3.0 Existing Conditions and Environment Consequences

This chapter presents the environmental analysis of the Proposed Action and its alternatives. The affected environment, environmental consequences and applicable mitigation measures are described, and each of the proposed alternatives are evaluated in terms of the following resource topics:

- Hydrology and Water Quality
- Biological Resources
- Hazardous Waste
- Land Use, Recreation and Public Health
- Visual Quality
- Transportation
- Noise
- Air Quality
- Socioeconomics and Environmental Justice
- Utilities and Service Systems
- Cultural Resources

The environmental analysis focuses on the determination of whether the proposed alternatives would "significantly affect the quality of the human environment," under NEPA, or would result in a "significant effect on the environment," under CEQA.

Under CEQ's NEPA guidelines, the human environment is defined as "the natural and physical environment and the relationship of people with the environment (CEQ NEPA Guideline 1508.14). The term "significantly" under NEPA relates to both context and intensity of a purported effect (CEQ NEPA Guideline 1508.27).

Under CEQA guidelines, a significant effect on the environment is defined as "a substantial, or potentially substantial, adverse change in the environment" (Public Resources Code Division 13 21068). The term "adverse change" under CEQA is defined as an "adverse change in any of the physical conditions within the area affected by the project including land, air, water, minerals, flora, fauna, ambient noise, and objects of historic or aesthetic significance" (CEQA Guidelines 15382).

Specific significance criteria were used to evaluate the significance of anticipated effects of the proposed alternatives and are presented under the discussion of environmental consequences of each resource topic. Significance criteria were based on the CEQA Checklist and the criteria used by other similar proposed restoration projects. Finally, as defined in *2.0 Purpose and Need and Proposed Alternatives*, the anticipated effects of the proposed alternatives were measured against the baseline conditions of the restoration site. Specifically, baseline conditions are the existing environmental setting of the restoration site at a fixed point in time (i.e., the present).

3.1 Hydrology and Water Quality

This section addresses hydrology and water quality resources located within the Cullinan Ranch Site and potential effects that may occur with implementation of the proposed alternatives. The information provided in this section is based on the following documents:

- Hydrodynamic Modeling Investigation, Cullinan Ranch Restoration Project, Solano County (Moffat & Nichol and Hydroikos Associates, June 2004).

- Napa River Salt Marsh Restoration Project Final EIS (California Coastal Conservancy, California Department of Fish and Game, and U.S. Army Corps of Engineers, May 2004).

- Bel Marin Keys Unit V Expansion of the Hamilton Wetland Restoration Project. Final Supplemental EIR/EIS. (Jones & Stokes, April 2003).

Although prepared to analyze a range of restoration scenarios for the Cullinan Ranch Site, the alternatives described and modeled within the Moffat & Nichol study differ from the alternatives that are described in the alternatives analysis section of this document in *Chapter 2.0 Purpose and Need and Proposed Alternatives.* For example, Case 1 in the study correlates to the No-Action Alternative, while Alternative 1 in Table 2-2 discusses an option that was considered but withdrawn. The Preferred Restoration Alternative corresponds to Alternative 8 in the Moffat & Nichol study, while the Partial Restoration Alternative corresponds to Alternative 4a as described in the report.

3.1.1 Existing Conditions

Regional Hydrologic Setting

Climate

The San Francisco Bay Area experiences a Mediterranean climate characterized by mild, wet winters and warm summers. Due to the proximity of the San Francisco Bay system to the ocean, temperatures are seldom below freezing. Typical summer weather includes sea breezes caused by differential heating between the interior valleys and the coast, while winter weather is dominated by storms from the northern Pacific Ocean that produce nearly all the annual rainfall.

San Pablo Bay typically receives about 90% of its precipitation in the late fall and winter months (November–April); January has the greatest average rainfall. Average annual precipitation ranges from about 20 inches in San Pablo Bay to 40 inches in the upper watersheds of the region's major tributaries, which are the Napa River and Sonoma Creek (Jones & Stokes 2004).

Tides

San Francisco Bay experiences a mixed diurnal tide cycle, with two high tides and two low tides per day. The existing tidal range along Dutchman Slough and South Slough is about the same between Napa River and the westerly limit of the Site, because South Slough is also connected to San Pablo Bay via Napa Slough and Sonoma Creek. Tidal data from two tide gages in the vicinity (Mare Island Naval Shipyard, Carquinez Strait, CA 9415218, and Edgerly Island, Napa River, CA 9415415) are presented in Table 3.1-1. The local sloughs experience a spring tide range of 5.9 feet, with a high water mark of about 3 feet

above NGVD that corresponds with the elevation of high fringe marshes in the area (Moffat & Nichol 2004).

A tidal phase lag of approximately 20 minutes at high water exists between the mouth of Dutchman Slough and the westerly limit of the Site. The convergence zone (where high waters from Napa River and Napa sloughs meet) is near the westerly limit of the Site. Tides propagate from the mouth of Sonoma Creek and the mouths of Dutchman and South Sloughs and meet in South Slough just west of the Cullinan Ranch Site's western boundary.

Table 3.1-1. Tidal Datum

Tidal Plane	Mare Island, CA 9415218	Edgerly Island, CA 9415415
Highest Observed Water Level	5.32 ft (12/96)	---
Mean Higher High Water (MHHW)	3.54 ft	3.85 ft
Mean High Water (MHW)	2.98 ft	3.15 ft
Mean Tide Level (MTL)	0.81 ft	---
National Geodetic Vertical Datum – 1929 (NGVD)	0.00 ft	---
Mean Low Water (MLW)	-1.36 ft	-1.59 ft
Mean Lower Low Water (MLLW)	-2.32 ft	-2.45 ft
North American Vertical Datum – 1988 (NAVD)	-2.74 ft	---
Lowest Observed Water Level	-3.98 ft (4/86)	---

Source: Moffat & Nichol, 2004.

Bay Delta Estuary and Groundwater Resources

The Bay-Delta estuary is the largest estuary on the West Coast of North and South America. It can be divided into three distinct component bays or "sub-estuaries": San Francisco Bay, San Pablo Bay, and Suisun Marsh. Located on the central coast of California, this estuary system occupies a natural topographic separation between the northern and southern coastal mountain ranges and functions as the only drainage outlet for waters of the Central Valley.

The Central Valley is drained by the Sacramento and San Joaquin Rivers, which enter San Pablo Bay and San Francisco Bay through the Delta at the eastern end of Suisun Bay. The Sacramento and San Joaquin Rivers contribute more than 95% of the estuary's freshwater inflow. Many smaller rivers and streams also convey fresh water to the Bay-Delta estuary. The volume and timing of freshwater inflow are among the most important factors affecting physical, chemical, and biological conditions in the estuary. Freshwater input from the Delta peaks during the spring, when snow from the Sierra and other high mountain ranges of California melts. Input from smaller local tributaries, influenced by the region's Mediterranean climate, is strongly seasonal, with more than 90% of net annual runoff occurring during the winter (November–April) rainy season (Goals Project 1999, Jones & Stokes 2004).

In the north-bay region, the principal groundwater-bearing aquifer is composed of alluvial deposits, which cover most of the valley areas in the Sonoma and Napa Valleys. These aquifers are largely continuous,

with general flow toward San Pablo Bay. In the region adjacent to the bay, however, local flow has been reversed as a result of groundwater extraction, leading to saltwater intrusion.

Groundwater levels in the alluvial deposits vary locally, but are generally 5–75 feet below the ground surface. In southern Sonoma County, variations are observed because of the presence of local impermeable layers, which create small, semi-confined aquifers. Specific yield is a measure of aquifer productivity. It is defined as the volume of water drained and divided by the total volume of the sample. In alluvial deposits, the specific yield is moderate to high (8%–17%), which illustrates that the aquifer can produce substantial amounts of water.

The most significant natural recharge into alluvial aquifers occurs from rivers and streams. Generally, the alluvial deposits are not permeable enough to allow large volumes of natural recharge from surface infiltration, although precipitation provides limited recharge through the ground surface. As the land elevation ascends into the Huichica mountain range, the groundwater aquifer changes because volcanic deposits are present. The Huichica formation is composed of reworked volcanic sediments, with a low specific yield ranging from 3% to 7%. The low specific yield illustrates that this aquifer has lower productivity than alluvial deposits. The Huichica formation produces limited amounts of groundwater, and the same soil conditions that limit productivity also limit recharge. The primary source of recharge is infiltration, usually through outcrops of the formation in the higher mountainous areas. (Jones & Stokes 2004).

Project Hydrologic Setting

San Pablo Bay

San Pablo Bay is a shallow bay strongly influenced by runoff from the Sacramento and San Joaquin Rivers. Natural runoff from tributaries directly into San Pablo Bay is highly variable. The upper elevations of the tributary watersheds are low enough to preclude any significant snow pack in most years, so there is no significant snowmelt runoff. In addition, permeability of soils and bedrock is generally low in the Coast Ranges. Thus, infiltration rates are slow and runoff rates are high; therefore, the majority of the area's runoff occurs during and shortly after rainfall events. Consequently, tributary base flow is poorly sustained; runoff volume and stream flow depend almost entirely on total precipitation, which is variable from year to year (Jones & Stokes 2004).

Napa River

The Napa River watershed encompasses approximately 425 square miles. The Napa River flows south through the Napa Valley approximately 40 miles from its headwaters on the southern slopes of Mt. St. Helena and the Mayacamas Mountains to its mouth in San Pablo Bay. Flows from the Napa River vary markedly between dry and wet years. The long term average discharge of the Napa River is approximately 66,000 acre-feet (af). Throughout the years, discharge amounts have varied greatly, ranging from a minimum of approximately 5,000 af, recorded in 1931, to a maximum in excess of 200,000 af, recorded in 1986 (Jones & Stokes 2004).

Sonoma Creek

The Sonoma Creek watershed encompasses approximately 160 square miles. The watershed is commonly divided into three subbasins: Fowler Creek and the smaller creeks west of Sonoma; Nathanson Creek and the creeks east of Schellville; and the mainstem of Sonoma Creek. The headwaters of the western tributaries lie in the Sonoma Mountains; most of the small creeks are collected by Fowler Creek, which eventually drains to Sonoma Creek near the town of Sonoma. The eastern tributaries drain the hills to the north and east of Sonoma and join Schell Creek just south of Sonoma. Schell Creek flows for five miles before entering a network of channels and sloughs that connect with Sonoma Creek.

Sonoma Creek flows into San Pablo Bay via a number of circular sloughs and channels that have been highly modified over the last 150 years by dredging, construction of levees, and channel realignment. Flows from Sonoma Creek also vary markedly between dry and wet years. The long-term average discharge of Sonoma Creek is approximately 43,000 af. The minimum rate that has been recorded for this system was approximately 3,000 af, recorded in 1939, and the maximum, in excess of 115,000 af, was recorded in 1956 (Jones & Stokes 2004)

CDFG Ponds 1, 2, 2A, 3, 4 and 5

In general, the hydrology of the CDFG ponds is driven by operation of the CDFG facilities and the annual rainfall patterns. There is a net evaporative loss of water from the ponds, which was important when the ponds were previously used for salt production. The net evaporative loss typically ranges from 22 to 23 inches per year. Water levels vary based on the seasonal and operational conditions of the water control structures, but were historically maintained by Cargill at 0.5 - 4.5 feet deep.

Dutchman and South Sloughs

Both Dutchman and South Sloughs are tidally influenced channels. Before diking of the Cullinan Ranch area ca. 1900, Dutchman Slough included a small, narrow connection to what is now called South Slough (formerly Navy Yard Slough). The present connection of Dutchman Slough with South Slough likely dates back to the time when the remaining marshes of the area were diked for agricultural use and salt production. After levee construction in the early 1900's, ponds 1, 2/2A, 3, and Cullinan Ranch were isolated from the tidal regime by perimeter levees. At that time Dutchman Slough was dredged and extended to connect to South Slough. The tidal prism through South Slough and Dutchman Slough reduced significantly. As a result of the reduced tidal prism, South Slough silted in and fringe marshes, such as those currently found along the channel, developed naturally over time. Although South Slough was historically the dominant connector channel between Napa River and Sonoma Creek, the diking and excavation activities, including sedimentation in South Slough, have resulted in Dutchman Slough presently being the dominant connector channel (Moffat & Nichol 2004). Peak tidal currents in Dutchman Slough are in the range of 0.8 ft/s to 1.8 ft/s (Moffat & Nichol 2004).

Water Quality Setting

Regional Water Quality

In a natural system, surface-water quality depends primarily on the mineral composition of the rocks in the upper source areas of the stream. Farther downstream, water quality is influenced by the mineral characteristics of the materials through which it flows and by contributions from tributaries. In an urban, developed system, such as San Francisco Bay, water quality is also affected by discharges from point and non-point sources.

San Pablo Bay receives substantial inflow from the Sacramento and San Joaquin Rivers and smaller amounts of inflow from the Petaluma and Napa Rivers and Sonoma and Novato Creeks. The Cullinan Ranch Site is a closed system and does not drain into San Pablo Bay. Water quality in San Pablo Bay is maintained through a continuous cycle of circulation and flushing that results from the interaction of tidal fluctuation with freshwater inflow. Consequently, water quality and salinity in San Pablo Bay is a result of the relative mixing of these water sources.

Water quality in San Pablo Bay has been evaluated as part of a study of the San Francisco Bay. Data from the Aquatic Habitat Institute study indicates that several pollutants are present at levels of concern in San Pablo Bay and San Francisco Bay as a whole (Liu et. al. 2006). Table 4-4 lists waters in the San Pablo Bay region that have been designated as impaired and the pollutants for which they were so designated. The designation as impaired can be the result of pollutants, such as heavy metals or pesticides, or a physical property of the water, such as dissolved oxygen content or temperature.

The water quality in the San Pablo Bay tributaries is influenced by past and present agricultural activities. Sonoma Creek and the Petaluma and Napa Rivers are impaired by sediment, nutrients, and pathogens that are all related to the abundant agricultural activities found within the greater watershed. The North Bay, including San Pablo Bay, is also impaired by persistent agricultural chemicals, such as DDT and Chlordane, which may have been used anywhere in the Sacramento and San Joaquin Rivers watersheds. Metals, polychlorinated biphenyls (PCBs), mercury, and remnants of past industrial and mining operations also occur in San Pablo Bay. Furthermore, a health advisory has been issued for the entire San Francisco Bay estuary (California Regional Water Quality Control Board, San Francisco Bay Region 1997) because of mercury levels that have been found in aquatic organisms (Jones & Stokes 2003).

Table 3.1-2. Impaired Water Bodies in the vicinity of the Cullinan Ranch Site as listed by the San Francisco Bay Regional Water Quality Control Board under Section 303(d) of the Clean Water Act.

Water Body/Waterways	Listed Impairment/Pollutant
San Pablo Bay	Chlordane, DDT, Diazinon, Dieldrin, Dioxin Compounds, Exotic Species, Furan Compounds, Mercury, Nickel, PCBs, Selenium
Napa River	Nutrients, Pathogens, Sedimentation/Siltation
Sonoma Creek	Nutrients, Pathogens, Sedimentation/Siltation
San Francisco Bay, Central	Chlordane, DDT, Diazinon, Dieldrin, Dioxin Compounds, Exotic Species, Furan Compounds, Mercury, PCBs, Selenium

Source: State Water Resources Control Board, 2003.

3.1.2 Regulatory Setting

Clean Water Act

The Environmental Protection Agency (EPA) has granted the State of California primacy in administering and enforcing the provisions of the Clean Water Act (CWA) and the National Pollution Discharge Elimination System (NPDES). NPDES is the primary federal program that regulates point source and non-point source discharges to waters of the United States.

The State of California adopts water quality standards to protect beneficial uses of state waters as required by Section 303 of the CWA and the Porter–Cologne Water Quality Control Act of 1969 (PCWQCA). Placement of clean fill materials into waters of the United States is regulated by Section 404 of the CWA, which is administered by the U.S. Army Corps of Engineers (Corps). Under the CWA, the state Regional Water Quality Control Board (RWQCB) must issue Section 401 Water Quality Certification or a waiver for a project to be permitted under Section 404. Water quality certification requires the evaluation of water quality considerations associated with dredging or placement of fill materials into waters of the United States.

Rivers and Harbors Act

The Rivers and Harbors Act (RHA) of 1899 prohibits the unauthorized obstruction or alteration of any navigable waters of the United States. As defined by the RHA, navigable waters include all waters that are:

- subject to the ebb and flow of tides and/or
- presently, historically, or potentially used for foreign or interstate commerce.

Regulations implementing Section 10 of the RHA are coordinated with those implementing CWA Section 404. Specifically, the RHA regulates:

- construction of structures in, under, or over navigable waters;
- excavation or deposition of material in navigable waters; and
- all work affecting the course, location, condition, or capacity of navigable waters.

The RHA is administered by the Corps. If a proposed activity falls under the authority of both CWA Section 404 and RHA Section 10, the Corps processes and issues a single permit. For activities regulated only under RHA Section 10, such as installation of a structure not requiring fill, permit conditions may be added to protect water quality during construction (Jones & Stokes 2004).

McAteer-Petris Act

The McAteer-Petris Act of 1965 established the San Francisco Bay Conservation and Development Commission (BCDC) as a temporary state agency charged with preparing a plan for the long-term use of the San Francisco Bay (the Bay Plan). In August 1969, the McAteer-Petris Act was amended to make BCDC a permanent agency and to incorporate the policies of the Bay Plan into state law.

Under the McAteer-Petris Act and the Bay Plan, any person or agency proposing to place fill in, to extract materials from, or to make any substantial change in the use of any water, land, or structure in BCDC's jurisdiction in San Francisco Bay is required to secure a San Francisco Bay permit. BCDC grants San Francisco Bay permits for projects that meet either of the following qualifications:

- The project is necessary to the health, safety, or welfare of the public in the entire Bay Area.
- The project is consistent with the provisions of the Bay Plan and implementing regulations.

There are three types of San Francisco Bay permits: region-wide permits, administrative permits, and major permits. The type of permit issued depends on the scope and nature of the proposed activities. Implementation of the proposed Cullinan Ranch Restoration Project would require the preparation of a major permit.

Porter-Cologne Water Quality Control Act of 1969

The Porter-Cologne Water Quality Control Act (PCWQCA) established the State Water Resources Control Board (SWRCB) and divided the state into nine regional basins, each with a regional RWQCB. The SWRCB is the primary state agency responsible for protecting the quality of the State's surface and groundwater supplies. The PCWQCA authorizes the SWRCB to draft state policies regarding water quality. In addition, the PCWQCA authorizes the SWRCB to issue Waste Discharge Requirements (WDRs) for discharges into state waters.

The PCWQCA requires that the SWRCB or the RWQCB adopt water quality control plans, known as Basin Plans, for the protection of water quality. A Basin Plan must:

- identify beneficial uses of water to be protected;
- establish water quality objectives for the reasonable protection of the beneficial uses, and
- establish a program of implementation for achieving the water quality objectives.

The Basin Plans also provide the technical basis for determining WDRs, taking enforcement actions, and evaluating clean water grant proposals. The San Francisco Bay RWQCB, which has jurisdiction over the Cullinan Ranch Site, adopted the most recent Basin Plan in May 1995 (Jones & Stokes 2003).

San Francisco Bay Regional Water Quality Control Board Authority

The Water Quality Control Plan of the San Francisco Bay Region (*Basin Plan*) establishes beneficial uses for surface and groundwater resources and sets regulatory water quality objectives that are designed to protect those beneficial uses. Under the current *Basin Plan*, designated beneficial uses of the San Francisco Bay area's surface waters include municipal and domestic supply; agricultural supply; industrial service supply; groundwater recharge; contact and non-contact recreation; warm freshwater fish habitat; cold freshwater fish habitat; wildlife habitat; migration of aquatic organisms; and spawning, reproduction and/or early development of fish.

Beneficial uses of San Francisco Bay Area groundwater include municipal and domestic supply, agricultural supply, and industrial service supply. The *Basin Plan* establishes numeric and narrative surface and groundwater water quality objectives designed to protect designated beneficial uses of surface water and groundwater resources. Other applicable water quality criteria include the California Toxics Rule (CTR), which establishes numeric criteria for aquatic life and human health protection for approximately 130 priority trace metal and organic constituents. Numeric water quality objectives include specific concentration-based values that may be imposed on the effluent or at the edge of an allowable mixing zone within the receiving water.

Numeric *Basin Plan* and CTR criteria differ depending on the salinity content. The Basin Plan defines fresh water, saltwater, and estuarine waters as follows: fresh water has a salinity of less than 5 parts per thousand (ppt) more than 75% of the time; saltwater has a salinity of more than 5 ppt more than 75% of the time; and estuarine water has a salinity that is between that of fresh water and saltwater. In general, the lower of the saltwater or fresh water quality criteria apply to estuarine conditions. The San Francisco Bay RWQCB applies estuarine water quality criteria to San Pablo Bay and Napa River. Narrative criteria provide general guidance to avoid adverse water quality impacts for constituents including salinity, sediment (i.e., total suspended solids [TSS]), tastes and odors, sulfides, toxicity, and bioaccumulation. Numeric criteria included in the Basin Plan include such parameters as trace metals, dissolved oxygen, turbidity, temperature, pH, bacteriological pathogens, and un-ionized ammonia. As described above, the San Francisco Bay RWQCB is required to identify water bodies that do not meet water quality objectives pursuant to Section 303(d) of the CWA.

3.1.3 Environmental Consequences and Mitigation Measures

Methodology

The evaluation of hydrologic and water quality effects is based on a review of the conclusions of the Hydrodynamic Modeling Investigations (Appendix A) prepared by Moffat & Nichol and Hydroikos Associates for the No Action, Preferred and Partial Restoration Alternatives (numbers 1, 8 and 4a, respectively, in the study). Potential effects resulting from implementation of the proposed alternatives were evaluated against existing baseline conditions at the Site.

Significance Criteria

The following significance criteria were used to evaluate the proposed alternatives. The proposed alternatives would adversely affect the hydrology of the Cullinan Ranch Site, and adjacent properties and waterways, if they would:

- increase the risk of flood peaks or volumes that would damage infrastructure or property or endanger public safety;
- result in hydrologic changes that could adversely affect existing or planned biological communities;
- increase the potential for erosion;
- violate any water quality standards or waste discharge requirements;
- substantially increase suspended solids in and turbidity in receiving waters, or
- discharge contaminants into the waters of the United States.

Environmental Effects of the No-Action Alternative

As described in *2.0 Purpose and Need and Proposed Alternatives*, under the No-Action Alternative it is assumed that there would not be any breaches to the Cullinan Ranch property, and therefore, tidal influence would not be introduced to the Site. Under this alternative, the existing levees separating the Cullinan Ranch Site from adjacent waters would be maintained in perpetuity.

HYD-1. Implementation of the No-Action Alternative would not result in changes in the tidal prism leading to increased peak volumes

Under the No-Action Alternative, there would be no tidal inundation of the Site and the existing hydrologic conditions would remain. Routine levee maintenance would be required for all the perimeter levees that separate the Site from tidally influenced waters. Because tidal action would not be introduced to the Site, there would not be any expected increases in peak volumes resulting in significant adverse effects at the Site. ***No impact.***

HYD-2. Implementation of the No-Action Alternative would not result in sediment deposition

Under the No-Action Alternative, there would not be any breaches to the Cullinan Ranch Site from adjacent waterways, and restoration activities occurring at Pond 3 would remain separated from the Site. As a result, there would be no source of new sediment onto the Site, and therefore deposition on Cullinan Ranch would not occur. There would be no impacts related to sedimentation expected under this alternative. ***No impact.***

HYD-3. Implementation of the No-Action Alternative would not result in hydrologic changes that could adversely affect existing or planned biological communities

Under the No-Action Alternative, the Cullinan Ranch Site would not be open to tidal inundation and all existing levees and existing fringe marsh habitat on the interior of these levees would remain unchanged, except during periods of levee repair and maintenance. Furthermore, the existing upland and transitional marsh habitats would remain unchanged. Therefore, there would not be any significant adverse effects on existing biological communities.

However, implementation of the No-Action Alternative would hinder the development of a continuous tidal marsh corridor that would be connected following restoration of the Cullinan Ranch Site, along with additional planned neighboring sites, to tidal exchange. Although there would still be large areas of existing and restored tidal marsh habitats surrounding the project Site, the overall connectivity and efficiency of the system would be reduced through preserving the Site in existing conditions. ***Less-than-significant impact.***

HYD-4. Implementation of the No-Action Alternative would not result in Exceedances of Water Quality Objectives

Under the No-Action Alternative the Cullinan Ranch Site would not be opened up to tidal exchange. Existing surface water quality conditions would remain, which are influenced by precipitation and runoff from adjacent areas. The existing water quality conditions at the Cullinan Ranch Site have not resulted in exceedances of established water quality objectives, and would remain largely unchanged. Therefore, there would not be any significant adverse effects related to water quality impacts under this alternative. ***Less-than-significant impact.***

Environmental Effects of the Preferred Restoration Alternative

HYD-5. Implementation of the Preferred Restoration Alternative would result in changes in the tidal prism leading to increased peak volumes

Under the Preferred Restoration Alternative, breaches to Dutchman and South Sloughs would increase the tidal prism throughout the area dramatically as Cullinan Ranch, which had been completely diked and separated from tidal influence, would become inundated with tidal flows from the adjacent slough channels. Breaches in Dutchman Slough would also be coordinated with those in the southern perimeter levee of Pond 3, providing a complimentary hydrologic system between the two restored sites. This would improve water circulation within the restored Cullinan Ranch Site, and add to the overall increased tidal prism within the system.

Hydrologic modeling investigations performed by Moffat & Nichol concluded that following implementation of the Preferred Restoration Alternative, high water levels within Dutchman Slough would be similar to existing conditions on the Cullinan Ranch Site while low water elevations would be increased due to the large quantities of water ebbing from the Site. Additionally, peak velocities are expected to increase to approximately four times the existing flow conditions at the mouth of Dutchman Slough, and five to six times the velocities currently found at the mouth of South Slough. These changes in flow greatly exceed the existing capacities of the channels, and would result in scour throughout both systems. While the mouth of Dutchman Slough is expected to widen and deepen, the western reach of the slough could

actually decrease in size when water is diverted to the Site. Tidal flows within the western reaches of Dutchman Slough would be composed of waters remaining after the Cullinan Ranch Site has filled. The slow speed of the flows would result in deposition of sediments within the western portion of Dutchman Slough. As a result, the slough would more closely resemble the historical conditions in which the western portions of Dutchman Slough were relatively silted in. The Preferred Restoration Alternative would also result in an increased tidal prism in the South Slough system, overall widening and deepening the channel and returning it to its near historic conditions, when it acted as the primary source of flow through the area. The Tables 3.1.3 and 3.1.4 summarize the hydrologic modeling results for the Preferred Restoration Alternative. Additional supporting documentation is included in Appendix A (Moffat & Nichol 2004).

Immediately following levee breaching for the Preferred Restoration Alternative, there would be a dramatic increase in the tidal prism throughout the area as tidal action is allowed to return to an area that is currently diked and void of tidal influence. The prism would gradually decrease again as the Site becomes inundated and tidal marsh elevations increase. During the approximately 60 years required for the channel systems and marsh plain elevations to establish on the Site the tidal prism is expected to increase slowly once again, and Dutchman and South Sloughs would gradually reach equilibrium widths and depths to support the evolving ecosystem on the restored Cullinan Ranch Site.

Although there would be dramatic changes in the slough channels and tidal prism within the vicinity of the project area immediately following implementation, potential flooding or hazards to infrastructure and/or public safety would be minimized through project features described in *2.0 Purpose and Need and Proposed Alternatives.* These include the proposed reinforcement of levees that separate the project area from adjacent properties and roadways, and the installation of water control structures. In addition, the increasing flow velocities and tidal prism would not prevent adjacent waterways from being navigable, although South Slough would replace Dutchman Slough as the primary throughway in the area. Immediately following breaching there would be dramatic changes to the system, but as the Site becomes inundated and the prism once again declines, the overall navigability of the system is not expected to significantly change. Therefore, no significant impacts are expected that would increase the risk of flooding or damage to existing infrastructure or property as a result of increased flow velocities and tidal prism from project implementation. ***Less-than-significant impact.***

Table 3.1-3. Modeled Water Levels for the Preferred Restoration Alternative

Location	Modeling Points	High Water	Low Water	Range	
		(ft)	(ft)	(ft)	% of Ex.
Dutchman Slough	P1	3.7	-2.5	6.2	98%
	P2	3.7	-1	4.7	75%
	P3	3.7	-0.4	4.1	65%
	P4	3.7	-0.3	4	63%
	P5	3.7	-0.3	4	63%
	P6	3.7	-0.3	4	63%
South Slough	P22	3.7	-2.5	6.2	98%
	P23	3.7	-1.8	5.5	87%
	P24	3.7	-0.3	4	63%
	P7	3.7	-0.3	4	63%
	P8	3.7	-0.6	4.3	69%
Guadalcanal Village	P10-P11	3.7	-1	4.7	75%
Cullinan Ranch	P12-P21	3.7	-0.3	4	---

Source: Moffat & Nichol, 2004

Table 3.1-4. Modeled Velocities and Tidal Prism for the Preferred Restoration Alternative

Location	Modeling Point	Maximum Velocity		Diurnal Tidal Prism		Equilibrium Cross Sectional Area	
		(ft/s)	% of Ex.	(ac.ft)	% of Ex.	(m^2)	% of Ex.
Dutchman Slough	V1 / E2	7.4	411%	3956	395%	622	235%
	V2	3	214%	---	---	---	---
	V3 / E3	2.3	164%	1416	182%	319	146%
	V4 / E4	1.2	86%	507	89%	164	78%
	V5 / E5	1	125%	357	83%	131	76%
South Slough	V9 / E13	3	231%	2377	267%	447	157%
	V8 / E11	2.8	311%	1617	527%	348	245%
	V7 / E10	3.4	567%	970	1865%	250	481%
	V6 / E6	0.7	88%	258	93%	106	70%
	P8 / E8	1.9	173%	419	499%	145	175%

Source: Moffat & Nichol, 2004

HYD-6. Implementation of the Preferred Restoration Alternative would Result in Hydrologic Changes that could Adversely Affect Existing or Planned Biological Communities

Implementation of the Preferred Restoration Alternative would result in the removal of existing fringe habitats, including marshes and uplands that have established along the levees that support waterways adjacent to the Cullinan Ranch Site. In particular, habitats along Dutchman and South Sloughs, and Napa River may be impacted. The removal of these habitats could occur as the tidal prism within this area increases, scouring the channels and altering sediment dispersal throughout the system. In addition, seasonal wetland and upland habitats that have established on the Cullinan Ranch Site would be permanently inundated through implementation of the Preferred Restoration Alternative. Impacts related to the loss of existing habitat are evaluated in detail in *3.2 Biological Resources*.

Implementation of the Preferred Restoration Alternative would also allow the necessary conditions on the Cullinan Ranch Site to establish in order to support planned biological communities. Based on the hydrologic modeling conducted for the Proposed Action, over the long run, the trajectory of habitat development in the marsh would be largely controlled by sediment deposition and the salinity of the system, as influenced by the evolving tidal prism. Following the initial breaching of the levees, the lower portions of Dutchman and South Sloughs would deepen and widen in response to the increased volumes and velocity of water moving through the waterways as tidal inundation occurs on the Site. At this time, the Site would remain largely inundated, and the tidal prism would again decrease. As sedimentation occurs at the Site, the tidal prism would once again slowly increase as a channel system evolves across the Site, and water exchange increases between the Site and adjacent slough channels. Over an approximately 60-year period, equilibrium conditions would be reached, and the planned tidal marsh habitat would form at approximately one foot above the mean tide level (Moffat & Nichol 2004). Although this duration could be influenced by changes in the sediment supply, the salinity regime, and the rate of sea level rise, as well as changes in other sites as further restoration projects may be implemented in the area, the overall outcome of the project is expected to be the same. Therefore, hydrologic changes resulting from implementation of this alternative would not be expected to adversely affect planned biological communities, as these communities could be established on the Site once marsh plain elevations are reached. ***Less-than-significant impact.***

HYD-7. Implementation of the Preferred Restoration Alternative would result in Hydrologic changes that cause Erosion of Adjacent Levees

Under implementation of the Preferred Restoration Alternative, scour would widen the channels of both Dutchman and South Sloughs, causing the channels to erode existing perimeter levees. Additionally, part of Pritchett Marsh and levees along the Guadalcanal Village wetlands and Pond 3 may also erode as a result of the changing flow patterns within the sloughs. Currently, the existing levee systems experience some on-going active erosion due to tidal fluctuation within the slough system. However, these conditions would be greatly magnified with the additional flow that is expected within the slough channels through implementing the Preferred Restoration Alternative. The erosion of these areas may result in the loss of fringe tidal marsh habitat that has formed along the perimeter levees. However, as sediment accumulates on the Cullinan Ranch Site, the tidal prism within the system will stabilize, and erosion rates will decrease along these levees, allowing the formation of new tidal marsh fringe habitat.

