and two upland headcut sites were identified on Lusher parcel 108-030-04 (Figure 3-1 in Appendix H). The depressional wetland site is in a swale and has slumping banks; however, it does not have an associated headcut and it now undergoing headward migration in either direction, and thus appears to be stable. This erosion site is in a well-vegetated Oregon ash riparian woodland with sandy loam soils (*Gielow sandy loam 0–5% slopes*; see Section 5.3.8.3) and adjacent areas are vegetated with wet meadow with similar soils. The upland headcuts are on a small swale to Old Outlet Creek and are well vegetated with mixed riparian woodland with fluvaquent soils (*Fluvaquents, 0–1% slopes*; see Section 5.3.8.3) with adjacent areas vegetated with a mixture of oak woodland grassland, Oregon ash riparian woodland, mixed riparian woodland, and wet meadow with similar soils (Figure 4-3 in Appendix H). The upland headcut sites appear unstable, with a high potential for sediment to enter Old Outlet Creek. These two headcuts will be rehabilitated as part of wetland rehabilitation actions (Chapter 7, Sections 7.3.1.18, 7.3.1.19, and 7.3.1.20) to reduce the potential for sedimentation to Old Outlet Creek. See Appendix H for rehabilitation concepts for these headcuts. Water quality monitoring data will be collected for several parameters, including parameters related to sediment levels. If the data show that increased sedimentation is occurring in the vicinity of the offsite mitigation properties, these erosion features will be inspected to determine if they are becoming unstable again and contributing to excessive sediment to the parcel and valley streams (Chapter 11).

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

5.3.8.3 Soils/Substrates

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

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

Surface horizon textures consist of sandy loam or loam. Subsurface horizon textures consist of stratified loam, fine sandy loam, sandy loam, or sandy clay loam.

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

5.3.8.4 Jurisdictional Wetlands and Other Waters of the United States

According to the wetland delineation on the Lusher parcels, there are 60.33 acres of jurisdictional wetlands and 2.67 acres of other waters. Wetland types mapped on these parcels include swale, wet meadow, and riparian woodland wetland. The other waters mapped on the Lusher parcels include four intermittent streams: Upp Creek, Mill Creek, Old Outlet Creek, and Outlet Creek.

A total of 0.44 acre of wetland swale was mapped on Lusher parcels 108-030-03 (0.313 acre) and 108-030-04 (0.12 acre). One drainage crosses the parcel from south to north, draining toward Upp Creek. This feature appears to be artificial to facilitate drainage on the parcel. The drainage was dominated by pennyroyal mint, water-plantain, and semaphore grass (not identified to species).

A total of 41.30 acres of wet meadow was mapped on Lusher parcels 038-060-08 (4.07 acres), 108-030-03 (17.90 acres), and 108-030-04 (19.33 acres). Dominant vegetation in the wet meadows consisted of tall fescue, Harding grass, meadow foxtail, spreading rush, camas, and perennial ryegrass.

A total of 17.946 acres of riparian woodland wetland and riparian scrub wetland was mapped on Lusher parcels 038-060-08 (0.80 acre), 108-030-03 (1.18 acres), and 108-030-04 (15.97 acres). Riparian woodland wetland and riparian scrub wetland vegetation types consisted of Oregon ash riparian woodland, valley oak riparian woodland, willow scrub riparian, and mixed riparian woodland.

A total of 2.67 acres of other waters was mapped on Lusher parcels 038-060-08 (0.49 acre), 108-030-03 (0.15 acre), and 108-030-04 (2.02 acres). Other waters mapped on the Lusher properties comprise five intermittent streams: Upp, Mill, Old Outlet, and Outlet Creeks, and a short unnamed tributary to Old Outlet Creek. These creeks have low-gradient channels with a mix of silt, sand, and gravel substrates. All these channels have been modified at some time to facilitate the drainage of the adjoining properties for agricultural uses. Mill, Old Outlet, and Outlet Creeks have well-developed mature riparian vegetation along their banks. Upp Creek is sparsely vegetated with willow riparian scrub.

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

5.3.8.5 Protected Fisheries

There is a total of 14.49 acres of riparian habitat associated with protected fisheries on Lusher parcels 038-060-08 (0.91 acre), 108-030-03 (1.82 acres), and 108-030-04 (11.76 acres). These riparian corridors occur in association with Upp Creek, Old Outlet Creek, and Outlet Creek.

5.3.8.6 Riparian Habitats

A total of 16.22 acres of riparian habitat was mapped on the Lusher parcels. These areas are associated with Outlet Creek and along fence rows, and occur in isolated clusters in areas of wet meadow. These areas are vegetated with mixed riparian woodland, valley oak riparian woodland, and Oregon ash riparian woodland.

5.3.8.7 Listed Plants

Special-status plant surveys were performed on the western Lusher parcels in April 2007 and on the eastern Lusher parcel (108-030-04) in March 2010. The April 2007 surveys identified Baker’s meadowfoam in the wet-meadow areas on the western parcels. Baker’s meadowfoam was observed on Lusher parcels 038-060-08 and 108-030-03. Areas of potential Baker’s meadowfoam habitat were also mapped on the same parcels.

A total of 33.89 acres of Baker’s meadowfoam habitat (observed and potential) was identified on the Lusher parcels: 5.29 acres of observed Baker’s meadowfoam on parcels 038-060-08 (0.92 acre) and 108-030-03 (4.37 acres); and 28.60 acres of potential Baker’s meadowfoam on parcels 038-060-08 (10.92 acres) and 108-030-03 (17.68 acres).

