

DRAFT

**Environmental Impact Statement/Environmental Impact Report
Cullinan Ranch Restoration Project
Solano and Napa Counties, California**

April 2008

Prepared for:

U.S. Fish and Wildlife Service
San Pablo Bay National Wildlife Refuge
7715 Lakeville Highway
Petaluma, CA 94954
Christy Smith
707-769-4200

California Department of Fish and Game
Central Coast Region
P.O. Box 47
Yountville, CA 94599
Larry C. Wyckoff
707-944-5542

Prepared by:

Ducks Unlimited
3074 Gold Canal Drive
Rancho Cordova, CA 95670
Jeff McCreary
916-852-2000



Table of Contents

Table of Contents	i
List of Tables	iii
List of Figures	iv
List of Abbreviations	v
Executive Summary	1
1.0 Introduction	21
1.1 Project Background.....	21
1.2 Regulatory Overview.....	27
1.3 Intent and Scope of this Environmental Document.....	28
1.4 Public Involvement and Scoping.....	28
1.5 Issues of Known Controversy.....	28
1.6 Other Pertinent Studies and Documents.....	28
1.7 Report Organization.....	31
2.0 Purpose and Need and Proposed Alternatives	33
2.1 Introduction.....	33
2.2 Purpose and Need.....	33
2.3 Project Goal and Objective.....	33
2.4 Proposed Alternatives.....	33
2.5 Project Construction and Phasing.....	57
2.6 Alternatives Analysis.....	61
2.7 Required Approvals and Permits.....	64
3.0 Existing Conditions and Environment Consequences	65
3.1 Hydrology and Water Quality.....	66
3.2 Biological Resources.....	84
3.3 Hazardous Waste.....	121
3.4 Land Use, Recreation and Public Health.....	126
3.5 Visual Quality.....	138
3.6 Transportation.....	144
3.7 Noise.....	148
3.8 Air Quality.....	153
3.9 Utilities and Service Systems.....	164
3.10 Socioeconomics and Environmental Justice.....	166
3.11 Cultural Resources.....	166

4.0	Other Required Analyses	173
4.1	Cumulative Impacts	173
4.2	Significant and Unavoidable Impacts	176
4.3	Irreversible and Irretrievable Commitments of Resources	176
4.4	Relationship between Short-Term Uses of the Environment and the Maintenance and Enhancement of Long-Term Productivity	176
5.0	List of Preparers	177
6.0	References	179
7.0	Appendices	183
A	Hydrology Report.....	185
B	Common and Special Status Species Tables and USFWS Species List	267
C	Scoping Comments.....	289
D	Cullinan Ranch Contaminant Sampling Report and Contaminant Cleanup.....	303

List of Tables

	Page
Table ES-1. Summary Comparison of Proposed Alternatives	5
Table ES-2. Summary of Environmental Consequences	7
Table 2-1. Summary Comparison of Proposed Alternatives	62
Table 2-2. Alternatives Considered and Withdrawn	63
Table 3.1-1. Tidal Datum.....	67
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	71
Table 3.1-3. Modeled Water Levels for the Preferred Restoration Alternative.....	77
Table 3.1-4. Modeled Velocities and Tidal Prism for the Partial Restoration Alternative.....	77
Table 3.1-5. Modeled Water Levels for the Partial Restoration Alternative.....	85
Table 3.1-6. Modeled Velocities and Tidal Prism for the Partial Restoration Alternative.....	85
Table 3.3-1. Summary Results of Soil Sampling.....	123
Table 3.4-1. General Plan Land Use Designations and Zoning	127
Table 3.6-1. Highway Segment Levels of Service	145
Table 3.7-1. Typical Construction Equipment Noise Emission Levels	150
Table 3.7-2. Typical Predicted Noise Levels at Various Distances from an Active Construction Site	151
Table 3.8-1. Air Quality Monitoring Data Recorded at Vallejo Monitoring Station from 2000 to 2003.....	155
Table 3.8-2. Estimated Annual Average Emission for the SFBAAB	157
Table 3.8-3. Federal and State Ambient Air Quality Standards	158

List of Figures

	Page
Figure 1-1: Regional Location	23
Figure 1-2: Restoration Site and Adjacent Areas	25
Figure 2-1: No Action Alternative	37
Figure 2-2: Preferred Restoration Alternative	39
Figure 2-3: Proposed Ditch Plug	41
Figure 2-4: Proposed Transmission Tower Access Boardwalk	43
Figure 2-5: Proposed Pond 1 Levee Improvements	45
Figure 2-6: Proposed Highway 37 Improvements	47
Figure 2-7: Typical Sections of Proposed Levee Breaches.....	51
Figure 2-8: Partial Restoration Alternative	55
Figure 3.2-1a: Existing Habitat Types in the Restoration Site.....	Follows Page 86
Figure 3.2-1b: Pampas Grass Populations Present in the Restoration Site	Follows Page 92
Figure 3.2-2a: CNDDDB 9-Quadrangle Search of Special-Status Plant Species Surrounding the Restoration Site	Follows Page 100
Figure 3.2-2b: CNDDDB 9-Quadrangle Search of Special-Status Wildlife Species Surrounding the Restoration Site	Follows Page 102
Figure 3.5-1: Typical Views of the Cullinan Ranch Site, Looking North.....	139
Figure 3.5-2: Typical View Looking Southeast	140