In addition to erosion, wind-induced waves pose a significant risk in terms of erosion on perimeter levees. The size of wind-generated waves is primarily a function of the wind speed, wind fetch, wind duration, and water depth (Jones & Stokes 2003). Because the Site is approximately –2.0 feet NGVD, breaching the levee would result in complete inundation of the Site, which would produce conditions favorable to large wave development, as the Site is generally flat in nature, and does not support natural features or structures to dissipate wave energy. Therefore, inadequate protection of the Highway 37 levee from wind-induced waves from within the Cullinan Ranch Site could result in significant erosion of the levees. Previous hydrologic studies completed by Moffat & Nichol determined that a levee height of 8.0 feet NGVD for the Highway 37 levee, and 7.0 feet NGVD for the Pond 1 levee would be sufficient to protect the eastern portion of the highway from extreme tidal events (Moffat & Nichol 2002). In addition, Caltrans requested that the height for the Highway 37 levee be raised to 9.0 feet NGVD due to overtopping issues they encountered on the Guadalcanal Restoration Site. In order to protect these areas, these existing levees would be raised and re-enforced, as described in the *2.0 Purpose and Need and Proposed Alternatives*, in order to minimize potential erosion effects. The armoring may consist of, but is not limited to, placement of stone, flattening of levee slopes, and planting vegetation. Consequently, significant adverse effects are not expected to result from excessive or unexpected erosion of adjacent levees under implementation of the Preferred Restoration Alternative. ***Less-than-significant impact.***

HYD-8. Implementation of the Preferred Restoration Alternative would not result in Degraded Groundwater Quality

Following levee breaching at Cullinan Ranch, inundation of the Site with tidally influenced waters could further degrade the quality of shallow groundwater due to saltwater intrusion. However, shallow groundwater within and around the Cullinan Ranch Site already experiences an influx of saline water due to the proximity of San Pablo Bay and the tidal influence of the sloughs in the area, as well as past agricultural practices on the Site, which cause saltwater intrusion into the system. Although the salinity of the shallow groundwater may be minimally increased through project implementation, the soil structure at the Site, as described above in the *Bay Delta Estuary and Groundwater Resources* setting section, limits the exchange of surface water and shallow groundwater with deeper groundwater bodies. Therefore, degradation of deeper groundwater quality as a result of implementing the Preferred Restoration Alternative is unlikely to occur. ***Less-than-significant impact.***

HYD-9. Implementation of the Preferred Restoration Alternative would not Discharge Contaminants into the Waters of the U.S. Bay Delta Estuary

Implementation of the Preferred Restoration Alternative could initially, through pre-flooding, create a waterbody with inadequate tidal flushing, resulting in stagnation and depressed dissolved-oxygen concentrations. Breaching is scheduled to occur during the winter when rains and high water conditions in the Napa River and surrounding sloughs exists, therefore providing immediate dilution of anaerobic waters. Breaching would occur before January 30 when salmonids are expected to migrate through the area. After breaching, as the Site continues to accumulate sediment and the tidal prism increase, water quality conditions will improve as the exchange of water to and from the Site improves. However, it could take several years for these conditions to occur. Following the establishment of the mature channel system on the Site, water moving on and off the Site would be relatively the same as that in the adjacent channels, and therefore will not exceed water quality objectives. Therefore, there would not be adverse effects

resulting in the discharging of contaminants that would exceed water quality objectives with implementation of the Preferred Restoration Alternative. ***Less-than-significant impact.***

HYD-10. Implementation of the Preferred Restoration Alternative would not result in Substantial Increased Suspended Solids in and Turbidity in Receiving Waters

Implementation of the Preferred Restoration Alternative could increase suspended sediments within the adjacent slough channel system following the breaching of the levees at Cullinan Ranch. However, due to lowering the water table, the Site has greatly subsided over time as compared to adjacent lands. As such, sedimentation would largely occur on-site as adjacent waterways are scoured with the increased tidal prism and flow velocities. Therefore, as tidal marsh habitat develops, suspended solids would be deposited within the Site, or within the evolving slough channel network. Therefore, increased suspended solids and/or turbidity within the receiving waters of San Pablo Bay are not expected to significantly increase as high levels of deposition would be drawn on-site. ***Less-than-significant impact.***

Environmental Effects of the Partial Restoration Alternative

HYD-11. Implementation of the Partial Restoration Alternative would Result in Changes in the Tidal Prism Leading to Increased Peak Volumes

Under the Partial Restoration Alternative, a single breach to Dutchman Slough would increase the overall tidal prism throughout the adjacent slough channel system as a 300-acre area of Cullinan Ranch, now completely diked and separated from tidal influence, would become inundated with tidal flows. Hydrologic modeling results indicate that as a result of this action there would not be significant changes in water levels within the adjacent slough channels. However, modeling results indicated that implementing restoration on only the eastern portion of the Site would result in peak velocities nearly doubling in the immediate vicinity of the mouth of Dutchman Slough. Additionally, velocities in the slough downstream from the breach site would likely be reduced, as much of the flow from Dutchman Slough would enter the Cullinan Ranch Site. Tables 3.1-5 and 3.1-6 summarize the modeling results for the Partial Restoration Alternative. Please refer to Appendix A for additional information on the model used and the results generated from the model (Moffat and Nichol 2004).

Unlike the Preferred Restoration Alternative, implementation of this alternative would not result in significant changes to the hydrology of South Slough. However, similar to the Preferred Restoration Alternative, the mouth and adjacent reaches of Dutchman Slough would scour over time due to the increased flow and velocities that would occur following the breach into Cullinan Ranch. Over time, as the mouth of the slough scours, increasing the depth and width of the channel, a greater tidal prism could be supported by the system, and would increase tidal exchange from the slough to the Cullinan Ranch Site. As the Site continues to evolve and accumulate sediment, the tidal prism within the area would slowly increase until equilibrium conditions are reached.

As a result of implementing the Partial Restoration Alternative, increases in the tidal prism and peak velocities would initially flood the Cullinan Ranch Site and erode portions of the perimeter levees that contain Dutchman Slough. However, through the reinforcement of levees, as described in *2.0 Purpose and Need and Proposed Alternatives*, damage to existing levees,

infrastructure, and property, or risk to public safety would not be expected. In addition, changes in the navigability of the adjacent slough channels would not be greatly affected, as Dutchman Slough, through this alternative, would remain largely open and connected to the larger slough channel network in the area. ***Less-than-significant impact.***

Table 3.1-5. Modeled Water Levels for the Partial Restoration Alternative

Location	Modeling Point	HW	LW	Range	
		(feet)	(feet)	(feet)	(% of Ex.)
Dutchman Slough	P1	3.8	-2.5	6.3	100%
	P2	3.8	-2.4	6.2	98%
	P3	3.8	-2.3	6.1	97%
	P4	3.8	-2.3	6.1	97%
	P5	3.8	-2.4	6.2	98%
	P6	3.8	-2.4	6.2	98%
South Slough	P22	3.8	-2.5	6.3	100%
	P23	3.8	-2.5	6.3	100%
	P24	3.8	-2.4	6.2	98%
	P7	3.8	-2.4	6.2	98%
	P8	3.8	-2.4	6.2	100%
Guadalcanal Village	P10-P11	3.8	-2.4	6.2	98%
Cullinan Ranch	P12-P21	3.8	-1.2	5	---

Source: Moffat & Nichol, 2004.

Table 3.1-6. Modeled Velocities and Tidal Prism for the Partial Restoration Alternative

Location	Modeling Point	Maximum Velocity		Diurnal Tidal Prism	
		(ft/s)	(% of Ex.)	(acre-ft)	(% of Ex.)
Dutchman Slough	V1 / E2	3.4	189%	2058	205%
	V2	2.7	193%		
	V3 / E3	1.2	86%	505	65%
	V4 / E4	1.2	86%	312	55%
	V5 / E5	0.7	88%	208	48%
South Slough	V9 / E13	1.2	92%	841	94%
	V8 / E11	0.8	89%	292	95%
	V7 / E10	0.5	90%	50	98%
	V6 / E6	0.7	88%	157	57%
	P8 / E8	0.9	82%	187	223%

Source: Moffat & Nichol, 2004.

HYD-12. Implementation of the Partial Restoration Alternative would Result in Hydrologic Changes that could Adversely Affect Existing or Planned Biological Communities

Implementation of the Partial Restoration Alternative would result in the removal of existing fringe habitats, including marshes and uplands that have established along the levees that support waterways adjacent to the Cullinan Ranch Site. This would occur as the channels scour and sedimentation rate changes, particularly in Dutchman Slough, causing the mouth of the channel to increase in size beyond the existing levees. In addition, wetland and upland habitats that have established on the 300-acre Partial Restoration Site in the eastern portion of the Cullinan Ranch Site would be inundated through implementation of the Preferred Restoration Alternative. Impacts related to existing habitat loss are evaluated in detail in *3.2 Biological Resources*.

Implementation of the Partial Restoration Alternative would also produce the necessary conditions on the Cullinan Ranch Site to support planned biological communities. Based on the hydrologic modeling conducted for the Partial Restoration Alternative, the trajectory of habitat development in the marsh would be largely controlled by sediment deposition and the salinity of the system, as influenced by the evolving tidal prism. Following the initial breaching of the Dutchman Slough levee, the mouth of the slough channel would deepen and widen in response to the increased tidal prism and velocity of water moving though the channel as tidal inundation occurs on-site. At this time, the Site would remain largely inundated. As the supporting sloughs scour the prism would slowly increase and sediment accumulate on the Site, supporting channel evolution and increasing water exchange on and off the Site, until equilibrium conditions are reached. At this point, new marsh habitat can begin to establish along the channel margins, at approximately one foot above mean tide level. The time required to reach this point is estimated to take approximately 100 years, which would be 40 years longer than the Preferred Restoration Alternative, due to the decrease in tidal exchange from the Site to the adjacent slough channels. Additionally, the Site would not be restored in conjunction with Pond 3. This timing could be influenced by changes in the sediment supply, the salinity regime, and the rate of sea level rise, as well as changes in other sites as further restoration projects may be implemented in the area. Consequently, hydrologic changes resulting from implementation of this alternative would not be expected to adversely affect planned biological communities, as these communities could be established on the Site once marsh plain elevations are reached. ***Less-than-significant impact.***

HYD-13. Implementation of the Partial Restoration Alternative would result in Hydrologic changes that cause Erosion of Adjacent Levees

Under implementation of the Partial Restoration Alternative, the anticipated scouring at the mouth of Dutchman Slough and deepening and widening the channel may cause the erosion of levees along the restored reaches. Additionally, areas of Pritchett Marsh and levees along the Guadalcanal Village wetlands could also be eroded with the increased tidal prism and flow velocities through this area. Although the effects would be smaller than those under the Preferred Restoration Alternative, erosion potential under this alternative is still significant. Due to the active nature of the existing tidal prism, existing levees and adjacent habitats currently experience some level of active erosion at all times. However, following implementation of the Partial Restoration Alternative, erosion rates would greatly increase.

Levees adjacent to the Cullinan Ranch Site may also be subject to increased erosion from tidal current and wave forces under the Partial Restoration Alternative. As described in *2.0 Purpose*

and Need and Proposed Alternatives, the portion of the Cullinan Ranch levee that is located adjacent to Dutchman Slough would be repaired and protected from tidal influence and erosion that already exists under this alternative. In order to minimize these potential effects, erosion protection, or armoring, would be constructed in place along the 5,700-foot section of the levee that lies adjacent to the restored reach. In order to minimize potential flooding of Highway 37 a buttress levee would be constructed against the existing embankment along a 3,500-foot section of the southeast corner of the Cullinan Ranch Site where the existing embankment could be inundated by tidal action. Armoring along the 3,500-foot buttress levee would protect the levee from erosion. The armoring may consist of, but is not limited to, placement of riprap, flattening of levee slopes, and planting vegetation (pickleweed). Consequently, adverse effects resulting in excessive or unexpected erosion of adjacent levees under implementation of the Partial Restoration Alternative are not expected. ***Less-than-significant impact.***

HYD-14. Implementation of the Partial Restoration Alternative would not result in Degraded Groundwater Quality

Similar to the Preferred Restoration Alternative, after implementation of the proposed breach under the Partial Restoration Alternative, inundation of the Cullinan Ranch Site could degrade shallow groundwater through saltwater intrusion. However, shallow groundwater within and around the Cullinan Ranch Site already experiences an influx of saline water due to the proximity of San Pablo Bay and the tidal influence of the sloughs in the area, as well as past agricultural practices on the Site. Although the salinity of the shallow groundwater may be minimally increased through project implementation, the soil structure at the Site, as described above in the *Bay Delta Estuary and Groundwater Resources* setting section, limits the exchange of surface water and shallow groundwater with deeper groundwater bodies. Therefore, degradation of deeper groundwater quality as a result of implementing the Preferred Restoration Alternative is unlikely to occur. ***Less-than-significant impact.***

HYD-15. Implementation of the Partial Restoration Alternative would not Discharge Contaminants into the Waters of the U.S. Bay Delta Estuary

Similar to the Preferred Restoration Alternative, implementation of the Partial Restoration Alternative could initially, through pre-flooding, create a waterbody with inadequate tidal flushing resulting in stagnation and depressed dissolved-oxygen concentrations. Breaching is scheduled to occur during the winter when rains and high water conditions in the Napa River and surrounding sloughs exists, therefore providing immediate dilution of anaerobic waters. Breaching would occur before January 30 when salmonids are expected to migrate through the area. After breaching, as the Site continues to accumulate sediment and the tidal prism increases, water quality conditions will improve as the exchange of water to and from the Site improves. However, it could take several years for these conditions to occur. Following the establishment of the mature channel system on the Site, water moving on- and off-site would be relatively the same as that in the adjacent channels, and therefore will not exceed water quality objectives. Therefore, there would not be adverse effects resulting in the discharging of contaminants that would exceed water quality objectives with implementation of the Partial Restoration Alternative. ***Less-than-significant impact.***

HYD-16. Implementation of the Partial Restoration Alternative would not Result in Substantial Increased Suspended Solids in and Turbidity in Receiving Waters

Implementation of the Partial Restoration Alternative could largely increase suspended sediments within the adjacent slough channel system following the breaching of the levees at Cullinan Ranch. However, because the Site has greatly subsided due to lowering of the water table, as compared to adjacent lands, sedimentation would largely occur on-site as adjacent waterways are scoured with the increased tidal prism and flow velocities. Therefore, suspended solids within the system would be largely deposited within the Site, or within the evolving slough channel network, as tidal marsh habitat develops. Therefore, increased suspended solids and/or turbidity within the receiving waters of San Pablo Bay are not expected to significantly increase as high levels of deposition would be drawn on-site. ***Less-than-significant impact.***

3.2 Biological Resources

This chapter describes the existing biological resources located within the Cullinan Ranch Site and the surrounding Project Area. For the purposes of this chapter, the Cullinan Ranch Site includes the 1,525 acres proposed for restoration, which are bounded by Dutchman Slough and South Slough. These sloughs are held back by levees that prevent tidal waters from entering the Cullinan Ranch Site. The greater Project Area includes the surrounding areas adjacent to the Site that may either be directly affected by project activities or impacted over time through the return of tidal influence to the Site (an additional 380 acres). Biological resources that are evaluated include wetland, aquatic and terrestrial environments, and special status plant and animal species. An overview of applicable federal and state regulations is also provided. This chapter describes potential effects that may occur to both the Site and the Project Area with implementation of the proposed alternatives and proposes mitigation measures to offset the adverse effects.

This assessment of biological resources takes into consideration the general context of the proposed alternatives as a restoration action intended to result in the establishment of a self-sustaining habitat and the continued existence of salt marsh-dependent endangered species in perpetuity. In addition, the Proposed Action is based upon on-going natural sedimentation processes and tidal dynamics within a geomorphic setting in which a 100-year restoration horizon would be considered short-term. Therefore, the relative timeframes used to evaluate and considerations of biological effects are considerably longer than those in a typical assessment of effects to biological resources.

3.2.1 Survey Methodology

Data Resources

Botanical taxonomy and nomenclature in this section conforms to the *Jepson Manual* (Hickman 1993). Common names of plant species are derived from the Integrated Taxonomic Information System (ITIS 2005). Vegetation classifications were created as generic classifications incorporating special-status species habitat requirements, wetland definitions from the U.S. Army Corps of Engineers wetland delineation manual, and habitat descriptions from Natural Communities of California (Holland 1986); wetland and deepwater habitat classifications conform to the U.S. Army Corps of Engineers wetland delineation manual (1987). Background information presented in this chapter is based on the following sources:

- Bayland Ecosystem Habitat Goals Report (Goals Project 1999).
- Delineation of Wetlands and Waters of the U.S. for the Cullinan Ranch Restoration Project (ECORP Consulting 2000).
- Ecology of Salt Marsh Ecosystems of the San Francisco Bay Estuary and Restoration of Tidal Wetlands in the San Pablo Bay: 1999 Progress Report (Takekawa et. al. Unpubl. Rep. U.S. Geological Survey, SF Bay Estuary Field Station, Vallejo, CA.).
- General biological survey efforts undertaken by staff at the San Pablo Bay National Wildlife Refuge and USGS.
- Science Support for Wetland Restoration in the Napa-Sonoma Salt Ponds, San Francisco Bay Estuary: 1999 Progress Report. (Takekawa et al. Unpubl. Rep. U.S. Geological Survey, Davis and Vallejo, CA.).
- U.S. Fish and Wildlife Species List for the Cuttings Wharf Quadrangle (2007).
- California Natural Diversity Database for the Cuttings Wharf Quadrangle and eight surrounding quadrangles (2007).

Biologists from USFWS and U.S. Geological Survey (USGS) have been conducting focused surveys for special status species in and around Cullinan Ranch over the last decade. Researchers at the USGS Western Ecological Research Center, San Francisco Bay Estuary Field Station have conducted botanical surveys, amphibian surveys and monitored the changes in the amount and distribution of cattails throughout the Site (Pers. comm. Block 2007). Botanical surveys were conducted by USGS in March 1994, June 1994, June 1998, October 1998, February 1999, and March 2001. Phragmites australis locations were also documented by USGS from February through April 2001. In 2001, USFWS biologists conducted surveys for rails, including the federally endangered California clapper rail, along the northern perimeter of Cullinan Ranch Site (Ecosystem Restoration Sciences 2004). Additional rail surveys were conducted by Avocet Research Associates in areas surrounding the Site (Sonoma Creek and Pritchett Marsh) from 1999 through 2002. Surveys for the federally endangered salt marsh harvest mouse were conducted by a Sacramento State University research biologist during summer and winter 1999 (Pers. comm. Hulst 2007).

Habitat Mapping

In December 2006, NRM Environmental Consulting (NRM) biologists conducted a reconnaissance-level survey of the Cullinan Ranch Site and Project Area. The purpose of this survey was to verify existing conditions and map habitat types on the Site and in the surrounding areas. Surveys were conducted on foot and by car and consisted of walking a portion of the levee system as well the interior lowland areas. Biologists mapped habitat types based on vegetative cover, observable hydrologic influence, and management goals (i.e. sensitive species habitat protection) as observable via aerial photograph. The final habitat classifications were based on mapping systems developed by Sawyer and Keeler-Wolf (1995) and Holland (1986). The following classifications characterize the current conditions at the Cullinan Ranch Site: emergent marsh, open water, remnant tidal and tidal marsh, seasonal wetland, and upland.

Following field surveys, the remainder of the Site was digitized utilizing aerial photo interpretation, using recent digital true color, ortho-rectified aerial photographs from August 2005 (USDA 2005) and compared against photographs from Department of Fish and Game aerial imagery of Napa Marsh from 2004. The seasonal difference in the two aerial photographs was helpful in delineating between the designated habitat classifications. Additional imagery available via Google Earth (www.googleearth.com) was utilized to provide visual comparison where the primary aerial photographs

were shadowed, blurred, or otherwise insufficient. Open water was outlined using the "drier" late season aerial photograph to create an accurate boundary of a perennial open water feature and not a result of winter/spring rains.

Limitations

Because of the size and extent of marshland cover within the Site and surrounding Project Area, biologists were not able to access the entire Cullinan Ranch Site and Project Area on foot. Therefore, mapping of vegetation communities and habitats was conducted by aerial photograph analysis in combination with ground truthing.

3.2.1 Existing Conditions

The Cullinan Ranch Site is located adjacent to the northern edge of San Pablo Bay within an area known as the San Pablo Baylands (Figure 3.2-1a). Similar to many of the former tidal marsh areas that have been isolated from tidal action, soil oxidation and the resulting compaction at the Cullinan Ranch Site have resulted in considerable reduction in surface elevation, a process known as subsidence. Currently, the Site is approximately 3-8 feet below sea level (Towill Incorporated 2000). Areas with reduced elevations such as those at the Cullinan Ranch Site tend to collect rain and stormwater runoff and over time begin to exhibit seasonal wetland characteristics. At the Cullinan Ranch Site, existing elevations are approximately 2.0 feet NGVD, which is well below intertidal marsh elevations (Moffat and Nichol, et. al. 2004).

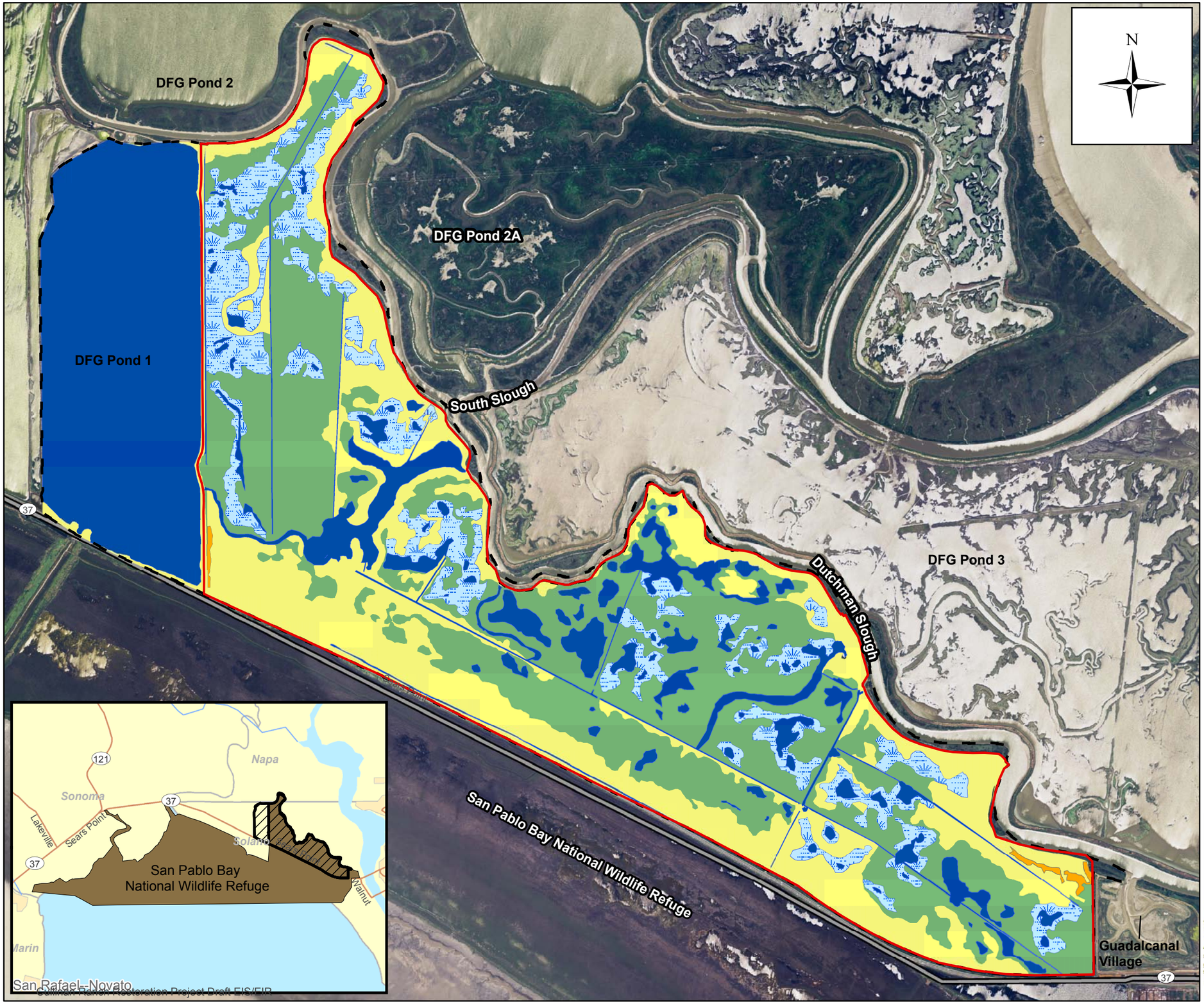
Historically, the Cullinan Ranch Site was utilized for agriculture, whereby rainwater was pumped off the Site for hay production. During this time, the Site exhibited upland characteristics until it was acquired by USFWS in 1994. Once acquired by USFWS, the practice of pumping rainwater ceased and freshwater seasonal wetlands became dominant. In 2006, the USFWS National Wetlands Inventory On-line Wetlands Mapper identified the Cullinan Ranch Site as Pf/u (palustrine farmed). Palustrine wetlands are classified as non-tidal wetlands dominated by trees, shrubs, emergent vegetation, mosses or lichens; or wetlands in tidal areas with salinity levels lower than 0.5 ppt. (Cowardin 1979).

In general, the Site currently consists of wetland communities, aquatic communities and upland communities. There are five habitat types within these three communities: emergent marsh, seasonal wetland, tidal marsh, open water, and upland habitats. Emergent marsh and seasonal wetland habitats are distributed throughout the interior of the Site. Upland ruderal habitat occurs at elevations above the edge of water and along the levee tops. Each of the habitat types and its relationship to the Cullinan Ranch Site is described in more detail below. Figure 3.2-1a depicts the distribution of these habitat types at the Cullinan Ranch Site. Tables B-1 and B-2 in Appendix B list the common plant and bird species observed at the Cullinan Ranch Site.

The surrounding Project Area also consists of wetland, aquatic and upland communities. The area known as CDFG Pond 1 supports intertidal and subtidal aquatic habitat. A restored (2001) tidal marsh known as the Guadalcanal Village is located directly east of the Cullinan Ranch Site. South of the Cullinan Ranch Site, across the Highway 37 levee, tidal marsh habitat stretches to the shoreline of San Pablo Bay. The exterior levee adjacent to Dutchman Slough, outside the Site, supports remnant tidal marsh vegetation, characterized by pickleweed and gumplant vegetation (Figure 3.2-1a).

Figure 3.2-1a

Existing Habitat Types in the Project Area



- Remnant Tidal Marsh
- Emergent Marsh
- Open Water
- Tidal Marsh
- Seasonal Wetland
- Upland
- Restoration Site
- Project Area

Approximate Habitat Acreages in the Cullinan Ranch Restoration Site*

Emergent Marsh	227
Open Water	172
Remnant Tidal Marsh	3
Seasonal Wetland	626
Tidal Marsh	5
Upland	495
Total	1528

* Habitats were mapped using aerial photo interpretation and minimal ground truthing, therefore acreages are an approximation. Wetland and water habitats were identified using hydrology and vegetation indicators only and are not meant to meet Corps delineation standards. Approximately 33 additional acres of remnant tidal marsh habitat, 11 acres of upland habitat, and 369 acres of open water habitat occur in the greater Project Area.

0 1,000 2,000 3,000 4,000 Feet

2/21/07

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Wetland Communities

Two types of wetland communities make up the majority of the land cover within the Cullinan Ranch Site: 626 acres of seasonal wetlands and 227 acres of emergent marsh (Figure 3.2-1a). A small area of tidal marsh habitat persists along the eastern boundary of the Site adjacent to the tidally influenced Guadalcanal Village. This five-acre area is dominated by pickleweed and saltgrass and is a result of tides overtopping the adjacent Guadalcanal Village levee since 2001 (Pers. comm. Block 2007).

Emergent Marsh Wetland

There are approximately 227 acres of emergent marsh wetlands within the Cullinan Ranch Site. Emergent marsh wetlands are perennial wetlands that support herbaceous emergent vegetation. The vegetation in this habitat type is characterized by bulrushes, Baltic rush, and cattail. Emergent marsh wetlands are distinguished from seasonal wetlands in that they are inundated for longer periods of time and support only obligate hydrophytic vegetation. Emergent marsh wetlands provide year-round habitat for migratory waterfowl, reptiles, and amphibians. However, no connectivity to tidal sloughs and anaerobic conditions of the marsh habitat within the Site do not provide suitable habitat for spawning fish.

Seasonal Wetland

There are approximately 626 acres of seasonal wetlands within the Cullinan Ranch Site. Seasonal wetlands are pools and depressions that occur within an upland land matrix and are seasonally inundated with rainwater or runoff. The vegetation in this habitat type is dominated by cattail, and also supports a mix of hydrophytic and upland species such as bulrush and saltgrass. Seasonal wetlands occur throughout the majority of the interior portion of the Site (Figure 3.2-1a). This habitat type is similar to the emergent marsh wetland habitat classification; however, it is inundated for shorter periods of time during the year, and is identified as a transitional zone between emergent marsh and upland habitat. Since the cessation of pumping for agricultural use, dense stands of cattails have rapidly expanded across seasonally inundated areas on the Cullinan Ranch Site. It is anticipated that this species will continue to encroach upon areas that support open water habitats up to five feet deep.

Borrow ditches adjacent to the Highway 37 levee were created during construction of the highway levee and now support seasonal wetland habitat and emergent wetland vegetation. Seasonal wetlands provide important foraging and resting opportunities for migratory waterfowl.

Tidal Marsh

There are approximately five acres of tidal marsh habitat in the eastern portion of the Site, adjacent to Dutchman Slough and Guadalcanal Village, which is probably a result of tidal or brackish water overflow from the tidally influenced Guadalcanal Village. There are an additional three acres of remnant tidal marsh habitat within the Site located adjacent to Dutchman Slough (Figure 3.2-1a). The vegetation in this habitat type is characterized by pickleweed and saltgrass. These small areas of tidal marsh habitat occur between mean high water (MHW) and mean higher high water (MHHW). Dominant halophytic vegetation includes pickleweed, marsh gumplant, and saltgrass.

There are approximately 33 additional acres of remnant tidal marsh habitat located in the surrounding Project Area (north of the Site) at the base of the outer levee slopes along Dutchman Slough and South Slough.

Additional tidal marsh habitat occurs south of the Cullinan Ranch Site and the Project Area, across the Highway 37 levee. Expanses of tidal marsh extend from the highway south to the shores of the San Pablo

Bay. Natural channel formations are absent from these expansive tidal marsh areas due to the rapid expansion of these marshlands during the last century. Guadalcanal Village, a restoration project created to compensate for wetland impacts associated with Caltrans projects in the vicinity, has reached marsh plain elevations and currently functions as a self sustaining tidal marsh (Bias, M. & Turner, K. et. al. 2005 and Pers. comm. Woo 2007).

Tidal marsh wetlands provide nutrients and organic matter for the mudflats of the San Pablo Bay ecosystem. This habitat provides food, cover, and breeding habitat for many wetland-dependent wildlife species, including the special status salt marsh harvest mouse, California clapper rail, California black rail, salt marsh bird's beak and Mason's lilaeopsis.

Aquatic Communities

Open water habitats. Antecedent channel networks or ditches are still evident and can be easily identified in air photos of the Cullinan Ranch Site. Open-water freshwater habitats, including freshwater marsh habitats, occur in the interior portion of the Site during the rainy season, and adjacent to Highway 37 in the borrow ditches. The ditches throughout the Site contain deep, stagnant freshwater, which do not support special status fish. Open salt water, or brackish habitats occur in Dutchman and South Sloughs adjacent to the Site and within the Project Area. Open-water habitats provide foraging and roosting habitat for numerous species of wildlife, including mallard, cinnamon teal, great blue heron, snowy egret, and American coot.

