SECTION 3.0

Coastal Salt Marsh Area Sites

Section 3.0 contains all of the information related to the Coastal Salt Marsh Area sites. This section is organized as follows:

3.1: Site Background and Extent of Contamination provides background information and discusses the nature of contamination for the sites in the Coastal Salt Marsh Area currently owned by the Army and also the sites in the adjacent coastal salt marsh habitat on property currently owned by the SLC. It provides a brief summary of the historical investigations and describes, in general terms, the nature of contamination found at the coastal salt marsh sites. In addition, it provides a background discussion for each site and identifies the nature of contamination.

3.2: Overview of Risk Assessment and Action Goals provides an overview of the risk assessment and the process used to establish action goals for the coastal salt marsh sites. It presents details of the process used to determine contaminants of potential concern (COPCs) and to establish action goals.

3.3: Remedial Action Objectives (RAOs) describes the goals that proposed remedial actions are expected to accomplish and the development of RAOs for the coastal salt marsh sites, and presents how the different agencies (DTSC, RWQCB, and Army) identify and implement their respective laws and standards for selection of remedies.

3.4: Summary and Evaluation of Alternatives summarizes the evaluation and selection of remedial alternatives presented for each coastal salt marsh site. It provides a description of the remedial alternatives, and the process for selecting alternatives for each site. The rationale for adopting the selected alternative is also provided.

Information for the Inboard Area sites is presented in Section 2.0.

SECTION 3.1

Site Background and Nature of Contamination

This section addresses the sites in the coastal salt marsh, currently owned by the Army, and the sites in the adjacent coastal salt marsh habitat, currently owned by the SLC. For ease of terminology, this section will use the term "coastal salt marsh" to refer to all areas outboard of the perimeter levee.

This section provides background information and discusses the nature of contamination for each site in the coastal salt marsh. Subsection 3.1.1 briefly summarizes the historical investigations and describes, in general terms, the nature of contamination found at the coastal salt marsh sites. Subsection 3.1.2 identifies the sites in the coastal salt marsh that are addressed in this ROD/RAP. Subsection 3.1.3 provides background information for each site and identifies the nature of contamination and COPCs.

3.1.1 Historical Investigations and Nature of Contamination

Numerous activities were conducted in the coastal salt marsh between 1987 and 2002. Historical activities included a confirmation study for hazardous waste, remedial investigations, biological testing data studies, and a HHERA. The following documents summarize the findings of these activities:

- *Coastal Salt Marsh December 2001/January 2002 Sampling Report* (USACE, 2002b): The Army collected additional soil samples at the coastal salt marsh sites to further characterize and investigate the extent of chemicals detected in the previous investigations, with the exception of the High Marsh Proposed Channel Cut and the Boat Dock Nonchannel Area.
- *Draft Channel Cut Sampling Report, Coastal Salt Marsh* (USACE, 2002a): The Army conducted this specific investigation to evaluate the soil in the High Marsh Proposed Channel Cut.
- *Human Health and Ecological Risk Assessment* (USACE, 2001): An HHERA was completed for the coastal salt marsh sites.
- *Remedial Design Investigation Report* (FW, 2000): A design data report was completed following the RI for the Antenna Debris Disposal Area and Boat Dock.
- *Comprehensive Remedial Investigation* (IT, 1999a): C*oastal* salt marsh sites were investigated during the RI, which consisted of collecting and analyzing soil, sediment, and water samples to determine whether the sites were affected by past activities. The RI activities ranged from review and evaluation of previous investigation data to the collection of soil, sediment, and groundwater samples for analysis. During the RI, additional background data were collected for metals. These data were combined with background data collected in previous investigations and were used to determine baseline (or background) concentrations for metals and PAHs in sediment and soil.

- *Biological Testing Data Report* (IT, 1999b).
- *1998 Interim Removal Action Report* (IT, 1999b): An interim removal action was conducted at the transformer pad in the Boat Dock Nonchannel Area.

A list of documents included in the Administrative Record for HAAF is attached as Appendix A. Portions of the coastal salt marsh were used to support U.S. Army and U.S. Army Reserve operations at HAAF. Activities in the coastal salt marsh included emergency rescue operations in San Pablo Bay, disposal of construction debris, destruction of waste discharge of surface water, and discharge of treated sewage water. Transformers and transformer pads, a winch at the Boat Dock, and a burn pit at the ELCDDA supported these activities.

Additional features of the coastal salt marsh include the ODD, which receives stormwater runoff and drainage from the Main Airfield, and the FSTP Outfall, which received Main Airfield sanitary wastes from the FSTP. Based on historical investigations, the types of contaminants detected at various sites in the coastal salt marsh include:

- TPH-d, TPH-g, and TPH-motor
- Metals
- Dioxins
- VOCs
- SVOCs, including PAHs
- PCBs
- Pesticides

3.1.2 Sites Evaluated in this ROD/RAP

The following sites located in the coastal salt marsh are evaluated in the remainder of this ROD/RAP:

- Antenna Debris Disposal Area
- East Levee Construction Debris Disposal Area
- High Marsh Area
- Historic ODD
- ODD
- Boat Dock
- Area 14
- FSTP Outfall

3.1.3 Background and Nature of Contamination

The following sections provide a description of each coastal salt marsh site and a summary of the types of contaminants (metals, pesticides, TPH, etc.) detected at each site. Remedial actions are presented and evaluated in this ROD/RAP for residual COPCs (FFS COPCs) that were detected above actions goals. More information regarding action goals and FFS COPCs is provided in Subsection 3.2.2. Specific information regarding sample locations and

individual sample results is available in the primary reports cited for each coastal salt marsh site. The location of each site is shown in Figure 3.1-1.