List of Abbreviated Terms

dBa	A-Weighted Decibels
ABAG	Association of Bay Area Governments
ACHP	Advisory Council on Historic Preservation
APE	Area of Potential Effect
ATCMs	air toxic control measures
BA	Biological Assessment
BAAQMD	Bay Area Air Quality Management District
BCDC	San Francisco Bay Conservation and Development Commission
CALFED	CALFED-Bay Delta Program
Caltrans	California Department of Transportation
CAP	Clean Air Plan
CARB	California Air Resources Board
CASAC	Clean Air Scientific Advisory Committee
CCMP	Comprehensive Conservation and Management Plan
CDFG	California Department of Fish and Game
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CESA	California Endangered Species Act
CEQ	California Environmental Quality Act
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CNPPA	California Native Plant Protection Act
CNPS	California Native Plant Society
Code	California Fish and Game Code
Corps	U.S. Army Corps of Engineers
CRHR	California Register of Historical Resources
CWA	Clean Water Act
dB	Decibel
DDT	dichlorodiphenyltrichloroethane
DDD	dichlorodiphenyldichloroethane
EFH	Essential fish habitat
EGP	Ecosystem Goals Project
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
ERPP	Ecosystem Restoration Program
ESA	Endangered Species Act
FHWA	Federal Highway Administration
Ft	foot/feet
GPS	Global positioning system
HWY 37	Highway 37
Km	kilometer(s)
Leq	Equivalent Sound Level
Ldn	Day-Night Equivalent Sound Level
LOS	Level of service
LTMS	Long Term Management Strategy
M	meter(s)
MOA	Memorandum of Agreement
Mi	mile(s)
MHW	Mean high water
MHHW	Mean higher high water
NGVD 1929	National Geodetic Vertical Datum 1929
NHPA	National Historic Preservation Act

U.S. Fish and Wildlife Service

NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NRHP	National Register of Historic Places
NSRP	Napa-Sonoma Restoration Project
NWPs	Nationwide Permits
PG&E	Pacific Gas & Electric Co.
PCWQCA	Porter-Cologne Water Quality Control Act
Refuge	San Pablo Bay National Wildlife Refuge
RCRA	Resource Conservation and Recovery Act
RWQCB	Regional Water Quality Control Board
SFBAAB	San Francisco Bay Area Air Basin
SHPO	State Historic Preservation Officer
TACs	Toxic Air Contaminants
UTM	Universal Transverse Mercator
USFWS	United States Fish and Wildlife Service

Executive Summary

This section provides a brief description of the project background; project goal and objective; proposed alternatives, including a summary comparison of the proposed alternative; summary of the environmental consequences of the Proposed Action; and description of the issues of known controversy.

Project Background

The United States Fish and Wildlife Service (USFWS) proposes to restore tidal influence to approximately 1,525 acres of land formerly known as Cullinan Ranch (Proposed Action). The Cullinan Ranch Site is located near the northern shore of San Pablo Bay in Solano and Napa Counties. Specifically, the Site is located near the northern shore of San Pablo Bay in Solano and Napa Counties, and is bordered by South and Dutchman Sloughs to the north and Highway 37 to the south (Figure 1-2). The western edge of the Site is bordered by wildlife habitat, which is owned and managed by the California Department of Fish and Game (CDFG) and is known as CDFG Pond 1. Guadalcanal Village, currently owned by the California Department of Transportation (Caltrans), borders the Site to the east and is in the process of being restored to tidal marsh. An existing perimeter levee along Dutchman and South Sloughs delineates the northern edge of the Site.

Prior to the 1900s, and again in the 1940s, sloughs in the vicinity of the Cullinan Ranch Site were diked or eliminated to prevent flooding and to convert the previously existing tidal wetlands and slough channels into upland habitat for agricultural uses. The Cullinan Ranch Site was one of the first portions of the Napa/Sonoma marsh complex to be diked and reclaimed for agriculture. In the ensuing years, without the continuous deposition of sediments associated with tidal influence, and soil compaction resulting from farming of the site, portions of the Site subsided or lost up to six feet of elevation from the Site's original condition. Cullinan Ranch was farmed primarily for oats and hay into the 1980s. In 1987, a private proposal supported by the City of Vallejo to develop the Site into a residential/marina community was defeated by several conservation groups. In 1991, the USFWS, under the authority of the Endangered Species Act (ESA), acquired Cullinan Ranch and incorporated it into the San Pablo Bay National Wildlife Refuge (Refuge). The Refuge is one of hundreds of federal wildlife refuges charged with protecting, maintaining, and creating habitat for species protected under the Federal Endangered Species Act (ESA). Specifically, the Refuge at San Pablo Bay is tasked with protecting habitat for salt marsh-dependent plant and animal species including the federally endangered salt marsh harvest mouse (*Reithrodontomys raviventris*) and California clapper rail (*Rallus longirostris obsoletus*). These species and their habitats are severely diminished in the San Francisco and San Pablo Bays, and specifically at the Cullinan Ranch Site, due to development and reclamation of Bay wetlands for farming, ranching, salt production and urban development.