Subtidal Aquatic Habitat Although this habitat type is not present within the Cullinan Ranch Site, it occurs within the Project Area in tidally influenced Dutchman and South Sloughs. Subtidal habitat is deep enough that its substrate is submerged even during low tide events. Benthic organisms such as worms and clams typically occur in the soft muddy bottom of subtidal habitats. Fish species, waterfowl and diving ducks are also typical users of subtidal aquatic habitat for foraging.

Intertidal Aquatic Habitat The CDFG Pond 1 is located in the Project Area just west of the Cullinan Ranch Site. Pond 1 supports open water or intertidal aquatic habitat that is inundated during high tides, depending on the CDFG management pattern. Pond 1 is currently a combination of intertidal habitat and open water. Intertidal habitats exhibit exposed mudflats twice daily during low tides. When exposed or covered by shallow water, mudflats provide important foraging and roosting areas for resident and migrant shorebirds, wading birds, and gulls.

Upland Communities

In its past use for agricultural hay production, the Cullinan Ranch Site primarily exhibited upland characteristics. Currently, only the inboard levee slopes and the tops of the levees support upland habitat at the Cullinan Ranch Site.

Ruderal Upland Habitat Ruderal upland habitat at the Cullinan Ranch Site is characterized by non-native vegetation: mustard, wild fennel, poison hemlock and annual grasses. The native scrub plant coyote brush also occurs in the ruderal upland habitat. The abundance and distribution of invasive non-native vegetation has increased significantly over the past five years (Pers. comm. Block 2007).

In general, ruderal uplands provide habitat for raptors, owls, sparrows, and mammals including raccoons, rabbits, ground squirrels, mice, and rats. Ruderal habitat within the Site and surrounding Project Area

provides foraging, roosting and nesting habitat for short eared owls, northern harriers, and white-tailed kites. In addition, upland habitat on levee tops adjacent to tidal marshes provides important refuge for marsh species during extreme high tide events.

Figure 3.2-1b

Pampas Grass Populations Present in the Project Area.

Pampas grass
Restoration Site
Project Area

Data Source: USGS 2006 survey data

0 1,000 2,000 3,000 4,000 Feet

2/21/06

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Invasive Species

Invasive species in and around the Cullinan Ranch Site are located along levee roads, trails, and adjacent to drainages. Common non-native species in the Site include fennel, perennial peppergrass, New Zealand spinach, common wild radish, and pampas grass.

Of particular concern is the spread of pampas grass within the Site. A 2006 survey conducted by USFWS mapped 45 patches of pampas grass within the Cullinan Ranch Site (Figure 3.2-1b). These populations are concentrated in the northwestern and southeastern corners of the Site, with outlier individual populations scattered throughout the Site, primarily along drainages.

Perennial pepperweed is another invasive species of particular concern due to its dominance in the vicinity of the Sonoma Creek Bridge along Highway 37. Both of these species have the potential to spread rapidly, choking out native plant species.

3.2.2 Regulatory Setting

Federal Endangered Species Act

The federal Endangered Species Act (ESA) of 1973 protects fish and wildlife species that have been identified by the USFWS and/or the National Oceanic and Atmospheric Administration (NOAA) as threatened or endangered. The term "endangered" refers to species, subspecies, or distinct population segments that are in danger of extinction through all or a significant portion of their range; threatened refers to species, subspecies, or distinct population segments that are likely to become endangered in the near future.

The ESA is administered by the USFWS and NOAA. In general, NOAA is responsible for protection of ESA-listed marine species and anadromous fish while other listed species are under the jurisdiction of the USFWS. The following specific provisions of the ESA apply to the Proposed Action.

Section 9, Prohibition of Take Section 9 of the ESA prohibits the "take" of any fish or wildlife species listed under the ESA as endangered. "Take" of threatened species is also prohibited under Section 9 unless otherwise authorized by federal regulations. "Take," as defined by the ESA, means "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct." Harm is defined as "any act that kills or injures the species, including significant habitat modification." In addition, Section 9 prohibits removing, digging up, cutting, and maliciously damaging or destroying federally listed plants that may occur at Sites under federal jurisdiction, such as the Cullinan Ranch Site.

Section 7, Consultation and Authorization of Take Section 7 of the ESA provides a means for authorizing take of threatened and endangered species by federal agencies. It applies to actions that are conducted, permitted, or funded by a federal agency. Under Section 7, the federal agency conducting, funding, or permitting an action (the lead agency) must consult with USFWS or NOAA, as appropriate, to ensure that the proposed action will not jeopardize endangered or threatened species or destroy or adversely modify designated critical habitat. If a proposed project "may affect" a listed species or designated critical habitat, the lead agency is required to prepare a biological assessment (BA) evaluating the nature and severity of the expected effect. In response, USFWS or NOAA issues a biological opinion with a determination of one of the following findings.

The proposed action may:

- either jeopardize the continued existence of one or more listed species (jeopardy finding),
- result in the destruction or adverse modification of critical habitat (adverse modification finding),
- will not jeopardize the continued existence of any listed species (no jeopardy finding), or
- result in adverse modification of critical habitat (no adverse modification finding).

The BO issued by USFWS or NOAA may stipulate discretionary "reasonable and prudent" conservation measures. If the Proposed Action under review would not jeopardize a listed species, USFWS or NOAA would issue an incidental take statement to authorize the proposed activity.

The USFWS San Pablo Bay National Wildlife Refuge (Refuge) would implement the Proposed Action. Staff at the Refuge would consult with staff at the USFWS Ecological Services Division and NOAA Fisheries to complete an internal project review process pursuant to Section 7 of the Endangered Species Act. The outcome of the Section 7 process will be a Biological Opinion, as discussed above.

Federal Clean Water Act

The federal Clean Water Act (CWA) is the primary federal law protecting the quality of the nation's surface waters, including lakes, rivers, and coastal wetlands. As such, it empowers the United States Environmental Protection Agency (EPA) to set national water quality standards and effluent limitations and establishes permit review mechanisms to enforce them, operating on the principle that all discharges into the nation's waters are unlawful unless specifically authorized by a permit.

Most of the CWA's provisions are at least indirectly relevant to the management and protection of biological resources because of the link between water quality and ecosystem health. The portions of the CWA that are most directly relevant to biological resources management are contained in CWA Section 404, which regulates the discharge of dredged and fill materials into "waters of the United States," including all areas within the ordinary high water mark of a stream, including non-perennial streams with a defined bed and bank and any stream channel that conveys natural runoff, even if it has been realigned; and seasonal and perennial wetlands, such as those present at the Cullinan Ranch Site.

Wetlands are defined for regulatory purposes as areas "inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions" (33 CFR 328.3, 40 CFR 230.3). CWA Section 404 requires project proponents to obtain a permit from the U.S. Army Corps of Engineers (Corps) for all discharges of dredged or fill material into waters of the United States, including oceans, bays, rivers, streams, lakes, ponds, and wetlands, before proceeding with a proposed activity. The Corps may issue either an individual permit evaluated on a case-by-case basis, or a general permit evaluated at a program level for a series of related activities. General permits are preauthorized and are issued to cover multiple instances of similar activities expected to cause only minimal adverse environmental effects. Nationwide Permits (NWPs) are a type of general permit issued to cover particular fill activities. Each NWP specifies particular conditions that must be met in order for the NWP to apply to a particular project. Waters of the United States both at the Cullinan Ranch Site and within its vicinity are under the jurisdiction of the Corps.

Compliance with CWA Section 404 requires compliance with several other environmental laws and regulations, including NEPA, the ESA, the federal Coastal Zone Management Act, and the National Historic Preservation Act. In addition, the Corps cannot issue or verify any permit until a water quality

certification, or waiver of certification, has been issued (by the State Regional Water Quality Control Board) pursuant to CWA Section 401. Section 404 permits may be issued only for the least environmentally damaging practicable alternative. That is, authorization of a proposed discharge is prohibited if there is a practicable alternative that would have less adverse impacts and lacks other significant adverse consequences.

Magnuson-Stevens Fishery Conservation and Management Act

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

The Magnuson-Stevens Act states that consultation regarding EFH should be consolidated, where appropriate, with the interagency consultation, coordination, and environmental review procedures required by other federal statutes, such as NEPA, CWA, and ESA. Essential fish habitat consultation requirements can be satisfied through concurrent environmental compliance requirements if the lead agency provides NOAA Fisheries with timely notification of actions that may adversely affect EFH and if the notification meets the requirements for EFH assessments.

Refuge staff will coordinate with NOAA Fisheries pursuant to the Magnuson-Stevens Act concurrent with the Section 7 consultation process described above.

Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA) (16 USC 703) enacts the provisions of treaties between the United States, Great Britain, Mexico, Japan, and the Soviet Union and authorizes the U.S. Secretary of the Interior to protect and regulate the taking of migratory birds. It establishes seasons and bag limits for hunted species and protects migratory birds, their occupied nests, and their eggs (16 USC 703, 50 CFR 21, 50 CFR 10). Most actions that result in taking or in permanent or temporary possession of a protected species constitute violations of the MBTA. Examples of permitted actions that do not violate the MBTA include: the possession of a hunting license to pursue specific game birds; legitimate research activities; display in zoological gardens; bird-banding; and other similar activities (Faanes et al. 1992). USFWS is responsible for overseeing compliance with the MBTA.

State Endangered Species Act

The California Endangered Species Act (CESA), which is administered by the California Department of Fish and Game (DFG), protects wildlife and plants listed as threatened and endangered by the California Fish and Game Commission. CESA prohibits all persons from taking species that are state-listed as threatened or endangered except under certain circumstances. The CESA defines "take" as any action or attempt to "hunt, pursue, catch, capture, or kill" a listed species.

Section 2081 of the CESA provides a means by which agencies or individuals may obtain authorization for incidental take of state-listed species, except for certain species designated as "fully protected" under the California Fish and Game Code (see below). Under Section 2081, a take must be incidental to, and not the purpose of, an otherwise lawful activity. Requirements for a Section 2081 permit are similar to those used in the ESA Section 7 process. In general, the requirements include identification of impacts on listed species; development of mitigation measures that minimize and fully mitigate impacts; development of a monitoring plan; and assurance of funding to implement mitigation and monitoring.

California Fish and Game Code

The California Fish and Game Code (Code) provides a variety of species protection from unauthorized take. The Code defines "take" as "hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill." Certain species are considered fully protected, meaning that the Code explicitly prohibits all take of individuals of these species, except for take required for scientific research, which may be authorized by the DFG. Section 5050 of the Code lists fully protected amphibians and reptiles, Section 5515 lists fully protected fishes, Section 3511 lists fully protected birds, and Section 4700 lists fully protected mammals.

The Code provides less stringent protection for other species, prohibiting most take, but permitting DFG to issue regulations authorizing take under certain circumstances. Eggs and nests of all birds are protected under Section 3503, nesting birds (including raptors and passerines) are protected under Sections 3513 and 3503.5, birds of prey are protected under Section 3503.5, migratory non-game birds are protected under Section 3800, and other specified birds are protected under Section 3505.

Lake or Streambed Alteration Agreements (Section 1600 et seq.)

Section 1600 regulates activities that interfere with the natural flow of, or substantially alter the channel, bed, or bank of a lake, river, or stream. Lake and streambed alteration activities are covered under Section 1601 for public agencies and Section 1603 for private parties. Requirements to protect the integrity of biological resources and water quality are often conditions of streambed alteration agreements administered under Section 1600 et seq.

California Native Plant Protection Act

The California Native Plant Protection Act (CNPPA) of 1977 prohibits importation of rare and endangered plants into California; unauthorized take of rare and endangered plants; and sale of rare and endangered plants (the "threatened " category replaced "rare" when the CESA was enacted in 1984). CESA defers to the CNPPA, which ensures that state-listed plant species are protected when state agencies are involved in projects subject to CEQA. Removal of plants for performance of a public service by a public agency or a publicly or privately owned public utility is exempt from CNPPA.

Porter-Cologne Water Quality Control Act

The Porter-Cologne Water Quality Control Act (PCWQCA) established State Water Resources Control Board (SWRCB) and divided the state into nine regional basins, each of is under the jurisdiction of Regional Water Quality Control Boards (RWQCBs). The PCWQCA authorizes the SWRCB to draft state policies regarding water quality. Additionally, the PCWQCA requires the SWRCB to issue Waste Discharge Requirements (WDR) for discharges into state-controlled waters. The PCWQCA also requires the SWRCB or the RWQCB to adopt water quality control plans, or Basin Plans, for the protection of water quality. A Basin Plan must identify the beneficial uses of water to be protected, establish water quality objectives for the reasonable protection of the beneficial uses, and establish a program of

implementation for achieving the water quality objectives. Furthermore, the Basin Plans also provide a technical basis for determining WDR's, justification for enforcement actions, and evaluating clean water grant proposals (Jones & Stokes 2003). The Cullinan Ranch Site falls within the jurisdiction of the San Francisco Bay RWQCB (SFRWQCB). The most recent Basin Plan for the San Francisco Bay region was adopted by the SFRWQCB in May 1995.

The SWRCB and the San Francisco Bay RWQCB have taken the position that the Porter-Cologne Act and basin plans developed pursuant to the Act provide independent authority to regulate discharge of fill material to wetlands outside the jurisdiction of Corps. This applies specifically to isolated wetlands considered non-jurisdictional based on the Solid Waste Agency of Northern Cook County (SWANCC) v. United States Army Corps of Engineers (9121 S.CT. 675, 2001) decision, which limited the Corps's jurisdiction over isolated wetlands.

3.2.3 Special Status Species

For the purpose of this document, special-status species are plants and wildlife that are legally protected under the federal ESA, CESA, or other regulations and species considered sufficiently rare by the scientific community to qualify for such listing. Special status species include:

- species that are listed or proposed for listing as threatened or endangered under the ESA (50 CFR 17.12 for listed plants, 50 CFR 17.11 for listed animals, and various notices in the Federal Register for proposed species);
- species that are candidates for possible future listing as threatened or endangered under ESA (64 FR 57534, October 25, 1999);
- species that are listed or proposed for listing by the State of California as threatened or endangered under CESA (14 CCR 670.5);
- plants listed as rare under the California Native Plant Protection Act of 1977 (California Fish and Game Code, Section 1900 et seq);
- plants considered by the California Native Plant Society (CNPS) to be "rare, threatened, or endangered in California";
- species that meet the definitions of rare or endangered under CEQA (State CEQA Guidelines, Section 15380);
- animals fully protected in California (California Fish and Game Code, Section 3511 [birds], 4700 [mammals], and 5050 [reptiles and amphibians]); and
- nesting raptors protected in California (California Fish and Game Code, Section 3503.5)

Special status plants and animals that have the potential to occur at the Cullinan Ranch Site are listed in Table B-3 found in Appendix B. The USFWS species list for the Cuttings Wharf Quadrangle is also provided in Appendix B (USFWS 2007). Figures 3.2-2a and 3.2-2b depict special status species occurrence data from the California Department of Fish and Game's California Natural Diversity Database (CNDDB 2007) for the Cuttings Wharf 7.5-minute USGS quadrangle and the eight surrounding quadrangles.

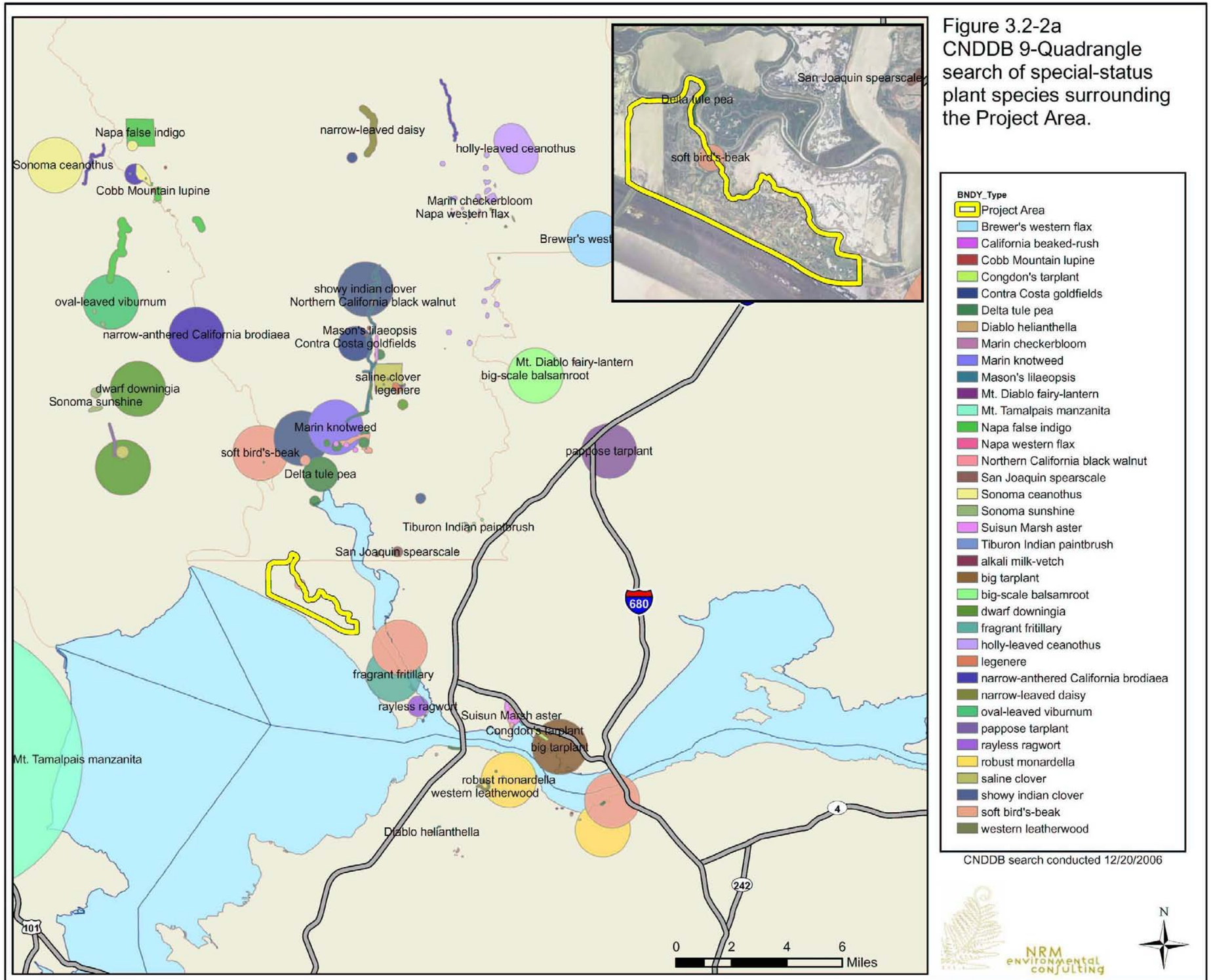

Figure 3.2-2a
CNDDB 9-Quadrangle search of special-status plant species surrounding the Project Area.

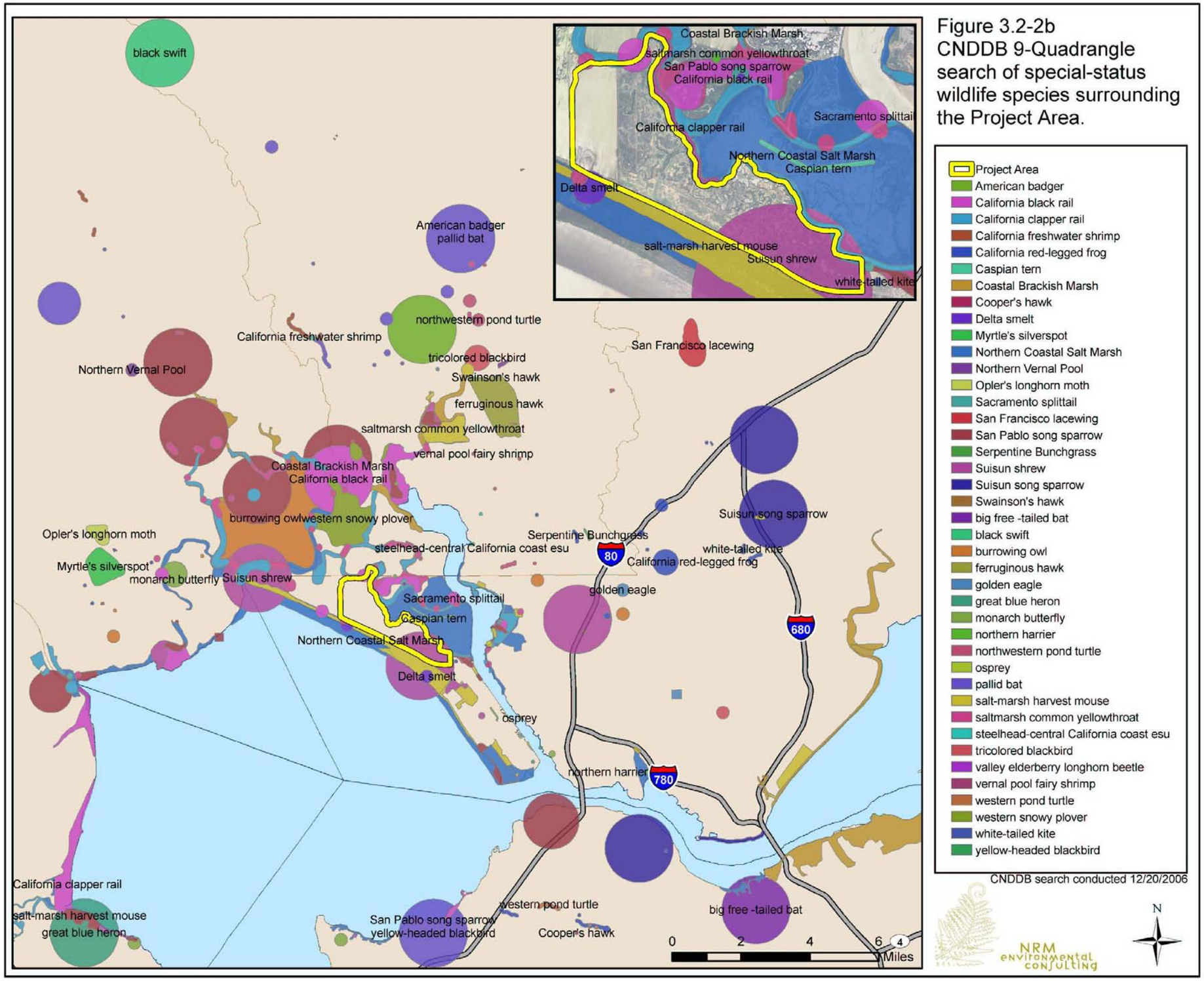

Figure 3.2-2b
CNDDB 9-Quadrangle search of special-status wildlife species surrounding the Project Area.

- Project Area
- American badger
- California black rail
- California clapper rail
- California freshwater shrimp
- California red-legged frog
- Caspian tern
- Coastal Brackish Marsh
- Cooper's hawk
- Delta smelt
- Myrtle's silverspot
- Northern Coastal Salt Marsh
- Northern Vernal Pool
- Opler's longhorn moth
- Sacramento splittail
- San Francisco lacewing
- San Pablo song sparrow
- Serpentine Bunchgrass
- Suisun shrew
- Suisun song sparrow
- Swainson's hawk
- big free -tailed bat
- black swift
- burrowing owl
- ferruginous hawk
- golden eagle
- great blue heron
- monarch butterfly
- northern harrier
- northwestern pond turtle
- osprey
- pallid bat
- salt-marsh harvest mouse
- saltmarsh common yellowthroat
- steelhead-central California coast esu
- tricolored blackbird
- valley elderberry longhorn beetle
- vernal pool fairy shrimp
- western pond turtle
- western snowy plover
- white-tailed kite
- yellow-headed blackbird

CNDDB search conducted 12/20/2006

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Special Status Plants

Suitable habitat for special status plants occurs in the tidal marsh (and remnant tidal marsh) habitats located along the northern perimeter of the Cullinan Ranch Site and in the 33acres in the surrounding Project Area. Special status species that could occur in these areas include soft bird's beak, Delta tule pea, Mason's lilaeopsis, Marin knotweed, California cord grass, Suisun marsh aster, and San Joaquin spearscale. Two special-status plant species are known from the Project Area: soft bird's-beak and Delta tule pea (CNDDB 2007). Soft bird's beak was recorded from the Site and the surrounding Project Area in 1982 (CNDDB 2007). Delta tule pea was recorded in the Project Area along the northern boundary of the Site in 1983 (CNDDB 2007) (Figure 3.2-2a). However, subsequent surveys for Delta tule pea have not located this species at the previously recorded site. In 2005 a species similar to Delta tule pea was observed in large numbers from the same area (Email correspondence Barson 2005). Though a small amount of suitable habitat for special status plants is currently present, previous disturbance to the Site (agricultural use until 1994) and a lack of tidal influence, result in a low potential that special-status plant populations persist in the Site.

Special Status Wildlife

The Cullinan Ranch Site and surrounding area have the potential to support habitat for 31 special status wildlife species (Table B-3). Anadromous salmonids, Delta smelt and Sacramento splittail have all been recorded in surrounding areas (CNDDB 2007, Figure 3.2-2b); however the aquatic conditions within the Site are currently not suitable for these species. Similarly, the tidewater goby is a federally endangered species once known from the area but because of current conditions, no longer believed to occur in the Site. Salmonids including Central Valley steelhead, Central California coastal steelhead, winter-run and Central Valley spring-run chinook salmon, and Central California coast coho salmon, which are federally-listed species, have potential to occur within in South Slough and Dutchman Slough. Additionally, San Pablo Bay is a critically designated habitat for winter-run Chinook salmon and Central California coast steelhead. The delta smelt, listed as federally threatened has been found in the Mare Island Strait and the San Pablo Bay during surveys performed in 2006 (CDFG 2006). Though suitable habitat for special status fish does not occur in the Cullinan Ranch Site, restoration of tidal influence would result in the creation of suitable habitat for these special status fish.

There is low potential for California red-legged frog to occur in the Site. USGS conducted a survey for amphibians in 1990, at which time no red-legged frogs were detected (Pers. comm. Block 2007). Amphibian surveys conducted in 1998 detected three pacific tree frogs (Jones & Stokes 2004). The closest CNDDB record occurrence for California red-legged frog is located approximately seven miles east of the Site; however there is no hydrologic connection between this occurrence and the Site (CNDDB 2007). There is suitable habitat for the special status northwestern pond turtle within Cullinan Ranch. The closest CNDDB record for this species is approximately six miles north of the Site (CNDDB 2007).

There is suitable habitat and moderate to high potential for 20 special status birds, of which 13 have been observed within or adjacent to the Cullinan Ranch Site. As described in Table B-3 (Appendix B), the California clapper rail is a federally- and state-listed endangered species with a low potential for occurrence within the Cullinan Ranch Site. There is low quality habitat for this species along the outboard levees of Cullinan Ranch bordering the Dutchman and South Slough levees; and limited moderate habitat available for this species near Pond 2A. Biologists have conducted clapper rail surveys along the northern border of the Cullinan Ranch Site, in Pritchett Marsh and in Sonoma Creek. During these surveys USFWS biologists recorded Virginia rails, California black rails and sora rails in tidal marsh habitats bordering Cullinan Ranch and CDFG ponds along Dutchman and South Sloughs. Clapper rails were detected by Avocet Research Associates in Pritchett Marsh during 1999, 2001 and 2002; and

both clapper rails and black rails in Sonoma Creek during 1999, 2000 and 2001 surveys. However, other than one incidental occurrence in 2001, clapper rails have not been detected in the Site during any of the surveys (Pers. Comm. Block 2007 and Herzog, et. al. 2004 and Liu, et. al. 2006). Other nearby occurrences of California clapper rail detections are on Skaggs Island from 1993 and Mare Island from 1996 (CNDDB 2007).

The California black rail is a federal species of concern and a state-listed threatened species with a high potential to occur within the suitable habitats in and adjacent to the Cullinan Ranch Site. As mentioned above, this species has been detected in marsh habitats bordering the Site and in Sonoma Creek. Raptors, including short-eared owl, white-tailed kite and northern harrier, have been observed foraging in the upland and seasonal wetland habitats within the Cullinan Ranch Site and suitable nesting habitat for these species is present (Pers. comm. Block 2007). The San Pablo song sparrow is both a federal and state species of concern with a high potential to occur within the habitats present at the Cullinan Ranch Site.

There is moderate potential for five special status bat species, but no surveys have been conducted within the Site, but a few have been observed in the region (Figure 3.2-2b). The Site contains suitable habitat for the Suisun ornate shrew, which has also been recorded from the area (CNDDB 2007). Suitable habitat for the federally endangered salt marsh harvest mouse is present within the approximately eight acres of pickleweed habitat (remnant tidal marsh and tidal marsh habitat) in the Site. Suitable habitat also occurs outside the Site within the Project Area adjacent to Dutchman and South Sloughs. The species was last recorded within the remnant tidal marsh habitats on the outboard levees of the Dutchman and South Sloughs in 1999 (CNDDB 2007 and Pers. comm. Hulst 2007). The salt marsh harvest mouse is a federally-listed and state-listed species that is included as a "fully protected" species in the California Fish and Game Code.

3.2.4 Environmental Consequences and Mitigation Measures

Methodology

Direct effects on existing biological resources were evaluated by comparing the quantity and quality of habitats present at the Cullinan Ranch Site under baseline conditions with the anticipated condition of the resources after implementation of the Proposed Action. Also considered were the anticipated conditions of the Site soon after implementation of the Proposed Action and the condition that will occur when tidal marsh elevations are attained and the Cullinan Ranch Site has taken on characteristics of a fully functioning tidal marsh. A primary assumption used in the evaluation of adverse effects was that tidal marsh elevations and habitat characteristics would dominate the Cullinan Ranch Site within 70-100 years of initiation of the Proposed Action. Predictions of future conditions are largely based on approximate rates of sediment accumulation, channel formation, and colonization by tidal marsh vegetation. The actual rate at which tidal wetland habitats would evolve is somewhat speculative because of the uncertainties regarding the function and interaction of the parameters in a tidal system.

For this evaluation, biological resources associated with the Cullinan Ranch Site are presumed to be affected if the quantity or quality of a given habitat would be substantially changed or permanently lost either immediately after the Proposed Action is implemented or when the tidal marsh condition is achieved. Direct impacts on individual species were assessed based on the potential for the species to be disturbed during implementation of the proposed alternatives, (i.e., noise associated with operation of construction equipment).

Significance Criteria

The following significance criteria were used to evaluate the proposed alternatives. The proposed alternatives would adversely affect biological resources at the Cullinan Ranch Site if they would:

- Cause the substantial loss of the population of a federally- or state-listed, proposed, or candidate species, either through direct or indirect loss, as a result of modification of the breeding or foraging habitat of such a species resulting in increased mortality or decreased reproductive success;
- Cause the substantial loss or long-term degradation of any environmentally sensitive habitat;
- Cause a substantial disturbance to wildlife species resulting from human activities;
- Result in avoidance by wildlife of biologically important habitat for substantial periods, which may increase mortality or reduce reproductive success;
- Interfere with the movement of any resident or migratory fish or wildlife species;
- Cause a change in species distribution or abundance of a sensitive community; or
- Cause a change in local and regional distribution and extent of the biological resource.

Project alternatives were considered to have a beneficial impact if implementation would result in an increase in the quantity or quality of habitat that supports special status species or sensitive biological resources.

Environmental Effects of the No-Action Alternative

BIO-1. Implementation of the No-Action Alternative could result in Potentially Adverse Effects on Biological Resources

Under the No-Action Alternative, restoration of the Cullinan Ranch Site would not be undertaken by the lead agencies, and the Site would remain in its current state, which is devoid of tidal influence. In its current condition, there is a high likelihood that non-native, invasive plant populations, including populations of pampas grass and perennial pepperweed, would continue to expand, outcompeting native species and decreasing habitat value for special status species at the Site. It is possible that the cattail vegetation that occurs at the Cullinan Ranch Site would continue to dominate and choke the seasonal wetland habitat, thereby eliminating valuable open water habitat. Open water provides habitat for over-wintering, migrating and roosting waterfowl. Foraging and roosting opportunities for migrating or wintering waterfowl would be substantially reduced over time by encroachment of the existing vegetation unless the Site was managed to maintain open water areas.

