

2.0 Purpose and Need and Proposed Alternatives

2.1 Introduction

This chapter discusses the purpose, need, goals, and objectives of the Proposed Action. A description of the Proposed Alternatives and construction activities and an alternatives analysis are also provided.

2.2 Purpose and Need

The Cullinan Ranch Site is part of 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 and California clapper rail. These species and their habitats are severely diminished in the San Francisco and San Pablo Bays, due to development and reclamation of bay wetlands for farming and ranching. The purpose and need of the project is to fulfill the federal mandate to protect and create habitat for endangered and threatened salt marsh-dependent species. The property was purchased under the authority of the Endangered Species Act by the San Pablo Bay National Wildlife Refuge with the intent that it would be restored to support tidally influenced habitats. The introduction of twice-daily tidal flows to the site would eventually result in the deposition of sediments that would bring the site to tidal marsh elevations and create meandering slough channels throughout the site. As a result, it is anticipated that through successional processes salt-tolerant, marsh plain vegetation would be established. Tidal mudflats and marsh plain vegetation, including pickleweed and cordgrass, would provide vital tidal 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). The No-Action Alternative, the Preferred Restoration Alternative and the Partial Restoration Alternative, described herein meet the purpose and need of the project at varying degrees.

2.3 Project Goal and Objective

The goal of the Proposed Action is to restore tidal influence to the Cullinan Ranch Site to allow restoration to 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 endangered species, including salt marsh harvest mouse and the California clapper rail, in the larger San Francisco Bay ecosystem.

2.4 Proposed Alternatives

A total of eight alternatives were identified and analyzed (see tables 2-1 and 2-2). 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 set forth by the lead agencies. The proposed alternatives were considered with optional implementation features (such as

staging the implementation of the alternative or limiting the amount of tidal exchange) to minimize effects on adjacent habitats along Dutchman Slough. These features were removed from further consideration because hydraulic modeling revealed that they would not significantly reduce the potential for adverse effects to adjacent habitats.

Based on hydrologic modeling, the lead agencies were able to carry forward three possible restoration alternatives to environmental analysis, the No-Action Alternative, the Preferred Restoration Alternative, and the Partial Restoration Alternative. In accordance with NEPA, the potential environmental effects of each of these alternatives will be evaluated in an equal level of detail. Upon the evaluation of environmental effects, public circulation of the environmental document, consideration of public comments, and approval of the final environmental document, the lead agencies will make their final selection of an alternative to be carried forward to construction. A detailed description of the Proposed Alternatives is provided below.

2.4.1 Baseline Conditions

According to NEPA, “baseline conditions consist of pre-project environmental conditions. Specifically, the baseline conditions are the existing environmental setting of the project site at a fixed point in time (i.e., the present). The elimination of tidal influences and past agricultural activities on Cullinan Ranch have caused up to six feet of land subsidence on the Site. Additionally, the hydrologic isolation from adjacent tidal sloughs for the purpose of farming, followed by the cessation of pumping/draining practices created seasonal freshwater wetland habitats on the Cullinan Ranch Site, which are not characteristic of its historical brackish marshes. Due to these conditions, the existing levees, which protect Cullinan Ranch from adjacent tidal waters, require some emergency levee repair work. Furthermore, seasonal wetlands and swales on Cullinan Ranch are stagnant and require continued mosquito abatement and maintenance work. This EIS/EIR will evaluate the effects of the No-Action Alternative, Preferred Restoration Alternative, and the Partial Restoration Alternative in comparison to the existing baseline conditions as described above. These baseline conditions are also shown in Figure 2-1.

2.4.2 No-Action Alternative

Under the No-Action Alternative, no action would be taken by the lead agencies to restore tidal influence to the Cullinan Ranch Site; however, the lead agencies would be required to maintain the existing levees that protect the Site from tidal inundation in perpetuity (Figure 2-1). In addition, mosquito control activities including the use of tracked vehicles and biorational chemicals would be continued. Essentially, under this alternative, the Cullinan Ranch Site would remain unchanged from existing conditions for some time. It is expected that over time, Cullinan Ranch would not provide open seasonal wetland habitat, but would become a dense cover of cattails and non-native invasive weeds. Mosquito control would necessarily be continued. However, dense emergent cover in the wetland areas would significantly decrease the effectiveness of mosquito control.

2.4.3 Preferred Restoration Alternative (Proposed Action)

The Preferred Restoration Alternative would restore the entire 1,525-acre Cullinan Ranch Site. Under the Preferred Restoration Alternative, restoration would occur through the process of natural sedimentation with some on-site and off-site material used for ditch blocking and levee work. If additional clean, off-site or dredge material became available, it could be used to create islands, fill in ditches and toe drains, or raise the general elevation within Cullinan Ranch. Under this alternative, up to four breaches would be constructed between Cullinan Ranch and Dutchman and South Sloughs (Figure 2-2) and one between

Cullinan Ranch and Guadalcanal Village. The invert of the breaches would conform to the existing invert and thalweg of Dutchman South. This elevation would be carried through the levee footprint, then transition to the existing grade within Cullinan Ranch. Material from the breach construction would be placed on the interior levee slope.

The Preferred Restoration Alternative would include 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 – Pre-flood Cullinan Ranch Site prior to breach of levees
- Component 7 – Breach the levees along Dutchman and South Sloughs and Guadalcanal Village
- Component 8 – Long-term monitoring

Immediately prior to levee breach construction, the Cullinan Ranch Site would be slowly flooded to allow the dissemination of non-avian wildlife species to other areas. The water control structures installed in the Pond 1 levee will be instrumental to this phase of restoration. Sections of the Cullinan Ranch levee would be lowered to within tidal range for habitat improvements during this time. Breach construction would be initiated at the west end of the site. Breach locations will be as close to historic channels as practicable. The placement of these breaches would increase the capacity of South Slough over time. This would result in South Slough conveying a larger percentage of the tidal prism into Cullinan Ranch and would reduce physical effects to Dutchman Slough and Pritchett Marsh. The size of the breaches would initially result in a muted tidal prism within Cullinan Ranch. This would result in lower tidal velocities which in turn would reduce the adverse impacts to the adjacent slough system. Over time the breaches would erode as the system came into equilibrium. The existing Pond 1 levee would be reinforced and raised where necessary. The borrow ditch adjacent to the Pond 1 levee on the Cullinan Ranch Site would be filled. Two water control structures would be installed in the Pond 1 levee to provide pre-breach flood water and circulation between Pond 1 and Cullinan Ranch. A new channel would be constructed in Pond 1. Material generated by the channel construction would be utilized on the Cullinan Ranch Site. A public access platform would be constructed adjacent to the Pond 1 levee and a kayak launch installed. A deepwater channel would be constructed to connect the ramp to natural slough channels. Intertidal benches would be constructed at the public access point to encourage the development of pickleweed and provide interpretation opportunities. The toe drain adjacent to the Highway 37 embankment would be filled to match adjacent ground elevations. A buttress levee would be constructed adjacent to a portion of Highway 37 where the highway would need protection from tidal fluctuations. The levee would be constructed with a top elevation of 9.0 feet and have a 5:1 horizontal to vertical slope from 9.0 feet to 8.0 feet, after which it would transition to a 10:1 slope. Pickleweed would be collected from the toe drain, stockpiled and planted on the new levee slope prior to construction, if practicable. The remainder of the highway's shoreline would be armored to protect the levee from wind-generated erosion. The following discussion describes the major components of the Preferred Restoration Alternative.