The purpose of the Proposed Project is to fulfill the federal mandate to protect and create habitat for salt marsh-dependent species by restoring tidal influence to the Site. The introduction of twice-daily tidal flows to the Site would result in the deposition of sediments that would bring the Site to tidal marsh elevations and create meandering slough channels. As a result, it is anticipated that through successional processes, salt-tolerant, marsh plain vegetation would be established. Marsh plain vegetation including pickleweed, cord grass and other habitat components would provide vital salt marsh habitat for the endangered species in the area. The recovery plan for salt marsh harvest mouse identifies restoration of tidal marsh habitat at Cullinan Ranch as an action

that should be pursued in the interests of the continued existence of salt marsh dependent, federally listed threatened and endangered species in San Pablo Bay (USFWS 1989).

Project Goal and Objective

The goal of the Proposed Action is to restore tidal influence to the Cullinan Ranch area Site, to allow restoration of its near-historic state as mature tidal marsh. The objective of the Proposed Action is to contribute to the increased provision of suitable habitat to support the endangered species such as the salt marsh harvest mouse and the California clapper rail in the larger San Francisco Bay ecosystem.

Proposed Alternatives

A total of eight alternatives were identified and analyzed. The alternatives were analyzed based on a set of criteria including effects to adjacent habitats; effects to the existing levees; effects on the hydrology of the existing slough channels and adjacent water bodies; costs of implementing restoration activities and long-term maintenance; and effects of project construction on existing uses on and adjacent to the Cullinan Ranch Site. Five of these alternatives were removed from further consideration because they did not meet the cost and engineering feasibility criteria as set forth by the lead agencies. Many of the alternatives considered were formulated with optional implementation features in order to minimize effects on adjacent habitats (such as the fringe marshes along Dutchman Slough and Pritchett Marsh) such as staging the Proposed Action and/or limiting the amount of tidal exchange. These features were analyzed but removed from further consideration because hydrologic modeling revealed that they would not significantly reduce adverse effects to adjacent habitats. The evaluation of alternatives withdrawn from further consideration is provided in *2.0 Purpose and Need and Proposed Alternatives*. Based on additional hydrologic modeling and information obtained from the Napa Sonoma Restoration Project (NSRP), the lead agencies carried forward three possible restoration alternatives to environmental analysis, the No-Action Alternative, the Preferred Restoration Alternative, and the Partial Restoration Alternative.

No-Action Alternative

Under the No-Action Alternative, no action would be taken by the lead agencies to restore tidal influence to the Site; however, continued maintenance of the Dutchman and South Slough levees would occur. Without extensive maintenance and rehabilitation of the existing levee between Cullinan Ranch and Dutchman Slough the Cullinan Ranch Site would eventually transform from seasonal wetland habitat to tidal estuarine marsh wetlands. The deterioration of the levee system would be accelerated due to higher tidal velocities induced by the NSRP. However, the breaching of the levee would be uncontrolled and may occur along levee sections not planned for in the Proposed Action. Under the No-Action Alternative the components of the Proposed Action would not be implemented. As such, tidal inundation of the Cullinan Ranch Site would cause flooding and erosion along Highway 37 and California Department of Fish and Game (CDFG) Pond 1. Under this alternative, the lead agencies would be required to maintain the northern levee along Dutchman Slough in perpetuity. Maintenance activities would likely be increased as the levees age and scour increases in response to activities undertaken by the NSRP.

Preferred Restoration Alternative

The Preferred Restoration Alternative would restore the entire 1,525-acre Cullinan Ranch Site with implementation of the following project components:

- Component 1 – Construct boardwalk to provide access to existing electrical towers
- Component 2 – Block drainage ditches to promote redevelopment of the natural sloughs
- Component 3 – Improve the Pond 1 levee and install water control structures
- Component 4 – Protect Highway 37 from flooding and erosion
- Component 5 – Construct public access areas
- Component 6 – Breach the levees along Dutchman and South Sloughs and Guadalcanal Village
- Component 7 – Long-term monitoring