Under this alternative, the USFWS would be required to maintain the Dutchman Slough levee in perpetuity to prevent flooding of Highway 37. As the levees age and further erode, levee maintenance activities, such as armoring to prevent levee failure, would need to be implemented. Such activities could cause periodic, short-term disturbances to existing habitats at the Site as well as remove segments of remnant tidal marsh. However, the disturbances would not differ from those that currently occur during existing levee maintenance activities. ***Less-than-significant impact.***

Environmental Effects of the Preferred Restoration Alternative

BIO-2. Implementation of the Preferred Restoration Alternative would result in the Temporary Disturbance to, and short-term loss of, Intertidal Mudflats within CDFG Pond 1

In conjunction with the Napa-Sonoma Salt Marsh Restoration Project (NSRP), implementation of the Preferred Restoration Alternative would involve augmentation of the existing levee that separates Cullinan Ranch from CDFG Pond 1. The CDFG Pond 1 levee in its current condition may not be strong enough to withstand the erosional forces that would occur at the Cullinan Ranch Site after implementation of the Proposed Action. Under the Preferred Restoration Alternative, a portion of Pond 1 would be dredged, which would generate soil material that would be used to flatten out or reduce the overall slope of the existing levee and fill in the eastern borrow ditch adjacent to the levee. Dredging activities are anticipated to occur during the summer construction season and would last for approximately one month, during which time dredging equipment and construction crews would be present. Pond 1 is managed by CDFG as open water with some intertidal habitat. Over time the pond has silted in, causing water management to become problematic. The dredging operation would install channels within Pond 1 to facilitate water management. A main channel will be dredged connecting the intake structure at the south end of the pond to a pump station at the north end of the pond, a distance of approximately 6,000 feet. Two smaller channels will connect the main channel to two new water control structures between Pond 1 and Cullinan Ranch. These smaller channels would total approximately 6,000 feet in length. A portion of the channels would cut through what is sometimes managed as intertidal mudflat, resulting in a conversion of intertidal mudflat to open water habitat. The open water habitat created by the dredging will fill in once again over time. Disturbance to intertidal mudflats during dredging, and loss of intertidal mudflats for some period of time after dredging has concluded is not considered to be an adverse effect because only a small area will be disturbed and for a short duration. In addition, the new channels would increase water movement within Pond 1 without increasing the overall elevation of the water surface. The creation of the new channels in Pond 1 is anticipated to increase the amount of intertidal habitat currently available in Pond 1. ***Less-than-significant impact.***

BIO-3. Implementation of the Preferred Restoration Alternative could result in the Temporary Loss of Salt Marsh Harvest Mouse Habitat and Potential Mortality of Individual Salt Marsh Harvest Mice

Habitat for the salt marsh harvest mouse within the Cullinan Ranch Site occurs in the three-acre area of tidal marsh habitat with pickleweed vegetation on the eastern boundary of the Site adjacent to Dutchman Slough and Guadalcanal Village, in the two-acre area of remnant tidal marsh adjacent to the Pond 1 levee and in the 33 acres of remnant tidal marsh areas along the outboard levees of Dutchman and South Sloughs (Figure 3.2.-1a). Implementation of the proposed breaches along the Dutchman and South Slough levees would result in the temporary loss of remnant tidal marsh habitat present on the outboard levees, and could potentially result in direct mortality of salt marsh harvest mice if they were to be present in the remnant tidal marsh habitat within the Site at the time the proposed breaches were implemented. Although the temporary loss of tidal marsh habitat during breaching would be off-set through the overall creation of 1,525 acres of suitable tidal marsh habitat, the potential for loss of the existing habitat and direct mortality of individual members of the species would constitute an adverse effect. To

minimize this effect, the following mitigation measure shall be implemented. ***Less-than-significant impact, with implementation of mitigation.***

Mitigation Measure BIO-3.1: Remove Salt Marsh Harvest Mouse Habitat and Place Barrier Fencing in Buttress Levee Construction Area. USFWS will, as part of their annual salt marsh harvest mouse (SMHM) monitoring, trap the tidal marsh areas within the project area where the levee will be constructed to determine presence or absence of SMHM. The areas containing pickleweed will be fenced prior to monitoring and if mice are found they will be moved to adjacent available habitat out of the project area. A bobcat front loader and weed eaters will be used to remove pickleweed vegetation (sod) from the Site and re-plant pickleweed sod onto newly constructed and lowered levee sections. Transplanting pickleweed sod was successfully implemented on the Tubbs Setback restoration project where the sod sites contributed the greatest number of native salt marsh-associated species, plant biomass, and cover of litter and wrack relative to other plot type sites (Downard, et.al. 2003). The barrier fencing around the construction areas will be left in place prior to implementation of the Proposed Action. Installation of fencing will prevent re-entry into the construction area from adjacent tidal marsh habitat. Prior to construction, the UFWS and CDFG will consult to evaluate these and any other appropriate mitigation methods for avoiding mortality of salt marsh harvest mice.

Mitigation Measure BIO-3.2: Slow Flood-up of Cullinan Ranch. Prior to breaching the South and Dutchman Slough levees, the Cullinan Ranch Site will be slowly flooded to capacity, in stages, using water from the CDFG Pond 1 via the water control structures. This slow, staged procedure will allow the movement of the majority of mammals out of the area into adjacent tidal marsh and areas within Guadalcanal without being forced, en masse, onto Highway 37.

BIO-4. Implementation of the Preferred Restoration Alternative could Disturb California Clapper Rails and Black Rails

California clapper rails and black rails may be present while construction activities are taking place along the outboard levees of Dutchman and South Sloughs. Individuals of the species, including nesting young and nest eggs, could be directly harmed by noisy construction equipment or by removal of suitable habitat along the outboard levees. Disturbance of these species through either construction equipment noise or direct removal of suitable habitat would constitute an adverse effect. To minimize this effect, the following mitigation measure shall be implemented. ***Less-than-significant impact, with implementation of mitigation.***

Mitigation Measure BIO-4.1: Avoid Disturbance to California Clapper Rail and Black Rail Habitat During their Breeding Period. Construction within tidal marsh habitat along Dutchman and South Sloughs shall not occur during the nesting season for both species from February 1st to July 31st. If construction must occur during this period, pre-construction surveys shall be performed by a qualified biologist in coordination with the USFWS and CDFG. Surveys will be based on USFWS-approved survey methodology and will result in a determination of the presence or absence of rails in or within 250 feet of the construction area. If rails are determined to be present, coordination with the USFWS will be initiated to determine what, if any, additional mitigation measures may be required to allow construction to proceed.

BIO-5. Implementation of the Preferred Restoration Alternative could Disturb San Pablo Song Sparrow and Result in Abandoned Nests and Mortality of Young

If the San Pablo song sparrow is present within or adjacent to areas near the proposed breach locations, individual members of the species could be directly harmed when the levee breaches are implemented. Furthermore, nesting habitat could be destroyed, or nesting young could be killed by construction equipment during proposed restoration activities at the Site. The loss or removal of suitable habitat or direct mortality of individuals of this species would constitute an adverse effect. To minimize this effect, the following mitigation measure shall be implemented. ***Less-than-significant impact, with implementation of mitigation.***

Mitigation Measure BIO-5.1: Locate and Avoid San Pablo Song Sparrow Habitats and Nests at the Cullinan Ranch Site. Pre-construction surveys to identify the locations of San Pablo song sparrow habitat shall be conducted by a qualified biologist in coordination with the USFWS and CDFG. If San Pablo song sparrow nests are identified on the Cullinan Ranch Site, the nest locations shall be mapped and nesting territories shall be estimated. Pre-construction survey results shall be submitted to USFWS and CDFG prior to initiation of construction activities. If active breeding is not observed within 250 feet of proposed construction activities, construction may proceed. If active breeding territories are recorded, USFWS and the CDFG shall determine if further mitigation measures to avoid or reduce potential mortality of this species are required.

BIO-6. Implementation of the Preferred Restoration Alternative could result in Construction-Related Mortality of Salmonids and other Special Status Fish

As described in Table B-3 (Appendix B), salmonid species, including Central Valley steelhead, Central California coastal steelhead, winter-run and Central Valley spring-run chinook salmon, and Central California coast coho salmon, which are federally-listed species, have the potential to occur within South and Dutchman Sloughs. Additionally, San Pablo Bay is critically designated habitat for winter-run chinook salmon and Central California coast steelhead. As described below under BIO-15, the Proposed Action would eventually restore tidal connectivity with San Pablo Bay and increase available suitable habitat for special status fish. However, if these special status fish species are present in the slough channels during implementation of the proposed west-side breaches, direct mortality of individuals of this species could occur. The modification or removal of suitable habitat or direct mortality of individuals of this species would constitute an adverse effect. To minimize this effect, the following mitigation measure shall be implemented. ***Less-than-significant impact, with implementation of mitigation.***

Mitigation Measure BIO-6.1: Avoid Construction that Could Affect Tidal Aquatic Habitats when Salmonid Species are Known to Occur. Construction activities that could affect tidal aquatic habitats within Dutchman and South Sloughs shall not take place during periods when salmon species could be present, including migration periods. If construction activities must occur during periods when salmon species could be present, the USFWS shall consult with NMFS and CDFG to determine what, if any, additional mitigation measures may be required.

BIO-7. Implementation of the Preferred Restoration Alternative could result in Mortality of Salmonids and other Special Status Fish due to Entrapment

Under this alternative, ditch blocks would be placed along linear channels to encourage establishment of natural meandering channels. When the elevation of the substrate begins to reach marsh plain elevations, special status fish species could become trapped behind ditch blocks during extreme low tide conditions. Based on the existing hydrologic modeling results, the Project Area will be open water habitat for the next 50-80 years, during which time the potential for entrapment would not occur. Given the low probability of mortality and the beneficial effect of an overall increase in habitat for anadromous fish this impact is considered less than significant. ***Less-than-significant.***

BIO-8. Implementation of the Preferred Restoration Alternative would result in the Conversion of Seasonal Wetland Habitat to Tidal Marsh Habitat

Approximately 853 acres of freshwater seasonal and emergent marsh wetlands occur at the Cullinan Ranch Site. The freshwater wetlands have been present since approximately 1994 when the USFWS made the decision to discontinue the drainage and pumping operations left in place by the previous owner who utilized the Cullinan Ranch Site for agricultural purposes. The Proposed Action would re-introduce tidal flows to the Site resulting in the inundation and conversion of the freshwater wetland to tidal wetland.

Seasonal and emergent marsh wetlands in addition to open water habitat at the Cullinan Ranch Site are used by a variety of waterfowl and special status bird species as indicated in Tables B-1 and B-3 (Appendix B). The conversion of freshwater wetlands to tidal habitat will impact special status birds, including migratory waterfowl that use the Cullinan Ranch Site for breeding and foraging. Therefore, conversion of the seasonal and emergent marsh wetlands at the Cullinan Ranch Site would constitute an adverse, unavoidable effect. It would result in a significant change in the distribution and abundance of suitable habitat available for migratory waterfowl and shorebirds in the project vicinity. No mitigation is available. ***Significant and Unavoidable Impact***.

BIO-9. Implementation of the Preferred Restoration Alternative would Result in Placement of Permanent Fill in Jurisdictional Wetlands and Waters of the U.S.

The Cullinan Ranch Site currently supports approximately 1,033 acres of wetlands and waters of the U.S., all of which are considered subject to the jurisdiction of the Army Corps of Engineers. Filling of a portion of the jurisdictional wetlands and waters would occur as a result of armoring and buttressing the Highway 37 levee. Currently the Highway 37 levee is protected from tidal forces by the Dutchman Slough levee. When the Proposed Action occurs, tidal flows will enter the Site from Dutchman Slough and the Highway 37 levee will be subject to tidal waters. Armoring and support of the Highway 37 levee is needed in discrete locations where the existing roadway occurs below the Mean High High (MHH) tidal elevation. The armoring and support will include engineered fill and riprap materials as needed and may be placed in existing jurisdictional wetlands adjacent to the highway within the restoration area. This is considered an adverse effect because the existing wetland habitat would be permanently lost resulting in a change in distribution and abundance of special status species, habitats, and sensitive communities. Filling of wetlands is considered an adverse and unavoidable effect. No mitigation is available. ***Significant and Unavoidable Impact.***

BIO-10. Implementation of the Preferred Restoration Alternative would result in Permanent Loss of Mammal Habitat and Potential Mortality of individual Mammals

Under the Preferred Restoration Alternative, mammals such as skunks, red fox, and raccoons would lose habitat when upland areas are inundated with tidal waters from Dutchman and South Sloughs. Because the 1,525-acre Site will become subtidal and intertidal habitat, it would no longer provide habitat for these mammals. Additionally, during the inundation process, mammals could be forced from upland areas onto Highway 37. Because Highway 37 has a concrete median barrier that separates opposing lanes of traffic, these mammals would be trapped and likely killed by collisions with cars. The loss of upland habitat and the potential for mammal mortality due to road kill on Highway 37 could result in a change in species distribution and abundance of common wildlife at the Cullinan Ranch Site. The loss of upland habitat areas would constitute an adverse, unavoidable effect; however, to minimize the potential mortality effect, the following mitigation measure shall be implemented. ***Significant and Unavoidable Impact.***

Mitigation Measure BIO-3.2: Slow Flood-up of Cullinan Ranch. Prior to breaching the levee on the South and Dutchman Sloughs, the Cullinan Ranch Site will be slowly flooded to capacity, in stages, using water from CDFG Pond 1 via the water control structures. This slow, staged procedure will allow the movement of the majority of mammals out of the area into adjacent tidal marsh and Guadalcanal without being forced, en masse, onto Highway 37.

BIO-11. Implementation of the Preferred Restoration Alternative would result in Loss of Foraging Habitat for Raptor Species

Raptors currently use seasonal wetland habitat and upland areas for foraging. White-tailed kites, short-eared owls and other birds of prey will be prevented from foraging in discrete portions of the Cullinan Ranch Site during construction activities due to disturbance of the existing habitats. Additionally, with implementation of the Proposed Action, breaches along the western perimeter levee of the Site will result in inundation of the seasonal wetland and upland areas within the Site with tidal waters. As such, the Site will become subtidal and intertidal habitat and will no longer provide foraging habitat for the raptor species currently using the Site. The loss of foraging habitat for raptor species would result in a minor change in species distribution and abundance of raptor species foraging at the Cullinan Ranch Site. Because there is an abundance of suitable foraging habitat for these species in the surrounding area, this impact is considered less than significant. No mitigation is necessary. ***Less than Significant.***

BIO-12. Implementation of the Preferred Restoration Alternative would result in Loss of Habitat for Wintering Waterfowl

The existing habitats at the Cullinan Ranch Site support numerous wintering waterfowl species, some of which are special status species as described in Table B-3 (Appendix B). Waterfowl habitat in the San Francisco Bay is considered to be a substantial resource that supports a large portion of waterfowl in the Pacific Flyway (Goals Project 1999). After implementation of the Proposed Action the majority of the Cullinan Ranch Site will be converted to intertidal and subtidal habitats that include open water during high tide events. This habitat type is of some value for migratory waterfowl, particularly diving ducks and bay ducks. During the time period required for natural sedimentation to establish marsh plain elevations, which may take up to 70 years to accomplish, and after establishment of tidal marsh habitat, there would be an overall loss

of suitable deepwater waterfowl habitat used by wintering birds at the Cullinan Ranch Site. Waterfowl are protected under the MBTA and are considered to be special status species. In addition, the Proposed Action would result in a change in species distribution and abundance of wintering waterfowl in the project vicinity. Loss of habitat for these special status species due to restoration activities would constitute an adverse, unavoidable effect. ***Significant and Unavoidable Impact.***

BIO-13. Implementation of the Preferred Restoration Alternative would Result in the Loss of Foraging habitat for Special Status Bat Species

Currently the seasonal wetlands at the Site support foraging habitat for five special status bat species as described in Table B-3 (Appendix B). These bat species forage over freshwater wetlands that produce insect prey, however, no surveys have been conducted and it is not known if bats feed over Cullinan Ranch. After the Cullinan Ranch Site is inundated with tidal waters it will no longer support insect prey that require freshwater to reproduce and suitable foraging habitat for bat species would be directly lost. The loss of suitable foraging habitat for special status bat species, that may or may not use Cullinan Ranch, would constitute an adverse, unavoidable effect. No mitigation is available. ***Significant and Unavoidable.***

BIO-14. Implementation of the Preferred Restoration Alternative would Result in the Potential Spreading of Invasive Non-Native Plants

Construction of the Proposed Project, specifically grading and earthwork during construction of the Highway 37 augmentation and flooding could result in the spread of non-native invasive plant species. Of particular concern is perennial pepperweed. Perennial pepperweed is known to occur in the vicinity of the Sonoma Creek Bridge along Highway 37. The species is known to spread rapidly in areas adjacent to tidal channels creating dense stands, which choke out native and beneficial species. Tires and equipment could spread this species to uninfected areas in the course of construction activities that involve earthwork and grading. Although the long-term conversion of the Cullinan Ranch Site to tidal marsh would result in an overall decrease in non-native plant populations (including star thistle) through destruction of the existing seed bank, potential spread of invasive plants during construction activities is considered an adverse effect. Implementation of the following mitigation measure would minimize this effect. ***Less-than-Significant, with implementation of mitigation.***

Mitigation Measure BIO-14.1: Prevent Spread of Perennial Pepperweed to Uninfested Areas. A qualified botanist will conduct a non-native plant assessment of areas subject to construction activities including grading and earthwork. Recommendations will be made to control the spread of non-native species. Measures may include establishment of wash stations for construction vehicles and equipment to clean tires of weeds and other propagules before they enter and leave the Site and development of an herbicide spray program to destroy perennial pepperweed or other invasive infestations prior to construction.

Mitigation Measure BIO-14.2: Monitor the Cullinan Ranch Site for Infestation by Invasive Non-Native Plants. Areas disturbed by earthmoving equipment or grading will be monitored for infestation of perennial pepperweed or other potentially invasive species. All infestations occurring will be controlled and removed to the extent feasible without jeopardizing the establishment of any surrounding native plants. A long-term monitoring plan will be developed, subject to review and approval by the USFWS.

BIO-15. Implementation of the Preferred Restoration Alternative would Result in the Increase in Subtidal Aquatic Habitat for Anadromous and Special Status Fish Species

The previous agricultural diking, pumping to remove freshwater, and resulting elimination of tidal influence to the Cullinan Ranch Site have caused the Site to subside or lose approximately six feet of elevation. The Site is currently approximately –2 feet NGVD, which is below sea level. It is anticipated that the Cullinan Ranch Site will remain inundated by tidal waters that enter the Site from Dutchman and South Sloughs until Site elevations increase through the natural deposition of sediment. Since the Cullinan Ranch Site is at such a low elevation the period during which subtidal aquatic habitat will persist over most of the Site is expected to be approximately 70 years. As a result there will be a substantial increase in subtidal habitat available for anadromous fish that currently inhabit adjacent subtidal aquatic habitat in the Project Area. Anticipated increases in subtidal habitats through restoration activities would result in a beneficial effect for special status fish species in the Napa River and San Pablo Bay including those listed in Table B-3 (Appendix B). ***Beneficial Impact.***

BIO-16. Implementation of the Preferred Restoration Alternative will result in an Increase of Breeding and Foraging Habitat for Salt-Marsh Dependent Special Status Species

Implementation of the Preferred Restoration Alternative will result in an increase of approximately 1,525 acres of tidal marsh habitat over the existing condition at the Cullinan Ranch Site. The tidal marsh habitat will be available to salt marsh dependent species including the California clapper rail, black rail, salt marsh harvest mouse, San Pablo song sparrow, Suisun shrew, and plants such as soft bird's beak, Mason's lilaeopsis, and others. The tidal marsh habitat that will occur at the Cullinan Ranch Site will include tidal marsh vegetation, meandering tidal sloughs, and upland refugia. The combination of these habitats in close proximity to each other will support many salt marsh-dependent wildlife and plant species in addition to the special status species mentioned above. Furthermore, restoration of tidal marsh habitat in the San Pablo Bay and San Francisco Bay regions is identified in the Ecosystem Goals Project and other planning documents as a favorable outcome. Anticipated increases in these habitats through restoration activities would result in a beneficial effect to special status species. ***Beneficial Impact.***

BIO-17. Implementation of the Preferred Restoration Alternative would Increase Suitable Habitat for Migratory Shorebirds

Mudflats and shallow water intertidal habitats are important foraging and resting habitat for shorebirds in the San Pablo Bay region during spring and fall migration, and over-wintering periods. Introduction of tidal flows to the Cullinan Ranch Site will initially result in the creation of mudflats and shallow water areas along the perimeter of the Cullinan Ranch Site that will appear during low tide events. As sediments are deposited from tidal waters, the Site elevations would increase and mudflat habitats would continue to expand throughout the Site. When the Cullinan Ranch Site reaches tidal elevation equilibrium in approximately 70 years, it is expected to begin to support tidal marsh vegetation and to include meandering primary and secondary slough channels that will continue to provide shorebird foraging habitat. Implementation of the Preferred Restoration Alternative would result in a beneficial effect on migratory shorebirds by increasing the amount of suitable habitat. ***Beneficial Impact.***

BIO-18. Implementation of the Preferred Restoration Alternative would Increase Suitable Foraging Habitat for the Brown Pelican and Double-crested Cormorant

Upon implementation of the west-side breaches, the Cullinan Ranch Site will support subtidal habitat and suitable foraging habitat for the double-crested cormorants and other diving duck species as described in Table B-3 (Appendix B). Opening of the Cullinan Ranch Site to allow the return of the tidal influence would also provide opportunities for fish and other prey of the brown pelican and double-crested cormorant to inhabit the Site and contribute to the overall habitat quality for these duck species. The increase in suitable subtidal habitat would constitute a beneficial effect. ***Beneficial Impact.***

BIO-19. Implementation of the Preferred Restoration Alternative would Result in Establishment of Upland-Wetland Transition Zones

The existing conditions at the Cullinan Ranch Site include levee slopes at a 3:1 horizontal to vertical ratio. The steep sides of existing levees at the Site are typical of the levees in the San Pablo Bay region. Steep levee slopes preclude development of a gradual upland to wetland transition that is more representative of natural conditions in tidal marshes. The gradual upland-wetland transition zone that occurs in natural settings provides important habitat for a variety of wildlife and plant species that can only occur in such habitats.

Under the Preferred Restoration Alternative, the construction of 10:1 levee slopes would be implemented in the discrete locations where levee buttressing is needed to protect the roadway from high tide events. This gradual levee slope ratio will increase the extent of the buffer area between the existing roadway and the tidal marsh. Levee side slopes along the Pond 1 levee will be increased to 7:1, which is slightly steeper. Sections of the Dutchman Slough levee will be lowered and flattened, which will allow tidal flows to overtop the levees under extreme high tide conditions. The gradual slopes of the Proposed Action will increase the total amount of upland-transition area available to salt marsh harvest mice and other species for use as upland refuge during extreme high tide events. This would likely result in fewer mortalities to individuals of the species, which may be forced onto the adjacent roadway or into predator habitat during high tide conditions. An increase in the amount of upland to wetland transition habitat will also result in an increase in suitable habitat for special status plant species including San Joaquin spearscale, and soft bird's-beak. These sites will be planted with native plants to augment natural recruitment into the area. The overall effects from increased upland habitat would constitute a beneficial effect. ***Beneficial Impact.***

Environmental Effects of the Partial Restoration Alternative

BIO-20. Implementation of the Partial Restoration Alternative could Result in the Temporary Loss of Salt Marsh Harvest Mouse Habitat and Potential Mortality of Individual Salt Marsh Harvest Mice

The federally endangered salt marsh harvest mouse was historically known from tidal marsh habitats in the vicinity of Cullinan Ranch. Currently, habitat for the salt marsh harvest mouse within the Cullinan Ranch Site occurs in an area of remnant tidal marsh habitat with pickleweed vegetation on the eastern boundary of the Site adjacent to Dutchman Slough and Guadalcanal Village (Figure 3.2.-1a). Outside the Site, Dutchman and South Sloughs support tidal marsh habitat on their outboard levees. Recent biological studies have determined that tidal marsh

habitat along the outboard levees does not support populations of salt marsh harvest mice (Jones & Stokes 2004). Implementation of the proposed 400-foot, east-side breach along the Dutchman Slough levee would result in the temporary loss of tidal marsh habitat and could potentially result in direct mortality of salt marsh harvest mice if they were to be present at the time the proposed breach was implemented. Although the temporary loss of tidal marsh habitat during breaching would be off-set through the overall creation of tidal marsh habitat, the temporary loss of the existing habitat and potential for direct mortality of individual members of the species would constitute an adverse effect. To minimize this effect, the following mitigation measure shall be implemented. ***Less-than-significant impact, with implementation of mitigation.***

Mitigation Measure BIO-3.1: Remove Salt Marsh Harvest Mouse Habitat and Place Barrier Fencing.

Mitigation Measure BIO-3.2: Slow Flood-up of Cullinan Ranch.

BIO-21. Implementation of the Partial Restoration Alternative could Disturb California Clapper Rails and Black Rails

The black rail could occur in the freshwater marsh habitats within the 300 acres proposed for restoration under the Partial Restoration Alternative. The California clapper rail could occur in adjacent tidal marsh habitats. Because California clapper rails and black rails may be present during the construction activities associated with this alternative, individuals of the species, including nesting young and nest eggs, could be directly harmed by construction equipment, construction noise or by removal of suitable habitat along the Dutchman Slough levee. Disturbance of these species through either construction equipment noise or direct removal of suitable habitat would constitute an adverse effect. To minimize this effect, the following mitigation measure shall be implemented. ***Less-than-significant impact, with implementation of mitigation.***

Mitigation Measure BIO-4.1: Avoid Disturbance to California Clapper Rail and Black Rail Habitat During their Breeding Period.

BIO-22. Implementation of the Partial Restoration Alternative could Disturb San Pablo Song Sparrow and Result in Abandoned Nests and Mortality of Young

The San Pablo song sparrow could occur in tidal marsh habitat within or adjacent to the proposed breach location. Under this alternative, individual members of the species could be directly harmed when the levee breach is implemented. Furthermore, nesting habitat could be destroyed, or nesting young could be killed by construction equipment during proposed restoration activities at the Site. The loss or removal of suitable habitat or direct mortality of individuals of this species would constitute an adverse effect. To minimize this effect, the following mitigation measure shall be implemented. ***Less-than-significant impact, with implementation of mitigation.***

Mitigation Measure BIO-5.1: Locate and Avoid San Pablo Song Sparrow Habitats and Nests at the Cullinan Ranch Site.

BIO-23. Implementation of the Partial Restoration Alternative could Result in Construction-Related Mortality of Salmonids and Other Special Status Fish

Salmonid species including Central Valley steelhead, Central California coastal steelhead, winter-run and Central Valley spring-run chinook salmon, and Central California coast coho salmon, which are federally-listed species, have potential to occur within in South Slough and Dutchman Slough. If these special status fish species are present in Dutchman Slough during implementation of the proposed 400-foot east-side breach, direct mortality of individuals of these species could occur. The modification or removal of suitable habitat or direct mortality of individuals of these species would constitute an adverse effect. To minimize this effect, the following mitigation measure shall be implemented. ***Less-than-significant impact, with implementation of mitigation.***

Mitigation Measure BIO-6.1: Avoid Construction that Could Affect Tidal Aquatic Habitats when Salmonid species are known to Occur.

BIO-24. Implementation of the Partial Restoration Alternative could Result in Mortality of Salmonids and Other Special Status Fish due to Entrapment

Similar to the Preferred Restoration Alternative, ditch blocks would be placed in the Cullinan Ranch Site along linear channels to encourage establishment of natural meandering channels. When elevation of the substrate begins to reach marsh plain elevations, special status fish species could become trapped behind ditch blocks during extreme low tide conditions. Based on the existing hydrologic modeling results, the Site will be open water habitat for the next 50-80 years, during which time the potential for entrapment would not occur. Given the low probability of mortality and the beneficial effect of an overall increase in habitat for anadromous fish (See BIO-15) this impact is considered less than significant. ***Less-than-significant.***

BIO-25. Implementation of the Partial Restoration Alternative would Result in the Conversion of Seasonal Wetland Habitat

The Partial Restoration Alternative would re-introduce tidal flows to 300 acres of the Cullinan Ranch Site resulting in the inundation and conversion of freshwater seasonal and emergent marsh wetland to tidal wetland. Seasonal and emergent marsh wetland habitat at the Cullinan Ranch Site is used by a variety of waterfowl and special status bird species as indicated in Tables B-1 and B-3 (Appendix B). Under this alternative, conversion of freshwater wetland habitat to tidal marsh habitat would not result in a significant loss of suitable habitat available to migratory waterfall and shorebirds because the remaining 80% of the Cullinan Ranch Site would remain in its current biological condition. No mitigation required. ***Less than Significant***.

BIO-26. Implementation of the Partial Restoration Alternative would Result in placement of Permanent Fill in Jurisdictional Wetlands and Waters of the U.S.

The Cullinan Ranch Site currently supports approximately 1,033 acres of wetlands and waters of the U.S., all of which are considered subject to the jurisdiction of the Army Corps of Engineers. Filling of jurisdictional wetlands would occur as a result of armoring and buttressing the Highway 37 and constructing an internal levee that separates the 300-acre restoration area from the Cullinan Ranch Site.

Currently, the Highway 37 levee is protected from tidal forces by the Dutchman Slough levee. Under the Partial Restoration Alternative, tidal flows will enter the Cullinan Ranch Site from Dutchman Slough and the Highway 37 levee will be subject to tidal waters. Armoring and support of the Highway 37 levee is needed where the existing roadway occurs below the Mean High High (MHH) tidal elevation. The armoring and support will include engineered fill and riprap materials as needed and may be placed in existing jurisdictional wetlands adjacent to the highway within the 300-acre restoration area.

These construction activities would have an adverse effect because the existing wetland and Waters of the U.S. would be permanently lost resulting in a change in distribution and abundance of special status species, habitats, and sensitive communities. Filling of wetlands is considered an adverse and unavoidable effect. No mitigation is available. ***Significant and Unavoidable Impact.***

BIO-27. Implementation of the Partial Restoration Alternative would Result in Permanent Loss of Mammal Habitat and Potential Mortality of Individual Mammals

Under the Partial Restoration Alternative, mammals such as skunks, red fox and raccoons would lose habitat when upland areas are inundated with tidal waters from Dutchman Slough. Because the 300-acre project Site will become subtidal and intertidal habitat, it would no longer provide habitat for mammals. Additionally, during the inundation process, mammals could be forced from upland areas onto Highway 37. Because Highway 37 has a concrete median barrier that separates opposing lanes of traffic, these mammals would be trapped and likely killed by collisions with cars. The loss of upland habitat and the potential for mammal mortality due to road kill on Highway 37 would not result in a significant change in species distribution and abundance at the Cullinan Ranch Site because the amount of upland habitat lost under this alternative is relatively small compared to the available suitable habitat on and adjacent to the Site. Furthermore, mammals fleeing inundation would have access to upland areas in the remaining 1,225 acres of the Cullinan Ranch Site, thereby reducing potential for individuals to collide with vehicles on Highway 37. ***Less-than-significant.***

BIO-28. Implementation of the Partial Restoration Alternative would Result in Loss of Foraging Habitat for Raptor Species

Under the Partial Restoration Alternative, birds of prey such as white-tailed kites and short-eared owls will lose foraging habitat when seasonal wetland and upland areas that support rodent prey are inundated with tidal waters from Dutchman Slough. Because the 300-acre project Site will become subtidal and intertidal habitat, it would no longer provide foraging habitat for the raptor species currently using the Site. The loss of foraging habitat for raptor species would result in a minor change in species distribution and abundance at the Cullinan Ranch Site and would not constitute an adverse effect. No mitigation is necessary. ***Less-than-significant.***

BIO-29. Implementation of the Partial Restoration Alternative would result in Conversion of Habitat for Wintering Waterfowl

Waterfowl habitat in the San Francisco Bay is considered to be a substantial resource that supports a large portion of the waterfowl population in the Pacific Flyway (Goals Project 1999). Under the Partial Restoration Alternative 300 acres of the Cullinan Ranch Site would eventually be converted to intertidal and subtidal habitats that include open water during high tide events.