A new occurrence of North Coast semaphore grass was observed during the March 2010 surveys of Lusher parcel 108-030-04. The occurrence was mapped in the southeast corner of the parcel near the junction of Outlet Creek and Old Outlet Creek, and comprised approximately 9,437 individuals within an area of 0.59 acre.

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

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

5.3.9.1 Historical and Existing Vegetation

A 1956 aerial photograph shows the MGC Plasma parcels were in use for crop production at that time (Cartwright Aerial Surveys 1956); conditions at that time were much as they are today—

mostly supporting herbaceous vegetation with a few scattered trees. Upland grassland is the dominant vegetation community on the MGC Plasma parcels is upland grassland. Vegetation in these areas is dominated by an introduced mix of grasses and includes four solitary valley oaks and a black oak. Dominant vegetation in these grasslands includes Mediterranean barley, Harding grass, clovers, perennial ryegrass, cranesbill, and rough cat's-ear. There are areas of wet meadow and swales throughout these parcels. Dominant vegetation in these areas consists of California oatgrass, pennyroyal, meadowfoam, downingia, tufted hairgrass, coyote thistle, dense sedge, and spreading rush (California Department of Transportation 2009a; U.S. Army Corps of Engineers 2011).

5.3.9.2 Historical and Existing Hydrology/Topography

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

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

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

5.3.9.3 Soils/Substrates

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

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

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

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

5.3.9.4 Jurisdictional Wetlands and Other Waters of the United States

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

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

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

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

5.3.9.5 Protected Fisheries

There are no protected fisheries on the MGC Plasma parcels.

5.3.9.6 Riparian Habitats

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

5.3.9.7 Listed Plants

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

5.3.10 Nance (APN 108-050-06)

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

5.3.10.1 Historical and Existing Vegetation

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

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

5.3.10.2 Historical and Existing Hydrology/Topography

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

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

5.3.10.3 Soil/Substrates

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

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

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

5.3.10.4 Jurisdictional Wetlands and Other Waters of the United States

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

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

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

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

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

5.3.10.5 Protected Fisheries

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

5.3.10.6 Riparian Habitats

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

5.3.10.7 Listed Plants

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

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

5.3.11 Niesen (APN 108-040-02)

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

5.3.11.1 Historical and Existing Vegetation

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

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

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

5.3.11.2 Historic and Existing Hydrology/Topography

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

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

5.3.11.3 Soils/Substrates

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

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

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

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

5.3.11.4 Jurisdictional Wetlands and Other Waters of the United States

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

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

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

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

5.3.11.5 Protected Fisheries

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

5.3.11.6 Riparian Habitats

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

5.3.11.7 Listed Plants

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

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

5.3.12 Taylor (APNs 037-210-16, 037-221-65, 037-221-68, and 037-240-41)

The 470-acre Taylor parcels are in the hills at the north end of Little Lake Valley, north of Reynolds Highway. The parcels discussed in this document are only small portions of the Taylor Ranch, where easements or fee title for upland oak preservation will be purchased. The parcels are used for cattle grazing, and two small areas of both parcels appear to be used for hay production or pasture grazing.

5.3.12.1 Historical and Existing Vegetation

An aerial photograph taken in 1956 (Cartwright Aerial Surveys 1956) shows that the areas of grassland present today have not changed substantially in more than 50 years. Caltrans biologists performed surveys on August 20, 2008, November 14, 2008, and January 14, 2009, to assess the potential for upland oak woodland mitigation on portions of the Taylor parcels dominated by grassland. Most woodlands on the parcels are conifer woodlands dominated by Douglas-fir and Pacific madrone, with some oaks. Some areas support oak woodlands, chiefly dominated by black and Oregon white oak.

5.3.12.2 Historical and Existing Hydrology/Topography

Several streams are visible on the Taylor parcels on USGS topographic maps. The topography on these parcels is generally hilly and drains south toward Little Lake Valley. The hydrology and topography of the parcels seems relatively unaltered. A 1942 15-minute series USGS topographic map (included in Wildlands 2008) shows the topography of these parcels to be much the same as it is today.

During fieldwork in May 2010 for an erosion site assessment of the offsite mitigation properties (Caltrans 2010), a total of 15 erosion sites were identified on Taylor parcels 037-221-68 (9 erosion sites mostly associated with an existing road) and 037-240-41 (6 erosion sites associated with existing roads) (Appendix J).

Parcel 037-221-68 was identified as having seven erosion sites in upland that are typified by headcuts, scour areas, and/or eroding gullies with headcuts. All of these erosion sites are in the north-central portion of the parcel (see Figures 3-1 and 3-2 in Appendix J). Most of these erosions sites are associated with an access road and its associated culvert crossings. The erosion sites are relatively stable. These sites are high up in the watershed and appear to contribute a relatively small fraction of sediment to downstream receiving waters. Furthermore, any sediment that is eroded and transported is likely deposited and stored in the high-gradient unnamed tributaries as a sediment source that is only transported farther downstream in pulses during large storm events. Approximately 1 mile separates these areas from Berry Creek, the nearest hydrologic feature, and the existing wetland complex on the Watson parcels that these areas eventually drain to; these two factors suggest that much of the sediment that is mobilized and transported from these areas is likely deposited on the alluvial fan channel leading to the Watson parcel or in the wetland complex on Little Lake Valley floor rather than being transported farther downstream to receiving channels. Water quality monitoring data will be collected for several parameters, including parameters related to sediment levels. If the data show that increased sedimentation is occurring in the vicinity of the offsite mitigation properties, these erosion features will be inspected to determine if they are becoming unstable and contributing to excessive sediment to the parcel and valley streams (Chapter 11).