Under the Preferred Restoration Alternative, restoration would occur through the process of natural sedimentation with some on-site and/or off-site material used for ditch blocking and levee work. Under this alternative, up to four, 100-foot wide breaches would occur between Cullinan Ranch and Dutchman and South Sloughs and one between Cullinan Ranch and Guadalcanal Village. Sections of the Cullinan Ranch/ Dutchman Slough levee would be lowered to within the upper limits of the tidal range for habitat improvements during this time. In addition, three breaches from Pond 3 to Dutchman Slough would occur and portions of the Pond 3/ Dutchman Slough levee would be lowered as part of the NSRP (the NSRP preceded this project and due to the potential for accelerated levee erosion along Dutchman Slough opted to postpone the levee breaching and lowering until Cullinan Ranch was restored). These breaches would be in the same vicinity as three of the Cullinan Ranch breaches, which is an integral part of the restoration plan as the correlated breach locations would draw Napa River water through Pond 3 and minimize effects to Dutchman Slough and Pritchett Marsh. The NSRP also includes breaching Pond 3 and the All American Canal to South Slough. This action as proposed, would cause scour within South Slough and increase the conveyance of the slough, which was historically the primary slough in the area. The larger capacity in South Slough would result in conveyance of more water into Cullinan Ranch, which would further reduce effects to Dutchman Slough and Pritchett Marsh. Additionally, the existing Pond 1 levee would be reinforced and raised where necessary. The adjacent borrow ditch on the Cullinan Ranch Site would be filled, two water control structures would be placed in the Pond 1 levee to provide water circulation between Pond 1 and Cullinan Ranch, and a new channel would be constructed in Pond 1. A buttress levee would be constructed adjacent to Highway 37 where the highway would need protection from tidal fluctuations. The levee would be constructed with a top elevation of 9.0 feet NGVD 29, have a 5:1 horizontal to vertical slope from 9 feet to 8 feet, after which it would transition to a 10:1 slope. The remainder of the highway would be armored to protect the levee from wind-generated erosion. If necessary, the adjacent habitat in Pritchett Marsh would be protected from increased tidal velocities through the installation of sheet pile or other armoring techniques along the outer edge of the marsh.

Partial Restoration Alternative

The Partial Restoration Alternative would restore 300 acres of the Cullinan Ranch Site. The Partial Restoration Alternative was developed in order to limit potential impacts to the hydrology of Dutchman Slough. While it would meet the purpose and need of the project, a smaller overall area within Cullinan Ranch would be restored, and connectivity with other adjacent restoration projects would be limited.

The Partial Restoration Alternative would include implementation of the following project components:

- Component 1-Block Drainage Ditches to Promote Redevelopment of the Natural Sloughs
- Component 2- Construct Internal Levee
- Component 3- Protect Highway 37 from Flooding and Erosion
- Component 4- Breach the Levee along Dutchman Slough
- Component 5- Long-Term Monitoring

Under the Partial Restoration Alternative, restoration would occur within a 300-acre area on the east side of the Cullinan Ranch Site through the process of natural sedimentation with some on-site and off-site material used for internal levee work. Under this alternative, one, 100-foot wide breach would occur between Cullinan Ranch and Dutchman Slough (Figure 2-8). A 3,500-foot long internal levee would be constructed at an elevation of 9-feet (NGVD 1929) on top of the existing access road from Dutchman Slough to the Highway 37 embankment. This levee would bisect the Site and maintain the western 1,225 acres as existing seasonal wetlands. Under this alternative, the PG&E tower access boardwalk would not be constructed, the new public access area and parking lot would not be built, the Pond 1 levee improvements would not take place, and over four miles of the existing Dutchman Slough levee would be maintained in perpetuity along the western portion of the Site.

Furthermore, the partial restoration will border approximately 5,700-feet of the Highway 37 embankment. In order to minimize potential flooding of HWY 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 remaining 2,200-feet of highway embankment would also be provided within this section to protect the levee from erosion. The buttress levee, which would be constructed to a height of 9-feet (NGVD 1929), would protect low sections of the highway from tidal waters; it would also prevent stormwater runoff from escaping the road shoulder. A grassy swale would be constructed between the existing highway embankment and the buttress levee to convey stormwater runoff from the highway. The water would drain eastward into a detention basin consisting of an abandoned ditch segment between Guadalcanal Village and Highway 37, where it would be held until it could drain into Cullinan Ranch at low tide through tide gates. Alternatively, the stormwater could potentially be diverted into the existing drainage canals located near Guadalcanal Village and the Mare Island Bridge. Table ES-1 below provides a summary comparison of these alternatives.

Table ES-1. Summary Comparison of Proposed Alternatives

	No-Action Alternative	Preferred Restoration Alternative	Partial Restoration Alternative
Number of Acres to Be Restored	0	1,525	300
Fill Material			
On-site and off-site material	Not required.	80,000- 100,000 cubic yards of Pond 1 dredge spoils 124,000 cubic yards of structural fill 36,000 cubic yards of riprap 1,000 cubic yards of base rock	95,000 cubic yards of structural fill 5,000 cubic yards of riprap
Proposed Components			
Construct Boardwalk to Provide Access to Existing Electrical Towers	Not proposed, but may occur.	Would occur prior to breaching or levee enforcements.	Not proposed.
Block Drainage Ditches to Promote Redevelopment of the Natural Sloughs	Not proposed.	Would occur prior to breaching, some work would occur in conjunction with Pond 1 levee work.	Would occur prior to breaching and only in the area being restored into tidal habitat.
Improve Pond 1 Levee	Not proposed.	Dredging Pond 1 to improve water circulation and generate material for improvement of the levee. Raise levee elevation and reinforce levee through use of on-site and/or off-site material. Installation of two water control structures to create a hydrologic connection between Pond 1 and the Cullinan Ranch site.	Not proposed.
Protect of Highway 37 from Flooding and Erosion	Not proposed, but may occur.	Buttress levee would be constructed along approximately 3,500 feet of adjacent HWY 37 embankment where edge of pavement is less than 8.0 feet (NGVD 1929). Erosion protection along the remaining 12,100 feet of HWY 37 embankment where edge of pavement is greater than 8.0 feet (NGVD 1929).	Buttress levee would be constructed along approximately 3,500 feet of adjacent HWY 37 embankment where edge of pavement is less than 8.0-feet (NGVD 1929) Erosion protection would be placed along the remaining 2,200 feet of HWY 37 embankment where edge of pavement is greater than 8.0 feet (NGVD 1929).