Although this habitat type is of some value for migratory waterfowl, particularly diving ducks and bay ducks, there would be an overall loss of high quality waterfowl habitat in the 300-acre area. Waterfowl are protected under the MBTA and are considered to be special status species. Because implementation of this alternative would result in a change in species distribution and abundance of wintering waterfowl in the North Bay project vicinity, the conversion of habitat for these special status species due to restoration activities would constitute an adverse, unavoidable effect. ***Significant and Unavoidable Impact.***

BIO-30. Implementation of the Partial Restoration Alternative would result in the Loss of Foraging habitat for Special Status Bat Species

Under the Partial Restoration Alternative 300 acres of freshwater wetland habitat would be inundated with tidal waters. As a result of this action, the project Site would no longer support insect prey that require freshwater to reproduce and suitable foraging habitat for special status bat species would be directly lost. However, because the remaining 1,225 acres of the Cullinan Ranch Site would not be subject to tidal action, insect prey populations would persist in the area. The minor loss of suitable foraging habitat for special status bat species would not constitute an adverse effect. No mitigation is necessary. ***Less-than-significant.***

BIO-31. Implementation of the Partial Restoration Alternative would Result in the Potential Spreading of Invasive Non-Native Plants

Under the Partial Restoration Alternative construction of the Highway 37 augmentation and armoring could result in the spread of non-native invasive plant species. Slow flood up of the area could also result in the spread of non-native plant species. Of particular concern is perennial pepperweed. Perennial pepperweed is known to occur in the vicinity of the Sonoma Creek Bridge along Highway 37. The species is known to spread rapidly in areas adjacent to tidal channels creating dense stands of the plant, choking out natives and beneficial species. Tires and equipment could spread this species to uninfected areas in the course of construction activities that involve earthwork and grading. Although the long-term conversion of a portion of the Cullinan Ranch Site to tidal marsh would result in a decrease in non-native plant populations (including phragmites and star thistle) through destruction of the existing seed bank, potential spread of invasive plants during construction activities is considered an adverse effect. Implementation of the following mitigation measure would minimize this effect. ***Less-than-Significant, with implementation of mitigation.***

Mitigation Measure BIO-14.1: Prevent Spread of Perennial Pepperweed to Uninfested Areas.

Mitigation Measure BIO-14.2: Monitor the Cullinan Ranch Site for Infestation by Invasive Non-Native Plants.

BIO-32. Implementation of the Partial Restoration Alternative would Result in the Increase in Subtidal Aquatic Habitat for Anadromous and Special Status Fish Species

Under the Partial Restoration Alternative there will be an increase in subtidal habitat available for anadromous fish that currently inhabit adjacent subtidal aquatic habitat. Anticipated increases in subtidal habitats through restoration activities would result in a beneficial effect for special status

fish species in the project vicinity including those listed in Table B-3 (Appendix B). ***Beneficial Impact.***

BIO-33. Implementation of the Partial Restoration Alternative will Result in an Increase of Breeding and Foraging Habitat for Salt-Marsh Dependent Special Status Species

Implementation of the Partial Restoration Alternative will result in an increase of approximately 300 acres of tidal marsh habitat over the existing conditions at the Cullinan Ranch Site. The tidal marsh habitat will be available to salt marsh dependent species including the California clapper rail, black rail, salt marsh harvest mouse, San Pablo song sparrow, Suisun shrew, and plants such as soft bird's beak, Mason's lilaeopsis, and others. The tidal marsh habitat that will occur at the Cullinan Ranch Site will include tidal marsh vegetation, meandering tidal sloughs, and upland refugia. The combination of these habitats in close proximity to each other will support many salt marsh-dependent wildlife and plant species in addition to the special status species mentioned above. Furthermore, restoration of tidal marsh habitat in the San Pablo Bay and San Francisco Bay regions is identified in the Ecosystem Goals Project and other planning documents as a favorable outcome. Anticipated increases in these habitats through restoration activities would result in a beneficial effect to special status species. ***Beneficial Impact.***

BIO-34. Implementation of the Partial Restoration Alternative would Increase Suitable Habitat for Migratory Shorebirds

Implementation of the Partial Restoration Alternative will introduce mudflats and shallow water areas along the perimeter of the 300-acre restoration area that will appear during low tide events. As sediments are deposited from tidal waters, the Site elevations would increase and mudflat habitats would continue to expand throughout the Site. When the restoration area reaches tidal elevation equilibrium in approximately 70 years, it is expected to begin to support tidal marsh vegetation and to include meandering primary and secondary slough channels that will continue to provide shorebird foraging habitat. This alternative would result in a beneficial effect on migratory shorebirds by increasing the amount of habitat for migratory shorebirds. ***Beneficial Impact.***

BIO-35. Implementation the Partial Restoration Alternative would Increase Suitable Foraging Habitat for the Brown Pelican and Double-crested Cormorant

Upon implementation of the 400-foot levee breach, the 300-acre restoration area will support subtidal habitat, which constitutes suitable foraging habitat for double-crested cormorants and other diving duck species as described in Table B-3 (Appendix B). The return of the tidal influence to this area would also provide opportunities for fish and other prey of the brown pelican and double-crested cormorant to inhabit the Site and contribute to the overall habitat quality for these duck species. The increase in available subtidal habitat would constitute a beneficial effect. ***Beneficial Impact.***

BIO-36. Implementation of the Partial Restoration Alternative would Result in Establishment of Upland-Wetland Transition Zones

Under the Partial Restoration Alternative, the construction of 10:1 levee slopes would be implemented in the discrete locations where levee buttressing is needed to protect Highway 37

from high tide events. This gradual levee slope ratio will increase the extent of the buffer area between the existing roadway and the restored tidal marsh. The gradual slopes of the proposed restoration project will increase the total amount of upland-transition area available to salt marsh harvest mice and other species for use as upland refuge during extreme high tide events. This would likely result in fewer mortalities to individuals of the species, which may be forced onto the adjacent roadway or into predator habitat during high tide conditions. An increase in the amount of upland to wetland transition habitat will also result in an increase in suitable habitat for special status plant species including San Joaquin spearscale, and soft bird's-beak. This increase in upland-wetland transition zones would constitute a beneficial effect. ***Beneficial Impact.***

3.3 Hazardous Waste

This section addresses hazardous wastes at the Cullinan Ranch Site. The information provided in this section is based on the Cullinan Ranch Contaminant Sampling Report (CSR) prepared by Tetra Tech (November 2003) and incorporated into this analysis by reference as Appendix D. The report presents the results of Tetra Tech's soil sampling investigations and analysis of contaminants discovered at the Cullinan Ranch Site. In 2006, removal and disposal of zinc contaminated soils was performed in a portion of the Site. The results of this clean-up effort are provided in a report prepared by GeoEngineers (October 2006) and incorporated into this analysis by reference as Appendix D.

3.3.1 Existing Conditions

Previous Hazardous Waste Studies The USFWS conducted three surveys in 1988, 1989, and 1990 to identify potential contaminants at the Cullinan Ranch Site. In 1988, the UFWS identified the following areas of concern:

- trash in the ponded area near the farmyard;
- mosquito abatement practices on or adjacent to the property;
- unknown past pesticide use practices;
- the proximity of Mare Island Naval Shipyard hazardous waste sites; and
- the general water quality of the Napa River and San Pablo Bay.

During the survey conducted in 1989, the USFWS identified the following additional areas of concern:

- another ponded area used as a dump;
- two buildings containing cans of pesticides;
- areas of discolored soil; and
- "opaque milky green water" in the drainage ditch near the pump house.

The 1989 survey also mentioned the possibility of dioxins occurring in areas where herbicide drums or herbicide treated vegetation may have been burned. An interview with the tenant farmer also revealed problems with people dumping trash in the ditch along Highway 37 to the south and the former practice of spraying oil on gravel near the pole barn to cut down on dust.

Investigations conducted in 1990 identified elevated levels of barium, copper, nickel, and zinc at the Cullinan Ranch Site with suspected contamination from arsenic, mercury, and selenium. Additional surveys conducted 1990 also detected elevated concentrations of dichlorodiphenyltrichloroethane (DDT) and dichlorodiphenyldichloroethane (DDD) in the farmyard area at Cullinan Ranch.

Areas Sampled during Field Investigations. Soil samples were collected from the following areas of the Cullinan Ranch Site: the pole barn; the farmyard (including the pump canal); the East Pond; and the West Pond. During field investigations, gravel and the remains of structures, including a large concrete foundation, were found present in areas around the farmyard and the pole barn. All sites except for the pump canal were dry during sampling.

Criteria Used to Evaluate Contaminant Levels. The following criteria were used to evaluate whether identified contaminants were in exceedance of applicable regulatory standards.

- San Francisco Bay Ambient Sediment Concentrations (established by the Regional Water Quality Control Board);
- Wetland Surface Material Concentrations for Beneficial Reuse of Dredged Materials (established by the Regional Water Quality Control Board);
- Wetland Foundation Material Concentrations for Beneficial Reuse of Dredged Materials (established by the Regional Water Quality Control Board);
- Effects Range-Low (ER-L) concentrations;
- Effects Range-Median (ER-M) concentrations; and
- 95 Upper Confidence Limit (UCL) of the Geometric Mean for Western Soils

These criteria are considered acceptable and appropriate for comparing with soils and exposed sediments from Cullinan Ranch because future restoration activities at the Site will result in all sampling areas being flooded; therefore, all surface soils will become submerged sediment. It should be noted that the Wetland Surface and Foundation Material Concentrations are based on San Francisco Bay Ambient Sediment Concentrations and ER-M values, respectively; therefore, concentrations that exceeded one criterion usually exceeded the corresponding criteria as well. Other regional sediment concentrations such as the mean concentrations from the Regional Monitoring Program's San Pablo Bay sampling location and the U.S. Army Corp of Engineers marsh study were also evaluated but were not applied since they are not based on regulatory guidance or toxicological data.

Summary of Findings Table 3.3-1 summarizes the findings of the soil sampling conducted by Tetra Tech. Detailed results of the soil sampling are provided in the complete Contaminant Sampling Report found as Appendix D to this document.

Table 3.3-1. Summary Results of Soil Sampling

Sample Area	Potential Contaminant
Pole Barn Area	**Metals** Zinc, Arsenic, Mercury, Nickel, Copper,
Farmyard Area	**Metals** Arsenic, Cadmium, Copper, Mercury, Nickel, Lead, Zinc
Pump Canal (area was submerged in water during soil sampling)	**Metals** Iron, Nickel, Zinc, Mercury **Pesticides** DDD, DDT, DDE, Chlordane
East Pond Area	**Metals** Arsenic, Copper, Mercury, Nickel
West Pond Area	**Metals** Arsenic, Nickel, Mercury, Copper, Nickel,
Source: TetraTech 2003.	

Within the samples that were collected, a few chemicals were detected at a frequency of 100 percent including: aluminum, barium, calcium, chromium, cobalt, copper, iron, magnesium, manganese, nickel, potassium, sodium, vanadium, and zinc. Calcium, iron, magnesium, potassium, and sodium are essential nutrients that are not usually considered to be toxic. Aluminum, barium, cobalt, manganese, and vanadium do not have toxicological criteria; however, concentrations were generally well below the maximum concentrations for types of soils that underlay the Cullinan Ranch Site. Chemicals that were found within the sample areas that most frequently exceeded criteria levels used in the contaminant analysis include arsenic, copper, lead, mercury, nickel, zinc, DDTs, and chlordane.

At the pole barn area concentrations of zinc may pose unacceptable ecological risk under current conditions. The maximum concentration of zinc exceeded the San Francisco Bay Ambient and San Francisco Wetland Surface value by a factor of 10. However, on July 19, 2006 GeoEngineers directed the removal and disposal of 34.86 tons of zinc-contaminated soils from the old pole barn area. Details of the removal are provided in the Report on Soil Excavation and Disposal San Pablo Bay National Wildlife Refuge – Cullinan Ranch (GeoEngineers 2006, Appendix D). No other metal concentrations were found to exceed San Francisco Bay or Wetland criteria indicating that other metal concentrations do not pose an unacceptable risk at the Cullinan Ranch Site.

The majority of the contaminants found at the farmyard area exceeded criteria levels used in the contaminant analysis. At the farmyard area high nickel concentrations were not found to be widespread and adverse effects at the Site are likely to be similar to those that already exist within the Site's sediments. Total DDTs and total chlordanes exceeded all available comparison values in the majority of samples taken from the farmyard. However, concentrations are likely to continue degrading naturally since pesticide application was discontinued with transfer of the Cullinan Ranch Site to USFWS ownership in 1991.

At the farmyard area, concentrations of lead and zinc were above the San Francisco Bay Ambient, San Francisco Wetland Surface, and ER-L values, but they did not exceed the ER-M or San Francisco Wetland Foundation Material values. Therefore, lead and zinc do not pose an unacceptable risk at the Cullinan Ranch Site. Both arsenic and cadmium were found to exist at levels below acceptable normal levels and therefore, neither metal would pose an ecological risk at the farmyard. All other detected metal

concentrations were below the San Francisco Bay Ambient and San Francisco Wetland Surface Material values at the farmyard area.

The metal concentrations measured in both the East Pond and West Pond areas were not found to exceed any of the applied criteria. Therefore, metal concentrations within these areas do not pose an unacceptable risk to ecological receptors at the Cullinan Ranch Site.

3.3.2 Regulatory Setting

Several federal and state agencies regulate the use, generation, transport, and disposal of hazardous substances. The EPA is the federal agency with regulatory authority over hazardous substances. The California EPA (Cal-EPA) is the state agency with the authority to regulate hazardous substances. Hazardous substances and waste are primarily regulated by the following federal and state regulations: Federal Resource Conservation and Recovery Act (RCRA); Comprehensive Environmental Response, Compensation and Liability Act (CERCLA); California Code of Regulation Title 26; and other relevant state and federal regulations (Jones & Stokes 2003).

3.3.3 Environmental Consequences and Mitigation Measures

Methodology

The evaluation of hazardous waste effects is based on a review of the conclusions of the Contaminant Sampling Report (Appendix D) prepared by Tetra Tech for the Proposed Action. Potential effects resulting from implementation of the proposed alternatives were evaluated against the existing conditions at the Site.

Significance Criteria

The following significance criteria were used to evaluate the proposed alternatives. The proposed alternatives would adversely affect resources at the Cullinan Ranch Site if they would:

- Create a potential public health hazard; or
- Involve the release of onsite contaminants or imported contaminants that pose a hazard to human, animal or plant populations within the Cullinan Ranch Site or its vicinity.

Environmental Effects of the No-Action Alternative

HAZ-1. Implementation of the No-Action Alternative would not result in Adverse Effects related to Hazardous Wastes

Under the No-Action Alternative, restoration of the Cullinan Ranch Site would not be undertaken by the lead agencies. Current levee maintenance work would continue on the Site; however, no other earth-moving activities would occur. As described above under "Affected Environment,' some metals and pesticides were found on during soil sampling conducted on the Site. Although the contaminant analysis revealed criteria exceedances, the various exceedances of contaminants were not found to be at levels that would directly result in a significant ecological risk to plant and wildlife populations inhabiting the Cullinan Ranch Site. Furthermore, the USFWS is considering future remediation of the Site. Consequently, there would not be any adverse effects associated with hazardous wastes under the No-Action Alternative. ***No impact.***

Environmental Effects of the Preferred Restoration Alternative

HAZ-2. Implementation of the Preferred Restoration Alternative could result in the Release of Onsite Contaminants contained in Dredged Materials

As described above under "Affected Environment," several metals and pesticide contaminants found on the Cullinan Ranch Site exceeded established pollutant criteria levels. Implementation of dredging and other soil-moving activities required for augmenting and reinforcing the existing Pond 1 and Highway 37 levees, and the placement of these materials elsewhere within the Cullinan Ranch Site could result in the disturbance and redistribution of the identified onsite contaminants that have been buried or otherwise sequestered in sediments. Although the contaminant analysis revealed criteria exceedances, the various exceedances of contaminants were not found to be at levels that would directly result in a significant ecological risk to plant and wildlife populations inhabiting the Cullinan Ranch Site, this potential for release of previously undisturbed onsite contaminants would constitute an adverse effect. Implementation of the following mitigation measure would minimize this effect. ***Less-than-significant impact, with implementation of mitigation.***

Mitigation Measure HAZ-2.1: Implement Selected Remediation within areas on the Cullinan Ranch Site where Dredging and Soil-Moving Activities would occur during Construction. Prior to dredging and soil-moving activities, USFWS shall conduct remediation of soils within areas where such activities will occur, and where onsite spoils will be placed. The remediation shall strive to reduce contaminants within these spoils to levels below the ambient levels established by the appropriate wetland cover criteria. The remedial activities shall be conducted in accordance with applicable local, state and federal regulations.

HAZ-3. Implementation of the Preferred Restoration Alternative would not result in the Release of Contaminants from Off-Site Source Materials

Implementation of the Preferred Restoration Alternative will require importing of approximately 150,000 cubic yards of off-site fill materials to complete levee reinforcement work at the Pond 1 and Highway 37 levees. The USFWS would seek only appropriate cover-quality materials that meet established criteria for placement on the Cullinan Ranch Site. Consequently this would not result in adverse effects associated with release of contaminants from off-site source materials with implementation of the Preferred Restoration Alternative. ***Less-than-significant impact.***

Environmental Effects of the Partial Restoration Alternative

HAZ-4. Implementation of the Partial Restoration Alternative could result in the Release of Onsite Contaminants contained in Dredged Materials

Implementation of dredging and other soil-moving activities required for constructing the levee along Highway 37 and the internal levee that would bisect Cullinan Ranch could result in the disturbance and redistribution of the identified onsite contaminants that have been buried or otherwise sequestered in sediments. Although the contaminant analysis revealed criteria exceedances, the various exceedances of contaminants were not found to be at levels that would directly result in a significant ecological risks to plant and wildlife populations inhabiting the Cullinan Ranch Site, this potential for release of previously undisturbed onsite contaminants

would constitute an adverse effect. Implementation of the following mitigation measure would minimize this effect. ***Less-than-significant impact, with implementation of mitigation.***

Mitigation Measure HAZ-2.1: Implement Selected Remediation within areas on the Cullinan Ranch Site where Dredging and Soil-Moving Activities would occur during Construction.

HAZ-5. Implementation of the Partial Restoration Alternative would not result in the Release of Contaminants from Off-Site Source Materials

Implementation of the Partial Restoration Alternative will require importing off-site fill materials to armor the levee adjacent to Highway 37 and to construct the internal levee that would bisect Cullinan Ranch. Because the USFWS would use only appropriate cover-quality materials that meet established criteria for placement on the Cullinan Ranch Site, placement of off-site source materials would not result in an adverse effect on human, animal or plant populations. ***Less-than-significant impact.***

3.4 Land Use, Recreation and Public Health

This section describes the land use pattern of the Cullinan Ranch Site and its vicinity. Plans and policies applicable to the project vicinity are also discussed. The proposed alternatives' compatibility with existing and proposed land uses is evaluated in addition to their consistency with existing plans and policies.

3.4.1 Existing Conditions

Existing Land Uses The Cullinan Ranch Site is currently a large complex of seasonal wetlands and is part of the San Pablo Bay National Wildlife Refuge system managed by the USFWS (Figure 1-2). Other than occasional docent-led bird tours for the public and maintenance of the levees by the USFWS, no other land uses exist on the Cullinan Ranch Site.

The many seasonal wetlands on the Cullinan Ranch Site function as storage areas for stagnant water that are a breeding ground for vectors, specifically mosquitoes. The roadside drainage ditch that follows the southern boundary of the Cullinan Ranch Site along Highway 37 is also an area where stagnant water forms and where mosquito breeding habitat abounds (see Figure 3.4-1). The Cullinan Ranch Site is primarily located within Solano County Mosquito Abatement District's jurisdiction as well as the jurisdiction of the Napa County Mosquito Abatement District. The existing magnitude of stagnant waters on the Cullinan Ranch Site contributes to insect management problems at the Cullinan Ranch Site.

Surrounding Land Uses Surrounding lands include San Pablo Bay and the San Pablo Bay National Wildlife Refuge to the south across Highway 37 and the City of Vallejo to the east across Napa River. The Guadalcanal Village is located directly adjacent to the eastern boundary of the Cullinan Ranch Site. Guadalcanal Village was restored to tidal marsh by Caltrans as mitigation for their Highway 37 improvement project. Mare Island is located further southeast in the project vicinity beyond the eastbound side of Highway 37. Mare Island is a former federal naval reserve that was closed in 1996; it is currently used for various industrial, commercial and non-profit business uses. The CDFG Pond 1 is located on the western boundary of the Cullinan Ranch Site and Dutchman and South Sloughs surround Cullinan Ranch on its northern edge. Ponds 2, 2A and 3 are located further north of the Cullinan Ranch Site across Dutchman Slough (Figure 1-2).

General Plan Land Use Designations and Zoning The Cullinan Ranch Site falls within the jurisdiction of Solano and Napa Counties. The majority of the Site is located within unincorporated Solano County and is part of the City of Vallejo's Sphere of Influence. As shown in Figure 1-2, a small portion of the Cullinan Ranch Site lies within Napa County. The land use designation and zoning of the Cullinan Ranch Site is described in Table 3.4-1 below.

Table 3.4-1. General Plan Land Use Designations and Zoning

Jurisdiction	Land Use Designation	Zoning
Solano County	Extensive Agriculture (1)	A-20 (Exclusive Agriculture) – allowable uses include: agriculture, residential, recreation, education and public assembly, retail trade, service, and communications and infrastructure
Napa County	Agriculture, Watershed and Open Space	Allowable uses include agriculture, processing of agricultural products and single family dwelling units

Notes: (1) Extensive agriculture designates property with lower quality soils used for dry land farming and range land.

Sources: Pers. Comm. Walsh 2004; Solano County Zoning Code. Sec. 28-21; Napa County 1998.

3.4.2 Regulatory Setting

Solano County General Plan

The following policies of the general plan *Land Use and Circulation Element* are applicable to the Proposed Action (County of Solano 1977).

- Preserve and enhance the quality and diversity of marsh aquatic habitat and wildlife habitats. (Marsh and Wetland Habitat Objective 1)
- The County shall preserve and enhance wherever possible the diversity of wildlife and aquatic habitats found in the Napa Marsh...and surrounding upland areas to maintain these unique wildlife resources. (Marsh and Wetland Habitat Policy 1)
- The County shall protect its marsh waterways, managed and natural wetlands, tidal marshes, seasonal marshes….which are critical habitats for marsh-related wildlife. (Marsh and Wetland Habitat Policy 2)
- In marsh areas, the County shall encourage the formation and retention of parcels of sufficient size to preserve valuable tidal marshes…for the protection of aquatic and wildlife habitats. (Marsh and Wetland Habitat Policy 6)
- The County shall ensure that public access at appropriate locations is provided and protected….such as the Napa Marsh. (Marsh and Wetland Habitat Policy 9)
- Within Napa Marsh, provisions should be made for public recreation access to the marsh for such uses as fishing, hunting, picnicking, hiking and nature and wildlife study. (Napa Marsh Area Policy 1)

Napa County General Plan

The following policies of the general plan *Land Use* and *Conservation and Open Space Elements* are applicable to the Proposed Action (County of Napa 1998).

- ECOLOGICALLY SENSITIVE AREAS - The County will limit development in ecologically sensitive areas such as those adjacent to river or streamside areas…(LU Element Policy 1.2)
- OPEN SPACE AREAS - The County will preserve suitable land for…recreation…habitat for fish, wildlife and wild vegetation and natural beauty. The County will encourage management of these areas in ways that promote wildlife habitat renewal, diversification and protection. (LU Element Policy 1.6)
- OPEN SPACE CHARACTER OF RURAL RECREATIONAL USES – Recreational uses permitted on lands designated for agriculture, watershed and/or open space shall be limited in density, intensity, need for public services, impacts on the natural environment, and growth-inducement. Such uses shall maintain the character of the surrounding area requiring a minimum of public support services (such as paved roads, emergency services, or law enforcement), a minimum of impervious surfaces, structures, natural landform alteration or other introduced or constructed features inconsistent with a rural environment…(LU Element Policy 2.4)

Vallejo General Plan

The following policies of the Vallejo General Plan are applicable to the Proposed Action:

- Protect valuable or unique fish and wildlife habitats through control of coastline development…along the critical areas of the Napa Marsh lands.
- Recognize areas valuable for marine life production, particularly the Napa Marshes…and work with (resource agencies) in insuring the protection of these areas from incompatible uses.

McAteer–Petris Act, and Coastal Zone Management Act and San Francisco Bay Plan

The McAteer Petris Act was passed by the State of California in 1965 when it established the San Francisco Bay Conservation Development Commission (BCDC) as the state agency responsible for regulating development in an around San Francisco Bay. The federal Coastal Zone Management Act of 1972 encourages states to voluntarily develop Coastal Management Programs to preserve and protect the unique features of each coastal area. BCDC is the state coastal management agency for the San Francisco Bay Area coastal zone, and its laws and policies constitute the federally approved state coastal management program for the Bay.

The San Francisco Bay Plan was completed and adopted by BCDC in 1968 and amended in May 2002. The BCDC developed the Bay Plan to use as a guide in governing development activities, including tidal restoration, in and around the Bay and its shorelines. The objectives of the Bay Plan are to:

- Protect the Bay as a great natural resource for the benefit of present and future generations.
- Develop the Bay and its shoreline to their highest potential with a minimum of Bay filling.

According to the Bay Plan, the Cullinan Ranch Site is a designated priority use area for wildlife refuges. The following Bay Plan policies are applicable to the Proposed Action.

- Where and whenever possible, former tidal marshes and tidal flats that have been diked from the Bay should be restored to tidal action in order to replace lost historic wetlands or should be managed to provide important Bay habitat functions, such as resting, foraging and breeding habitat for fish, other aquatic organisms and wildlife. As recommended in the Baylands Ecosystem Habitat Goals report, around 65,000 acres of areas diked from the Bay should be restored to tidal action. Further, local government land use and tax policies should not lead to the conversion of these restorable lands to uses that would preclude or deter potential restoration. The public should make every effort to acquire these lands from willing sellers for the purpose of restoration. (Bay Plan - Tidal Marshes and Tidal Flats Policy 4)
- Any tidal restoration project should include clear and specific long-term and short-term biological and physical goals, and success criteria and a monitoring program to assess the sustainability of the project. Design and evaluation of the project should include an analysis of: (a) the effects of relative sea level rise; (b) the impact of the project on the Bay's sediment budget; (c) localized sediment erosion and accretion; (d) the role of tidal flows; (e) potential invasive species introduction, spread, and their control; (f) rates of colonization by vegetation; (g) the expected use of the site by fish, other aquatic organisms and wildlife; and (h) site characterization. If success criteria are not met, appropriate corrective measures should be taken. (Bay Plan - Tidal Marshes and Tidal Flats Policy 5)
- Non-native species should not be used in habitat restoration projects. Any habitat restoration project approved by the Commission should include a program for the periodic monitoring of the site for non-native species and a program for control and, if appropriate and feasible, eradication should an introduction occur. The use of non-native plant species in public access landscape improvements should be avoided where a potential exists for non-native plants to spread into the Bay, other waterways, or transition zones between tidal and upland habitats. (Bay Plan - Tidal Marshes and Tidal Flats Policy 6)
- San Pablo Bay - Tidal marshes and extensive tidal flats are valuable wildlife habitat. Protect wildlife values (Bay Plan Map 2, Policy 1).
- Route 37 - Public access allowed in a manner protective of sensitive wildlife. Provide opportunities for wildlife compatible activities, such as wildlife observation and fishing (Bay Plan Map 2. Policy 2). (BCDC website 2004)

San Francisco Bay Trail Plan

The Bay Trail is a planned recreation corridor that will provide 400 miles of biking and hiking trails when completed. It will link nine counties, 47 cities, and 130 parks and recreation areas around San Francisco and San Pablo Bays. As mandated under Senate Bill 100, the Association of Bay Area Governments (ABAG) developed the Bay Trail Plan as a framework to provide guidance in the selection and implementation of the Bay Trail project. The main goal of the Bay Trail Plan is to provide public access to the Bay and its surrounding shorelines (Jones & Stokes 2003). Currently no existing or proposed Bay Trail alignments exist on the Cullinan Ranch Site. The nearest Bay Trail segment exists east of the Cullinan Ranch Site (across the Napa River Bridge) within the Vallejo city limits along Sacramento Street and Wilson Street (ABAG website 2007).

San Francisco Estuary Project Comprehensive Conservation and Management Plan and Ecosystem Goals Project

The San Francisco Estuary Project (Estuary Project) was established by the U.S. Environmental Protection Agency in 1987 as a result of growing public concern for the health of the San Francisco Bay and Delta. The Estuary Project is part of the EPA's National Estuary Program and is jointly sponsored by

the EPA and the State of California. After five years of study, the estuary's cooperative public-private partnership developed the Comprehensive Conservation and Management Plan (CCMP) for the estuary. The CCMP was formally adopted by the State on November 17, 1993 and by the EPA on December 9, 1993.

The San Francisco Bay Area Wetlands Ecosystem Goals Project (EGP), completed in 1998, was a five-year collaborative effort sponsored by a group of agencies that included EPA, CDFG, and the Regional Water Quality Control Board (RWQCB), in addition to numerous other public and private entities. The EGP was developed as a way to implement the provisions of the CCMP.

The purpose of the EGP is to provide guidance to public and private stakeholders interested in restoring and enhancing the wetlands and related habitats of the San Francisco Bay estuary system. It is an informational document that recommends the types, areal extent, and distribution of habitats needed to sustain diverse and healthy ecosystems in the San Francisco Bay estuary system. Recommendations are presented by region, subregion, and segment. Regionwide goals include restoration of large patches of tidal marsh connected by corridors to enable the movement of small mammals and marsh-dependent birds; restoration of large complexes of salt ponds for the management of shorebirds; and expansion of large areas of managed marsh. The Proposed Action area lies within the North Bay Subregion – Napa River Area as identified in the EGP. This EGP area, including Cullinan Ranch is identified as key area for tidal marsh restoration (Goals Project 1999).

CALFED Bay-Delta Program and Ecosystem Restoration Program Plan

The state and federal interagency CALFED Bay–Delta Program (CALFED) was created to address various problems in the San Francisco Bay/Sacramento–San Joaquin River Delta (Bay–Delta) region. The creation of CALFED provided a combination of state and federal funding to be used with three specific purposes: the development of water quality standards (Category I), water projects (Category II), and habitat restoration (Category III). Category III funding is distributed for projects that benefit targeted species, particularly endangered fish and marsh species.

In order to effectively administer Category III funding, CALFED produced a draft Ecosystem Restoration Program Plan (ERPP) that describes the important ecological processes, habitats, species, and stressors of the San Francisco Bay ecosystem. The specific goals of the ERPP are:

- Recover 19 at-risk native species and contribute to the recovery of 25 additional species.
- Rehabilitate natural processes related to hydrology, stream channels, sediment, floodplains and ecosystem water quality.
- Maintain and enhance fish populations critical to commercial, sport and recreational fisheries.
- Protect and restore functional habitats, including aquatic, upland and riparian, to allow species to thrive.
- Reduce the negative impacts of invasive species and prevent additional introductions that compete with and destroy native species.
- Improve and maintain water and sediment quality to better support ecosystem health and allow species to flourish.

The Proposed Action qualifies as a Category III project and funding for this environmental analysis may be distributed by CALFED.

Long-Term Management Strategy for Disposal of Dredged Sediments in San Francisco Bay

For many years, dredged material taken from federal and port channels and berthing areas was removed from the bottom of San Francisco Bay, placed in barges, transported to one of the federally designated areas in the Bay or ocean, and dumped. As a result of the controversy over the environmental impacts of this practice, new practices were adopted in the late 1980s by the agencies with authority over dredging and disposal operations for large, new work projects. The Long-Term Management Strategy for Disposal of Dredged Sediments in San Francisco Bay (LTMS) was established in 1991 to resolve disposal issues. The goals of the LTMS include disposing dredged material in the most environmentally sound manner and maximizing the use of dredged material as a resource. The LTMS agencies have agreed on a strategy of decreasing in-Bay disposal over time, with a goal of only 20% of Bay-dredged material being disposed in the Bay. The other 80% of the dredged material is proposed to be used as a resource or disposed of at an EPA-designated deep-ocean disposal site. This approach is intended to reduce the risk of adverse impacts from in-Bay disposal while maximizing environmental benefits through reuse and providing greater certainty regarding disposal options to dredging project sponsors.