Parcel 037-240-41 was identified as having six erosion sites in uplands that are typified by headcuts, slumps with headcuts, eroding gullies, and/or eroding gullies with headcuts. All of these sites are generally in the western portion of the parcel (Figure 3-1 in Appendix J). These areas are in moderately vegetated upland oak woodlands. While these areas appear to be relatively unstable, the underlying bedrock acts as grade control throughout its length, effectively limiting its erosive potential. The underlying bedrock, coupled with the long distance separating these sites from downstream receiving channels and the wetland complexes on Little Lake Valley floor as discussed above, likely limits the potential for these areas to contribute to downstream sedimentation in Little Lake Valley. Water quality monitoring data will be collected for several parameters, including parameters related to sediment levels. If the data show that increased sedimentation is occurring in the vicinity of the offsite mitigation properties, these erosion features will be inspected to determine if the headcuts are becoming unstable and contributing to excessive sediment to the parcel and valley streams (Chapter 11).

5.3.12.3 Soils/Substrates

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

- **Casabonne-Wohly-Pardaloe complex, 50–75% slopes:** Well drained soils found in hills and mountains. Surface soil profiles include gravelly loam, loam, and very gravelly sandy loam. Subsurface soil profiles include gravelly clay loam, very gravelly sandy loam, very gravelly loam, unweathered bedrock, and bedrock.
- **Casabonne-Wohly loams, 30–50% slopes:** Very deep, well drained soils that typically occur on hills and mountains. The soil is formed from material weathered from sandstone and/or shale. Surface horizon textures consist of loam or gravelly loam. Gravel content ranges from 5–25%. Subsurface horizon textures consist of clay loam, sandy clay loam, or gravelly clay loam.
- **Feliz loam, 0–2% slopes:** Very deep, well-drained soils that typically occur on floodplains formed from alluvium from mixed sedimentary rocks. Surface horizon textures consist of loam. Subsurface horizon textures consist of clay loam.

- **Fluvaquents, 0–1% slopes:** These soils are formed from alluvium weathered from sedimentary rock and are found on floodplains. They are characterized by very little to no horizon development and the presence of aquic conditions within 20 inches of the soil surface at some time during normal years, and are formed in fluvial environments. Typical surface horizons consist of gravelly sandy loam, while subsurface horizon textures may be variable.
- **Henneke-Montara complex, 50–75% slopes:** These are well-drained soils formed from residuum weathered from serpentinite and found on hills and mountains. Surface soil profiles include loam, gravelly loam, and very gravelly loam. Subsurface soil profiles consist of unweathered bedrock.
- **Hopland-Witherell-Squawrock complex, slopes:** Well-drained to somewhat excessively well drained soils that typically occur in hills and mountains. Surface soil profiles include loam, sandy loam, gravelly loam, cobbly loam, and very cobbly clay loam. Subsurface soil profiles include clay loam, very cobbly clay loam, very gravelly sandy clay loam, and unweathered bedrock.
- **Pardaloe-Kekawaka-Casabonne complex, 50–75% slopes:** Well-drained soils that typically occur in hills and mountains. Surface soil profiles include loam, clay loam, gravelly loam, and very gravelly sandy loam. Subsurface profiles include clay, clay loam, gravelly clay loam, very gravelly loam, and unweathered bedrock.
- **Sanhedrin-Kekawaka-Speaker complex, 50–75% slopes:** Well-drained soils that typically occur in hills and mountains. Surface soil profiles include gravelly loam, loam, clay loam, and gravelly clay loam. Subsurface profiles include clay, clay loam, gravelly clay loam, weathered bedrock, and unweathered bedrock.
- **Shortyork-Yorkville-Witherell complex, 15–30% slopes:** Moderately well drained, well drained, and somewhat excessively drained soils found in hills and mountains. Surface soil profiles include loam, sandy loam, gravelly loam, and very gravelly clay loam. Subsurface soils include sandy loam, clay, gravelly clay, very gravelly clay loam, and bedrock.
- **Talmage gravelly sandy loam, 0–2% slopes:** Somewhat excessively drained soils found on alluvial fans. Surface soils consist of gravelly sandy loam and stratified very gravelly coarse sandy loam to very gravelly loam. Subsurface soils include stratified very gravelly coarse sandy loam to very gravelly loam and stratified very gravelly coarse sand to very gravelly loamy sand.
- **Witherell-Hopland-Squawrock complex, 50–75% slopes:** These soils consist of well-drained to somewhat excessively drained soils derived from sandstone and shale and or/residuum weathered from sandstone and are found on hills and mountains. Surface soil profiles include loam, sandy loam, gravelly sandy loam, cobbly loam, and very cobbly clay loam. Subsurface soil profiles include clay loam, very cobbly clay loam, very gravelly clay loam, and bedrock.
- **Wohly-Casabonne-Paradaloe complex, 50–75% slopes:** Well-drained soils found in hills and mountains. Surface soil profiles include loam, gravelly loam, and very gravelly sandy loam. Subsurface soil profiles include clay loam, very gravelly sandy loam, very gravelly loam, gravelly clay loam, weathered bedrock, and unweathered bedrock.