3.1.3.1 Antenna Debris Disposal Area

The Antenna Debris Disposal Area is located along the northern portion of the ODD, north of the Building 35 pump station outfall basin. Apparent debris disposal occurred in two areas, one east of the ODD and one west of the ODD (see Figure 3.1-1). (Figures follow the tables at the end of this section.) Visual inspection of the areas indicates that they contain discarded materials from the former antenna facilities and building materials. The December 2001/January 2002 investigation conducted by USACE found debris to a depth of 8.5 feet bgs in the western area and to a depth of 3 feet bgs in the eastern area. Both areas are currently covered with a growth of native grasses, interspersed with some pickleweed, which is common to the rest of the marsh. This site was identified in the Archive Search Report (USACE, 2003) as ASR Site #15.

The western Antenna Debris Disposal Area was investigated by the Army in 1995 (WCFS, 1996), 1999 (FW, 2000), and in December 2001 and January 2002 (USACE, 2002b). During the 1995 and 1999 investigations, eight soil samples were collected in and near the western area. One of the samples was collected at 2 to 3 feet bgs beneath the western area. The results of these investigations indicate that lead and pesticides are common throughout the western area. Only one of the samples was analyzed for PCBs; they were detected in the sample. No samples were collected from the eastern Antenna Debris Disposal Area during the 1995 or 1999 investigations.

In December 2001 and January 2002, the Army collected soil samples from the eastern area and additional samples from the western area. The objective of the sampling was to investigate the extent of chemicals detected in the previous investigations at the western area and to characterize the eastern area sufficiently to determine the appropriate remedy. Sampling at the eastern and western areas resulted in detections of metals, pesticides, TPH, and PCBs.

Table 3.1-1 lists the FFS COPCs for the Antenna Debris Disposal Area. (The table follows the text of this section.) Concentrations of FFS COPCs detected at this site exceed action goals.

3.1.3.2 East Levee Construction Debris Disposal Area

The ELCDDA is located on the eastern margin of the Main Airfield Parcel in the coastal salt marsh and outboard of the east levee. It is bisected by the eastern boundary of the Main Airfield Parcel and lies primarily in land owned by the SLC (see Figure 3.1-1). The ELCDDA was used, from approximately 1961 onward, primarily for disposal of construction debris. A dirt road runs through the central portion of the ELCDDA. Pickleweed grows up to the edges of the road.

The ELCDDA includes a burn pit, located at the eastern end, which extends out into San Pablo Bay and has a slightly higher elevation than most of the ELCDDA and the coastal salt marsh. The nature and quantity of any wastes burned at the site are unknown, and no waste materials were evident at the surface or in soil samples collected at the site. This site was identified in the Archive Search Report (USACE, 2003) as ASR Site #13.

The ELCDDA was investigated by the Army in 1986 (WCC, 1987); 1990 (ESI, 1993); 1994 (USACE, 1994 and WC, 1994); 1995 (WCFS, 1996); 1997 (IT, 1999a); and December 2001 and January 2002 (USACE, 2002b). During the 1986, 1990, 1994, 1995, and 1997 investigations, trench sampling and soil samples were collected and analyzed. TPH-d, TPH-g, SVOCs, VOCs, PCBs, pesticides, dioxins, and metals have been detected in one or more soil samples from the site.

In December 2001 and January 2002, the Army collected additional soil and sediment samples in the burn pit area and in portions of the ELCDDA adjacent to the Main Airfield Parcel. The objectives of the sampling were: (1) to investigate the extent of known chemicals detected in previous investigations at the burn pit; and (2) to characterize the extent of contamination at an isolated location in the ELCDDA sufficiently to determine the appropriate remedy. Sampling at the ELCDDA indicated the presence of metals.

The FFS COPCs for the ELCDDA are listed in Table 3.1-1.

3.1.3.3 High Marsh Area

As described in Subsection 1.4.5, three primary habitat zones are present in the coastal salt marsh (Low Marsh, Middle Marsh, and High Marsh). The Army has investigated several areas in the Middle Marsh habitat as potential areas of concern. Although the areas are located in the Middle Marsh habitat, these areas are collectively known as (and are referred to in many of the coastal salt marsh investigation and planning documents) the High Marsh Area. To remain consistent with previous documents, the term "High Marsh" or "High Marsh Area" will be used to refer to areas located outboard of the perimeter levee that are not part of another identified site. The majority of the High Marsh Area is on land owned by the SLC. The High Marsh Area is on the portion of the coastal salt marsh plain that is dominated by pickleweed. The area extends from the northern to southern Main Airfield Parcel boundaries and to the east from the levee, nearly to the shoreline of San Pablo Bay. A portion of the High Marsh Area is located in the Main Airfield Parcel (see Figure 3.1-1).