3.4.3 Environmental Consequences and Mitigation Measures

Methodology

Information related to land uses, recreation, and public health at the Cullinan Ranch Site was reviewed and compared to the proposed alternatives to assess the potential for land use conflicts, recreation losses, and public health effects. The potential effects of the proposed alternatives were compared to the significance criteria listed below to determine the relative severity of each effect.

Significance Criteria

The following significance criteria were used to evaluate the proposed alternatives. The proposed alternatives would adversely affect land use, recreation and public health at the Cullinan Ranch Site if they would:

- Conflict or be incompatible with applicable land use plans, policies, or regulations of an agency with jurisdiction over the Proposed Action (including but not limited to a general plan, specific plan or zoning ordinance);
- Substantially conflict with either existing land uses on, or future land uses adjacent to, the Cullinan Ranch Site;
- Result in the loss of federal, state or local recreational uses, or require the construction of recreation facilities, the effects of which would result in adverse physical effects to the environment; or
- Result in the creation of significant new amounts of mosquito breeding habitat that would require expansion of existing mosquito abatement programs (reduction of these types of habitats is considered a beneficial impact).

Effects of the No-Action Alternative

LU-1. Implementation of the No-Action Alternative would not Result in Adverse Land Use, Recreation or Public Health Effects

As described in *2.0 Purpose and Need and Proposed Alternatives*, the No-Action Alternative would not result in the restoration of Cullinan Ranch and the existing land use patterns would essentially remain unchanged. Use of the Cullinan Ranch Site for existing recreational activities, such as docent-led bird tours, may have to cease temporarily until proper reinforcements can be made to existing levees. These activities would be allowed once construction activities were completed. Furthermore, the existing seasonal wetland pools and drainage ditches that provide mosquito breeding habitat would remain, and mosquito control would continue to be implemented by the Solano Mosquito Abatement District. Consequently, implementation of the No-Action Alternative would not result in adverse land use, recreation or public health effects. No mitigation is required. ***Less-than-Significant impact.***

Effects of the Preferred Restoration Alternative

LU-2. Implementation of the Preferred Restoration Alternative would be Generally Consistent with Applicable Local, State and Federal, State Plans and Policies

Under implementation of the Preferred Restoration Alternative, the future use of the Cullinan Ranch Site would be generally consistent with existing land use and zoning designations of both Solano and Napa counties. The existing land use and zoning designations generally allow agricultural operations and/or low-density development uses to be implemented on the Site. However, shortly after the USFWS purchased the Cullinan Ranch property in 1991, all agricultural practices ceased and the land is comprised of managed seasonal wetlands that are part of the San Pablo Bay National Wildlife Refuge. Furthermore, future use of the Site as a tidal wetland habitat would not constitute a land use that is more intense than existing uses necessitating a general plan zoning amendment.

The Preferred Restoration Alternative is generally consistent with applicable federal, state and local plans and policies that support the protection and enhancement of the wildlife and aquatic habitat values of marshlands located around San Pablo Bay. The following discussion evaluates the Preferred Restoration Alternative's compatibility with each plan or policy summarized under "Regulatory Setting" above.

Solano County General Plan

Restoring Cullinan Ranch from seasonal wetlands to tidal wetland habitat would meet the objectives of all of the applicable objectives and policies of the Solano County General Plan as it would:

- Preserve and enhance of the quality and diversity of marsh aquatic habitat and wildlife habitats found in Napa Marsh (Marsh and Wetland Habitat Objective 1 and Policy 1);
- Protect and preserve County marsh waterways, managed and natural wetlands, tidal marshes, and seasonal marshes that are critical habitats for marsh-related wildlife, such as California clapper rail and salt marsh harvest mouse (Marsh and Wetland Habitat Policy 2 and Policy 6); and

- Ensure that the provision for public recreation access to the Napa Marsh are for uses such as fishing, hunting, hiking and nature and wildlife study (Marsh and Wetland Habitat Policy 9 and Napa Marsh Area Policy 1).

Napa County General Plan

Restoring Cullinan Ranch from seasonal wetlands to tidal wetland habitat would meet the objectives of all of the applicable objectives and policies of the Napa County General Plan as it would:

- Not place urban development within an ecologically sensitive area such as the Napa River watershed (LU Element Policy 1.2);

- Utilize suitable land for recreation use and promote wildlife habitat renewal, diversification and protection (LU Element Policy 1.6); and

- Place recreational uses with limited intensity and need for public services on lands designated for agriculture, watershed and/or open space use (LU Element Policy 2.4).

Vallejo General Plan

Restoring Cullinan Ranch from seasonal wetlands to tidal wetland habitat would meet the objectives of all of the applicable policies of the Vallejo General Plan as it would:

- Protect valuable or unique fish and wildlife habitats through controlled coastline development within critical areas of the Napa Marsh lands (Natural Resources Policy 4); and

- Be conducted in conjunction with resource agencies in ensuring the protection of these areas from incompatible uses (Natural Resources Policy 5).

San Francisco Bay Plan

According to the Bay Plan, the Cullinan Ranch Site is a designated priority use area for wildlife refuges. Implementation of the Preferred Restoration Alternative would be consistent with the policies of the San Francisco Bay Plan as it would:

- Restore to tidal action former tidal marshes and tidal flats that have been diked from the Bay in order to replace lost historic wetlands (Bay Plan - Tidal Marshes and Tidal Flats Policy 4);

- Outline clear and specific long-term and short-term biological and physical goals, and success criteria and a monitoring program to assess the sustainability of the project (Bay Plan - Tidal Marshes and Tidal Flats Policy 5);

- Not use non-native species to accomplish habitat restoration (Bay Plan - Tidal Marshes and Tidal Flats Policy 6);

- Protect wildlife values of San Pablo Bay through restoration of tidal marshes and (Bay Plan Map 2, Policy 1); and

- Allow for public access and opportunities for wildlife compatible activities, such as wildlife observation and fishing in a manner that is protective of sensitive wildlife (Bay Plan Map 2, Policy 2).

Bay Trail Plan

The purpose of the Bay Trail Plan is to provide public access to the Bay and its surrounding shorelines. Although currently no existing or proposed Bay Trail alignments exist on the Cullinan Ranch Site, provision for improving access to the Cullinan Ranch Site and construction of an interpretive exhibit at the Cullinan Ranch Site as proposed under the Preferred Restoration Alternative would be consistent with the overall purpose of the Bay Trail Plan as it would provide public access to the San Pablo Bay Shoreline.

San Francisco Estuary Project Comprehensive Conservation and Management Plan and Ecosystem Goals Project

The San Francisco Estuary Project's CCMP was established to address growing public concern for the health of the San Francisco Bay and Delta. The San Francisco Bay Area Wetlands Ecosystem Goals Project (EGP) was developed as a way to implement the provisions of the CCMP and to provide guidance to public and private stakeholders interested in restoring and enhancing the wetlands and related habitats of the San Francisco Bay estuary system, such as San Pablo Bay. Because the Cullinan Ranch Site is identified as a key area for tidal marsh restoration under the EGP, implementation of the Preferred Restoration Alternative would be consistent with both the intent and purposes of the CCMP and EGP.

CALFED Bay-Delta Program and Ecosystem Restoration Program Plan

As described above, the planning effort for the Proposed Action is funded through Category III funds under CALFED's Ecosystem Restoration Program Plan (ERPP). Implementation of the Preferred Restoration Alternative would be inherently consistent with the specific goals of the ERPP since the Proposed Action qualified for this funding because its implementation would meet the following ERPP goals to:

- Contribute to the recovery of at-risk native species;

- Rehabilitate natural processes related to hydrology, stream channels, sediment, floodplains and ecosystem water quality;

- Maintain and enhance fish populations critical to commercial, sport and recreational fisheries; and

- Protect and restore functional habitats.

Long-Term Management Strategy for Disposal of Dredged Sediments in San Francisco Bay

The main goal of the LTMS is to dispose dredged material in the most environmentally sound manner and maximize the use of dredged material as a beneficial resource in the creation and restoration of upland and wetland habitats. The Preferred Restoration Alternative would primarily rely on natural sedimentation to establish suitable elevations for tidal marsh restoration rather than use of beneficial dredged materials. However, several other restoration sites within the San Francisco Bay ecosystem have been identified as reuse sites in the LTMS management plan. Furthermore, augmentation of the Pond 1 levee and reinforcement of the Highway 37 levee will require use of off-site material. Beneficial reuse of off-site material to complete construction of these project components would be consistent with main goal of the LTMS.

As described above, the Preferred Restoration Alternative would be consistent with the applicable plans and policies of local, state and federal planning documents governing the development and use of tidal wetland habitat within the San Francisco Bay ecosystem that includes the Cullinan Ranch Site. As a result, there are no adverse effects in relation to inconsistencies with land use plans and policies. ***No impact.***

LU-3. Implementation of the Preferred Restoration Alternative would be Consistent with Existing and Future Land Uses on and Adjacent to the Cullinan Ranch Site

The Cullinan Ranch Site is currently an open space, seasonal wetland area that is managed by the USFWS as part of the San Pablo Bay National Wildlife Refuge. Implementation of the Preferred Restoration Alternative would result in the restoration of the Site from seasonal wetlands to tidal wetlands. Introduction of tidal waters onto the Cullinan Ranch Site could potentially conflict with the use of Highway 37 during high tide events. However, as described in 2*.0 Purpose and Need and Proposed Alternatives*, the existing levee located adjacent to Highway 37 within the project boundary, would be improved to protect the roadway from potential tidal water fluctuations prior to implementation of the proposed breaches. Other adjacent uses such as Ponds 2, 2A and 3 to the north, Pond 1 to the west, San Pablo Bay National Wildlife Refuge to the south, and Guadalcanal Village to the east would also be compatible with the proposed land uses at the Cullinan Ranch Site. Once restoration activities are underway, each of these adjacent areas will either be hydrologically connected to the Cullinan Ranch Site or will be managed in conjunction with the Cullinan Ranch Site as a contiguous tidally-influenced, wildlife habitat area. As a result, the Preferred Restoration Alternative would be consistent with existing and future land uses on and adjacent to the Cullinan Ranch Site. ***Less-than-Significant impact.***

LU-4. Implementation of the Preferred Restoration Alternative would Result in Temporary Elimination of Access to Existing Recreation Uses of the Cullinan Ranch Site

As described above under "Existing Conditions," the Cullinan Ranch Site is currently closed to the public except for docent-led bird tours. During construction, access to the Cullinan Ranch Site via the Pond 1 levee would be restricted until augmentation of the Pond 1 levee was completed and while the Highway 37 levee was improved. The elimination of existing access to this recreational activity would be short-term and construction related. Access to the Cullinan Ranch Site would be available on the improved Pond 1 levee once all construction activities were completed and the access points were safe enough to use for vehicular access. Furthermore, the

Preferred Alternative includes public access features such as construction of a public parking lot in the southwestern corner of the Cullinan Ranch Site, addition of acceleration and deceleration lanes from Highway 37 to allow formal access to the Site, construction of kayak access, and installation of interpretive signs at the proposed parking area to provide educational information about the San Pablo Bay National Wildlife Refuge. Implementation of this recreational element could also accommodate future development of the Bay Trail at the Cullinan Ranch Site linking existing and planned trails in the project vicinity. Consequently, effects to existing and future recreational opportunities at the Cullinan Ranch Site are not considered adverse. ***Less-than-Significant impact.***

LU-5. Implementation of the Preferred Restoration Alternative would Result in Reduction of Existing Mosquito Breeding Habitat due to Introduction of Tidal Influences onto the Cullinan Ranch Site

As described under "Existing Conditions," the Cullinan Ranch Site currently stores large amounts of standing water that are breeding sites for mosquitoes. Mosquitoes can carry various diseases that may be passed on to humans leading to serious health effects and in some cases, mortality. Mosquitoes require standing water to complete their growth cycle. Any body of standing water represents a breeding site for mosquitoes, with the exception of ponded areas that are flushed by tidal action. These areas are not stagnant for a long enough period of time to support the mosquito larvae to maturity. Typically, greater numbers of mosquitoes are produced in water bodies with water levels that slowly increase or recede than in water bodies with rapidly fluctuating water levels. Permanent bodies of open water that have good circulation (i.e., tidal wetlands), low temperatures, and low organic content typically sustain stable nutrient content and support rich floral and faunal species diversity, including mosquito predators and pathogens. Additionally, wave action across large bodies of water physically retards mosquito production by inhibiting egg laying and larval survival (Jones & Stokes 2003). The Preferred Restoration Alternative would result in opening of the existing Cullinan Ranch Site to tidal influences of the Napa River. Initially, tidal action on the Cullinan Ranch Site will result in the slow circulation of water, but over time as the tidal wave actions reach equilibrium, the Cullinan Ranch Site will become an open water body that exhibits the mosquito-limiting characteristics described above. Overall, a decrease in mosquito producing habitats would likely occur with implementation of the Preferred Restoration Alternative, however the following mitigation measure is recommended to ensure that proper mosquito abatement procedures are implemented throughout construction and implementation of the Proposed Action. ***Less-than-Significant impact, with implementation of mitigation.***

Mitigation Measure LU-5.1: Coordinate with Local Mosquito Abatement Districts during Project Design, Construction and Operation. The USFWS shall consult with both the Solano and Napa Mosquito Abatement Districts (MADs) during design, implementation and operation phases of the Preferred Restoration Alternative regarding mosquito abatement control measures for the Cullinan Ranch Site. Consultation shall include:

- Development and implementation of strategies to minimize potential mosquito breeding habitats during initial phases of restoration;
- Use of appropriate biological and/or chemical USFWS and EPA-approved pesticides; and

- Consultation with the MADs to perform continuous monitoring of larval and adult mosquito populations, water quality, and vegetation density and to implement management measures in accordance with the MADs procedures and programs.

Effects of the Partial Restoration Alternative

LU-6. Implementation of the Partial Restoration Alternative would be Generally Consistent with Applicable Local, State and Federal, State Plans and Policies

Similar to effects of the Preferred Restoration Alternative, under the Partial Restoration Alternative, the restored portion of the Cullinan Ranch Site would be generally consistent with existing land use and zoning designations of both Solano and Napa counties. The Partial Restoration Alternative is also consistent with applicable federal, state and local plans and policies that support the protection and enhancement of the wildlife and aquatic habitat values of marshlands located around San Pablo Bay. (LU-2 provides a detailed description of the compatibility of the Proposed Action with applicable federal, state, and local plans and policies). The portion of Cullinan Ranch that would remain seasonal wetland under this alternative would also be consistent with land use and zoning designations of Solano and Napa counties. Current land use and zoning designations generally allow agricultural operations and/or low-density development uses to be implemented on the Site. Consequently, the Partial Restoration Alternative would be consistent with the applicable plans and policies of local, state and federal planning documents governing the development and use of tidal wetland habitat within the San Francisco Bay ecosystem that includes the Cullinan Ranch Site. As a result, there are no adverse effects in relation to inconsistencies with land use plans and policies. ***No impact.***

LU-7. Implementation of the Partial Restoration Alternative would be Consistent with Existing and Future Land Uses on and Adjacent to the Cullinan Ranch Site

Implementation of the Partial Restoration Alternative would result in restoration of a portion of Cullinan Ranch Site from seasonal wetlands to tidal wetlands (approximately 20%). Similar to the Preferred Restoration Alternative, introduction of tidal waters onto any portion of the Cullinan Ranch Site could potentially conflict with the use of Highway 37 during high tide events. However, as described in 2.*0 Purpose and Need and Proposed Alternatives*, the existing levee located adjacent to Highway 37 within the project boundary, would be improved to protect the roadway from potential tidal water fluctuations prior to implementation of the proposed breach. Other adjacent uses include Ponds 2, 2A and 3 to the north, Pond 1 to the west, San Pablo Bay National Wildlife Refuge to the south, and Guadalcanal Village to the east; these land uses would also be compatible with the proposed land uses at the Cullinan Ranch Site. Pond 3 and Guadalcanal Village will eventually be hydrologically connected to the Cullinan Ranch Site and will be managed in conjunction with the Cullinan Ranch Site as a contiguous tidally-influenced, wildlife habitat area. After implementation of the Partial Restoration Alternative Ponds 1, 2, and 2A would remain in their current condition as would the San Pablo Bay National Wildlife Refuge. The Partial Restoration Alternative would be consistent with existing and future land uses on and adjacent to the Cullinan Ranch Site. ***Less-than-Significant impact.***

LU-8. Implementation of the Partial Restoration Alternative would Result in Reduction of Existing Mosquito Breeding Habitat due to Introduction of Tidal Influences onto a Portion of the Cullinan Ranch Site

Overall, a decrease in mosquito producing habitats would likely occur with implementation of the Partial Restoration Alternative, however the following mitigation measure is recommended to ensure that proper mosquito abatement procedures are implemented throughout construction and implementation of the alternative. ***Less-than-Significant impact, with implementation of mitigation.***

Mitigation Measure LU-5.1: Coordinate with Local Mosquito Abatement Districts during Project Design, Construction and Operation.

3.5 Visual Quality

This section evaluates the effects of the proposed alternatives on the visual quality of the Cullinan Ranch Site and its vicinity. A description of the existing visual landscape and regulatory setting is provided. This evaluation primarily focuses on the change in the landscape during construction activities and also describes the expected change that would occur with implementation of the Proposed Action.

3.5.1 Existing Conditions

Surrounding Land Uses and Visual Landscape The area surrounding Cullinan Ranch is primarily open water habitat to the north and west, Highway 37 to the south, and the City of Vallejo to the east in the distance. The surrounding areas encompass unobstructed vistas of marshland, creeks and a tidal bay with distant views of hills and mountains. The Sonoma and Vaca Mountains and San Pablo Bay dominate the views to the north and south. There are a few pockets of trees and man-made structures, such as electrical transmission towers, that parallel Highway 37. Typical views of the Cullinan Ranch Site and its immediate surroundings are shown in Figures 3.5-1 and 3.5-2. The Cullinan Ranch Site is a mixture of seasonal freshwater marsh (wetlands), freshwater ditch/slough and coastal salt marsh (ECORP Consulting 2000). The seasonal wetlands make up the majority of the Cullinan Ranch Site and are comprised of grasslands, shrubbery, isolated trees and various sized pools of water. The freshwater ditches and sloughs are primarily found next to the existing levees along Pond 1 and Highway 37 and other areas on the Site and are comprised of pools of water with bordering upland habitat such as grassland and shrubbery. The coastal salt marsh habitat is located within South and Dutchman Sloughs and is primarily comprised of open water with bordering upland habitat.

Viewer Groups The primary viewers of Cullinan Ranch Site are roadway travelers who use Highway 37 and local recreationists that may use the Pond 1 levee. Roadway travelers are considered to have a low sensitivity level to existing views because their views of the Cullinan Ranch Site and its surroundings are generally fleeting and not uncommon along the entire Highway 37 route. The recreationists who use the Pond 1 levee are considered to have a moderate sensitivity level to existing views because they are able to view the Cullinan Ranch Site and its surroundings for a prolonged period of time. However, similar to the roadway travelers, the recreationists' views of the Site are not uncommon to those provided from other locations within the entire Highway 37 route and the surrounding areas in general.

Light and Glare The primary source of light and glare within the surrounding areas, including the Cullinan Ranch Site, is light spillage from headlamps of vehicles traveling along Highway 37. The

Cullinan Ranch Site is not currently lit by any lighting fixtures. There is no highway lighting along Highway 37 within the boundaries of the Cullinan Ranch Site.

Figure 3.5-1. Typical Views from the Cullinan Ranch Site Looking North

Figure 3.5-2. Typical Views of the Cullinan Ranch Site Looking South

3.5.2 Regulatory Setting

The *Scenic Roadways Element* of the Solano County General Plan designates the portion of Highway 37 between the Solano-Sonoma County lines to Interstate 80 at Vallejo as a scenic roadway. For the portion of Highway 37 that is located within the Cullinan Ranch Site boundaries, the *Scenic Roadways Element* designates sensitive views of marshlands present on both sides of Highway 37's foreground. The *Scenic Roadways Element* encourages preserving the long-range views of marshlands and recommends adhering to the posted speed limits so excessive speeds do not impact the visual experience of the scenic drive. The following policies of the *Scenic Roadways Element* also apply to the Proposed Action:

- Immediately adjoining dry lands and uplands within and around a marsh should remain in open space use (grazing, cropland, or other extensive uses) (Foreground Component B, Marshlands, Policy 1);
- Existing animal and vegetative habitats should be protected from encroachment due to their own visual value and their role in maintaining the marsh ecosystem and its overall scenic value (Foreground Component B, Marshlands, Policy 2);
- Public roadway construction and improvement activities should be subject to restrictions permitting the natural water movement necessary to sustain the marsh environment (Foreground Component B, Marshlands, Policy 3); and
- Since such a flat and expansive natural environment tends to exaggerate vertical elements, placing utility lines underground is highly recommended (Foreground Component B, Marshlands, Policy 1). (Solano County 1977).

According to the California Scenic Highway Mapping System, Highway 37 is eligible for designation as a state scenic highway; however, Caltrans has not officially designated Highway 37 as a state scenic highway. (Caltrans website 2004).

3.5.3 Environmental Consequences and Mitigation Measures

Methodology

The effects of the proposed alternatives were evaluated by analyzing the expected change in the visual character of the Cullinan Ranch Site and the expected change in views of the Site from adjacent areas. This evaluation is qualitative in nature and does not include simulated views of the Cullinan Ranch Site after implementation of the Proposed Action.

Significance Criteria

The following significance criteria were used to evaluate the proposed alternatives. The proposed alternatives would adversely affect visual quality at the Cullinan Ranch Site if they would:

- Substantially affect a scenic vista or damage scenic resources (such as trees, rock outcroppings and/or historic buildings) within a state scenic highway;
- Substantially degrade the existing visual character of the site and its surroundings; or
- Create a new source of light and glare that could adversely affect day and nighttime views in the area.

Effects of the No-Action Alternative

VQ-1. Implementation of the No-Action Alternative would not Result in Adverse Effects on the Visual Quality of the Cullinan Ranch Site or its Surroundings

As described above under "Existing Conditions," the Cullinan Ranch Site is located adjacent to the Highway 37 corridor, which is a locally designated scenic roadway under the Solano County General Plan. The Cullinan Ranch Site is not designated as a state scenic highway. Views from the Cullinan Ranch Site do provide scenic vistas of the surrounding marsh, bayland and distant mountains. Views of the Cullinan Ranch Site are primarily comprised of seasonal wetlands, upland grasslands and shrubbery, and isolated trees. Under the No-Action Alternative, Cullinan Ranch would retain the characteristics of a seasonal wetland area since tidal waters would not flood the Site. Implementation of the No-Action Alternative would not conflict with the policies of the *Scenic Roadways Element* of the Solano County General Plan as the adjoining dry lands and uplands around the existing marsh areas would remain in open space use (Foreground Component B, Marshlands, Policy 1), and no new vertical elements that could obstruct scenic views would be constructed (Foreground Component B, Marshlands, Policy 1). As a result, implementation of the No-Action Alternative would not result in adverse effects on visual quality. ***Less-than-Significant impact.***

Effects of the Preferred Restoration Alternative

VQ-2. Implementation of the Preferred Restoration Alternative would not Substantially Affect a Scenic Vista or Degrade the Existing Visual Character of the Site and its Surroundings

Implementation of the Preferred Restoration Alternative would result in the transformation of the Cullinan Ranch Site from primarily seasonal wetlands to tidal marshes. During construction activities, construction crews would be operating several trucks and other construction equipment on the Site to unload off-site material, construct PG&E boardwalks, complete levee reinforcements, excavate and block drainage ditches, repair and enhance the Pond 1 levee, construct kayak access within the Cullinan Ranch Site, and install interpretive signs. Use of construction vehicles and equipment on the Cullinan Ranch Site would constitute a change in the existing visual character of the Site. However, the construction activities on the Site would be temporary and construction vehicles and equipment would be permanently removed from the Site once construction activities were completed. Once construction activities were completed and the proposed breaches were implemented, Cullinan Ranch would be opened up to the tidal influences of adjacent waters constituting a change in the overall landscape of the Site. With this change in landscape, over time Cullinan Ranch would no longer exhibit the characteristics of a seasonal wetland area since tidal waters would flood the Site and its upland grasslands, shrubbery and trees would be underwater. Cullinan Ranch would instead exhibit characteristics of an open waterbody similar to the adjacent Ponds 1, 2, 2A and 3. Although this change in habitat would alter the existing visual features of the Site, restoration of the Site from its current state to its near-historic condition as a tidal marsh would not adversely affect the overall visual character of the Site or its surrounding area. Once construction activities are completed, viewer groups would view the Site in the same manner as existing views and the change in visual landscape would not lower the relative sensitivity of each viewer group since the Site would generally remain as an open space natural habitat area. Furthermore, implementation of the Preferred Restoration Alternative would be consistent with the policies of the *Scenic Roadways Element* of the Solano County General

Plan as listed above. As a result, implementation of the Preferred Restoration Alternative would not result in adverse effects on visual quality. ***Less-than-Significant impact.***

VQ-3. Implementation of the Preferred Restoration Alternative would not Create New Sources of Light and Glare which could adversely affect Existing Day and Nighttime Views

As described under "Existing Conditions", the only source of light and glare within the surrounding area, including the Cullinan Ranch Site, is light spillage from the headlamps of vehicles traveling on Highway 37. Construction activities would only occur during daylight hours and thus would not require use of nighttime lighting. Additionally, the Cullinan Ranch Site is not currently lit by lighting fixtures, nor will any such fixtures be installed under this alternative. Therefore, implementation of the Preferred Restoration Alternative would not create any new sources of light and glare that could adversely affect existing day or nighttime views of the Cullinan Ranch Site or its surrounding areas. ***No Impact.***

Effects of the Partial Restoration Alternative

VQ-4. Implementation of the Partial Restoration Alternative would not Substantially Affect a Scenic Vista or Degrade the Existing Visual Character of the Site and its Surroundings

Implementation of the Partial Restoration Alternative would result in the conversion of approximately 300 acres of seasonal wetlands to tidal marsh habitat. During construction activities, construction crews would be operating several trucks and other construction equipment on the Site to unload off-site material for construction of the internal levee, breach the Dutchman Slough levee and complete the Highway 37 levee reinforcements. Use of construction vehicles and equipment on the Cullinan Ranch Site would constitute a change in the existing visual character of the Site. However, the construction activities on the Site would be temporary and construction vehicles and equipment would be permanently removed from the Site once construction activities were completed. Once construction activities are completed and the proposed breach is implemented, 300 acres of Cullinan Ranch would be opened to the tidal influences of adjacent waters constituting a minor change in the overall landscape of the Site. This portion of the Cullinan Ranch Site would eventually exhibit characteristics of an open waterbody similar to the adjacent Ponds 1, 2, 2A and 3. Additionally, construction of a 3,500-foot long buttress levee and armoring of a 2,200-foot section of the existing Highway 37 embankment will protect Highway 37. An approximately 4,000-foot long internal levee will divide Cullinan Ranch and would contain tidal waters in the eastern portion of the Cullinan Ranch Site. Construction of the above listed elements would alter the existing visual features of the Project Area. Although this alternative would result in changes to the existing visual features of the Site, implementation of the Partial Restoration Alternative would not adversely affect the overall visual character of the Site or its surrounding area. There would be no changes to the western portion of the Cullinan Ranch Site and viewer groups accessing the area via the Pond 1 levee would not experience a significant change in visual features. Furthermore, implementation of the Partial Restoration Alternative would be consistent with the policies of the *Scenic Roadways Element* of the Solano County General Plan as listed above. As a result, implementation of the Partial Restoration Alternative would not result in adverse effects on visual quality. ***Less-than-Significant impact.***

VQ-5. Implementation of the Partial Restoration Alternative would not Create New Sources of Light and Glare, which could Adversely Affect Existing Day and Nighttime Views

As described under "Existing Conditions", the only source of light and glare within the surrounding area, including the Cullinan Ranch Site, is light spillage from the headlamps of vehicles traveling on Highway 37. Construction activities would only occur during daylight hours and thus would not require use of nighttime lighting. Additionally, the Cullinan Ranch Site is not currently lit by lighting fixtures, nor will any such fixtures be constructed under this alternative. Similar to the Preferred Restoration Alternative, implementation of the Partial Restoration Alternative would not create any new sources of light and glare that could adversely affect existing day or nighttime views of the Cullinan Ranch Site or its surrounding areas. ***No Impact.***

3.6 Transportation

This section evaluates the potential effects on traffic and transportation from implementation of the proposed alternatives. Information from the following documents provides the basis for this discussion:

- Napa River Salt Marsh Restoration Project Final EIR/EIS. (California Coastal Conservancy, California Department of Fish and Game, and U.S. Army Corps of Engineers April 2004).
- Bel Marin Keys Unit V Expansion of the Hamilton Wetland Restoration Project. Final Supplemental EIR/EIS. (Jones & Stokes, April 2003).
- State Route 37 Highway Improvement in Vallejo, Solano County, California Draft EIR/EIS. (U.S. Department of Transportation - Federal Highway Administration, California Department of Transportation, April 1998).

3.6.1 Existing Conditions

Roadway Network The Cullinan Ranch Site is bounded by westbound Highway 37 along its southern border. Highway 37 is a principal arterial highway that extends east from U.S. Highway 101 in Novato to Interstate 80 in Vallejo. Within the boundaries of the Cullinan Ranch Site, the highway is a two-lane, median-separated facility with a single lane for westbound traffic heading toward Novato and Sonoma County, and a single lane for eastbound traffic toward Vallejo and Solano County. The two lanes of traffic are separated by a concrete barrier installed by Caltrans as a safety mechanism. Highway 37 is a heavily used commuter and recreation route and is also the major North Bay connection between the coastal region and the San Joaquin Valley. Highway 37 is frequently used for hauling of large loads (Caltrans 1998).

Cullinan Ranch Site Access. Currently, access to the Cullinan Ranch Site is directly from westbound Highway 37 onto several narrow turn-outs located adjacent to the northern edge of the roadway. Primary public access to the Site is from westbound Highway 37 onto the Pond 1 levee. A small portion of this existing graveled, wide section of the Pond 1 levee located adjacent to Highway 37 currently serves as a parking area for recreation users. An existing cyclone fence prevents auto access to the majority of the Pond 1 levee. However, there are no direct turn-out lanes, or deceleration/acceleration lanes that allow vehicles to safely enter and exit the highway near the Cullinan Ranch Site. Returning to the eastbound direction of Highway 37 from the Cullinan Ranch Site is accomplished by turning back onto westbound

Highway 37, and then completing a turn-around at Skaggs Island Road past the western limit of the Cullinan Ranch Site. There is no direct access to the Cullinan Ranch Site from eastbound Highway 37.

Existing Levels of Service Level of Service (LOS) is a qualitative measure of describing traffic and transportation movement, generally described in terms of speed and travel time, freedom to maneuver, traffic interruptions, comfort and convenience, and safety. The LOS are characterized through a letter rating system of A through F, with A being the best and F the worst (Caltrans 1998). Table 3.6-1 describes the standard descriptions of LOS for highway segments.

Table 3.6-1. Highway Segment Levels of Service

Level of Service	Description
A	Highest quality of service. Free traffic flow. Little or no restriction on maneuverability or speed. No delay. 55+ mph.
B	Stable traffic flow, speed becoming slightly restricted. Low restriction on maneuverability. No delay. 50 mph.
C	Stable traffic flow, but less freedom to select speed, change lanes or pass. Minimal delay. 45 mph.
D	Speeds tolerable but subject to sudden and considerable variation. Minimal delay. 40 mph.
E	Unstable traffic flow with rapidly fluctuating speeds and flow rates. Short headways, low maneuverability, and low driver comfort. Considerable delay. 35 mph.
F	Forced traffic flow. Speed and flow may drop to zero. Considerable delay. <25 mph.

Source: State Route 37 Highway Improvement in Vallejo, Solano County, California Draft EIR/EIS. (U.S. Department of Transportation - Federal Highway Administration, California Department of Transportation, April 1998)

Peak-hour traffic is one criterion that determines the LOS of a given transportation facility. The peak-hour traffic flow for the portion of Highway 37 adjacent to the Cullinan Ranch Site is 2,816 vehicles. Based on current service conditions, Caltrans has assigned an LOS grade of B to the section of Highway 37 immediately adjacent to the Cullinan Ranch Site. However, traffic volumes increase during peak-hours as the highway continues east into Vallejo where the LOS is D for various sections of the highway, particularly between the Napa River Bridge and the intersection of Highway 37 and State Route 29 in Vallejo (Jones & Stokes 2004).