- **Yokayo sandy loam, 8–15% slopes:** Well drained soils found on terraces. Surface soil profiles consist of sandy loam and clay. Subsurface soil profiles consist of clay and clay loam.
- **Yorkville-Squawrock-Witherell complex, 30–50% slopes:** Moderately well drained, well-drained, and somewhat excessively drained soils found on hills, mountains, and drainageways. Surface soil profiles include loam, sandy loam, gravelly sandy loam, cobbly loam, and very cobbly clay loam. Subsurface soil profiles include clay, gravelly sandy loam, gravelly clay loam, very cobbly clay loam, very gravelly clay loam, and bedrock.
- **Yorkville-Yorktree-Squawrock complex, 30–50% slopes:** Moderately well drained and well-drained soils found on hills and mountains. Surface soil profiles include loam, cobbly loam, and very cobbly clay loam. Subsurface soils include clay, gravelly clay, gravelly clay loam, very cobbly clay loam, very gravelly clay loam, and bedrock.

5.3.12.4 Jurisdictional Wetlands and Other Waters of the United States

There is no wetland delineation for the Taylor parcels. A review of topographic maps and aerial photographs indicates that there are several potentially jurisdictional streams on the Taylor parcels.

5.3.12.5 Protected Fisheries

There are no protected fisheries on the Taylor parcels.

5.3.12.6 Other Riparian Habitats

The Taylor parcels were not surveyed for other riparian corridors.

5.3.12.7 Listed Plants

There have been no special-status plant surveys on the Taylor parcels.

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

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

5.3.13.1 Historical and Existing Vegetation

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

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

5.3.13.2 Historical and Existing Hydrology/Topography

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

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

5.3.13.3 Soils/Substrates

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

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

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

5.3.13.4 Jurisdictional Wetlands and Other Waters of the United States

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

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

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

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

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

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

5.3.13.5 Protected Fisheries

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

5.3.13.6 Riparian Habitats

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

5.3.13.7 Listed Plants

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

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

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

5.3.14.1 Historical and Existing Vegetation

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

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

5.3.14.2 Historical and Existing Hydrology/Topography

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

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

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

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

5.3.14.3 Soils/Substrates

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

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

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

5.3.14.4 Jurisdictional Wetlands and Other Waters of the United States

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

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

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

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

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

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

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

5.3.14.5 Protected Fisheries

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

5.3.14.6 Riparian Habitats

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

5.3.14.7 Listed Plants

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

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

Chapter 6 Determination of Credits

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

As discussed in Chapter 3, Caltrans faced several challenges in identifying potential mitigation parcels. Because of these challenges, the size and complexity of the project, and a lack of uplands suitable for restoration or creation on the mitigation parcels, USACE determined that Caltrans' August 2010 Draft MMP did not meet the standard of no net loss of waters of the United States for the project. 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 re-evaluated 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 methodology 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

From the impacts assessment identified by USACE and Caltrans in Chapter 2, Caltrans has determined that Phase 1 of the project will result in 40.47 acres of permanent impacts to wetlands and 20.52 acres of temporary impacts to wetlands. As a result of refining the USACE's assessment of temporary impacts, and adjusting the compensation ratio for temporary impacts, Caltrans proposes that 75.99 credits of wetland compensatory mitigation will be needed to approach no net loss.

Construction of Phase 2 of the Willits Bypass project is not currently 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 for offsite wetland establishment and rehabilitation. The following sections describe the methodology for determining the wetland mitigation credit ratios for the various mitigation actions. A summary of the total mitigation credits using the USACE's functional equivalent indices for the mitigation actions is provided at the end of this chapter.

USACE also determined that the Phase 1 of the project would affect 4.7 acres of other waters. USACE's impact assessment for the project determined that 17.98 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, would also help improve water quality and other aquatic resources within the watershed. However, these related watershed benefits would not result in additional mitigation credits..

Caltrans will implement wetland protection and management actions on other jurisdictional wetlands that will not be counted toward compensatory wetland mitigation. Caltrans will also implement mitigation for the establishment, enhancement, and preservation of nonjurisdictional habitats. Although USACE will not assign wetland mitigation credit for all the wetlands that occur on the mitigation parcels, USACE has acknowledged Caltrans' conservation and management of the other offsite mitigation properties. CEs will be implemented for all jurisdictional and nonjurisdictional habitats. CEs include preserved wetlands that will be grazed according to a CDFG-approved management prescription to maintain and enhance State listed plant populations, other wetlands and riparian habitat for which no jurisdictional wetland credit is proposed, oak woodland, and grassland habitat. Although these habitats will not generate USACE mitigation credits, USACE has stated that they do add to the overall quality of the mitigation package.

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 areas 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 locations of the onsite mitigation areas 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 for 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 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 onHaehl Creek and Upp Creek,
- Erosion and headcut repair on the onsite mitigation parcels; and
- financial contributions to/and development of the Ryan Creek culvert project outside the project footprint and Little Lake Valley (Chapters 2 and 3).

6.3 Determination of Mitigation Credits

USACE generally recommends areal replacement of impacted 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 the USACE's and USEPA'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.