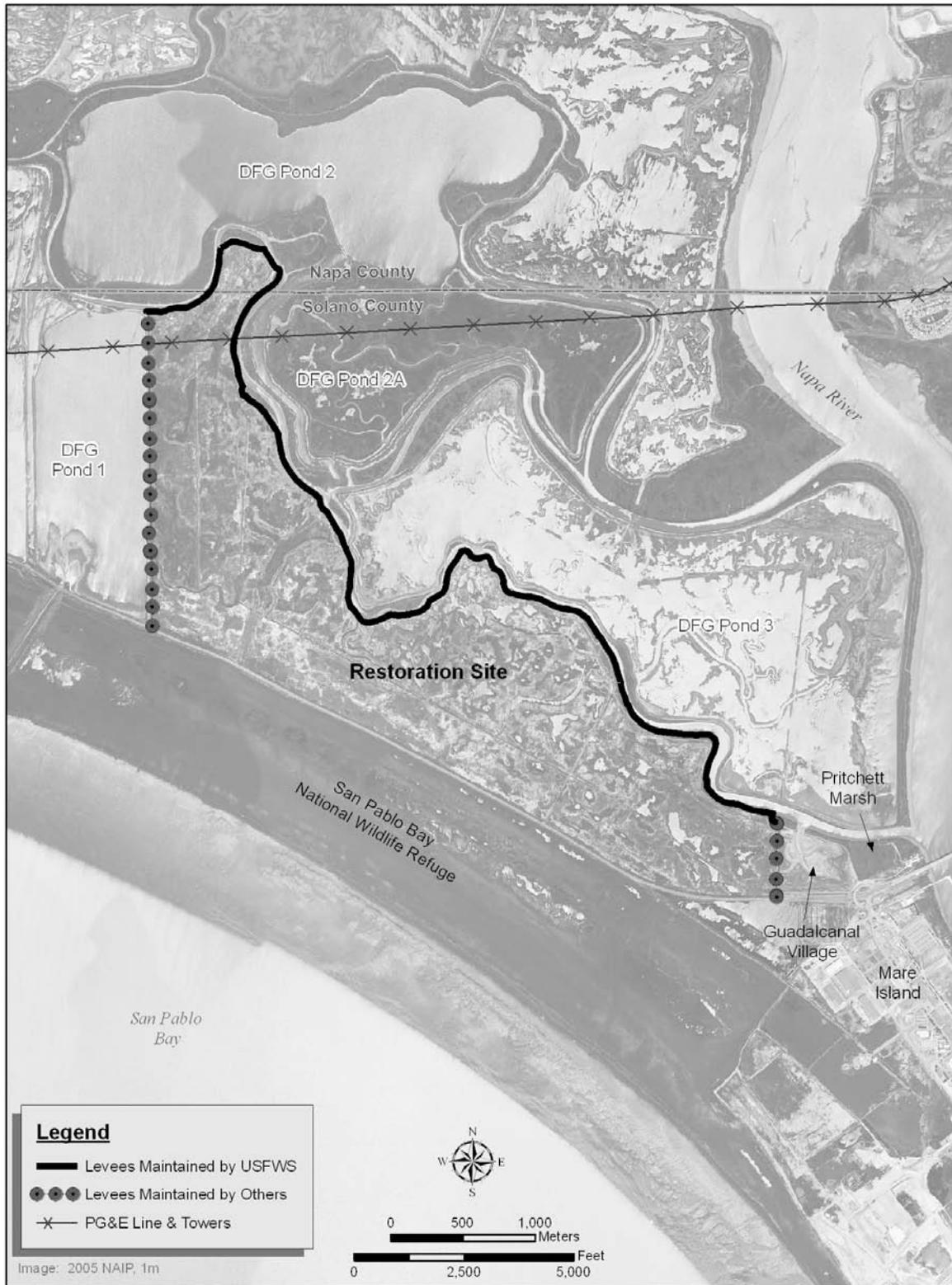


Figure 2-1. No Action Alternative

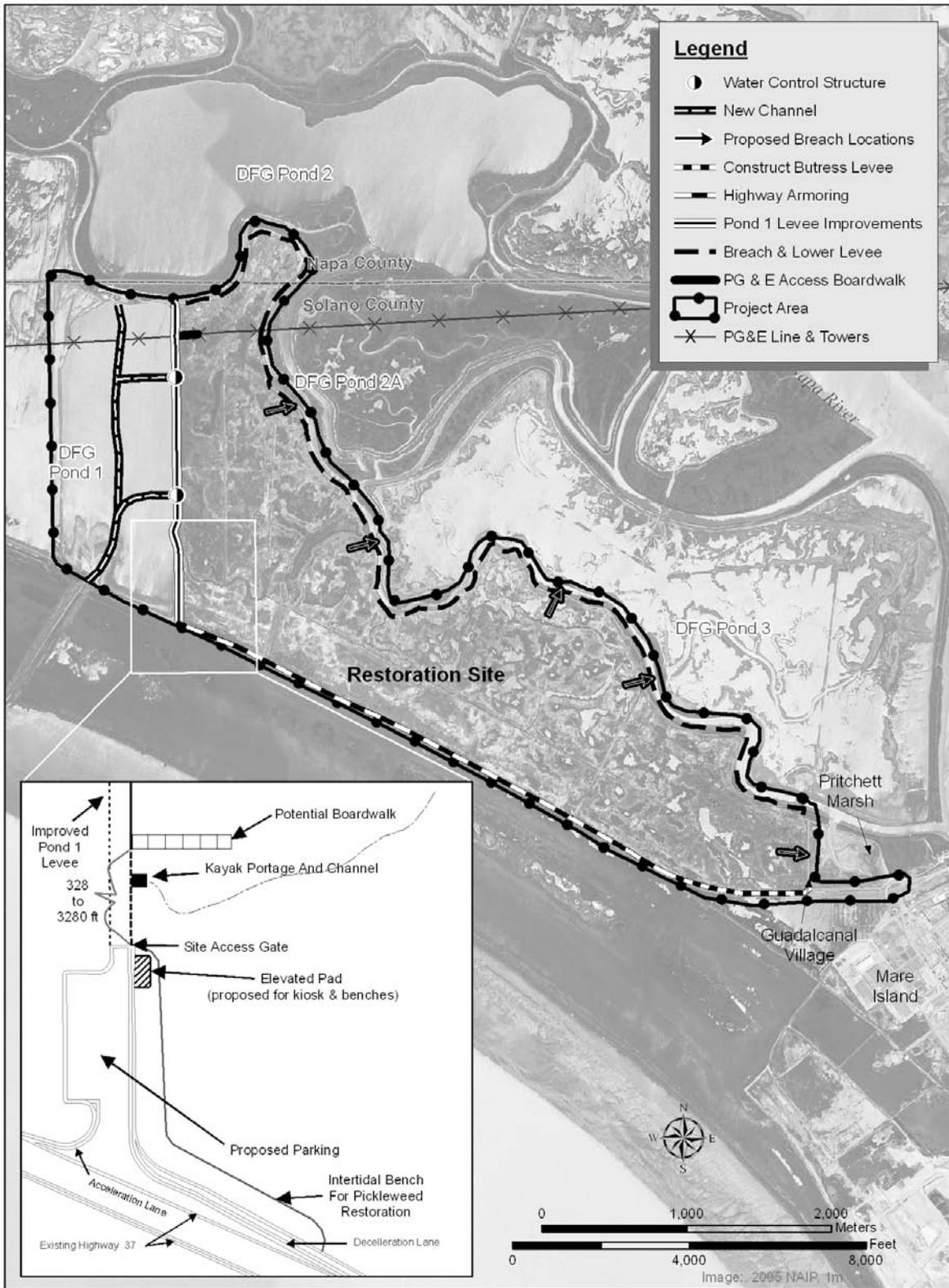


Figure 2-2. Preferred Restoration Alternative

Component 1 – Block Drainage Ditches to Promote Redevelopment of the Natural Sloughs

Prior to the Cullinan Ranch Site being used for agriculture, several drainage ditches were excavated on the Site to enable the lowering of the water table to levels conducive to farming operations. In addition, a number of low berms were constructed adjacent to these ditches using excavated spoils. The ditches conveyed water to a pump that discharged into Dutchman Slough. Pumping from these ditches and the resulting lowering of the groundwater table caused the observed subsidence at the Site. The ultimate restoration goal at Cullinan Ranch is to capture sufficient amounts of sediment from the supporting slough system water column and/or imported materials prior to breaching, such that the bottom elevation of the Site would rise to a level that could support a mature marsh, approximately one meter above the mean high tide. This subsidence reversal is expected to take decades, as the Site will slowly transform over time in response to accreting sediments. In order to ensure the formation of natural slough channels, ditch blocks will be placed where necessary within the existing manmade drainage ditches (Figure 2-3). The primary purpose of blocking the drainage ditches is to reduce the likelihood of developing artificial angular channels. Blocking these artificial waterways would facilitate the development of a natural network of meandering sloughs on the Cullinan Ranch Site. Ditch blocks would either be constructed of on-site soils retrieved from the existing internal berms, or through the use of off-site material. One known source of material is from CDFG Pond 1 of the Napa-Sonoma Marshes Wildlife Area, which is located adjacent to the Cullinan Ranch Site. A channel would be dredged within Pond 1 to enhance its ability to circulate water, and the resulting fill material that is removed from Pond 1 will be used on the Cullinan Ranch Site to block drainage ditches, raise elevations and reinforce the Pond 1 levee.