3.6.2 Environmental Consequences and Mitigation Measures

Methodology

The potential traffic and transportation effects that could occur with implementation of the proposed alternatives were evaluated qualitatively by comparing the existing conditions with anticipated construction activities. The evaluation of effects is focused on construction traffic and transportation, since use or maintenance of the Cullinan Ranch Site would not generate significant traffic on the roadway network adjacent to the Cullinan Ranch Site.

Significance Criteria

The following significance criteria were used to evaluate the proposed alternatives. The proposed alternatives would adversely affect traffic and transportation within and adjacent to the Cullinan Ranch Site if they would:

- Substantially increase traffic volumes such that the increases cause an unacceptable LOS within the existing roadway network; or
- Contribute substantially to traffic congestion within the existing roadway network.

Environmental Effects of the No-Project Alternative

TR-1. Implementation of the No-Action Alternative would not Result in Adverse Traffic Effects

Implementation of No-Action Alternative would not restore Cullinan Ranch to tidal marsh habitat. Under this alternative, none of the proposed construction activities would occur; therefore transport of off-site material for levee work and construction of access lanes to the restoration would not occur. Routine levee maintenance work would continue to take place and maintenance crews would continue to access the Site via the Pond 1 levee or other existing turn-outs along Highway 37. Additionally, public access to the Site would also continue to occur via the Pond 1 levee. Additional traffic associated with proposed restoration of the Site would not occur and therefore there would not be any new adverse traffic effects as a result of the No-Action Alternative. ***No impact.***

Environmental Effects of the Preferred Restoration Alternative

TR-2. Implementation of the Preferred Restoration Alternative could Diminish Overall Traffic Operations along Highway 37 or its Approaches during Importing Operations

Proposed improvements to the Pond 1 and Highway 37 levees could require approximately 14,900 truck trips to and from the Site for the importing of off-site fill material. Introduction of approximately 14,900 new truck trips to Highway 37 both at the western access point at Pond 1 and at the Mare Island approach could lead to slowing of traffic on the Highway 37 corridor. As described under "Existing Conditions," existing traffic volumes in the eastbound direction typically increase during peak-hours where the LOS is D for various sections of the highway, particularly between the Napa River Bridge and the intersection of Highway 37 and State Route 29 within Vallejo. Although the importing operation would be short-term, and introduction of approximately 14,900 truck trips onto the roadway would not by itself substantially increase traffic volumes, the addition of slow-moving trucks to this segment of roadway during peak-hours would result in overall diminished operations of the roadway.

The potential traffic impacts associated with importing operations as proposed under the Preferred Restoration Alternative are considered adverse. Implementation of the following mitigation would minimize these effects. ***Less-than-significant impact, with implementation of mitigation.***

Mitigation Measure TR-3.1: Develop and Implement a Traffic Control Plan in Coordination with Caltrans. The construction contractor shall develop a traffic control plan in accordance with Caltrans' highway construction safety standards. The contractor shall submit the traffic control plan to Caltrans for approval prior to commencement of construction activities. The traffic control plan shall include, but not be limited to the following provisions:

- Clearly delineate on maps and/or construction plans the specific routes that shall be used for access to the Cullinan Ranch Site by construction vehicles;
- Provide roadside signage at an appropriate distance before the access point warning that trucks will be entering and exiting the highway in both the westbound and eastbound directions;
- Designate an appropriate number of construction crew at entry and exit points to direct truck traffic onto the Cullinan Ranch Site or onto Highway 37 ramps; and
- If possible, limit truck importing operations to occur during non-peak hours.

TR-3. Construction of Access Lanes to and from Highway 37 could Result in Temporary Traffic Congestion along Highway 37

As described above, currently the Pond 1 levee serves as a public access point to Cullinan Ranch. An existing graveled, wide section of the Pond 1 levee located adjacent to Highway 37 currently serves as a parking area for recreation users. However, there are no built roadways leading either off or onto Highway 37 in this area, and access to or from the highway can be hazardous. Under the Preferred Restoration Alternative the existing access point to the Cullinan Ranch Site would be improved. Acceleration and deceleration lanes would be installed to facilitate safe highway merging. Construction of the deceleration lane would necessitate the widening of the Highway 37 embankment along its path. The existing small, gravel parking area would be improved by relocating it further away from the highway; paving the surface and providing room to accommodate approximately 10 vehicles. The new parking lot would be constructed along the Pond 1 levee. Construction equipment, such as pavers and graders, would be used and the Highway 37 shoulder could be closed during construction activities to build the new access lanes. It is anticipated that traffic control measures would need to be implemented to provide safe passage through this area during construction. Traffic control measures could require a reduction in speed, maneuvering around construction areas, and stopped traffic to allow for trucks or other construction vehicles to safely enter and exit the Cullinan Ranch Site. Implementation of such traffic control measures could lead to slowing of traffic along westbound Highway 37, which could further lead to traffic congestion along this portion of Highway 37. Although the traffic control measure would only be employed temporarily until the access lanes and parking lot are built, the anticipated construction-related traffic congestion would constitute an adverse effect. Implementation of the *Mitigation Measure TR-3.1* as described above would minimize this effect. ***Less-than-significant impact, with implementation of mitigation.***

Mitigation Measure TR-3.1: Develop and Implement a Traffic Control Plan in Coordination with Caltrans.

Environmental Effects of the Partial Restoration Alternative

TR-4. Implementation of the Partial Restoration Alternative could Diminish Overall Traffic Operations along Highway 37 or its Approaches during Importing Operations

Under the Partial Restoration Alternative proposed improvements to the eastern portion of the Highway 37 levee and construction of the internal levee could require approximately 13,200 truck trips to and from the Site for the importing of off-site fill material. Introduction of approximately 13,200 new truck to Highway 37 at the Mare Island approach could lead to slowing of traffic within the Highway 37 corridor. As described under "Existing Conditions," existing traffic volumes in the eastbound direction typically increase during peak-hours where the LOS is D for various sections of the highway, particularly between the Napa River Bridge and the intersection of Highway 37 and State Route 29 within Vallejo. Although the importing operation would be short-term, and introduction of 13,200 truck trips onto the roadway would not significantly increase traffic volumes, the addition of any slow-moving trucks to this segment of the roadway during peak-hours would result in overall diminished operations of the roadway.

The potential traffic impacts associated with importing operations as proposed under the Partial Restoration Alternative are considered adverse. Implementation of the following mitigation would minimize these effects. ***Less-than-significant impact, with implementation of mitigation.***

Mitigation Measure TR-3.1: Develop and Implement a Traffic Control Plan in Coordination with Caltrans.

3.7 Noise

This section evaluates noise effects associated with the proposed alternatives. The evaluation of noise effects is focused on construction noise, since use or maintenance of the Cullinan Ranch Site would not generate significant noise within and adjacent to the Cullinan Ranch Site. The noise analysis is based on previous noise measurements at the Cullinan Ranch Site since site-specific noise monitoring and modeling was not conducted for this analysis. Information from the following documents provides the basis for this discussion:

- Napa River Salt Marsh Restoration Project Final EIR/EIS. (California Coastal Conservancy, California Department of Fish and Game, and U.S. Army Corps of Engineers April 2004).
- Bel Marin Keys Unit V Expansion of the Hamilton Wetland Restoration Project. Final Supplemental EIR/EIS. (Jones & Stokes, April 2003).
- State Route 37 Highway Improvement in Vallejo, Solano County, California Draft EIR/EIS. (U.S. Department of Transportation - Federal Highway Administration, California Department of Transportation, April 1998).

The following terminology is used in the analysis of noise effects:

- **Noise.** Sound that is loud, unpleasant, unexpected, or otherwise undesirable.
- **Decibel (dB).** A unitless measure of sound on a logarithmic scale that indicates the squared ratio of sound pressure amplitude to a reference sound pressure amplitude. The reference pressure is 20 micropascals.

- **A-Weighted Decibels (dBA).** An overall frequency-weighted sound level in decibels that approximates the frequency response of the human ear.
- **Equivalent Sound Level (Leq).** A logarithmic average of noise levels from all sources of noise in a given area over a stated period of time (e.g., 24 hours, 1 year).
- **Day-Night Equivalent Sound Level (Ldn).** A 24-hour average sound level with a 10-decibel "penalty" added to noise during the hours between 10 p.m. and 7 a.m. to account for the greater noise sensitivity of people at night.
- **Sensitive Receptor**. A population that is more susceptible to impacts than is the general population. Sensitive noise receptors include schools, residences, childcare centers, health care facilities, and convalescent centers (Jones & Stokes 2004).

3.7.1 Existing Conditions

The primary sources of noise at the Cullinan Ranch Site are traffic noise from Highway 37 and noise from aircraft flying over the Site. Because the Cullinan Ranch Site is not developed, there are no sources of noise generated from the Site. The nearest urban development is located approximately two miles to the east at Mare Island and the City of Vallejo. There are no noise sensitive land uses such as schools, residences, child care centers, health care facilities, and convalescent centers located either on or directly adjacent to the Cullinan Ranch Site. However, atypical sensitive receptors include the existing wildlife species that inhabit the Site. Other sensitive receptors include construction workers and future recreational users of the Cullinan Ranch Site. Noise measurements were taken at four locations along Highway 37 as part of the previous residential development that was proposed for the Site in the 1980's. Since the intensity of land uses at the Cullinan Ranch Site has not changed since that time, the average of these noise measurements, or 63 dBA, represents the ambient noise level currently present at the Cullinan Ranch Site (EIP 1984).

3.7.2 Regulatory Setting

The federal Noise Control Act of 1972 established a requirement that all federal agencies administer their programs to promote an environment free of noise that jeopardizes public health or welfare. The EPA was given the responsibility for:

- providing information to the public regarding identifiable effects of noise on public health or welfare;
- publishing information on the levels of environmental noise that will protect public health and welfare within an adequate margin of safety;
- coordinating federal research and activities related to noise control; and
- establishing federal noise-emission standards for selected products distributed in interstate commerce.

The EPA identified indoor and outdoor noise limits to protect against effects on public health and welfare. Outdoor limits of 55 dB-Ldn and indoor limits of 45 dB-Ldn are identified as desirable to protect against speech interference and sleep disturbance for residential areas and areas with educational and healthcare facilities.

The U.S. Department of Housing and Urban Development has established guidelines for evaluating noise impacts on residential projects. Sites are generally considered acceptable if they are exposed to outdoor

noise levels of 65 dB-Ldn or less, normally unacceptable if they are exposed to levels of 65–75 dB-Ldn, and unacceptable if exposed to levels of 75 dB-Ldn or greater.

In 1987, the California Department of Health Services published guidelines for the noise elements of local general plans. These guidelines include a sound level/land use compatibility chart that categorizes various outdoor Ldn ranges by land use. These guidelines identify the normally acceptable range for low density residential uses as less than 65 dB, and conditionally acceptable levels as 55–70 dB (Jones & Stokes 2003).

The Solano County General Plan also includes noise thresholds for permanent facilities and construction-related activities. The maximum allowable noise levels from construction equipment are an average of 75 dBA at 50 feet. (Jones & Stokes 2004)

Because the Cullinan Ranch Site is not located within close proximity to residential or other sensitive land uses, the noise exceedance criteria that will be used for the purposes of this analysis is 65 dBA since it meets the mid-range acceptable noise levels for low-density, rural development established by federal and state guidelines. The Solano County criteria for construction equipment noise levels, 75 dBA at 50 feet, will also be used.

3.7.3 Environmental Consequences and Mitigation Measures

Methodology

Noise effects were qualitatively assessed by considering typical, predicted construction noise levels for similar restoration projects. Table 3-7.1 summarizes typical noise levels produced by construction equipment commonly used on construction projects. Noise produced by construction equipment would be reduced at a rate of about 6 dB per doubling of distance.

Table 3.7-1. Typical Construction Equipment Noise Emission Levels

Equipment	Typical Noise Level (dBA) 50 Feet from Source
Excavator	85
Dozer	85
Scraper	89
Compactor	82
Dump/Haul Trucks	88
Small Dredge	80
Pile Driver	95

Source: Jones & Stokes 2003, 2004

A reasonable worst-case assumption is that the three loudest pieces of equipment would be operated simultaneously and continuously over a period of at least 1-hour, including the pile driver, excavator or dozer and dump/haul trucks. Table 3.7-2, which assumes this combined source level, summarizes typical, predicted noise levels at various distances from an active construction site. These estimates of noise levels take into account attenuation (reduction in sound level) based on increasing distance, attenuation from molecular absorption, and anomalous excess attenuation (Jones & Stokes 2003, 2004).

Table 3.7-2. Typical Predicted Noise Levels at Various Distances from an Active Construction Site

Distance to Receptor (feet) Combined Equipment	Sound Level at Receptor (dBA)
50	93
100	87
200	81
500	72
600	71
800	68
1,000	65
1,500	61
2,000	58
2,500	55
3,000	52
4,000	48
5,280	44
7,500	37

Notes:
The following assumptions were used:
Basic sound level dropoff rate: 6.0 dB per doubling of distance
Molecular absorption coefficient: 0.7 dB per 1,000 feet
Anomalous excess attenuation: 1.0 dB per 1,000 feet
Reference sound level: 96 dBA
Distance for reference sound level: 50 feet
This calculation does not include the effects, if any, of local shielding, which may reduce sound levels further.

Source: Jones & Stokes 2003, 2004

Significance Criteria

The following significance criteria were used to evaluate the proposed alternatives. The proposed alternatives would adversely affect noise sensitive land uses at the Cullinan Ranch Site if they would:

- Permanently increase ambient noise levels to greater than 65 dBA at the Cullinan Ranch Site or in areas adjacent to the Site.

Environmental Effects of the No-Action Alternative

N-1. Implementation of the No-Action Alternative would not result in Adverse Noise Effects

Under the No-Action Alternative, none of the proposed construction activities would occur; therefore additional construction equipment would not be used on the Site. Routine levee maintenance work would continue to take place and ambient noise levels generated by these

activities would not differ significantly. Consequently, there would not be any adverse noise effects. ***No impact.***

Environmental Effects of the Preferred Restoration Alternative

N-2. Implementation of the Preferred Restoration Alternative would Result in Temporary Increases in Noise Levels to more than 65 dBA during Construction Activities

As described in Table 3.7-2, implementation of the Preferred Restoration Alternative could result in increases in noise levels exceeding 65 dBA at distances up to 1,000 feet, and exceeding 75 dBA at distances up to 200 feet due to combined equipment activity associated with dredging, scraping, compacting, truck hauling and dumping, and pile driving. As described above, the likely sensitive receptors at the Site would be wildlife species and construction workers. The nearest land uses that could be exposed to construction noise are located approximately two miles to the east. Furthermore, the existing ambient noise levels at the Site are approximately 63 dBA with the majority attributed to traffic noise from Highway 37. Furthermore, noise associated with construction activities would cease upon completion of major earth moving work. Due to the short-term nature of construction activities, and the lack of noise-sensitive land uses within and directly adjacent to the Cullinan Ranch Site, temporary noise effects due to construction activities are not considered adverse. However, the relatively high levels of noise that could result from the temporary use of construction equipment in close range to wildlife species' nesting, foraging or breeding habitats would contribute a short-term adverse effect on wildlife species inhabiting the Cullinan Ranch Site (adverse effects of construction noise on nesting special status birds are addressed under impacts BIO-4 and BIO-5). To minimize this effect, the following mitigation measure shall be implemented during construction activities. ***Less-than-significant impact, with implementation of mitigation.***

Mitigation Measure N-2.1: Implement Noise Reducing Construction Practices. In order to reduce noise levels during construction activities, the construction contractor shall implement, but not exclusively, the following noise-reduction practices.

- Use mufflers on all construction equipment, generators, and vehicles;
- Locate construction equipment staging areas as far away from any identified wildlife foraging, nesting or breeding habitats on the Site;
- Relocate stationery construction equipment if wildlife foraging, nesting or breeding habitats cannot be moved away from the noise source;
- Install temporary barriers around stationery construction noise sources if required;
- Shut off idling equipment when not in use;
- Reschedule construction activity outside breeding seasons for species whose mating is dependent on vocalization;
- Schedule construction activities to start before nesting season and discourage use of the property by nesters that may abandon nest after construction starts; and
- Schedule activities after nesting season is over to avoid nest abandonment.

Environmental Effects of the Partial Restoration Alternative

N-3. Implementation of the Partial Restoration Alternative would Result in Temporary Increases in Noise Levels to more than 65 dBA during Construction Activities

As described under adverse effects for the Preferred Restoration Alternative, construction of the Partial Restoration Alternative could also result in temporary increases in noise levels exceeding 65 dBA at distances up to 1,000 feet, and exceeding 75 dBA at distances up to 200 feet. Construction noise could result from the combined activity of scraping and compacting, truck hauling and dumping, and pile driving. This estimated rise in noise levels could cause a short-term adverse effect on wildlife species inhabiting Cullinan Ranch (adverse effects of construction noise on nesting special status birds are addressed under impacts BIO-4 and BIO-5). To minimize this effect, the following mitigation measure shall be implemented during construction activities. ***Less-than-significant impact, with implementation of mitigation.***

Mitigation Measure N-2.1: Implement Noise Reducing Construction Practices.

3.8 Air Quality

This section evaluates air quality effects associated with the proposed alternatives. The evaluation of air quality effects is focused on construction related activities, since use or maintenance of the Cullinan Ranch Site would not generate significant air pollutants within and adjacent to the Cullinan Ranch Site. The Bay Area Air Quality Management District's (BAAQMD's) CEQA guidelines were used to evaluate the proposed alternatives' air quality effects. Information from the following documents provides the basis for this discussion:

- Napa River Salt Marsh Restoration Project Final EIR/EIS. (California Coastal Conservancy, California Department of Fish and Game, and U.S. Army Corps of Engineers April 2004).
- Bel Marin Keys Unit V Expansion of the Hamilton Wetland Restoration Project. Final Supplemental EIR/EIS. (Jones & Stokes, April 2003).

3.8.1 Existing Conditions

Regional Setting All construction and operational areas associated with the restoration alternatives are located in the San Francisco Bay Area Air Basin (SFBAAB). The SFBAAB is composed of the following counties: Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, and Santa Clara, along with the southeast portion of Sonoma County and the southwest portion of Solano County. The SFBAAB encompasses an area of approximately 5,540 square miles (Jones & Stokes 2004).

Climate The primary sources of air pollution transport and concentrations are wind, atmospheric stability, terrain and insolation. Furthermore, the potential for the development of high pollutant concentrations at a given location depends upon the quantity of pollutants emitted in the surrounding area and the ability of the atmosphere to disperse them (BAAQMD 2004a).

The topography of the Cullinan Ranch Site is generally flat, and the Site itself has subsided with varying elevations between 1 and 6 feet (NGVD) below the existing adjacent lands. The Site and its surrounding areas are characterized by a Mediterranean climate of warm, dry summers and cool, damp winters (Jones

& Stokes 2004). The Cullinan Ranch Site also experiences windy conditions during both the summer and winter seasons. Based on monitoring data collected at the BAAQMD Vallejo Station, winds typically travel from the west and southwest between rates of 2 and 12 miles per hour within the vicinity of Cullinan Ranch (BAAQMD 2004a).

Existing Air Quality Conditions The existing air quality conditions within the Cullinan Ranch Site are characterized by air quality monitoring data collected at the BAAQMD Vallejo monitoring station in Vallejo, California, which is the closest station to the Cullinan Ranch Site. Recent monitoring data for ozone, carbon monoxide, PM10 and PM2.5 are presented below in Table 3.8-1. Furthermore, a description of the major pollutants found in the restoration area is provided below.

Ozone

Ozone is a respiratory irritant and an oxidant that increases susceptibility to respiratory infections and can cause substantial damage to vegetation and other materials. Ozone is a severe eye, nose, and throat irritant. Ozone also attacks synthetic rubber, textiles, plants, and other materials. Ozone causes extensive damage to plants by leaf discoloration and cell damage. Ozone is not emitted directly into the air, but is formed by a photochemical reaction in the atmosphere. Ozone precursors, which include reactive organic gases [1](ROG) and oxides of nitrogen (NOx), react in the atmosphere in the presence of sunlight to form ozone. Because photochemical reaction rates depend on the intensity of ultraviolet light and air temperature, ozone is primarily a summer air pollution problem. The ozone precursors, ROG and NOx, are emitted by mobile sources and by stationary combustion equipment (Jones & Stokes 2003). The monitoring data shows one instance when the ozone state standard was exceeded during the three most recent years of available data.

Carbon Monoxide

Carbon monoxide (CO) is essentially inert to plants and materials but can have significant effects on human health. Carbon monoxide is a public health concern because it combines readily with hemoglobin and thus reduces the amount of oxygen transported in the bloodstream. Effects on humans range from slight headaches and nausea to death. Motor vehicles are the dominant source of CO emissions in most areas. High CO levels develop primarily during winter when periods of light wind combine with the formation of ground-level temperature inversions (typically from the evening through early morning). These conditions result in reduced dispersion of vehicle emissions. Motor vehicles also exhibit increased CO emission rates at low air temperatures (Jones & Stokes 2003). The monitoring data shows no recorded violations of the CO standards during the three most recent years of available data.

[1] Reactive organic gases include any compound of carbon, excluding carbon monoxide, carbon dioxide, carbonic acid, metallic carbides or carbonates, and ammonium carbonate, For a complete list of gases excluded from this definition see the following California Air Resources Board website:
http://www.arb.ca.gov/ei/speciate/ROG_DFN_9_04.doc

Table 3.8-1. Air Quality Monitoring Data Recorded at Vallejo Monitoring Station

Pollutant	2004	2005	2006
Ozone (ppm)			
1 hour	0.104	0.087	0.080
8 hour	0.069	0.070	0.069
No. of days exceeded standard			
NAAQS (1 hour) > 0.12 ppm	0	0	0
CAAQS (1 hour) > 0.09 ppm	1	0	0
Carbon Monoxide (ppm)			
1 hour	n/a	n/a	n/a
8 hour	3.09	3.02	2.36
No. of days exceeded standard			
NAAQS (1 hour) ≥ 35 ppm	0	0	0
NAAQS (8 hour) ≥ 9 ppm	0	0	0
CAAQS (1 hour) ≥ 20 ppm	0	0	0
CAAQS (8 hour) ≥ 9 ppm	0	0	0
Nitrogen Dioxide (ppm)			
1 hour	0.049	0.070	0.055
Annual Average	0.012	0.011	0.011
No. of days exceeded standard			
NAAQS (Annual) ≥ 0.053 ppm	0	0	0
CAAQS (1 hour) ≥ 0.25 ppm	0	0	0
Sulfur Dioxide (ppm)			
Max 24 hour	0.005	0.005	0.004
Annual Average	0.001	0.001	0.001
No. of days exceeded standard			
NAAQS (Annual) ≥ 0.03 ppm	0	0	0
NAAQS (24 hour) ≥ 0.14 ppm	0	0	0
CAAQS (24 hour) ≥ 0.04 ppm	0	0	0
PM10 (µg/m^3)			
Max 24 hour	51.4	52.3	33.0
Annual Average	19.6	n/a	n/a
No. of days exceeded standard			
NAAQS (max 24-hour) >150 µg/m^3	0	0	n/a
CAAQS (max 24-hour) > 50 µg/m^3	6	n/a	n/a
PM2.5 (µg/m^3)			
Max 24 hour	39.7	43.8	25.4
Annual Average	11.1	n/a	n/a
No. of days exceeded standard			
NAAQS (max 24-hour) > 65 µg/m^3	0	0	n/a

Notes:
(1) n/a = no sufficient data available
(2) An exceedance is not necessarily a violation.
(3) Data taken from the CARB/BAAQMD internet sources for Vallejo monitoring station.
(4) 2000 was the first full year for with the BAAQMD measured PM2.5 levels.

Source: California Air Resources Board 2007; BAAQMD 2007.

Nitrogen Dioxide

Nitrogen dioxide is a reactive, oxidizing gas capable of damaging cells lining the respiratory tract. This pollutant is also an essential ingredient in the formation of ground-level ozone pollution. Nitrogen dioxide is one of the nitrogen oxides emitted from high-temperature combustion processes, such as those occurring in trucks, cars and power plants. Home heaters and gas stoves also produce substantial amounts of nitrogen dioxide in indoor settings. Exposure to nitrogen dioxide along with other traffic-related pollutants is associated with respiratory symptoms, episodes of respiratory illness, and impaired lung functioning. Studies in animals have reported biochemical, structural, and cellular changes in the lung when exposed to nitrogen dioxide above the level of the current state air quality standard. Clinical studies of human subjects suggest that nitrogen dioxide exposure to levels near the current standard may worsen the effect of allergens in allergic asthmatics, especially in children. Besides causing adverse health effects, nitrogen dioxide is responsible for the visibility reducing reddish-brown tinge seen in smoggy air in California (CARB 2004a). The monitoring data shows no recorded violations of the nitrogen dioxide standards during the three most recent years of available data.

Particulates

Particulate matter (PM) is a complex mixture of tiny particles that consists of dry solid fragments, solid cores with liquid coatings, and small droplets of liquid. These particles vary greatly in shape, size and chemical composition, and can be made up of many different materials such as metals, soot, soil, and dust. Particles 10 microns or less in diameter are defined as "respirable particulate matter" or "PM10". Fine particles are 2.5 microns or less in diameter (PM2.5) and can contribute significantly to regional haze and reduction of visibility in California. PM10 emissions are generated by a wide variety of sources, including agricultural activities, industrial emissions, dust suspended by vehicle traffic, and secondary aerosols formed by reactions in the atmosphere.

Extensive research indicates that exposure to outdoor PM10 and PM2.5 levels exceeding current air quality standards is associated with increased risk of hospitalization for lung and heart-related respiratory illness, including emergency room visits for asthma. PM exposure is also associated with increased risk of premature deaths, especially in the elderly and people with pre-existing cardiopulmonary disease. In children, studies have shown associations between PM exposure and impaired lung function and increased respiratory symptoms and illnesses. Besides reducing visibility, the acidic portion of PM (nitrates, sulfates) can harm crops, forests, aquatic and other ecosystems (CARB 2004a). The monitoring data shows a few exceedances of the PM10, and federal PM2.5 standards during the three most recent years of available data.

Table 3.8-2 summarizes the estimated annual average air emissions within the SFBAAB in 2000. As shown in the table, mobile sources are a primary contributor to air pollutants within the air basin and account for approximately 60% of ROGs, 93% of the carbon monoxide, 81% of the nitrogen oxides, and 12% of the PM10 emissions (Jones & Stokes 2004).

Table 3.8-2. Estimated Annual Average Emission for the SFBAAB (tons/day) (year 2000)

Source Type/Category	ROG	CO	NOx	SO_2	PM10
Stationary Sources					
Fuel Combustion	2.8	33.4	77.4	10.7	3.9
Waste Disposal	7.1	0.1	0.1	0.0	0.0
Cleaning and Surface Coating	71.0	0.0	0.0	--	0.0
Petroleum Production and Marketing	33.3	1.2	8.7	36.5	1.2
Industrial Processes	11.0	0.7	3.0	7.5	12.2
Subtotal	**125.2**	**35.4**	**89.2**	**54.7**	**17.3**
Areawide Sources					
Solvent Evaporation	74.6	--	--	--	--
Miscellaneous Processes	15.6	169.0	17.1	1.4	130.1
Subtotal	**90.2**	**169.0**	**17.1**	**1.4**	**130.1**
Mobile Sources					
On-Road Motor Vehicles	255.1	2,149.6	273.6	4.9	8.5
Other Mobile Sources	63.7	513.3	178.1	31.4	12.4
Subtotal	**318.8**	**2,622.9**	**451.7**	**36.3**	**20.9**
Total for SFBAAB	**534.2**	**2,867.3**	**558.0**	**92.4**	**168.3**

Source: Jones & Stokes, 2004.

3.8.2 Regulatory Setting

Federal and State Ambient Air Quality Standards. Both the federal and state governments have established ambient air quality standards for air pollutants. Most of the standards are set to protect public health. The air pollutants of greatest concern in the vicinity of the Cullinan Ranch Site include ozone, nitrogen dioxide, PM10, and PM2.5. Table 3.8-3 summarizes the federal and state ambient air quality standards.

Table 3.8-3. Federal and State Ambient Air Quality Standards

Pollutant	Averaging Time	State Standard	Federal Standard
Ozone	8 hours 1 hour	n/a 0.09 ppm	0.08 ppm
Carbon Monoxide	8 hours 1 hour	9.0 ppm (180 μg/m^3) 20 ppm (23 mg/ m^3)	9 ppm (10 mg/m^3) 35 ppm (40 mg/m^3)
Nitrogen Dioxide	Annual Average 1 hour	n/a 0.25 ppm (470 μg/m^3)	0.053 ppm (100 μg/m^3) n/a
Sulfur Dioxide	Annual Average 24 hours 1 hour	n/a 0.04 ppm (105 μg/m^3) 0.25 ppm (655 μg/m^3)	80 μg/m^3 (0.03 ppm) 365 μg/m^3 (0.14 ppm) n/a
Particulate Matter (PM10)	Annual arithmetic mean Annual geometric mean 24 hours	n/a 30 μg/m^3 50 μg/m^3	50 μg/m^3 n/a 150 μg/m^3
Particulate Matter (PM2.5)	Annual arithmetic mean 24 hours	12 μg/m^3 n/a	15 μg/m^3 65 μg/m^3
Sulfates	24 hours	25 μg/m^3	n/a
Lead	Calendar quarter 30-day average	n/a 1.5 μg/m^3	1.5 μg/m^3 n/a
Hydrogen Sulfide	1 hour	0.03 ppm (42μg/m^3)	n/a
Vinyl Chloride (chloroethene)	24 hours	0.010 ppm (26 μg/m^3)	n/a
Visibility-Reducing Particles	8 hours (1000-1800 PST)	n/a[1]	n/a

Notes: ppm = parts per million
mg/m3 = milligrams per cubic meter
μg/m^3 = micrograms per cubic meter

[1]Statewide VRP Standard (excluding Lake Tahoe Air Basin): Particles in sufficient amount to produce an extinction coefficient of 0.23 per kilometer when the relative humidity is less than 70%. This standard is intended to limit the frequency and severity of visibility impairment due to regional haze and its equivalent to a 10-mile nominal visual change.

Source: Jones & Stokes 2003; BAAQMD 2004c.

State and Federal Attainment Status The San Francisco Bay Area is given an air quality status designation by the federal and state regulatory agencies. Areas with monitored pollutant concentrations that are lower than ambient air quality standards are designated as ***attainment areas*** on a pollutant-by-pollutant basis. When monitored concentrations exceed ambient standards, areas are designated as ***nonattainment areas***. An area that recently exceeded ambient standards, but is now in attainment, is designated as a ***maintenance area***. Areas are often designated as unclassified when data are insufficient to have a basis for determining the area's attainment status. Nonattainment areas are further classified based on the severity and persistence of the air quality problem as moderate, serious, or severe. Classifications determine the minimum pollution control requirements. In general, the more serious the air quality classification, the more stringent the control requirements are that must be contained in the regional air quality plans (Jones & Stokes 2004).

The SFBAAB is currently in attainment of the federal standards for nitrogen dioxide, sulfur dioxide, and carbon monoxide. The SFBAAB is in nonattainment for ozone and is unclassified for PM10. The California Air Resources Board (CARB) designates areas of the state as either in attainment or in nonattainment of the state ambient air quality standards. An area is in nonattainment if the standards have been exceeded more than once in three years. Currently, the SFBAAB is in nonattainment for ozone and PM10, and in attainment for carbon monoxide, nitrogen dioxide, and sulfur dioxide under state standards. The SFBAAB is designated as a serious nonattainment area for ozone (CARB 2004a).

State and Federal Air Quality Management Programs Air pollution control programs were established in California before the enactment of federal requirements. Federal Clean Air Act legislation in the 1970s resulted in a gradual merging of state and federal air quality programs, particularly those relating to industrial sources. Air quality management programs developed in California since the late 1980s have generally responded to requirements established by the federal Clean Air Act.