	No-Action Alternative	Preferred Restoration Alternative	Partial Restoration Alternative
Breach the Levee along Dutchman and South Sloughs	Pond 3 breached to Napa River and South Slough. All-American Canal breached to South Slough. Pond 3 may be breached to Dutchman Slough as proposed under NSRP.	3 breaches from Pond 3 to Dutchman Slough as proposed under NSRP; Up to 4 breaches from Cullinan Ranch and Dutchman/South Sloughs and 1 breach in levee separating Guadalcanal Village and Cullinan Ranch.	1 breach from Cullinan Ranch to Dutchman Slough on the east side of the site near Guadalcanal Village. Potentially 1 breach in levee separating Guadalcanal Village and Cullinan Ranch.
Construct Internal Levee	Not proposed.	Not proposed.	A 3,500-foot levee would be constructed on top of the existing eastern access road into Cullinan Ranch from HWY 37 to the Dutchman Slough levee.
Construction of Access Lanes to and from Highway 37	Not proposed.	Would be installed near existing informal parking area located at Pond 1 levee access road.	Not proposed.
Long-Term Monitoring	Not proposed.	Would occur in accordance with funding and regulatory requirements.	Would occur in accordance with funding and regulatory requirements.

Environmental Consequences

This Environmental Impact Statement/Environmental Impact Report (EIS/EIR) evaluates the environmental consequences of the Proposed Action. Table ES-2 summarizes the analysis of environmental consequences presented in *3.0 Affected Environment and Environmental Consequences*.

Issues of Known Controversy

The public and resource agencies are primarily supportive of the Proposed Action. Issues that were brought up during public scoping (August 2002) included concerns over provisions for public access to the restoration site; ensuring the safety of the levee separating the restoration site from Highway 37; and restoration scenarios other than the Proposed Action. A summary of the comments received during the public scoping meeting is provided in Appendix A.

Table ES-2. Summary of Environmental Consequences

Environmental Consequence	NEPA Determination	CEQA Determination	Mitigation Measure
Hydrology and Water Quality			
No-Action Alternative			
HYD-1. Implementation of the No-Action Alternative would not result in changes in the tidal prism leading to increased peak volumes	No adverse effect	Less than significant	Not required
HYD-2. Implementation of the No-Action Alternative would not result in sediment deposition	No adverse effect	Less than significant	Not required
HYD-3. Implementation of the No-Action Alternative would not result in hydrologic changes that could adversely affect existing or planned biological communities	No adverse effect	Less than significant	Not required
HYD-4. Implementation of the No-Action Alternative would not result in Exceedances of Water Quality Objectives	No adverse effect	Less than significant	Not required
Preferred Restoration Alternative			
HYD-5. Implementation of the Preferred Restoration Alternative would result in changes in the tidal prism leading to increased peak volumes	No adverse effect	Less than significant	Not required
HYD-6. Implementation of the Preferred Restoration Alternative would Result in Hydrologic Changes that could Adversely Affect Existing or Planned Biological Communities	No adverse effect	Less than significant	Not required
HYD-7. Implementation of the Preferred Restoration Alternative would result in Hydrologic changes that cause Erosion of Adjacent Levees	No adverse effect	Less than significant	Not required
HYD-8. Implementation of the Preferred Restoration Alternative would not result in Degraded Groundwater Quality	No adverse effect	Less than significant	Not required
Environmental Consequence	NEPA Determination	CEQA Determination	Mitigation Measure

HYD-9. Implementation of the Preferred Restoration Alternative would not Discharge Contaminants into the Waters of the U.S. Bay Delta Estuary	No adverse effect	Less than significant	Not required
HYD-10. Implementation of the Preferred Restoration Alternative would not result in Substantial Increased Suspended Solids in and Turbidity in Receiving Waters	No adverse effect	Less than significant	Not required
Partial Restoration Alternative	No adverse effect	Less than significant	Not required
HYD-11. Implementation of the Partial Restoration Alternative would Result in Changes in the Tidal Prism Leading to Increased Peak Volumes	No adverse effect	Less than significant	Not required
HYD-12. Implementation of the Partial Restoration Alternative would Result in Hydrologic Changes that could Adversely Affect Existing or Planned Biological Communities	No adverse effect	Less than significant	Not required
HYD-13. Implementation of the Partial Restoration Alternative would result in Hydrologic changes that cause Erosion of Adjacent Levees	No adverse effect	Less than significant	Not required
HYD-14. Implementation of the Partial Restoration Alternative would not result in Degraded Groundwater Quality	No adverse effect	Less than significant	Not required
HYD-15. Implementation of the Partial Restoration Alternative would not Discharge Contaminants into the Waters of the U.S. Bay Delta Estuary	No adverse effect	Less than significant	Not required
HYD-16. Implementation of the Partial Restoration Alternative would not Result in Substantial Increased Suspended Solids in and Turbidity in Receiving Waters	No adverse effect	Less than significant	Not required