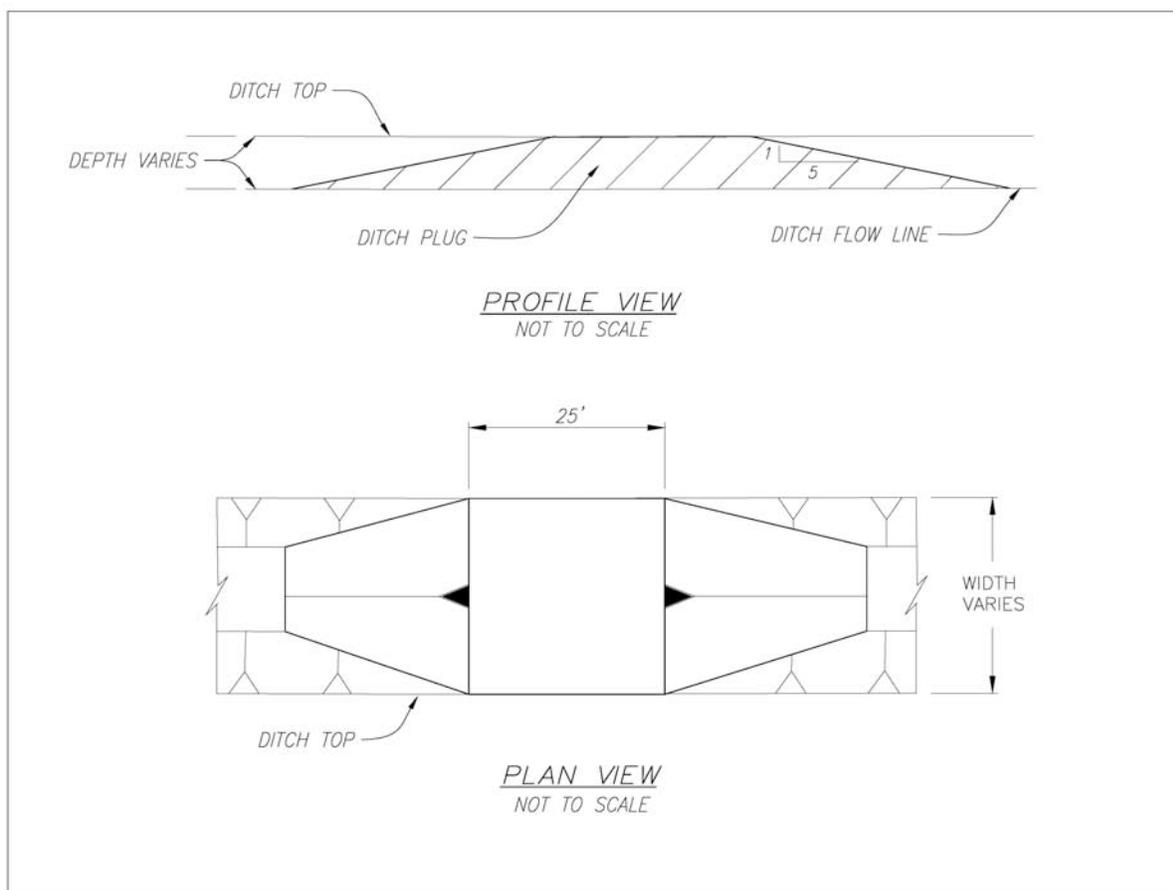


Figure 2.3. Proposed Ditch Plug

Component 2 – Construct Boardwalk to Provide Access to Existing Electrical Towers and Repair Levee

Five electrical transmission towers owned and maintained by Pacific Gas & Electric (PG&E) are located on the northwest portion of the Cullinan Ranch Site. When the initial breaches are implemented, these towers will need protection from tidally influenced scouring action and high water levels. PG&E previously completed an evaluation of methods that could be used to reinforce the towers. In June 2001, PG&E completed consultation with USFWS for their proposed reinforcement activities and their resulting effects on existing seasonal wetland habitat. Reinforcement of the concrete tower footing was completed in September 2003 by PG&E independent of the Proposed Action.

In addition to reinforcing the tower footings, PG&E will also need continued access to the affected towers for maintenance purposes. Access to the towers will be provided by constructing two boardwalks, one extending from the Pond 1 levee along the western project border, and the other from the levee that separates the Cullinan Ranch Site from South Slough (Figure 2-4). Construction of the boardwalks will be completed by PG&E in 2007, prior to breaching the levees along Dutchman and South Sloughs.

Two towers are located on the inside slope of the northern levee adjacent to South Slough. The tower footings are at an elevation that could make them vulnerable to wind generated waves that cause erosion. As a result, repair and armoring of the levee around the tower footings would occur to prevent erosion of the tower footings. The repair and armoring activities would occur prior to implementation of the proposed breaches along Dutchman and South Sloughs.

Component 3 – Improve the Pond 1 Levee and Install Water Control Structures

Introduction of tidal action to the Cullinan Ranch Site would result in increased pressure upon the existing levee that separates the Cullinan Ranch Site from Pond 1 (Figure 2-2). The existing condition of the Pond 1 levee is inadequate to withstand tidal action and wave induced erosion from the Cullinan Ranch Site. Therefore, the existing levee will be improved so that it can withstand future conditions.

Improving the levee would consist of filling the adjacent borrow ditch within the Cullinan Ranch Site, flattening out the side slope, and raising the levee where necessary to a minimum elevation of 8.0 feet NGVD 1929 (Figure 2-5). The current elevation of the Pond 1 levee ranges from 5.5 to 7.5 feet. Fill material required to raise the levee would be imported. Up to 100,000 cubic yards of material is expected to be removed from portions of Pond 1 where sediment accumulation has made water management difficult for the California Department of Fish and Game (CDFG). Removal of material from Pond 1 would create channels to connect the intake at the south end of the pond to the water control structures at the northern end. Channels would also be dredged to connect the existing water control structures to new structures proposed under this alternative. Dredge spoils would be used for side slope and toe drain filling. Any excess material from the dredging operations may be used to block the internal drainage ditches within Cullinan Ranch as described above.

After levee improvements are completed, two water control structures will be installed in the Pond 1 levee to provide water for staged pre-flooding of the site and circulation between Pond 1 and the Cullinan Ranch Site. This project component is consistent with CDFG's management goals for Pond 1. After the fill is in place the levee would be resurfaced with four inches of base rock along its 7,000 foot length. Resurfacing the levee would allow use of the levee as an access point and enhance public access and viewing of the Cullinan Ranch Site.