The enactment of the California Clean Air Act in 1988 and the federal Clean Air Act Amendment of 1990 has produced additional changes in the structure and administration of air quality management programs. The California Clean Air Act requires preparation of an air quality attainment plan for any area that violates state air quality standards for CO, sulfur dioxide, nitrogen dioxide, or ozone. Locally prepared attainment plans are not required for areas that violate the state standards for PM10. The CARB is addressing PM10 attainment issues. Air pollution problems in the SFBAAB are primarily the result of locally generated emissions. The SFBAAB, however, has been identified as a source of ozone precursor emissions, which occasionally contribute to air quality problems in the Monterey Bay area, the northern San Joaquin Valley, and the southern Sacramento Valley. Consequently, in addition to correcting local air pollution problems, air quality planning efforts for the SFBAAB must also reduce the area's impact on downwind air basins.

The BAAQMD has prepared two recent air quality plans designed to bring the SFBAAB into attainment with ozone standards. The 1999 Ozone Attainment Plan was designed to bring the SFBAAB into attainment with the federal ozone ambient air quality standards. It was approved by the CARB but was partially disapproved by the U.S. EPA. This plan contained 11 control strategy measures that would have included development and implementation of additional air quality rules and regulations for emission sources within the SFBAAB. A Bay Area 2001 Ozone Attainment Plan is currently being prepared by the BAAQMD, the Metropolitan Transportation Commission, and the Association of Bay Area Governments. This plan is a proposed revision to the Bay Area portion of California's plan to achieve the national ozone standard. The plan is being prepared in response to EPA's partial approval and partial disapproval of the Bay Area's 1999 Ozone Attainment Plan.

On December 20, 2000, the BAAQMD adopted the 2000 Clean Air Plan (CAP). The CAP represents the third triennial update of the 1991 CAP. It contains additional rules and regulations that are designed to bring the SFBAAB into attainment with the California ozone ambient air quality standards (Jones & Stokes 2003).

Federal Clean Air Act Conformity As required by the 1990 Federal Clean Air Act amendments, EPA enacted 2 separate federal conformity rules. Those rules (incorporated as section 40 CFR Parts 51 and 93) are designed to ensure that federal actions do not cause or contribute to air quality violations in areas that do not meet the national ambient air quality standards. The 2 rules include transportation conformity, which applies to transportation plans, programs, and projects, and general conformity, which applies to all other nontransportation-related projects.

The Proposed Action is subject to a federal conformity analysis under the general conformity rule. Currently, the SFBAAB, which includes Solano County, where the Cullinan Ranch Site is located, is classified as a serious federal nonattainment area for ozone. However, a conformity determination is not required if the applicability analysis determines that the project's direct and indirect emissions (1) do not exceed the conformity de minimis threshold levels, and (2) are less than 10% of the nonattainment/maintenance area's emissions for that pollutant. The conformity de minimis threshold level for a serious nonattainment area for ozone precursors is 50 tons per year and 100 tons per year for nitrous oxides. Ten percent of the BAAQMD's emissions inventory for ozone precursors for off-road equipment is approximately 12 tons per day for ROGs and 10 tons per day of nitrous oxides (Jones & Stokes 2003, 2004).

Toxic Air Contaminants Toxic Air Contaminants (TACs) are pollutants "...which may cause or contribute to an increase in mortality or serious illness, or which may pose a present or potential hazard to human health" (BAAQMD 1997b). The CARB has identified more than 240 chemical substances as TACs, and the list is updated periodically as more information is gathered about airborne chemicals and their potential health effects. Unlike criteria pollutants, there are no ambient standards for TACs. When TACs are identified, health effects data are evaluated on a case-by-case basis. For TACs that are known or suspected to cause cancer, CARB has consistently found that there are no levels or thresholds below which exposure is risk free. For noncancer health effects of TACs, such as neurological damage, a hazard index is developed. The hazard index is based on values of Acceptable Ambient Concentration Levels (AACLs) that are specific to individual TACs and exposure periods.

The state's TAC program collects data on TAC emissions and ambient levels. When data show that public exposure is significant, the CARB develops Air Toxic Control Measures (ATCMs) to reduce public exposure. The ATCMs can apply to stationary or mobile sources. BAAQMD adopts and enforces ATCMs and also uses its air permit program to evaluate and control the risk posed by TACs. BAAQMD requires potential sources to reduce TAC emissions to eliminate "hot spots" of public exposure from existing sources and prevent increases in TAC exposure from new or expanding stationary sources (Jones & Stokes 2004).

Diesel Particulate Matter On August 27, 1998, CARB formally identified particulate matter emitted by diesel-fueled engines as a TAC. Diesel engines emit TACs in both gaseous and particulate forms. The particles emitted by diesel engines are coated with chemicals, many of which have been identified by EPA as Hazardous Air Pollutants (HAPs), and by CARB as TACs. Diesel engines emit particulate matter at a rate about 20 times greater than comparable gasoline engines. Because by weight the vast majority of diesel exhaust particles are very small (92% to 94% of their combined mass consists of particles less than

2.5 micrometers in diameter), both the particles and their coating of TACs are inhaled into the lung. Like other particles of this size, a portion will eventually become trapped within the small airways and alveolar regions of the lung. While the gaseous portion of diesel exhaust also contains TACs, CARB's August 1998 action was specific to diesel particulate emissions that, according to supporting CARB studies, represent 50% to 90% of the mutagenicity of diesel exhaust (Jones & Stokes 2004).

Mutagenicity is the capacity to induce mutation of cells. Mutagenicity is one indication of the cancer-causing potential of a chemical. The California State Scientific Review Panel has identified a unit risk factor of 300 excess cancer cases per million persons exposed to a diesel particulate matter concentration of 1 $\mu g/m^3$. EPA currently designates diesel exhaust as a likely human carcinogen, but has stopped short of establishing a unit risk factor. EPA's Clean Air Scientific Advisory Committee (CASAC) has suggested that an annual NAAQS for PM2.5 would be adequately protective for long-term exposure to ambient diesel particulate matter (Jones & Stokes 2004).

The CARB action was taken at the end of a lengthy process that considered dozens of health studies, extensive analysis of health effects and exposure data, and public input collected over the last nine years. The International Agency for Research on Cancer (IARC) had previously concluded that diesel exhaust was a "probable" human carcinogen. Based on the IARC's action, California listed its "Proposition 65" program. Proposition 65, the California Safe Drinking Water and Toxic Enforcement Act, was passed by the voters in 1986. The act is therefore commonly known as the Proposition 65 program. Finally, EPA's evaluation of diesel exhaust (approved by CASAC) indicates that diesel exhaust is "likely to be carcinogenic". CARB is in the process of developing regulations governing additional PM emission reductions. The Diesel Risk Reduction Plan was adopted by CARB on September 28, 2000. The plan focuses on particulate matter reductions as a means of achieving reductions in diesel exhaust risk. The goal is to reduce diesel particulate matter emissions by about 90% overall from current levels, using retrofit technology and requiring new engines to meet very low (0.01 gram/brake horsepower–hour) emission standards for particulate matter. New regulations will be developed to achieve these emission reduction goals for particulate matter (Jones & Stokes 2004).

3.8.2 Environmental Consequences and Mitigation Measures

Methodology

The evaluation of adverse air quality effects resulting from implementation of the restoration alternatives is generally qualitative and follows requirements outlined by the BAAQMD. The BAAQMD's approach to analysis of construction impacts is to emphasize implementation of effective and comprehensive control measures rather than detailed quantification of emissions (Jones & Stokes 2003). However, an emissions estimate was prepared for the Preferred Restoration Alternative based on estimated truck trips required to complete construction activities.

Significance Criteria

The following significance criteria were used to evaluate the proposed alternatives. The proposed alternatives would adversely affect the air quality within and adjacent to the Cullinan Ranch Site if they would:

- Increase ambient pollutant levels from below to above the NAAQS or CAAQS;
- Substantially contribute to an existing or projected air quality standard violation; or

- Result in annual emissions in exceedance of established EPA and BAAQMD conformity thresholds, of 50 tons ROG per year or 100 tons NOx per year.

Environmental Effects of the No-Action Alternative

AQ-1. Implementation of the No-Action Alternative would not Result in Adverse Air Quality Effects

Implementation of the No-Action Alternative would not restore Cullinan Ranch to tidal marsh habitat. Under this alternative, none of the proposed construction activities would occur; therefore use of construction equipment would not be undertaken on the Site. Routine levee maintenance work would continue to take place and emissions of air quality pollutants would not differ significantly as a result of the No-Action Alternative. Consequently, there would not be any adverse air quality effects. ***No impact.***

Environmental Effects of the Preferred Restoration Alternative

AQ-2. Implementation of the Preferred Restoration Alternative would Result in Construction-Related Emissions of PM10

Construction activities proposed under the Preferred Restoration Alternative would be temporary in duration, but may still cause adverse air quality impacts. The primary pollutant of concern during construction related activities is PM10. Typically, construction-related emissions come from a variety of activities including: grading, excavation, roadbuilding and other earthmoving activities, travel by construction equipment, especially on unpaved surfaces, and exhaust from construction equipment. PM10 emissions from construction activity can vary considerably depending on factors such as the level of activity, the specific operations taking place, and weather and soil conditions (BAAQMD 1999). Construction-related emissions may cause substantial increases in localized concentrations of PM10. According to the emissions calculations prepared for the Preferred Restoration Alternative, construction-related emissions of PM10 are expected to total 1.2 tons per year, which is less than one percent of the total emissions generated for PM10 in the entire SFBAAB in 2000 (see Table 3.8-2 above). Although this contribution would be minimal from a regional perspective, the following measures would need to be implemented to comply with BAAQMD guidelines regarding construction activities. ***Less than significant impact, with implementation of mitigation.***

Mitigation Measure AQ-2.1: Implement BAAQMD Standards to Control PM10 Emissions during Construction. Basic Control Measures – The following controls shall be implemented during construction activities.

- Water all active construction areas at least twice daily.
- Cover all trucks hauling soil, sand, and other loose materials or require all trucks to maintain at least two feet of freeboard.
- Pave, apply water three times daily, or apply (nontoxic) soil stabilizers on all unpaved access roads, parking areas, and staging areas at construction sites.
- Sweep daily (with water sweepers) all paved access roads, parking areas and staging areas at construction sites.

- Sweep streets daily (with water sweepers) if visible soil material is carried onto adjacent public streets.
- Hydroseed or apply (non-toxic) soil stabilizers to inactive construction areas (previously graded areas inactive for 10 days or more).
- Enclose, cover, water twice daily, or apply (non-toxic) soil binders to exposed stockpiles (dirt, sand, etc.).
- Limit traffic speeds on unpaved roads to 15 mph.
- Install sandbags or other erosion control measures to prevent silt runoff to public roadways.
- Replant vegetation in disturbed areas as quickly as possible.

The following Optional Control Measures may be implemented during construction activities to further reduce emissions of PM10 pollutants.

- Install wheel washers for all exiting trucks, or wash off the tires or tracks of all trucks and equipment leaving the Site.
- Install wind breaks, or plant trees/vegetative wind breaks at windward side(s) of construction areas.
- Suspend excavation and grading activity when winds (instantaneous gusts) exceed 25 mph.
- Limit the area subject to excavation, grading, and other construction activity at any one time.

AQ-3. Implementation of the Preferred Restoration Alternative would Result in Minimal Emissions of Ozone Precursors from Construction Activity

Use of heavy-duty construction equipment during restoration activities would result in the temporary release of ozone precursors through vehicle exhaust. The emissions estimates prepared for the Preferred Restoration Alternative show that approximately 5.0 tons per year of nitrous oxides and 0.5 tons per year of ROG would be generated during construction activities. These estimates do not exceed the existing BAAQMD thresholds of 50 and 100 tons per year of nitrous oxides or ROGs, respectively. Furthermore, the predicted emissions are less than 10% of the total SFBAAB's typical emissions for these pollutants. Due to the temporary nature of construction activities, and because construction activities would be carried out in accordance with BAAQMD standards, there would not be an adverse air quality effect. No mitigation is required. ***Less-than-Significant impact.***

Environmental Effects of the Partial Restoration Alternative

AQ-4. Implementation of the Partial Restoration Alternative would result in Construction-Related Emissions of PM10

As with the Preferred Restoration Alternative, construction activities proposed under the Partial Restoration Alternative would be temporary in duration, but may still cause adverse air quality impacts. The Partial Restoration Alternative would result in construction of an internal levee, which would require approximately 4,833 truck trips to and from the Cullinan Ranch Site. Under the Partial Restoration Alternative proposed improvements to the eastern portion of the Highway 37 levee and construction of the internal levee would require a total of approximately 10,222 truck trips to and from the Site for the importing of off-site fill material. The primary pollutant of concern during restoration and construction related activities is PM10. Under this alternative, construction-related emissions would come from a variety of activities including: excavation and other earthmoving activities, travel by construction equipment, especially on unpaved surfaces, and exhaust from construction equipment. PM10 emissions from construction activity can vary considerably depending on factors such as the level of activity, the specific operations taking place, and weather and soil conditions (BAAQMD 1999). Construction-related emissions may cause substantial increases in localized concentrations of PM10. According to the emissions calculations prepared for the Partial Restoration Alternative, construction-related emissions of PM10 are expected to total 1.0 tons per year, which is less than one percent of the total emissions generated for PM10 in the entire SFBAAB in 2000 (see Table 3.8-2 above). Although this contribution would be minimal from a regional perspective, the following measures would be implemented to comply with BAAQMD guidelines regarding construction activities. ***Less than significant impact, with implementation of mitigation.***

Mitigation Measure AQ-2.1: Implement BAAQMD Standards to Control PM10 Emissions during Construction.

AQ-5. Implementation of the Partial Restoration Alternative would Result in Minimal Emissions of Ozone Precursors from Construction Activity

As described above, use of heavy-duty construction equipment during restoration activities would result in the temporary release of ozone precursors through vehicle exhaust. The emissions estimates prepared for the Partial Restoration Alternative show that approximately 3.9 tons per year of nitrous oxides and 0.4 tons per year of ROG would be generated during construction activities**.** These estimates do not exceed the existing BAAQMD thresholds of 50 and 100 tons per year of nitrous oxides or ROGs, respectively. Furthermore, the predicted emissions are less than 10% of the total SFBAAB's typical emissions for these pollutants. Due to the temporary nature of construction activities, and because construction activities would be carried out in accordance with BAAQMD standards, there would not be an adverse air quality effect. No mitigation is required. ***Less-than-Significant impact.***

3.9 Utilities and Service Systems

This section describes the existing utilities at the Cullinan Ranch Site and any adverse effects that may result with implementation of the proposed alternatives. The information provided in this section is based on a previously prepared analysis conducted by Pacific Gas & Electric (PG&E) for proposed activities that are needed to upgrade their facilities that are located on the Cullinan Ranch Site.

3.9.1 Existing Conditions

The Site is an undeveloped, previously farmed area that is currently comprised of a mix of freshwater seasonal wetland, upland, freshwater ditch/slough and coastal salt marsh habitats managed by the USFWS. There are five electrical transmission towers located on the northeast portion of the Cullinan Ranch Site, which are owned and maintained by PG& E (Figure 1-2). Four of the five towers are constructed on raised fill or small dirt mounds, with upland vegetation located in the immediate surrounding area. The towers are connected by an existing unimproved dirt vehicle trail. The towers are steel structures, supported by concrete footings.

Several electrical lines are located along the Highway 37 route within the road right-of-way. These electrical lines would not be affected by the proposed alternatives because any work that is to occur adjacent to Highway 37 would occur on the Cullinan Ranch side of the existing right-of-way. No other utilities or service systems exist at the Cullinan Ranch Site.

3.9.2 Environmental Consequences and Mitigation Measures

Methodology

The analysis of adverse effects to utilities and services systems was evaluated by comparing the change in existing conditions against implementation of the proposed alternatives. The analysis focuses on effects to known utilities at the Cullinan Ranch Site.

Significance Criteria

The following significance criteria were used to evaluate the proposed alternatives. The proposed alternatives would adversely affect utilities at the Cullinan Ranch Site if they would:

- Interfere with use or operation of existing facilities such that the service being provided would be disrupted or altered.

Effects of the No-Action Alternative

UT-1. Implementation of the No-Action Alternative would not Result in Adverse Effects to Existing Utilities and Service Systems

Under the No-Action Alternative, efforts to restore Cullinan Ranch to a tidal marsh habitat would not be undertaken by the lead agencies. The existing PG&E transmission towers would need no further reinforcement or additional access. Therefore, implementation of the No-Action Alternative would not result in adverse effects to existing utilities or service systems. ***No Impact.***

Effects of the Preferred Restoration Alternatives

UT-2: Implementation of the Preferred Restoration Alternative would not Interfere with or Require the Expansion of Existing Utilities and Service Systems

Under the Preferred Restoration Alternative up to four breaches would be implemented along South and Dutchman Sloughs introducing tidal action to the Cullinan Ranch Site. PG&E would construct a boardwalk before the breaches occurred to allow access to the transmission towers for

maintenance purposes. As a result, there would not be any adverse effects on the existing utilities from implementation of the Preferred Restoration Alternative. ***No impact.***

Effects of the Partial Restoration Alternative

UT-3: Implementation of the Partial Restoration Alternative would not Interfere with or Require the Expansion of Existing Utilities and Service Systems

Under the Partial Restoration Alternative, restoration of 300 acres in the eastern portion of the Cullinan Ranch Site would not impede access to the existing PG&E towers. As such, construction of the access boardwalk would not be necessary. Implementation of the Partial Restoration Alternative would not interfere with or require the expansion of utilities and service systems. ***No impact.***

3.10 Socioeconomics and Environmental Justice

NEPA states that an EIS must include a discussion of a proposed action's economic and social effects when these effects are related to effects on the natural or physical environments (40 C.F.R. 1508.14). Executive Order 12898 "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations," requires federal agencies to "identify and address, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations."

The Cullinan Ranch Site does not contain any urban development, the closest urban areas to the Cullinan Ranch Site are Mare Island and the City of Vallejo located approximately two miles to the east. The Cullinan Ranch Site is an approximately 1,525-acre area comprised of seasonal wetland, freshwater ditches, sloughs, and open water habitats. There are no businesses, permanent or temporary residents or community centers located on the site. Additionally, no minority or low income populations inhabit the Cullinan Ranch Site or are located directly adjacent to the site. As discussed in the previous sections of this chapter, the anticipated physical effects of the Preferred Restoration Alternative and the Partial Restoration Alternative would occur within the boundaries of the Cullinan Ranch Site and do not involve loss or acquisition of businesses, residential homes or community facilities. Thus there are no adverse social or economical effects, and the anticipated physical effects of the Proposed Action would not result in disproportionately high, adverse human health or environmental effects. No further analysis is required.

3.11 Cultural Resources

This section discusses the presence of sensitive archaeological and architectural resources on the Cullinan Ranch Site and evaluates the potential effects on these resources with implementation of the proposed alternatives. Information provided in this section is based on the Cultural Resources Report prepared for the Proposed Action by the USFWS in 1997, and is available by request to the San Pablo Bay NWR, Refuge Manager.

3.11.1 Existing Conditions

Determination of Significance of Cultural Resources. Historical resources are defined as buildings, sites, structures, objects, or districts, each of which may have historical, architectural, archaeological, cultural, or scientific significance.

Prior to the assessment of effects or the development of mitigation measures, the significance of cultural resources must be determined. The steps that are typically taken in a cultural resources investigation for CEQA compliance are:

- identify potential historical resources,
- evaluate the eligibility of historical resources,
- evaluate the effects of a project on all eligible historical resources.

Regarding cultural resources, NEPA requires compliance with Section 106 of National Historic Preservation Act (NHPA) (36 CFR et. seq.).The State and Federal compliance processes are often successfully coordinated and implemented simultaneously

Section 106 of the NHPA requires that, before beginning any undertaking, a federal agency must take into account the effects of the undertaking on historic properties and afford the Advisory Council on Historic Preservation (ACHP) an opportunity to comment on these actions. The Compliance with the Section 106 process includes the following six basic steps:

- Initiate consultation with State Historic Preservation Officer (SHPO)
- Identify and evaluate historic properties
- Assess effects of the project on historic properties
- Consult with SHPO.
- Create and submit a memorandum of agreement (MOA) to the ACHP only if project would result in adverse effects
- If adverse effects are identified then proceed in accordance with the MOA

The assessment of impacts presented in this section applies the Criteria of Effect and Adverse Effect, as defined by the NHPA. Because these criteria are consistent with the criteria for determining impacts for both CEQA and NEPA, this section will be used to document the effects of the Proposed Action for the purpose of CEQA, NEPA, and Section 106. Specific regulations regarding compliance with Section 106 state that, although the tasks necessary to comply with Section 106 may be delegated to others, the federal agency (in this case, the USFWS) is ultimately responsible for ensuring that the Section 106 process is completed according to statute.

Cultural Resource Significance Criteria.[2] CEQA guidelines define three reasons for which a property may qualify as a significant historical resource for the purposes of CEQA review.

- If the resource is listed in or determined eligible for listing in the California Register of Historical Resources (CRHR)

[2] The information under this topic is taken from Jones & Stokes 2003 and 2004.

- If the resource is included in a local register of historic resources, as defined in section 5020.1(k) of the Public Resources Code, or identified as significant in a historic resource survey meeting the requirements of section 5024.1(g) of the Public Resources Code unless the preponderance of evidence demonstrates that it is not historically or culturally significant
- If the lead agency determines the resource to be significant as supported by substantial evidence in light of the whole record (California Code of Regulations, Title 14, Division 6, Chapter 3, section 15064.5)

For a historic resource to be eligible for listing in the CRHR, it must be significant at the local, state, or national level and meet one or more of the following criteria.

- It is associated with events that have made a significant contribution to the broad patterns of local or regional history, or the cultural heritage of California or the United States.
- It is associated with the lives of persons important to local, California, or national history.
- It embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of a master, or possesses high artistic values.
- It has yielded, or has the potential to yield, information important to the prehistory or history of the local area, California, or the nation.

Historic resources automatically listed in the CRHR include those historic properties listed in, or formally determined eligible for listing in, the NRHP (PRC section 5024.1).

Because the Proposed Action must comply with NEPA and Section 106 of the NHPA, federal significance criteria are also applied in the following analysis. For federal projects, cultural resource significance is evaluated in terms of eligibility for listing in the NRHP. NRHP criteria for eligibility are defined as follows:

The quality of significance in American history, architecture, archeology, and culture is present in districts, sites, buildings, structures, and objects of state and local importance that possess integrity of location, design, setting, materials, workmanship, feeling and association, and that:

- are associated with events that have made a contribution to the broad pattern of our history;
- are associated with the lives of people significant in our past;
- embody the distinct characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
- have yielded, or are likely to yield, information important in prehistory or history (36 CFR 60.4).

In addition to meeting the significance criteria described above, a significant property must possess "integrity" to be considered eligible for listing in the NRHP. "Integrity" refers to a property's ability to convey its historical significance. Integrity is a quality that applies to historical resources in seven ways including: location, design, setting, materials, workmanship, feeling, and association. To be considered eligible for listing in the NRHP, a resource must possess at least two of the above listed qualities, and usually more depending on the context and the reasons why the property is significant.

Area of Potential Effects. The area of potential effect (APE) identified for the purposes of the cultural resource survey and assessment included the areas within the entire Cullinan Ranch Site.

Previous Cultural Resource Studies. A search of the file searches of the Northwest Information Center (File No. 96-315) was conducted as part of the cultural resource assessment for the Proposed Action. The file search revealed that several archaeological surveys have been conducted near the Project Area: two following the southern boundary of the Site along the Highway 37 corridor and three following the power line corridor located to the north of the Site. No recorded archaeological sites were identified near Cullinan Ranch as a result of these previous studies.

Field Survey Methods. In addition to reviewing files at the Northwest Information Center, a USFWS archaeologist conducted a field survey of the Cullinan Ranch Site on August 13, 1996. This field survey was an initial visit that was used to photograph the existing ranch buildings. A second field visit was conducted on June 18, 1996, which consisted of a pedestrian survey along the existing access roads. The June 18th survey also consisted of a thorough examination of the ranch complex area for indications of building foundations, outhouse structures, and refuel piles. Additional photographs and measurements of the ranch buildings were also taken at this time. The USFWS archaeologist also conducted an oral interview with Bill Kiser of Schellville, California, whose family includes three generations of farmers in the Napa Marsh area and whose family also at one time owned Cullinan Ranch. During field surveys, standing water and thick vegetation prevented survey of a few access roads and the area around the Cullinan Ranch buildings. Visibility of the native ground surface was greatly hampered by the existing vegetative cover and pools of water on the Cullinan Ranch Site. The majority of the areas that could not be surveyed were former drained and tilled fields.

Historical Uses of the Cullinan Ranch Site. Prior to alterations by humans the Site was part of a system of tidal marsh islands and sloughs, which encompassed approximately 40,000 acres within the Napa River and Sonoma Creek watersheds. During ethnographic times the Cullinan Ranch Site was occupied by the Coast Miwok group. Within the range of the Coast Miwok territory were the resources of the coast, sloughs, marshes, low hills and open valleys, providing a diversity of habitats that would provide sustenance throughout the year. The Napa marsh would have been a substantial resource, and would have received heavy usage. However, tidal flooding would have restricted occupation to uplands along the edges of the marsh or to high ground beyond the reach of daily high tides.

Historic use of the Napa Marsh unit, including the Cullinan Ranch Site, began in the late 1800s. Extensive diking and drainage practices produced fertile fields. The land was used to graze cattle and horses and to raise oats and hay for draft horses in San Francisco. Upper Tubbs Island, west of the Site along the northwest portion of San Pablo Bay, was leveled and/or filled between 1866 and 1900. Lower Tubbs Island received the same treatment between 1900 and 1940 when levees were constructed along the edges of the sloughs and pumping/tide gate systems were installed to drain the islands (Atwater 1979:353). Cullinan Ranch received the same treatment by government-sponsored farmers around the same time as Lower Tubbs Island. The Site may have been the first "island" reclaimed from San Pablo Bay (Kiser 1997). Over a period of years, the islands began to subside due to consolidation and dewatering. With subsidence, tide gates became impractical and more pumps had to be installed. Many of these diked "islands" are now three to ten feet below sea level.

Farm and ranch operations in the area typically included bunkhouses, hay barns and other outbuildings. At Cullinan Ranch, only the rusty, metal skeleton of a large pole barn remains. The original barns, ranch house, well and pump house have been removed. The ranch complex evolved into a dairy operation in the 1940s when the milking barn and several small storage buildings were constructed. In 1951 the Kiser family bought Cullinan Ranch and, in 1968 built the metal pole barn structure near Highway 37 to house large quantities of baled hay. The last known major levee maintenance was completed in 1973. The Kiser family sold Cullinan Ranch to a developer during the 1970's who held the land without major

improvements but leased the land out for dry land grain farming. The developer planned a community with housing, marinas, retail and commercial centers which was never built. In 1991, the USFWS purchased Cullinan Ranch, incorporating it into the San Pablo Bay National Wildlife Refuge with the explicit purpose of restoring it to its original tidal marsh condition, particularly for the benefit of endangered species.

Findings of Cultural Resources Survey. A ranch complex and a levee associated with ranch activities were identified and evaluated as not eligible for listing on the NRHP. A windmill was mapped on past maps as being located in the western middle third of the Cullinan Ranch Site, but no windmill or other structures were found at this location during the survey. However, the access road did exhibit a slight height elevation in comparison to the surrounding surface area, which was further encircled by Eucalyptus trees, indicating that structures once stood along the road. No other indications of buildings were observed during the field survey.

The original elements of Cullinan Ranch included a bunkhouse and large barn that were most likely established in the 1920s. The ranch was similar to others in the area established for production of hay for Bay Area horses. The original ranch house and well were destroyed in the late 1980s. In the late 1940s, the milk barn and lean-to sheds were constructed as Cullinan Ranch was modified into a dairy operation.

The loss of the house and well, buildings that were significant to the historical integrity of Cullinan Ranch, diminished the historical value of the bunkhouse. The milk barn and lean-to sheds represented the second phase of use of the reclaimed marshlands. These buildings represented a small dairy with no unique or innovative features. The pump house was modified several times and those changes likely reflect the shift from fuel powered electric pumps and the need for increased capacity as the land subsided.

Changes to the ranch setting impaired the property's ability to convey a clear link to the early period of settlement when the island functioned as a self-contained unit. The subsequent dairy operation was not within the historic period and detracted from the original ranch complex. Consequently, the bunkhouse and associated buildings were not considered eligible for listing on the NRHP and all buildings, with the exception of the metal pole barn, have since been removed from Cullinan Ranch.

The Cullinan Ranch north levee experienced periodic maintenance, installation and removal of water control structures, and receipt of adjacent slough dredge spoils, which have altered the original design and shape of the levee structure. Although the location of the levee has not changed, the setting, feel and materials have changed over time as a result of agricultural uses of the ranch. Furthermore, the historical integrity of the structure has been altered significantly. Consequently, the north levee is not considered to be eligible for listing on the NRHP.

3.11.3 Environmental Consequences and Mitigation Measures

Methodology

Evaluation of potential effects was based on the results of the Cultural Resource Report prepared for the Proposed Action (USFWS 1997). The proposed restoration activities were reviewed to determine whether any of the actions under each alternative would result in adverse effects to cultural resources.

Significance Criteria[3]

CEQA Criteria. According to State CEQA guidelines, a project that may cause a substantial adverse change in the significance of a historic resource is a project that may have a significant effect on the environment (CEQA rev. 1998 Section 15064.5(b)). CEQA further states that a substantial adverse change in the significance of a resource means the physical demolition, destruction, relocation, or alteration of the resource or its immediate surroundings such that the significance of a historic resource would be materially impaired. Actions that would materially impair the significance of a historic resource are any actions that would demolish or adversely alter those physical characteristics of a historic resource that convey its historical significance and qualify it for inclusion in the CRHR or in a local register or survey that meet the requirements of sections 5020.1(k) and 5024.1(g) of the Public Resources Code.

Section 106 Criteria. Under federal regulations, a project has an effect on a historic property when the undertaking could alter the characteristics of the property that may qualify the property for inclusion in the NRHP, including alteration of location, setting, or use. An undertaking may be considered to have an adverse effect on a historic property when the effect may diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. Adverse effects on historic properties include, but are not limited to:

- physical destruction or alteration of all or part of the property;
- isolation of the property from or alteration of the property's setting when that character contributes to the property's qualifications for listing in the NRHP;
- introduction of visual, audible, or atmospheric elements that are out of character with the property or that alter its setting;
- neglect of a property resulting in its deterioration or destruction; or
- transfer, lease, or sale of the property (36 CFR 800.9).

Effects of the No-Action Alternative

CR-1. Implementation of the No-Action Alternative would not Result in Adverse Effects to Cultural Resources

Implementation of No-Action Alternative would not restore Cullinan Ranch to tidal marsh habitat. Future breaches from Pond 3 into Dutchman Slough as proposed under the NSRP would not be implemented. Routine levee maintenance work would continue to take place and the state of the Cullinan Ranch Site would not differ significantly under these activities as a result of the No-Action Alternative. Consequently, there would not be any adverse cultural resource effects. ***No impact.***

Effects of the Preferred Restoration Alternative

CR-2. Implementation of the Preferred Restoration Alternative would not Result in Adverse Effects to Significant Cultural Resources

As described under "Existing Conditions," the Cullinan Ranch Site is property and identified resources on the property are ineligible for inclusion on the NRHP. The property has no strong associations with significant historical events or persons, nor are any of its structures and levees

[3] The information under this topic is taken from Jones & Stokes 2004.

architecturally significant or outstanding examples of structural engineering. In addition, Cullinan Ranch no longer exhibits historical integrity due to the earlier losses of the main ranch house and other structures. Therefore, implementation of the Preferred Restoration Alternative would not result in adverse effects to significant cultural resources at the Cullinan Ranch Site. ***No impact.***

CR-3. Implementation of the Preferred Restoration Alternative could Potentially Affect Subsurface Historic or Archaeological Artifacts

Proposed earth moving activities such as dredging and excavating could result in the inadvertent discovery of significant subsurface deposits of historic or archaeological artifacts at the Cullinan Ranch Site, which could be disturbed by construction activities. This is considered an adverse effect. Implementation of the following mitigation would minimize this effect. ***Less-than-significant impact, with implementation of mitigation.***

Mitigation Measure CR-3.1: Stop Work if Subsurface Cultural Deposits are Encountered during Construction Activities. If previously unknown subsurface historic or archaeological artifacts are encountered during deep earth-moving construction activities, work shall halt and the San Pablo Bay National Wildlife Refuge manager shall be immediately notified. A regional archaeologist or similarly qualified individual (under the approval of the USFWS) shall assess the deposits before work resumes in the discovery area.