The USACE has indicated that before publication of the 2008 Mitigation Rule, they would have imposed constraints on mitigation options and likely would have discouraged rehabilitation as a major component of a compensatory mitigation plan. As long as the mitigation proposal is restricted to the available parcels in Little Lake Valley watershed, rehabilitation of existing wetlands must be a major component of the mitigation actions to approach no net loss of function. Until the proposed wetland establishment areas replace the functions lost due to permanent impacts, there will be a loss to the areal extent of wetlands in Little Lake Valley. Conceptually, the increase in wetland function on existing wetlands through rehabilitation procedures will offset the loss of functions caused by project impacts. The 2008 Mitigation Rule offers no informed direction on how to approach such evaluations, and the USACE San Francisco District has stated they have no experience with any procedure to accomplish the task within the timeframe available on this project. It is USACE's position that long-term studies that could accomplish the task, such as the hydrogeomorphic method, are not viable because of temporal constraints and possibly costs. It is also USACE's position that other established methods, such as the California Rapid Assessment Method, may not be specific to evaluating wetland characteristics as an index to functional state, have not proven reliable to measure rehabilitation, or are prone to disputes.

The USACE San Francisco District has avoided using rehabilitation as a general compensatory mitigation tool in the past and has stressed site-specific analysis 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.

Though 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 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 utilize a numerical index to ensure that replacement of wetland functions is proportional to the level of impact. The numerical index will be created in part by assessing current wetland characteristics on the rehabilitation parcels and comparing them to the best attainable state identified and invoking best professional judgment 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 attainment of approaching no net loss of function for the impacts to the aquatic environment due to project impacts. The approximation of no net loss of function was determined to have been achieved when the areal acreage of established and rehabilitated wetlands equaled or exceeded the impact acreage. USACE did not accept a 1:1 compensation ratio for all the wetland mitigation actions because of what was considered the speculative nature of the actions, temporal loss of functions, and other pertinent considerations, as described below.

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 (i.e., 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	Mitigation Credits
Wetland Establishment – Group 1	24.54
Wetland Establishment – Group 2	10.32
Wetland Rehabilitation – Type 1	3.72
Wetland Rehabilitation – Type 2	15.97
Wetland Rehabilitation – Type 3	12.67
Wetland Rehabilitation – Type 4	7.34
Wetland Rehabilitation – Type 5	8.50
Total	**83.06**

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 to wetlands.

Onsite mitigation will be implemented in the bypass project footprint. Areas between the toe of the embankment and the limits of the new right-of-way, including all areas within temporary impact zones, will be restored to original elevation and grade, as shown in the project plans to re-establish appropriate topography and site drainage. Re-established wetlands will be seeded with an erosion control seed mix or wet meadow seed mix, depending on their location in the bypass project footprint. Re-established wetlands will also be planted with native wetland and/or riparian species, depending on location. Plants will be installed from container plants and cuttings. Plant species composition will vary depending on location using species from the most appropriate plant palate.

Wetland re-establishment performance standards, success criteria, and length of monitoring period are detailed in Chapter 9, summarized in Table 9-1, and depicted in Appendix D. Re-established wetlands will be monitored annually for 5 years. The success of re-established wetland habitat will be measured by performance standards and success criteria for the following:

- **Absolute percent cover by wetland species:** On average, at least 80% absolute vegetation cover by wetland plant species will be present in re-established or established wetland habitat at Year 5.
- **Absolute percent cover by native wetland species:** Native wetland vegetation in re-established or established wetland habitat will provide 50% absolute cover at Year 5.
- **Species richness:** All re-established or established wetland habitat will contain at least 75% of the number of species originally seeded and/or planted at Year 5.
- **Hydroperiod:** The hydroperiod for all re-established and established wetland habitats will be within, plus or minus, 10% of the hydroperiod for monitoring reference sites at Year 5.
- **Absolute cover by invasive plants:** Cover by invasive plants will be less than 5% or 10% of the absolute cover of all plants in re-established and established wetlands, respectively.

6.3.1.2 Wetland Establishment Credits

Caltrans will replace the permanent loss of 40.47 acres of jurisdictional wetlands by establishing of 58.93 acres of wetlands on the offsite mitigation properties in areas that are currently upland. This amount of areal wetland replacement acreage will more than offset the acreage of permanent loss, and is a significant contribution for approaching no net loss. The total amount of proposed wetland establishment equates to 34.86 credits. Wetland establishment is divided into two groups. Group 1 wetland establishment sites were 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 the Group 1 sites, and are currently being developed for the Group 2 sites. Because the Group 2 wetlands are currently at a preliminary grading and planting design level, USACE has determined that the Group 2 wetlands cannot be credited at a 1:1 ratio.

USACE will credit the wetland establishment in Group 1 at a 1:1 ratio. Caltrans anticipates the USACE will credit the Group 2 establishment at a 0.3:1 ratio. The wetland establishment credits are summarized in Table 6-2.

Established wetlands share the same performance standards, success criteria, and length of monitoring period as re-established wetlands.

Table 6-2. Summary of Wetland Establishment Credits

Parcel	APN	Wetland Establishment Proposed	
		Group 1 (1:1)	Group 2 (0.3:1)
Benbow	108-040-13	0	0.62
	108-020-06	0	0.60
Ford	108-010-06	2.85	0
	108-020-04	0	2.43
	108-030-02	0	1.18
Goss	103-230-02	0.55	0
Lusher	108-030-04	0	1.65
MGC North	103-230-06	6.69	0
MGC Middle	103-250-14	0.23	0
Niesen	108-040-02	5.87	0
Watson	037-221-30	8.34	0.51
Wildlands	108-020-07	0	0.74
	108-060-01	0	1.29
	108-070-09	0	1.30
Total		**24.54**	**10.32**

Note: The 10.32 acres of mitigation credit for Group 2 wetland establishment represents the adjusted total acreage based on the 0.3:1 credit ratio for these wetlands (i.e., actually, a total 34.40 acres of Group 2 wetland will be established).