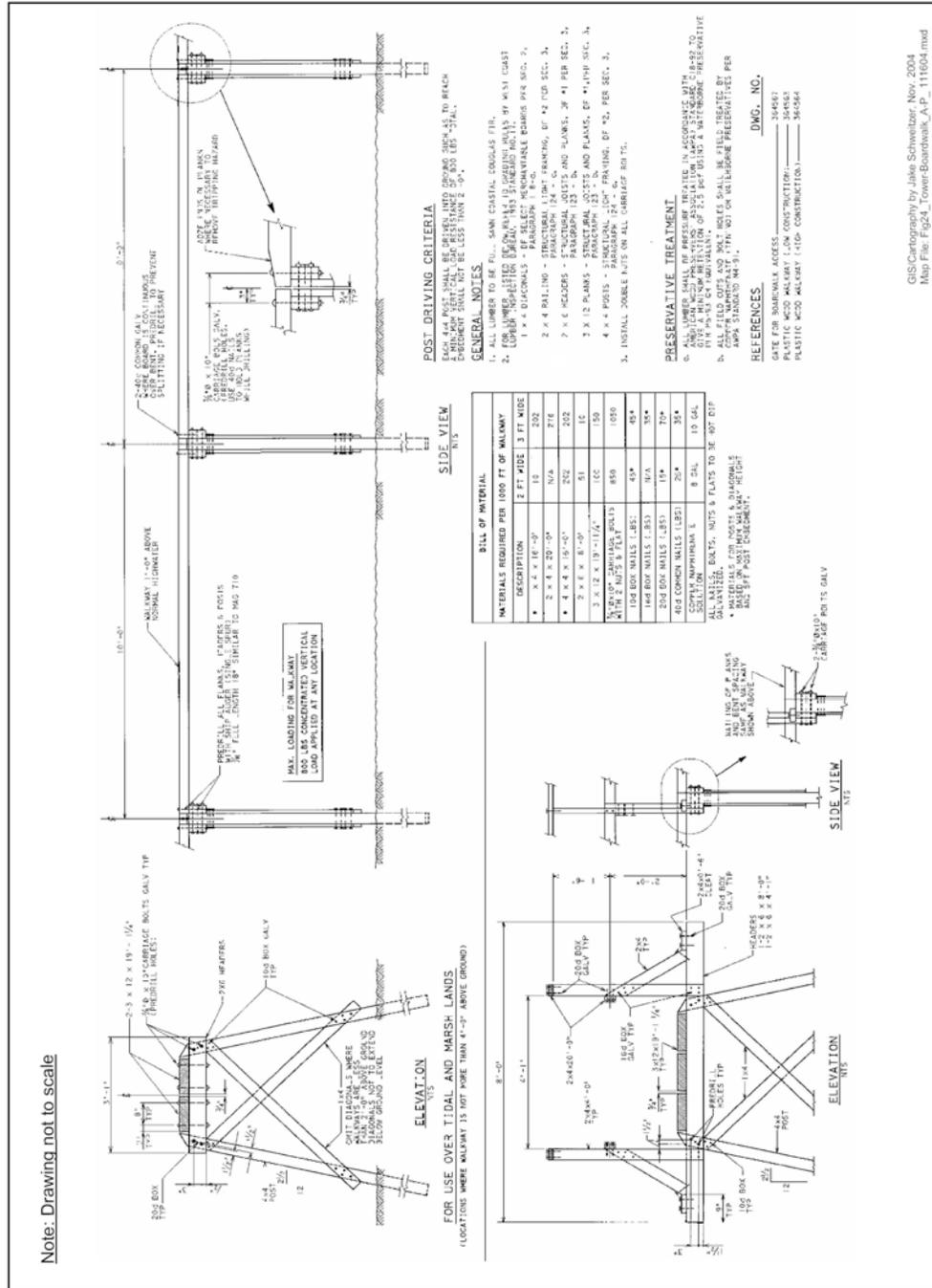


Figure 2-4. Proposed Transmission Tower Access Boardwalk

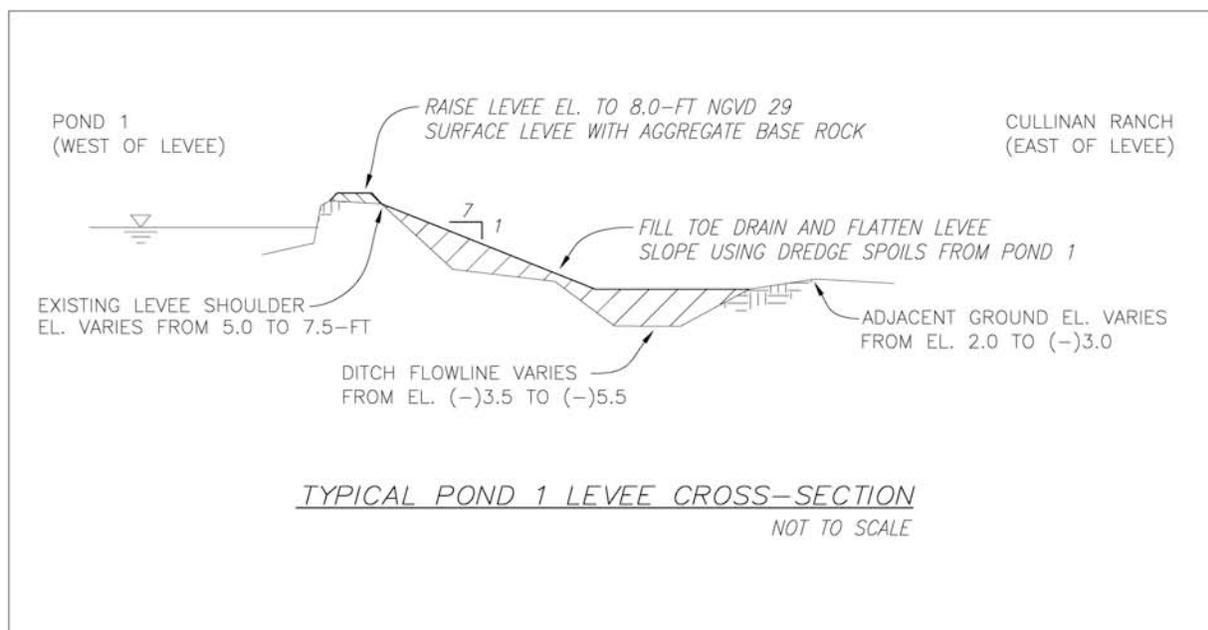


Figure 2.5. Proposed Pond 1 Levee Improvements

Component 4 – Protect Highway 37 from Flooding and Erosion

California State Route 37 is an elevated two-lane roadway located on an embankment that forms the southern boundary of the Cullinan Ranch Site. This embankment is essentially a flood control levee that protects the roadway, Cullinan Ranch, and adjacent northern properties from tidal flooding and wave action from San Pablo Bay to the South. Within the boundaries of the Cullinan Ranch Site, the Highway 37 embankment at the edge of pavement ranges in elevation from four to eleven feet (NGVD 1929). Hydrologic studies conducted by Moffat & Nichol Engineers determined that if the Cullinan Ranch Site was restored without adequately elevating and protecting the embankment, it is likely that the eastern portion of Highway 37 would be flooded during combined high tide and storm events. The studies determined that a levee height of 8.0' NGVD would be sufficient to protect the eastern portion of the highway from extreme tidal events (Moffat & Nichol 2002). In addition to flooding, inadequate protection of the Highway 37 levee from wind-induced waves from within the Cullinan Ranch Site could also result in significant erosion of the highway embankment. To minimize these potential effects, a buttress levee would be constructed against the existing embankment along an approximate 3,500-foot section of Highway 37 where the edge of the pavement could potentially be overtopped. Based upon real-world experience at the Guadalcanal Village restoration site Caltrans has requested that the buttress levee be constructed to an elevation of 9.0 feet (NGVD 1929) (Pers. Comm. Peterson 2007). Erosion protection, or armoring, would be constructed in place along the entire three-mile section of the embankment that lies within the project boundary. The armoring may consist of, but is not limited to, placement of stone, flattening of levee slopes, and planting vegetation. If practical, pickleweed would be collected from the toe drain prior to levee construction, stockpiled, and planted on the finished slope. The existing drainage ditch that parallels the highway would be filled to match adjacent ground elevations. The buttress levee and armoring would be constructed on top of this fill. A grassy swale would be constructed between the existing highway embankment and the buttress levee to convey stormwater runoff from the highway (Figure 2-6). 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 the Cullinan Ranch Site 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.

Component 5 – Construct Public Access Areas

Currently, the Pond 1 levee serves as a public access point to Cullinan Ranch. Under the Preferred Alternative, this access point will be improved (Figure 2-2). An existing graveled, wide section of the Pond 1 levee located adjacent to Highway 37 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. Paved acceleration and deceleration lanes will be installed on the north side of Highway 37 along the westbound lane, before and after the Pond 1 levee, to facilitate safe highway merging. Construction of the deceleration lane would necessitate the widening of the Highway 37 embankment along its path. The parking area would be improved by relocating it further away from the highway, paving the surface, and providing room to accommodate approximately ten vehicles. The new parking lot would be constructed along the Pond 1 levee and built primarily on uplands. Some re-contouring of the Pond 1 levee slope might be necessary but this is expected to be no more than 150 linear feet. Public use facilities such as a kayak launch, benches and interpretive signs would be placed within the Cullinan Ranch Site on a pad or platform adjacent to the parking lot. This pad would be constructed of on-site or imported fill material and would be located at the southwest corner of the property. Intertidal benches would be construction in this vicinity to facilitate pickleweed development and provide for interpretation opportunities. A pier would be constructed to facilitate angling and wildlife viewing.