Environmental Consequence	NEPA Determination	CEQA Determination	Mitigation Measure
Biological Resources			
No-Action Alternative			
BIO-1. Implementation of the No-Action Alternative would result in Potentially Adverse Effects on Biological Resources	No adverse effect	Less than significant	Not required
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	No adverse effect	Less than significant	Not required
BIO-3. Implementation of the Preferred Restoration Alternative would result in Temporary Loss of Salt Marsh Harvest Mouse Habitat and Potential Mortality of Individual Salt Marsh Harvest Mice	No adverse effect with mitigation implemented	Less than significant with mitigation implemented	Mitigation Measure BIO-3.1: Remove Salt Marsh Harvest Mouse Habitat and Place Barrier Fencing.
BIO-4. Implementation of the Preferred Restoration Alternative would result in temporary habitat loss and could Disturb California Clapper Rails and Black Rails	No adverse effect with mitigation implemented	Less than significant with mitigation implemented	Mitigation Measure BIO-4.1: Avoid Disturbance to California Clapper Rail and Black Rail Habitat During their Breeding Period
BIO-5. Implementation of the Preferred Restoration Alternative could Disturb San Pablo Song Sparrow	No adverse effect with mitigation implemented	Less than significant with mitigation implemented	Mitigation Measure BIO-5.1: Conduct restoration/breaching during winter months outside the breeding season.
BIO-6. Implementation of the Preferred Restoration Alternative could result in Construction-Related Mortality of Salmonids and Other Special Status Fish	No adverse effect with mitigation implemented	Less than significant with mitigation implemented	Mitigation Measure BIO-6.1: Avoid Construction that Could Affect Tidal Aquatic Habitats when Salmonid species are known to Occur
BIO-7. Implementation of the Preferred Restoration Alternative could result in Mortality of Salmonids and Other Special Status Fish due to Entrapment	No adverse effect	Less than significant	Not required
BIO-8. Implementation of the Preferred Restoration Alternative would result in the Conversion of Seasonal Wetland Habitat to Tidal Marsh Habitat	Adverse and Unavoidable	Significant and Unavoidable	No mitigation is available

Environmental Consequence	NEPA Determination	CEQA Determination	Mitigation Measure
BIO-9. Implementation of the Preferred Restoration Alternative would result in placement of Permanent Fill in Jurisdictional Wetlands and Waters of the U.S	Adverse and Unavoidable	Significant and Unavoidable	No mitigation is available
BIO-10. Implementation of the Preferred Restoration Alternative would result in Permanent Loss of Burrowing Mammal Habitat and Potential Mortality of Individual Mammals	Adverse and Unavoidable	Significant and Unavoidable	No mitigation is available
BIO-11. Implementation of the Preferred Restoration Alternative would result in Loss of Foraging Habitat for some Raptor Species	Adverse and Unavoidable	Significant and Unavoidable	No mitigation is available
BIO-12. Implementation of the Preferred Restoration Alternative would result in Loss of Habitat for Some Species of Wintering Waterfowl	Adverse and Unavoidable	Significant and Unavoidable	No mitigation is available
BIO-13. Implementation of the Preferred Restoration Alternative would result in the Loss of potential Foraging habitat for Special Status Bat Species	Adverse and Unavoidable	Significant and Unavoidable	No mitigation is available
BIO-14. Implementation of the Preferred Restoration Alternative would result in the Potential Spreading of Invasive Non-Native Plants	No adverse effect with mitigation implemented	Less than significant with mitigation implemented	Mitigation Measure BIO-17.1: Prevent Spread of Perennial Pepperweed by removal prior to breaching.
BIO-15. Implementation of the Preferred Restoration Alternative would result in the Increase in Subtidal Aquatic Habitat for Anadromous and Special Status Fish Species	Beneficial	Beneficial	Mitigation Measure BIO-17.2: Monitor the Cullinan Ranch site for and remove Infestations by Invasive Non-Native Plants Not required
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	Beneficial	Beneficial	Not required
BIO-17. Implementation of the Preferred Restoration Alternative would Increase Suitable Habitat for Migratory Shorebirds	Beneficial	Beneficial	Not required