6.3.1.3 Determination of Wetland Rehabilitation Credits

The determination of wetland rehabilitation credits was based on a assessment performed by the 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 and to develop a sustainable permit decision. Based on the outcome of this assessment, it was determined that a mitigation ratio of 0.1:1 or 0.05:1 would be accorded to each of the mitigation parcels based on the functions and values that the USACE assessment determined to be present on each parcel.

USACE identified removal of grazing as the primary tool available to achieve lifts in 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 the 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.

Following this assessment, the project's mitigation strategy and mitigation crediting system were reevaluated and revised. Previously proposed land management strategies to maintain and enhance Baker's meadowfoam mitigation habitat would be confined only to non-404 mitigation lands and would not be accorded any 404 mitigation credits. To avoid impacts to occupied or potential Baker's meadowfoam habitat, the non-404 offsite mitigation properties will continue to be grazed. Because USACE does not consider a managed grazing prescription to be a substantial form of wetland rehabilitation, wetland mitigation credit is not being proposed for any of the wetlands being managed for Baker's meadowfoam. Consequently, with credit values of 0.1:1 or

0.05:1 applied to the remaining 404 rehabilitation parcels, the project would not likely approach no net loss. To help attain no net loss, USACE developed the more aggressive alternative rehabilitation strategies, each with its own specific mitigation actions, performance standards, and success criteria that would need to be implemented by Caltrans to achieve the increased credit values sufficient to replace lost wetland functions and approach no net loss.

USACE 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 directed 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. A summary of this assessment is presented below.

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 was also intended to guide USACE in assigning functional equivalent indices on an acreage basis to enhancement 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.**

   Based on the current mitigation options available to Caltrans, there will be a net loss of wetland acreage within Little Lake Valley. 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 different and an overall incremental increase in kind or extent from the existing circumstance 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 to 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 discernable 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 anticipated 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 wetlands acreage impacted by the project. Wetland functions are generally 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 within 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—discernable 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 paulstrine 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 to 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, or 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, then 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 offers 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. Mitigative 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 proportionate 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. Within 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. Filled out as much of the parcel summary sheet as possible while onsite. If decisions could not be made with any degree of confidence, USACE, Caltrans, or their consultants were asked to investigate further and propose answers to unresolved questions (if applicable).
6. Submitted documentation to USACE to make final decisions for characterization and departures recorded on data sheets. USACE entertained considerations or alternative observations or interpretations from Caltrans and its consultants. If different interpretations could not be resolved by reviewing observations or discussing projected inferences, a notation of nonconcurrent opinion was included by Caltrans or its consultants, outlining their positions.
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

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 opportunities have been modified based on subsequent modifications to the wetland mitigation plan resulting from implementation of Baker's meadowfoam management actions. Table 7-1 presents the revised mitigation actions for each mitigation parcel.

As discussed previously, credit 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. Sustained successional plant development on heavily managed hayed or grazed pastures, 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). Sustained successional plant development on marginal hayed or grazed pastures, on which grazing would be eliminated, would be credited at 0.05:1 (e.g., 20 acres of rehabilitated wetland for 1 acre impact wetland). Based on this crediting methodology, much of the no net loss could be attained by removing grazing from of the mitigation parcels.

Table 6-3. Summary of USACE Assessment Recommendations

Parcel	APN	Best Opportunities Identified	Other Actions Identified
Arkelian	103-230-04	• No rehabilitation opportunities	• Remove unnecessary fencing • Preservation of unenhanced wetland and upland
Benbow	007-020-03	• Allow successional unmanaged vegetation development in rehabilitation wetland • Remove minor stock loafing pile	• Remove debris • Remove unnecessary fencing • Plant riparian vegetation where appropriate • Remove nonnative blackberry patch • Implement minor erosion control • Preserve unenhanced wetland, upland, and other waters
Benbow	007-010-04	• Allow successional unmanaged vegetation development in rehabilitation wetland	• Remove debris • Remove unnecessary fencing • Remove nonnative blackberry patch • Plant riparian vegetation where appropriate • Preservation of unenhanced wetland, upland, and other waters
Benbow	108-040-13	• Allow successional unmanaged vegetation development in rehabilitation wetland	• Remove unnecessary fencing • Remove debris • Plant riparian vegetation where appropriate • Preservation of unenhanced wetland, upland, and other waters
Benbow	108-030-07	• Allow successional unmanaged vegetation development in rehabilitation wetland	• Remove unnecessary fencing • Remove water trough and piping • Preservation of upland
Benbow	108-020-06	• Allow successional unmanaged vegetation development in rehabilitation wetland • Remove small upland levee to adjacent wetland grade to establish new wetland area	• Remove unnecessary fencing • Plant riparian vegetation where appropriate • Preservation of unenhanced wetland and upland