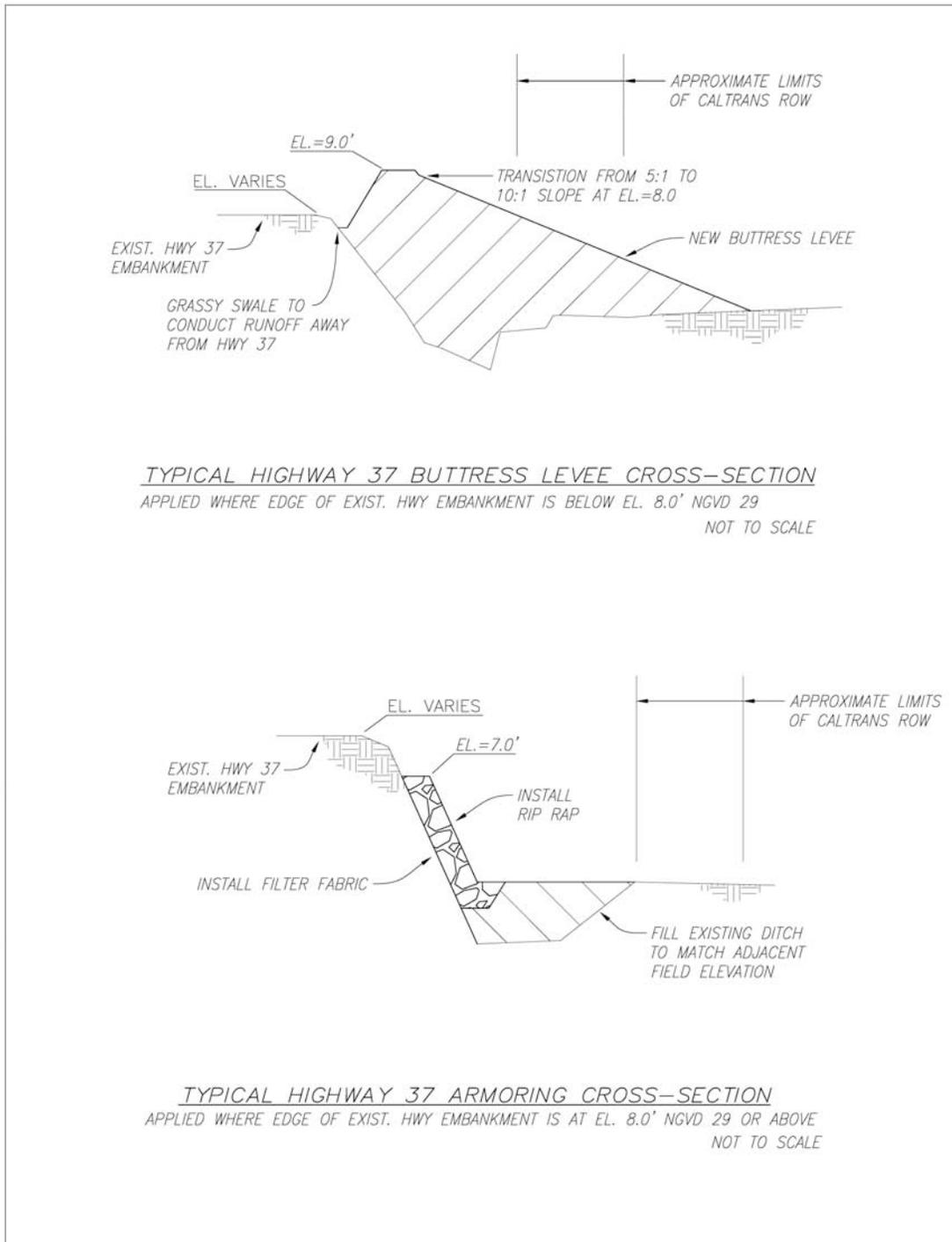


Figure 2.6. Proposed Highway 37 Improvements

Component 6 – Pre-Flood Cullinan Ranch Site Prior to Breach of Levees

The 1,525 acre Site has laid fallow for over a decade, allowing upland vegetation and marsh habitats to form. Mammals, which have populated the Site will be displaced when tidal flow is restored. To allow movement of animals from the Site, Cullinan Ranch will be slowly flooded in midwinter using the water control structures installed in the Pond 1 levee, as described above in Component 3. During the winter, Cullinan Ranch will be partially flooded due to ponding of rainwater. Once the Site is fully flooded with a minimum of one-foot of water, the levee between Cullinan and the Dutchman and South Sloughs will be breached to accommodate tidal flows.

Anaerobic conditions may form during the flood up period depending on the length of time water is held in Cullinan Ranch prior to breaching. Water quality monitoring will be instituted when Cullinan is flooded to determine water quality and therefore the timing of breaches. Due to the increase in floodwaters from the Napa River and rainfall accumulation during winter periods, any discharge into the sloughs from Cullinan Ranch during those events will be brief and quickly diluted. Breaching would occur prior to January 30 when salmonids are expected to migrate through the area.

Component 7 – Breach the Levee along Dutchman and South Sloughs and Guadalcanal Village

The levee separating the Site from Dutchman and South Sloughs will be breached in up to four locations, with the breach sequence starting near the western portion of Cullinan Ranch (Figure 2-7). The intent is to use South Slough and the lower portion of Dutchman Slough as the primary channels for the Site. To facilitate water movement onto the Site, some dredging might be required to open up the confluence of Dutchman and South Sloughs, which is currently an area where sediment deposition occurs. Where practical, there will be some levee recontouring near the breach locations. Breach size and depth of excavation could vary based upon final hydraulic evaluations that take into account breach locations, the amount of the tidal prism that will pass through the breach at each tide cycle, and the amount of restoration area that the breach would be supporting. In addition to implementation of the breaches, the northern levee would be lowered to within the upper range of the tide cycle and the interior levee slopes would be flattened in order to improve biological habitat in the short term.

Another levee, located along the eastern border of the Site separates Cullinan Ranch from the recently restored Guadalcanal Village. This levee was designed to resist tidal action. An armored spillway was installed in the levee and then backfilled during the Guadalcanal Village restoration. Under the Preferred Restoration Alternative, this armored breach may be opened to allow tidal flow between Cullinan Ranch and Guadalcanal Village.

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 acceleration of 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.

Component 8 – Long-Term Monitoring

Documentation of the physical and biological changes that occur both prior to and following restoration of the Cullinan Ranch Site, including the possible deposition of mercury within Cullinan, will be an essential component of the proposed restoration project. Monitoring activities will be conducted to

document changes in tidal hydraulics, geomorphology, habitat types, and functions as restoration progresses. Salt marsh harvest mouse, California clapper rail and other estuarine-dependent species will be monitored. Monitoring activities will also facilitate an adaptive management strategy to ensure that implementation of the restoration project results in stable, fully functioning and self sustaining tidal marsh habitat. Monitoring will likely be conducted in both dry (May – October) and wet (November – April) seasons. Since slough channels are expected to be primary habitats for fish and wildlife species, the Cullinan Ranch Site will be stratified into marsh plain and slough channel habitat types as it develops. Biological monitoring samples from the Cullinan Ranch Site will be gathered within a spatial framework with samples being taken at varying intensities within established grid systems or along transects. All sample locations will be geo-referenced to the nearest meter in a horizontal plane with a global positioning system (GPS) and all data will be digitized into a geographical information system (GIS) database. Aerial photographs will be taken in 3, 5 or 10 year time periods to document large-scale habitat changes depending on conditions at the site. A detailed monitoring plan will be developed using the most recent information available from surrounding restoration sites.

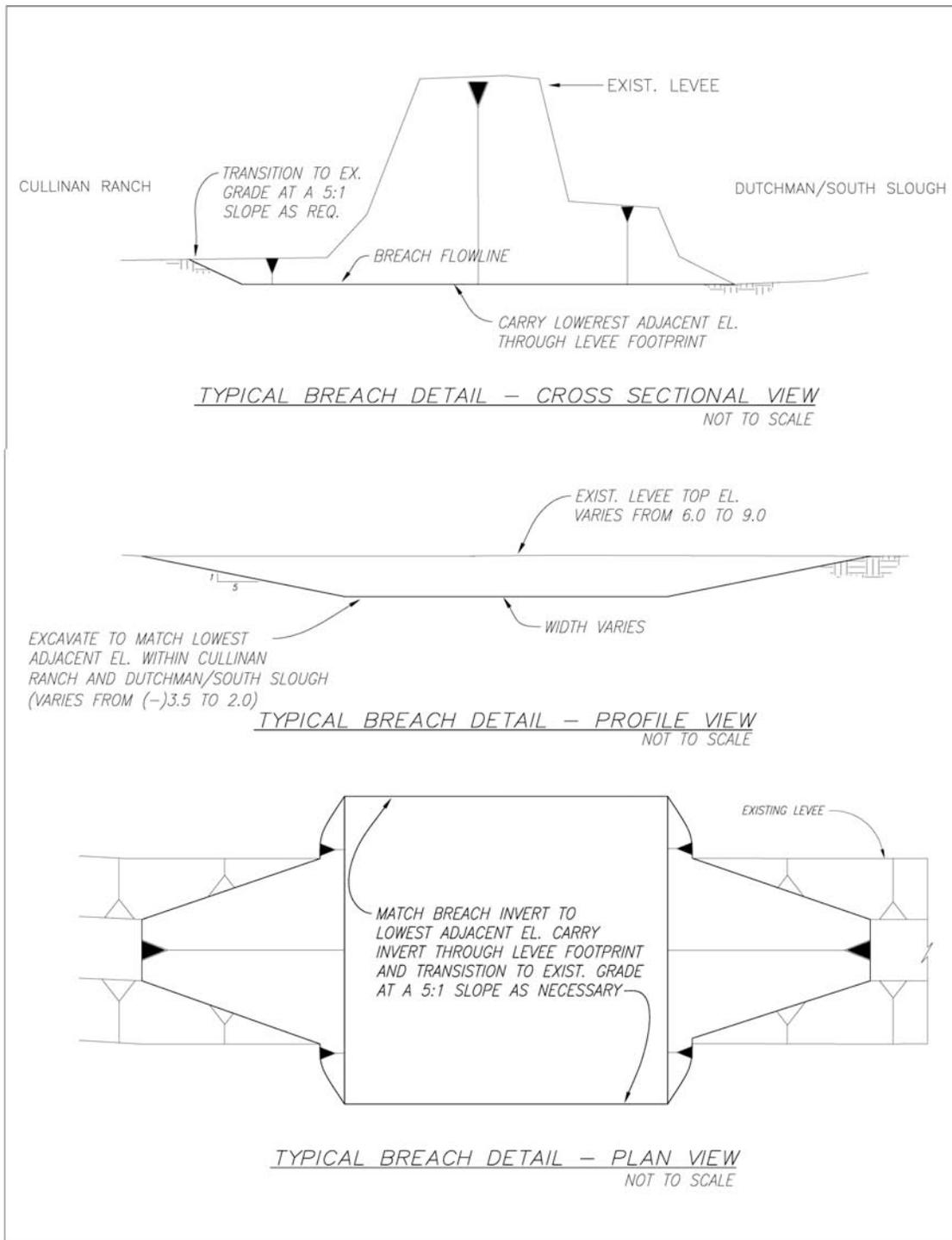


Figure 2.7. Typical Sections of Proposed Levee Breaches

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 and Guadalcanal Village
- Component 5: Long-term monitoring