Environmental Consequence	NEPA Determination	CEQA Determination	Mitigation Measure
BIO-18. Implementation of the Preferred Restoration Alternative would Increase Suitable Foraging Habitat for the Brown Pelican and Double-crested Cormorant	Beneficial	Beneficial	Not required
BIO-19. Implementation of the Preferred Restoration Alternative would result in Establishment of Upland-Wetland Transition Zones	Beneficial	Beneficial	Not required
Partial Restoration Alternative			
BIO-20. Temporary Loss of Salt Marsh Harvest Mouse Habitat and Potential Mortality of Individual Salt Marsh Harvest Mice	No adverse effect with mitigation implemented	Less than significant with mitigation implemented	Mitigation Measure BIO-3.1: Remove Salt Marsh Harvest Mouse Habitat and Place Barrier Fencing.
BIO-21. Implementation of the Partial Restoration Alternative could Disturb California Clapper Rails and Black Rails	No adverse effect with mitigation implemented	Less than significant with mitigation implemented	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	No adverse effect with mitigation implemented	Less than significant with mitigation implemented	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	No adverse effect with mitigation implemented	Less than significant with mitigation implemented	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 Preferred Restoration Alternative could result in Mortality of Salmonids and Other Special Status Fish due to Entrapment	No adverse effect	Less than significant	Not required
BIO-25. Implementation of the Partial Restoration Alternative would result in the Conversion of Seasonal Wetland Habitat to Tidal Marsh Habitat	No adverse effect	Less than significant	Not required
BIO-26. Implementation of the Partial Restoration Alternative would result in placement of Permanent Fill in Jurisdictional Wetlands and Waters of the U.S	Adverse and Unavoidable	Significant and Unavoidable	No mitigation is available

Environmental Consequence	NEPA Determination	CEQA Determination	Mitigation Measure
BIO-27. Implementation of the Partial Restoration Alternative would result in Permanent Loss of Burrowing Mammal Habitat and Potential Mortality of Individual Mammals	Adverse and Unavoidable	Significant and Unavoidable	No mitigation is available
BIO-28. Implementation of the Partial Restoration Alternative would result in Loss of Foraging Habitat for Raptor Species	Adverse and Unavoidable	Significant and Unavoidable	No mitigation is available
BIO-29. Implementation of the Partial Restoration Alternative would result in Loss of Habitat for Some Species of Wintering Waterfowl	Adverse and Unavoidable	Significant and Unavoidable	No mitigation is available
BIO-30. Implementation of the Partial Restoration Alternative would result in the Loss of Foraging habitat for Special Status Bat Species	Adverse and Unavoidable	Significant and Unavoidable	No mitigation is available
BIO-31. Implementation of the Preferred Restoration Alternative would result in the Potential Spreading of Invasive Non-Native Plants	No adverse effect with mitigation implemented	Less than significant with mitigation implemented	Mitigation Measure BIO-17.1: Prevent Spread of Perennial Pepperweed Mitigation Measure BIO-17.2: 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	Beneficial	Beneficial	Not required
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	Beneficial	Beneficial	Not required
BIO-34. Implementation of the Partial Restoration Alternative would Increase Suitable Habitat for Migratory Shorebirds	Beneficial	Beneficial	Not required
BIO-35. Implementation the Partial Restoration Alternative would Increase Suitable Foraging Habitat for the Brown Pelican and Double-crested Cormorant	Beneficial	Beneficial	Not required

Environmental Consequence	NEPA Determination	CEQA Determination	Mitigation Measure
BIO-36. Implementation of the Partial Restoration Alternative would result in Establishment of Upland-Wetland Transition Zones	Beneficial	Beneficial	Not required
Hazardous Waste			
No-Action Alternative			
HAZ-1. Implementation of the No-Action Alternative would not result in Adverse Effects related to Hazardous Wastes	No adverse effect	No impact	Not required
Preferred Restoration Alternative			
HAZ-2. Implementation of the Preferred Restoration Alternative could result in the Release of Onsite Contaminants contained in Dredged Materials	No adverse effect with mitigation implemented	Less than significant with mitigation implemented	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-3. Implementation of the Preferred Restoration Alternative would not result in the Release of Contaminants from Off-Site Source Materials	No adverse effect	Less than significant	Not required
Partial Restoration Alternative			
HAZ-4. Implementation of the Partial Restoration Alternative could result in the Release of Onsite Contaminants contained in Dredged Materials	No adverse effect with mitigation implemented	Less than significant with mitigation implemented	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	No adverse effect	Less than significant	Not required

Environmental Consequence	NEPA Determination	CEQA Determination	Mitigation Measure
Land Use, Recreation and Public Health			
No-Action Alternative			
LU-1. Implementation of the No-Action Alternative would not Result in Adverse Land Use, Recreation or Public Health Effects	No adverse effect	Less than significant	Not required
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	No adverse effect	No impact	Not required
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	No adverse effect	Less than significant	Not required
LU-4. Implementation of the Preferred Restoration Alternative Would Result in Temporary Elimination of Access to Existing Recreation Uses of the Cullinan Ranch site	No adverse effect	Less than significant	Not required
LU-5. Implementation of the Proposed Restoration Alternative Would Result in Reduction of Existing Mosquito Breeding Habitat due to Introduction of Tidal Influences onto the Cullinan Ranch site	Adverse Effect	Less than significant with Mitigation	Mitigation Measure LU-5.1: Coordinate with local Mosquito Abatement Districts during project design, construction and operation