Parcel	APN	Best Opportunities Identified	Other Actions Identified
Brooke	108-030-01 038-040-09 108-020-03 108-030-01	• No rehabilitation opportunities; parcels are fallow and have developed successional vegetation communities	• Preservation of wetlands, uplands, and other waters • Debris removal • Remove unnecessary fencing • Remove nonnative blackberry and teasel
Ford	108-010-05	• Allow unmanaged successional development in nonmarsh rehabilitation wetland	• Remove unnecessary fencing • Preservation of unenhanced wetland, upland, and other waters • Plant riparian vegetation where appropriate
Ford	108-010-06	• Allow unmanaged successional vegetation development in nonmarsh rehabilitation wetland • Establish wetland in previously identified areas	• Remove unnecessary fencing • Preservation of unenhanced wetland, upland, and other waters • Plant riparian vegetation where appropriate
Ford	108-020-04	• Allow unmanaged successional vegetation development in nonmarsh rehabilitation wetland	• Remove unnecessary fencing • Preservation of unenhanced wetlands, other waters, and upland • Plant riparian vegetation where appropriate • Plug or fill constructed drainage ditch running to the north
Ford	108-030-02	• Allow unmanaged successional vegetation development in rehabilitation wetlands	• Debris removal • Remove nonnative blackberry • Remove unnecessary fencing • Preservation of unenhanced wetlands, other waters, and upland • Plant riparian vegetation where appropriate
Ford	108-030-05	• Allow unmanaged successional vegetation development in rehabilitation wetlands	• Debris removal • Remove unnecessary fencing and posts • Remove nonnative blackberry • Preservation of unenhanced wetland, upland, and other waters • Plant riparian vegetation where appropriate
Frost	108-070-04	• Allow unmanaged successional vegetation to develop on rehabilitation wetland	• Debris removal • Plant riparian vegetation where appropriate • Fix erosion along tributary • Remove unnecessary fencing • Preservation of upland and other waters
Goss	103-230-02	• Allow unmanaged successional vegetation to develop on rehabilitation wetland • Establish wetland in previously identified area	• Remove unnecessary fencing • Preservation of unenhanced wetland and upland
Huff	037-240-RW	• No rehabilitation opportunities	• Debris removal • Preservation of wetlands, uplands, and other waters • Access restrictions for off-road vehicles

Parcel	APN	Best Opportunities Identified	Other Actions Identified
Lusher	108-030-03 108-060-08	• Allow unmanaged successional vegetation to develop on rehabilitation wetland	• Remove unnecessary fencing • Remove debris • Remove nonnative blackberry • Preservation of unenhanced wetland, upland, and other waters • Plant riparian vegetation where appropriate • Plug culvert at end of ineffective drainage ditch
Lusher	108-030-04	• Allow unmanaged successional vegetation to develop on rehabilitation wetland	• Remove unnecessary fencing • Remove nonnative blackberry • Preservation of unenhanced wetland, upland, and other waters • Plant riparian vegetation where appropriate
MGC North	103-230-06	• Allow unmanaged successional vegetation to develop on rehabilitation wetland • Establish wetland in previously identified area	• Remove unnecessary fencing • Preservation of upland
MGC Middle	103-250-14	• Allow unmanaged successional vegetation to develop on rehabilitation wetland • Establish wetland in previously identified area	• Remove unnecessary fencing • Preservation of unenhanced wetlands and upland
Nance	108-050-06	• Allow unmanaged successional vegetation to develop on rehabilitation wetland	• Debris removal • Remove unnecessary fencing • Plant riparian vegetation where appropriate • Preservation of unenhanced wetland, upland, and other waters
Niesen	108-040-02	• Allow unmanaged successional vegetation to develop on rehabilitation wetland • Establish wetland in previously identified area	• Remove unnecessary fencing • Remove nonnative blackberry • Regrade access road to original ground contour • Preservation of unenhanced wetland, upland, and other waters • Plant riparian vegetation where appropriate
Watson	037-221-30	• Allow unmanaged successional vegetation to develop on rehabilitation wetland • Cease haying of recruited obligate vegetation in seasonally ponded unit • Establish wetland in previously identified area	• Remove unnecessary fencing • Remove debris • Stabilize soil trampled by cattle with vegetative cover • Preservation of unenhanced wetland, upland, and other waters • Plant riparian vegetation where appropriate
Watson	037-250-05	• Allow unmanaged successional vegetation development on rehabilitation wetland	• Remove unnecessary fencing • Preservation of unenhanced wetlands, uplands, and other waters • Plant riparian vegetation where appropriate

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

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 were also 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 practicable compensatory mitigative opportunity available for the Willits Bypass. Rehabilitation is generally not encouraged by USACE as a principal mitigative action, but is allowed in the 2008 Mitigation Rule. In general, rehabilitating a degraded fully functional successional wetland on the available mitigation parcels would support the sustainability, ecological needs, and improvement of aquatic resources in the watershed.

Designed as broad national guidance, the 2008 Mitigation Rule seeks to implement what is “practicable and capable of compensating for the aquatic resource functions that will be lost as a result of the permitted activity” (2008 Mitigation Rule, p. 19672). Following the assessment, USACE determined that the compensatory mitigation actions proposed by Caltrans for the Phase 1 impacts to aquatic resources are commensurate with the amount and type of impacts to aquatic resources. Additionally, the compensatory mitigation sites are mostly adjacent to the impact areas, situated in the watershed where the impacts occur, and the rehabilitation component occurs on similar (in-kind) wetlands that will result in sustainable functional wetland systems, bear minimal costs associated with management actions, and have a suitable likelihood for ecological success and sustainability. Because the USACE has determined that there are no suitable watershed plans available and the mitigation parcels were purchased by Caltrans before proposing a mitigation plan, USACE has worked with Caltrans to produce the best available practicable plan “to maintain and improve the quality and quantity of aquatic resources within the watershed(s)”(2008 Mitigation Rule, p. 19674).