Under the Partial Restoration Alternative, restoration would occur within a 300-acre area on the east side of the 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 and one between Cullinan Ranch and Guadalcanal Village (Figure 2-8). A 3,500-foot long internal levee would be constructed at an elevation of 9.0 feet (NGVD 1929) on top of the existing access road from Dutchman Slough to the Highway 37 embankment, and existing culverts located under this levee would be removed. This levee would bisect the site and maintain the western 1,200 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 also 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 Alternative Area will border an approximately 5,700-foot section of the Highway 37 embankment. 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 and 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 9.0 feet (NGVD 1929), would protect low sections of the highway from tidal waters; it would also prevent storm water 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 the Cullinan Ranch Site at lot 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.

As under the Preferred Restoration Alternative, the armored spillway along the existing levee, which separates Cullinan Ranch from the recently restored Guadalcanal Village, may be opened. This would establish tidal flow between Cullinan Ranch and Guadalcanal Village, creating one contiguous tidally influenced area at the eastern portion of the Site. Long-term monitoring, as described above for the Preferred Restoration Alternative, would also occur under this alternative to document the physical and biological changes that occur on-site as a result of project implementation.

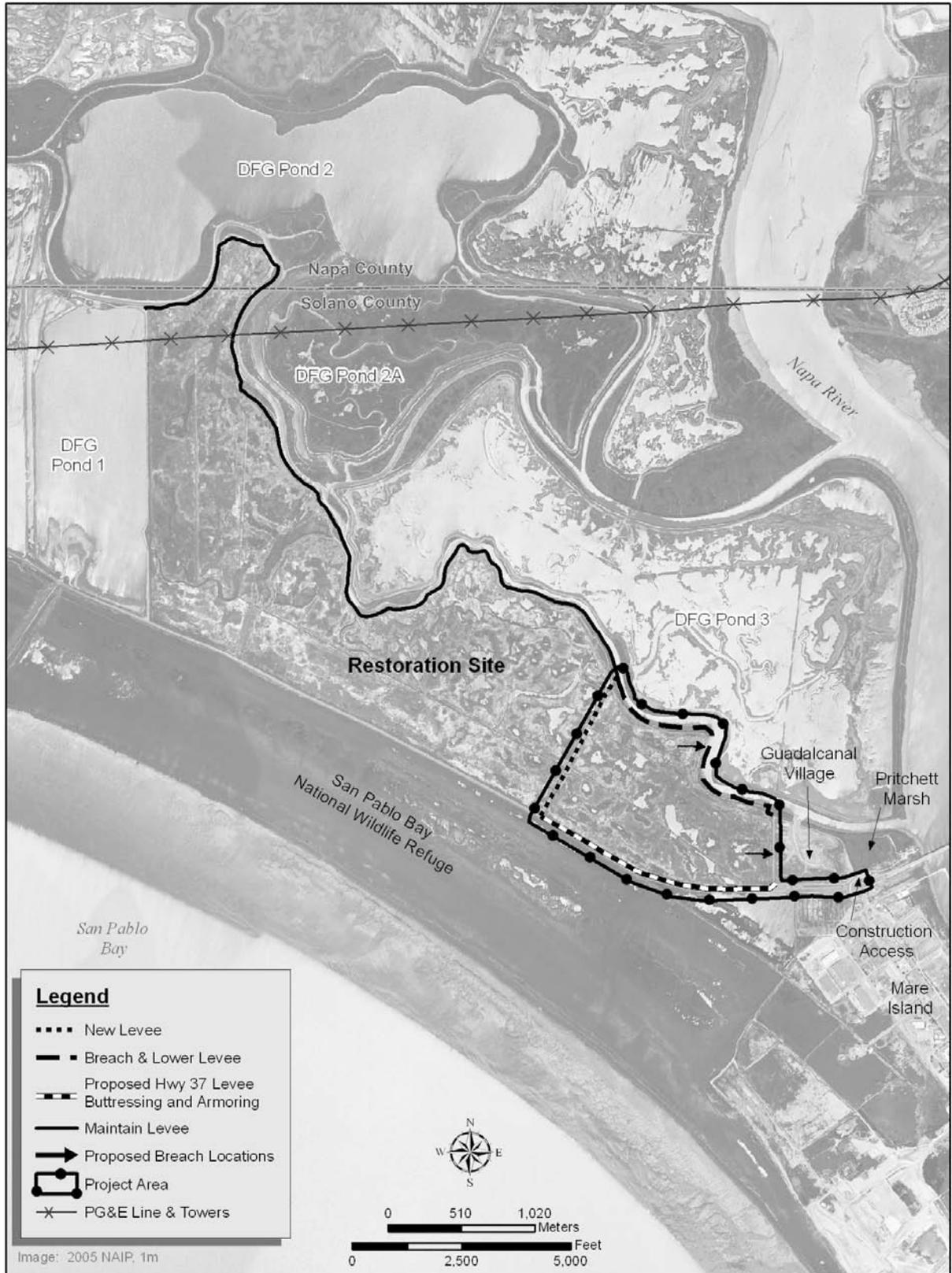


Figure 2-8. Partial Restoration Alternative

2.5 Project Construction and Phasing

Construction Equipment and Staging

Equipment that could be used during construction of the Proposed Action includes, but is not limited to, power generators, heavy-duty haul trucks, pile drivers, hydraulic dredge, mechanical dredge, barges, excavators, scrapers, compactors, dozers, refueling tanks, water tanks, service trucks, and other heavy equipment.

Construction staging areas would be located on upland areas of the Cullinan Ranch Site. For construction activities pertaining to the Pond 1 levee, the staging area would be located in the southwest corner of the Cullinan Ranch Site. Once construction is underway, slow-moving heavy equipment such as excavators and compactors would likely remain at the work site throughout the duration of construction activities. However, trucks used for importing fill material would be kept off-site.

Construction Phasing under the Preferred Restoration Alternative

Construction phasing would be highly dependent upon release of project funding and procurement of adequate amounts of suitable fill material. However, timing of construction of the individual project components is anticipated to occur according to the sequence described below.

Construction of the PG&E maintenance boardwalk and east tower armoring may occur first, followed by the ditch blocking. The boardwalk construction should be completed prior to initiation of this project. Ditch block installation is a relatively simple operation that would not conflict with any of the other levee work at the Site. As such, it will be implemented at the construction contractor's discretion.

Dredging of Pond 1 will be completed during the initial phase of construction, prior to levee breaching, in order to give the material time to dry before it is set in place. The material would be re-worked and graded once it is dry. Improvement to the Pond 1 levee and installation of the water control structures would be completed prior to breaching the northern levee. The dredging work within Pond 1 and the Highway 37 levee improvements may occur simultaneously. Once all improvements are made to the Pond 1 and Highway 37 levees and public access areas have been constructed, the west-side breaches would be made, allowing for tidal inundation of the Cullinan Ranch Site. Initiation of long-term monitoring of the Site would occur within the first year of flooding. Prior to initiating project construction, the project proponent would create a detailed long-term monitoring plan outlining the duration of monitoring and tasks to be completed over the duration of the monitoring period. A detailed description of the construction methods for each of the main project components is described below.