Environmental Consequence	NEPA Determination	CEQA Determination	Mitigation Measure
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	No adverse effect	No impact	Not required
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	No adverse effect	Less than significant	Not required
LU-8. Implementation of the Partial Restoration Alternative Would Result in Reduction of Existing Mosquito Breeding Habitat due to Introduction of Tidal Influences onto the Cullinan Ranch site	Adverse Effect	Less than signification with Mitigation	Mitigation Measure LU-5.1: Coordinate with local Mosquito Abatement Districts during project design, construction and operation
Visual Quality			
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	No adverse effect	No impact	Not required
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	No adverse effect	No impact	Not required
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	No adverse effect	No impact	Not required

Environmental Consequence	NEPA Determination	CEQA Determination	Mitigation Measure
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	No adverse effect	No impact	Not required
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	No adverse effect	No impact	Not required
Transportation			
No-Action Alternative			
TR-1. Implementation of the No-Action Alternative would not result in Adverse Traffic Effects	No adverse effect	No impact	Not required
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	No adverse effect with mitigation implemented	Less than significant with mitigation implemented	Mitigation Measure TR-3.1: Develop and Implement a Traffic Control Plan in Coordination with Caltrans
TR-3. Construction of Access Lanes to and from Highway 37 could result in Temporary Traffic Congestion along Highway 37	No adverse effect with mitigation implemented	Less than significant with mitigation implemented	Mitigation Measure TR-3.1: Develop and Implement a Traffic Control Plan in Coordination with Caltrans
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	No adverse effect with mitigation implemented	Less than significant with mitigation implemented	Mitigation Measure TR-3.1: Develop and Implement a Traffic Control Plan in Coordination with Caltrans
TR-5. Construction of Access Lanes to and from Highway 37 could result in Temporary Traffic Congestion along Highway 37	No adverse effect with mitigation implemented	Less than significant with mitigation implemented	Mitigation Measure TR-3.1: Develop and Implement a Traffic Control Plan in Coordination with Caltrans

Environmental Consequence	NEPA Determination	CEQA Determination	Mitigation Measure
Noise			
No-Action Alternative			
N-1. Implementation of the No-Action Alternative would not result in Adverse Noise Effects	No adverse effect	No impact	Not required
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	No adverse effect with mitigation implemented	Less than significant with mitigation implemented	Mitigation Measure N-2.1: Implement Noise Reducing Construction Practices
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	No adverse effect with mitigation implemented	Less than significant with mitigation implemented	Mitigation Measure N-2.1: Implement Noise Reducing Construction Practices
Air Quality			
No-Action Alternative			
AQ-1. Implementation of the No-Action Alternative would not result in Adverse Air Quality Effects	No adverse effect	No impact	Not required
Preferred Restoration Alternative			
AQ-2. Implementation of the Preferred Restoration Alternative would result in Construction-Related Emissions of PM10	No adverse effect with mitigation implemented	Less than significant with mitigation implemented	Mitigation Measure AQ-2.1: Implement BAAQMD Standards to Control PM10 Emissions during Construction
AQ-3. Implementation of the Preferred Restoration Alternative would result in Minimal Emissions of Ozone Precursors from Construction Activity	No adverse effect	Less than significant	Not required

Environmental Consequence	NEPA Determination	CEQA Determination	Mitigation Measure
Partial Restoration Alternative			
AQ-4. Implementation of the Partial Restoration Alternative would result in Construction-Related Emissions of PM10	No adverse effect with mitigation implemented	Less than significant with mitigation implemented	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	No adverse effect	Less than significant	Not required
Utilities and Service Systems			
No-Action Alternative			
UT-1. Implementation of the No-Action Alternative would not Result in Adverse Effects to Existing Utilities and Service Systems	No adverse effect	No impact	Not required
Preferred Restoration Alternative			
UT-2: Implementation of the Preferred Restoration Alternative would not Result in Interfere with or Require the Expansion of Existing Utilities and Service Systems	No adverse effect	No impact	Not required
Partial Restoration Alternative			
UT-3: Implementation of the Partial Restoration Alternative would not Result in Interfere with or Require the Expansion of Existing Utilities and Service Systems	No adverse effect	No impact	Not required
Cultural Resources			
No-Action Alternative			
CR-1. Implementation of the No-Action Alternative would not result in Adverse Effects to Cultural Resources	No adverse effect	No impact	Not required

Environmental Consequence	NEPA Determination	CEQA Determination	Mitigation Measure
Preferred Restoration Alternative			
CR-2. Implementation of the Preferred Restoration Alternative would not result in Adverse Effects to Significant Cultural Resources	No adverse effect	No impact	Not required
CR-3. Implementation of the Preferred Restoration Alternative could Potentially Effect Subsurface Historic or Archaeological Artifacts	No adverse effect with mitigation implemented	Less than significant with mitigation implemented	Mitigation Measure CR-3.1: Stop Work if Subsurface Cultural Deposits are Encountered during Construction Activities
Partial Restoration Alternative			
CR-4. Implementation of the Partial Restoration Alternative would not result in Adverse Effects to Significant Cultural Resources	No adverse effect	No impact	Not required
CR-5. Implementation of the Partial Restoration Alternative could Potentially Effect Subsurface Historic or Archaeological Artifacts	No adverse effect with mitigation implemented	Less than significant with mitigation implemented	Mitigation Measure CR-3.1: Stop Work if Subsurface Cultural Deposits are Encountered during Construction Activities