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, which 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 are already 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 ecological needs of the watershed include:

- Increased general habitat suitability (thatch accumulation, biotic structure complexity, increase in native perennial plants).
- Uniqueness (rare wetland type [palustrine forested–graben] in part).
- Flood flow 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 discernable functional lift that can be obtained by manipulating either of those wetland characteristics.

The hydrophytic plant community was determined to be impacted 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 increased native perennials, such as rushes and sedges, compared to 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.

Based on observations from field studies, USACE determined that successional plant development offered the best opportunity to provide fully functional wetlands with sustainable increases in functions that would improve the quality and quantity of aquatic functions and help fulfill the ecological needs in the watershed. The functional lift is considered minor because the departure from the best attainable wetland state is restricted to vegetation structural development and successional composition change. Based on the improvements that could be enacted on the existing mitigation parcels, USACE assigned an FEI of 0.1 credit per acre for allowing sustainable unmanaged successional vegetation development on units dominated by nonnative perennial agricultural grasses and 0.05 credit per acre for allowing sustainable unmanaged successional vegetation development on units not dominated by perennial agricultural grasses.

At the time of the USACE assessment, approaching no net loss was possible through removal of grazing on a selected set of mitigation parcels.

Modified Method to Determine Wetland Rehabilitation Credits

Following the USACE assessment, the project’s mitigation strategy and mitigation crediting system were re-evaluated 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 SF 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, which 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. The various types are 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** wetland rehabilitation only occurs 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 1 rehabilitation is assigned a mitigation value of 0.05 credit per acre.
- **Type 2** wetland rehabilitation requires there to be at least a 10% increase in absolute percent cover by native hydrophytic species over baseline conditions. The increase in cover may be provided by the planted and seeded areas or the untreated areas on which native vegetation currently occurs. Type 2 rehabilitation areas will be seeded and planted with native herbaceous wetland species. Type 2 rehabilitation is assigned a mitigation value of 0.1 credit per acre.
- **Type 3** wetland rehabilitation requires there to be at least a 40% increase in absolute percent cover by native hydrophytic species over baseline conditions. The increase in cover may be provided by the planted and seeded areas, or the untreated areas on which native vegetation currently occurs. Type 3 rehabilitation areas will be seeded and planted with native herbaceous wetland species. Native woody vegetation may also be planted at these locations. Type 3 rehabilitation is assigned a mitigation value of 0.2 credit per acre.
- **Type 4** wetland rehabilitation requires there to be at least a 70% increase in absolute percent cover by native hydrophytic species over baseline conditions. The increase in cover may be provided by the planted and seeded areas, or the untreated areas on which native vegetation currently occurs. Type 4 rehabilitation areas will be seeded and planted with native herbaceous wetland species. Type 4 rehabilitation is assigned a mitigation value of 0.3 credit per acre.
- **Type 5** riparian wetland rehabilitation requires there to be at least an increase in absolute cover by native riparian species over baseline conditions. The increase in cover may be provided by the planted and seeded areas or the untreated areas on which native vegetation currently occurs and will be rehabilitated by infill plantings. Type 5 rehabilitation areas will be seeded and planted with native riparian species. Type 5 rehabilitation is assigned a mitigation value of 0.3 credit per acre.

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.

Table 6-4. Summary of Wetland Rehabilitation Credit Determination

Parcel	APN	Wetland Rehabilitation Type (Credit Ratio)					Total
		Type 1 (0.05:1)	Type 2 (0.1:1)	Type 3 (0.2:1)	Type 4 (0.3:1)	Type 5 (0.3:1)	
Benbow	007-020-03		1.08	1.32	0.04		2.43
	007-010-04		1.90	0.96	0.54		3.39
	108-040-13		1.78	2.51	1.00	1.31	6.60
	108-030-07		1.97				1.97
Brooke	108-020-03				0.50		0.50
Ford	108-010-05				1.16		1.16
	108-010-06				0.86		0.86
	108-020-04			4.27	0.10	1.80	6.16
	108-030-02		2.79		0.04		2.83
	108-030-05		5.30	1.77	0.08		7.15
Frost	108-070-04					0.27	0.27
Lusher	108-030-04		1.09		2.33		3.42
MGC Plasma M	103-250-14		0.08			0.40	0.48
Niesen	108-040-02					0.41	0.41
Watson	037-221-30	1.16		0.39		0.58	2.13
	037-250-05	2.56					2.56
Wildlands	108-020-07			0.01	0.04		0.05
	108-030-08			0.43		0.003	0.433
	108-060-01					0.89	0.89
	108-070-08			0.33	0.36	1.63	2.32
	108-070-09			0.69	0.30	1.21	2.20
Total		**3.72**	**15.97**	**12.67**	**7.34**	**8.50**	**48.19**

Note: The mitigation acreage shown for each rehabilitation type represents the adjusted total based on the applicable credit ratio.

6.3.2 Determination of Other Waters Mitigation

The 4.70 acres of permanent and temporary impacts on jurisdictional other waters of the United States will be mitigated through rehabilitation and preservation 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 project footprint (Appendix F). In an April 18, 2011 meeting with Caltrans, USACE stated that the 12.5 acres of proposed other waters mitigation would be ample to satisfy no net loss of other waters. Approximately 18.00 acres of riparian zone rehabilitation is proposed as mitigation to offset impacts to 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.

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 will also improve protected fisheries habitat within Little Lake Valley, especially along Outlet Creek.