Construct Boardwalk to Provide Access to Existing Electrical Towers

Two boardwalks will need to be constructed for maintenance access to the towers. The shorter of the two boardwalks will be approximately 50 feet in length and will provide year-round access to towers 19/82 and 37/205. The longer boardwalk will be approximately 785 feet in length and will provide year-round access to towers 19/81, 37/206, and 37/207. Both boardwalks will be four feet wide with dual handrails, and the underside of the walking deck will be at 8 feet NGVD. Total deck area for both boardwalks will be approximately 3,340 square feet (0.076 acre). All boardwalks would be built in 20-foot increments, with 4-inch by 4-inch plastic piles spaced at 10-foot increments.

Armoring would be placed under two towers (19/82 and 37/205) and would consist of filter fabric and angular stone placed under and around the tower footings. The material would be imported and the armoring activity is expected to take approximately two weeks to complete.

Block Drainage Ditches to Promote Redevelopment of the Natural Sloughs

Existing drainage ditches are to be plugged in specified locations to discourage the formation of artificial slough channels. These plugs will be created using earthen fill from the existing low berms and potentially dredged material from Pond 1. Depending on the time of year the ditches may be filled with water. The ditches would not be drained to install these plugs. The material would be placed in the ditches with an excavator or dozer and compacted in place to form the plugs. The material would displace the water as it is installed. The top elevation of the plugs would be equal to the top elevation of the channel. All plugs could be installed within one week's time but would likely be installed at slow periods during the implementation of larger restoration projects.

Improve the Pond 1 Levee

In order to improve the Pond 1 levee approximately 80,000-100,000 cubic yards of material would be excavated out of Pond 1. If a hydraulic dredge were used the material would be pumped over the Pond 1 levee and placed on the levee slope and the adjacent borrow ditch. After the material has dried, a process which may take a few months, it would be reworked, as necessary, with land based equipment and incorporated into the existing levee slope to add support.

The second phase of the Pond 1 levee work would entail increasing the levee to an elevation of 8.0-foot NGVD 29. The material from the dredging operation would not be appropriate for this use. If practicable, on-site material would be used. As a last resort, suitable fill materials would be brought from off-site. Approximately 20,000 cubic yards of fill would be needed for this operation. In addition, approximately 10,000 cubic yards of fill would be needed to construct the deceleration/acceleration lanes, benches, and access pad near Highway 37. Assuming that all of the fill were imported, a swell of 30% and the use of 10-wheeler trucks, each with carrying capacity of 8 cubic yards of material, it is anticipated that 3,917 truck trips would be required. Once the fill is in place, approximately 1,000 cubic yards of base rock would be brought to the Site and placed on the new levee surface. Placement of the base rock would require approximately 100 truck trips. The second phase of Pond 1 levee improvements is expected to take three months to complete. Larger capacity trucks are available but access to this area during construction would be from Highway 37 and staging is limited. Two water control structures would be placed in the Pond 1 levee after the dredging operation is completed, but before placement of base rock.

Construction Route for Importing Off-Site Fill Material to Complete Pond 1 and Highway 37 Levee Improvements. A two-part construction route was identified for importing material to the Site where trucks would enter and exit at both the western and southeastern corners of the Cullinan Ranch Site. Currently, Highway 37, at the western edge of the Cullinan Ranch Site, consists of a single lane with a concrete divider on the south side and a narrow shoulder on the north side. A temporary access ramp would be constructed from this area onto the Cullinan Ranch Site. During construction, the western access point would only be used to import fill materials to the Pond 1 levee. Use of this access point would cease once this operation is complete. As described below, permanent acceleration and deceleration lanes would be constructed at this location for public access to the site.

Truck traffic involved with Pond 1 construction activities and Highway 37 levee improvements would enter the Site at its southeast corner from the south levee of Guadalcanal Village. Trucks would enter the eastern side of the Cullinan Ranch Site from Guadalcanal Village before Highway 37 merges to a single

lane. The right lane of the Mare Island Bridge would be utilized as the deceleration lane for truck traffic, and general traffic would utilize the left lane. Trucks would enter the Guadalcanal Village parking area and proceed onto the levee. Once on the Site, trucks would be restricted to the uplands near Highway 37 and continue along a temporary haul road immediately adjacent to the ditch. Once the ditch is filled and compacted to a level that would support truck traffic, the trucks could run along the new fill to aid in compaction. Construction of the levee would eventually envelop the abandoned haul road. During construction, two-way traffic would have to be maintained on the Site and exiting trucks would be skirted around the highway to the Mare Island overpass proceeding directly onto eastbound Highway 37. This would further reduce the traffic impacts along Highway 37 by eliminating the need for trucks to use the stretch of single lane highway adjacent to the Cullinan Ranch Site. This scenario was developed in order to minimize impacts to Highway 37. Other scenarios that may be proposed at the time of construction would be considered and, if determined to have the same or less impact as the scenario mentioned herein, might be implemented.

Protect Highway 37 from Flooding and Erosion

A buttress levee would be constructed adjacent to approximately 3,500 feet of highway embankment. The buttress levee, being higher than the adjacent highway embankment, would be designed with a grassy swale just below the highway shoulder to convey rainwater away from the embankment. 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 the Cullinan Ranch Site at low tide through tide gates. The buttress levee would be constructed with a flat slope into the Cullinan Ranch Site, which would provide transitional habitat as well as erosion resistance. Seeding of the swale or planting plugs using native plants on the buttress levee may also be implemented to further enhance the embankment's habitat contribution and ability to resist erosion. Construction of the buttress levee would require the use of approximately 114,000 cubic yards of fill material (this quantity includes filling the entire length of the toe drain). Assuming that the buttress levee is completely constructed using imported material, and that the material will swell 30%, it would take approximately 8,222 truck trips, using a standard 18 cubic yard transfer truck.

The remaining approximately 12,100 feet of highway embankment that is currently not protected by a buttress levee would be armored to prevent erosion. The adjacent toe drain would be filled to match the adjacent field elevation as part of the buttress levee construction and is intended to provide a firm base for the armoring. It would take approximately 35,800 cubic yards of rip rap to armor the slope. Assuming the use of transfer trucks, again with an 18 cubic yard capacity, and with proper coordination the rock importation would require 2,646 truck trips and take approximately one month to complete. Once the material reaches the Cullinan Ranch Site, the rock would be placed on the existing embankment slope on top of non-woven fabric in accordance to Caltrans standard specifications. This operation will take place before the buttress levee is constructed.

Construction Phasing under the Partial Restoration Alternative

Similar to the Preferred Restoration Alternative, under the Partial Restoration Alternative, construction phasing would be highly dependent upon release of project funding and procurement of adequate amounts of suitable fill material. However, timing of construction of individual project components is anticipated to occur according to the following sequence. The construction of the internal levee to separate the 300-acre area for restoration on the eastern portion of the site could occur simultaneously with the construction of the buttress levee adjacent to Highway 37 and the armoring of the existing Highway 37 embankment. Once the levee construction and improvements are completed, the breach between Cullinan Ranch and Dutchman Slough would be created, allowing tidal inundation of the eastern portion of the Site. Long term monitoring of the Cullinan Ranch Site would occur within the first year following

construction for the life of the Project under the discretion of the lead agencies. A detailed description of the construction methods that differ from the Preferred Restoration Alternative is provided below.

Construct Internal Levee

A newly constructed internal levee would function to separate the eastern and western portions of the Cullinan Ranch Site. The internal levee would be constructed on top of the existing eastern access road within the Cullinan Ranch Site. The levee would be constructed at an elevation of 8.0-feet (NGVD 1929) and have an approximate length of 3,500 feet. The tidal (eastern) side of the internal levee would be constructed with 7 to 1 side slopes to provide erosion resistance and transitional habitat. The western (seasonal) side would be constructed at a 5:1 side slope. Construction of the levee would require the use of approximately 75,200 cubic yards of fill material. Assuming 30% swell and the use of transfer trucks with an 18 cubic yard capacity, it would take approximately 5,426 truckloads if the levee was constructed entirely with imported material. With a productivity of 96 truckloads a day it would take approximately three months to complete the import operation.

Protect Highway 37 from Flooding and Erosion

Protecting Highway 37 would involve construction of a buttress levee adjacent to the highway. The buttress levee would be constructed adjacent to an approximately 3,500-foot section of highway embankment. The buttress levee, being higher than the adjacent highway embankment, would be designed with a grassy swale just below the highway shoulder to convey rainwater away from the embankment. 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 the Cullinan Ranch Site at low tide through tide gates. The embankment would be constructed with a flat slope, which would provide transitional habitat as well as erosion resistance. Seeding of the swale or planting plugs on the embankment may also be implemented to further enhance the embankment's habitat contribution and ability to resist erosion. Construction of the buttress levee would require the use of approximately 101,700 cubic yards of imported fill material. Assuming the use of transfer trucks with an 18 cubic yard capacity, it would take approximately 5,167 truckloads to construct the buttress entirely with imported material, or approximately 7,341 truck trips. With a productivity of 96 truckloads a day it would take an estimated four months to complete the import operation.

The remaining approximately 2,200-foot section of highway embankment that is currently not protected by a buttress levee would be armored to prevent erosion. If riprap material is used to armor the area, it is estimated that 5,100 cubic yards of riprap would have to be imported for this task, resulting in approximately 377 truck trips to import the material. With proper coordination the rock importation, this task would likely be accomplished within one week. Similar to the Preferred Alternative, the toe drain adjacent to the highway would be filled to field elevation as part of the buttress levee construction in order to provide a sound base for the armoring. Once the armoring material reaches the Cullinan Ranch Site, the rock would be placed on the existing embankment slope on top of non-woven fabric in accordance to Caltrans standard specifications.

Construction Route for Importing Off-Site Fill Material to Internal and Highway 37 Levee Improvements.

Truck traffic would enter the Site through Guadalcanal Village at its southeast corner to complete work for the proposed internal and Highway 37 levee improvements. To facilitate this circulation pattern, trucks would enter the eastern side of the Cullinan Ranch Site from the levee at Guadalcanal Village. The right lane of the Mare Island Bridge would be utilized as the deceleration lane for truck traffic, and general traffic would be allowed to utilize the left lane. Trucks would enter the Guadalcanal parking area and continue onto the levee. Once on the Site, trucks would be restricted to the uplands near Highway 37

and continue along a temporary haul road immediately adjacent to the ditch. Once the ditch is filled and compacted to a level that would support truck traffic, the trucks could drive over the new fill to aid in compaction. Construction of the levee would eventually envelop the abandoned haul road. During construction, two-way traffic would have to be maintained on the Site and exiting trucks would be skirted around the highway to the Mare Island overpass proceeding directly onto eastbound Highway 37. This would further reduce the traffic impacts along Highway 37 by eliminating the need for trucks to use the stretch of single lane highway adjacent to the Cullinan Ranch Site. This scenario was developed in order to minimize impacts to Highway 37. Other scenarios that may be proposed at the time of construction would be considered and, if determined to have the same or less impact as the scenario mentioned herein, might be implemented.

Breach the Levee along Dutchman Slough

Breach work consists of lowering the levee separating Dutchman Slough and Cullinan Ranch to within the upper limits of the tide range and constructing the breaches for the daily tidal exchange. The construction equipment and methods used to implement the work would be agreed upon during coordination between the USFWS and the selected contractor(s). However, it is anticipated that the breaches would be installed utilizing a long reach excavator mounted on a barge. The levee lowering associated with the breach work would be completed prior to the breaches and may be constructed by land-based equipment. This ultimately would depend upon the tide range during the construction period. The western breach would be constructed first. Most likely the barge would not be moved to the next breach site until the water within Cullinan Ranch came into equilibrium with the water in Dutchman Slough. The barge would then progress eastward creating the breaches in sequence. It is estimated that approximately 10,000 cubic yards of material would be generated from each breach. This material would be placed on the levee slope within Cullinan Ranch. The time to lower the levee and construct each breach would be dependent upon the site conditions (weather, tides, etc.) and type of equipment and method selected. If excavators were used and were assumed to move 1,000 cubic yards per day, then it would take approximately 10 days to complete each breach, excluding mobilization time.

2.6 Alternatives Analysis

A total of nine alternatives were analyzed as part of the development of the Proposed Project. Based on hydrologic modeling and engineering cost and feasibility criteria, the No-Action, Preferred Restoration and Partial Restoration Alternatives were carried forward for analysis in this EIS/EIR. NEPA requires that the proposed alternatives be considered with the same level of detail. The common practice is to quantify the impacts of the alternatives in the exact same manner as for the Proposed Action, so that reviewers and decision makers can effectively compare the differences (Bass et. al. 2001). For the purposes of this EIS/EIR, the environmental effects of the proposed alternatives are evaluated quantitatively for those resource topics where data are available. For resource topics where sufficient data are not available, the environmental effects of the proposed alternatives are evaluated qualitatively. Table 2-1 provides a summary comparison of the proposed alternatives.

Table 2-1. Summary Comparison of Proposed Alternatives

	No-Action Alternative	Preferred Restoration Alternative	Partial Restoration Alternative
Acres to be Restored	0	1,525	300
Proposed Components			
Construct boardwalk and armor 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 with Pond 1 levee work.	To occur prior to breaching, only in the area being restored into tidal habitat.
Improve Pond 1 levee	Not proposed.	Dredge Pond 1 to generate materials to improve levee. Raise levee elevation and reinforce using on-site and off-site material. Installation of two water control structures to create a hydrologic connection between Pond 1 and the Site.	Not proposed.
Protect Highway 37 from flooding and erosion	Not proposed, but may occur.	Buttress levee would be constructed along 3,500 feet of the adjacent Highway 37 embankment where the edge of pavement is less than 8.0 feet (NGVD 1929). Erosion protection along 12,100 feet of the Highway 37 embankment where the edge of pavement is greater than 8.0 feet (NGVD 1929).	Buttress levee would be constructed along 3,500 feet of the adjacent Highway 37 embankment where the edge of pavement is less than 8.0-feet (NGVD 1929) Erosion protection along 2,200 feet of the Highway 37 embankment where the edge of pavement is greater than 8.0 feet (NGVD 1929).
Breach the levee along Dutchman and South Sloughs	Not proposed.	Two west breaches in Cullinan Ranch along Dutchman and South Sloughs.	One breach from Cullinan Ranch to Dutchman Slough near Guadalcanal Village.
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 Highway 37 to the Dutchman Slough levee at an elevation of 8.0 feet.
Construct access lanes to and from Highway 37 and public access platform	Not proposed.	Would be installed near existing informal parking area located at Pond 1 levee access road.	Would not occur.
Long-term monitoring	Not proposed.	Would occur in accordance with regulatory requirements.	In accordance with funding & regulatory requirements.

Alternatives Considered and Withdrawn

Based on analysis of hydrologic and engineering features, the lead agencies developed a range of alternatives, which could be implemented to accomplish the purpose and need of the Proposed Action. Six restoration alternatives were identified and analyzed according to cost and engineering feasibility criteria and withdrawn from further consideration. Table 2-2 provides a description of these alternatives, which are no longer being considered.

Table 2-2. Alternatives Considered and Withdrawn

Description of Alternative Considered	Summary of Reason for Withdrawal
Alternative 1. One large in-take channel leading from San Pablo Bay. One Highway 37 bridge.	Although hydrologically effective, the costs and potential significant and unavoidable cumulative traffic impacts on Highway 37 associated with construction of the in-take channel would be prohibitive because the lack of available funding sources.
Alternative 2. Two in-take channels from San Pablo Bay.	Same reasons as above.
Alternative 3. Combination of two in-take channels from San Pablo Bay and two levee breaches between Dutchman Slough and Cullinan Ranch.	Same reasons as above.
Alternative 4. Deposition of off-site fill material to create marsh elevations throughout the Site to support tidal marsh vegetation and wildlife.	Transport of the large amounts of fill to the Site could potentially cause significant and unavoidable cumulative traffic impacts on Highway 37 and the streets leading to the Cullinan Ranch Site. No known source is known for the quantity of material required.
Alternative 5. Full restoration of Cullinan Ranch with self-regulating tide gates connecting Cullinan Ranch to Dutchman and South Sloughs. Tide gates would limit height of water within the Cullinan Ranch Site to protect adjacent properties.	Implementation of this alternative would require the maintenance of the Dutchman Slough levee as a flood levee in perpetuity by the USFWS. The constricted water flow would tend to produce water quality issues and lengthen the restoration time.

2.7 Required Approvals and Permits

The lead agencies will need to consult with the following resource agencies for issuance of permits and/or approvals prior to implementation of the Proposed Action:

- U.S. Fish and Wildlife Service: Internal Section 7 Consultation in accordance with the Endangered Species Act;
- U.S. Army Corps of Engineers: Section 404 Permit for filling jurisdictional waters in accordance with the Clean Water Act;
- National Marine Fisheries Service: Consultation in accordance with the Endangered Species Act, Fish and Wildlife Coordination Act, Marine Mammal Protection Act, and Magnuson Fisheries Conservation Act;
- San Francisco Regional Water Quality Control Board: Section 401 Water Quality Certification and approval of Section 402 Storm water Pollution Prevention Plan in accordance with the Clean Water Act;
- San Francisco Bay Conservation and Development Commission: Permit approval for the Proposed Action (McAteer/Petris Act-San Francisco Bay Plan) and review of federal permit for consistency with the Coastal Zone Management Act; and
- California Department of Transportation: Encroachment permit for work conducted within the Caltrans right-of-way.