For the purposes of this draft ROD/RAP and the development and evaluation of alternatives, the High Marsh Area has been divided into two subgroups: the area where the wetland restoration project proposes to cut a channel to breach the levee, and the remainder of the High Marsh Area. Samples from the Historic ODD and ODD are not included in the High Marsh Area. They are discussed and evaluated in Subsections 3.1.3.4 and 3.1.3.5, respectively. The FFS COPCs for the High Marsh Area are listed in Table 3.1-1.

Nonchannel Cut Area

The High Marsh Area was investigated by the Army in 1991 and 1992 (ESI, 1993); 1994 (USACE, 1994); 1995 (WCFS, 1996); 1997 (IT, 1999a); 1998 (IT, 1999c); and December 2001 and January 2002 (USACE, 2002b). During the 1991, 1992, 1994, 1995, 1997, and 1998 investigations, sediment samples were collected and analyzed for various constituents in the Nonchannel Cut Area. Various contaminants, including metals and pesticides, have been detected in samples collected in the Nonchannel Cut Area. The area near the pump station outfalls to the bay was identified in the Archive Search Report (USACE, 2003) as ASR Site #16.

In December 2001 and January 2002, the Army collected soil and sediment samples from portions of the Nonchannel Cut Area. The objective of the sampling was to characterize:

- Copper and manganese contamination at a location on the northern end of the High Marsh Area
- Extent of metals contamination (particularly lead) at a cluster of locations on the northern end of the High Marsh Area
- Extent of manganese contamination in the central portion of the High Marsh Area sufficiently to determine the appropriate remedy

Sampling at the High Marsh Nonchannel Cut Area resulted in detections of metals and pesticides.

The FFS COPCs for the Nonchannel Cut Area are listed in Table 3.1-1.

Proposed Channel Cut Area

The High Marsh Area was investigated by the Army in 1991 and 1992 (ESI, 1993); 1994 (USACE, 1994); 1995 (WCFS, 1996); 1997 (IT, 1999a); 1998 (IT, 1999c); and September 2001 (USACE, 2002b). During the 1991, 1992, 1994, 1995, 1997, and 1998 investigations, sediment samples were collected and analyzed for various constituents in the Proposed Channel Cut Area. In 1993, metals were detected above baseline concentration (the cumulative concentration of an analyte present in soil from both natural occurrence and anthropogenic activities that are unrelated to activities conducted at a site). Additionally, PAHs were detected above baseline concentrations at three locations in the Proposed Channel Cut Area. In 1995, metals were detected at all sampled locations in the Proposed Channel Cut Area of the High Marsh. PAHs were detected at one location, and two pesticides (chlordane and DDT) were detected above baseline concentrations at one location in the Proposed Channel Cut Area.

In September 2001, the Army conducted a specific investigation to evaluate the soil in the Proposed Channel Cut Area. Samples were collected at 12 locations and 3 depths (1, 2, and 4 feet bgs). The samples were collected in a grid from the ODD toward the bay where the planned channel cut is anticipated. TPH, metals, PAHs, and SVOCs were detected in samples collected from the Proposed Channel Cut Area.

The FFS COPCs for the Channel Cut Area are listed in Table 3.1-1.

3.1.3.4 Historic Outfall Drainage Ditch

The portion of the ODD now known as the Historic ODD runs from the southern edge of the ELCDDA southward to the northern edge of the runway overrun (see Figure 3.1-1). Concrete building materials are visible along portions of the Historic ODD and were apparently used as riprap. Much of the Historic ODD has filled with sediments throughout the years, although the channel is still visible.

The Army collected two sediment samples in the Historic ODD during the 1995 investigation. Metals, including cadmium, cobalt, lead, and manganese, were present in the samples. The Army investigated the Historic ODD in December 2001. During the investigation, the Army collected soil and sediment samples at 250-foot intervals along the

Historic ODD, in order to characterize the extent of contamination. Some metals and pesticides were detected.

The FFS COPCs for the Historic ODD are listed in Table 3.1-1.

3.1.3.5 Outfall Drainage Ditch

The ODD is located on the coastal salt marsh side of, and parallel to, the east perimeter levee (See Figure 3.1-1). The ditch receives stormwater runoff and drainage from the Inboard Area sites and PDD. Historically, the ODD ran from the northernmost portion of the Main Airfield Parcel south to the Historic ODD, which emptied into the Boat Dock channel. The ODD receives water from the airfield stormwater collection system. The water is discharged to the ODD from the pump house area. When the south runway extension was constructed in 1953, the northern portion of the ditch was rerouted to San Pablo Bay at a point near the northern edge of the ELCDDA. Currently, the ODD runs from the northernmost portion of the Main Airfield Parcel to the northern edge of the ELCDDA. From this point, the ditch makes a 90-degree turn and runs to its discharge point in San Pablo Bay. The ODD is 3 to 4 feet deep and 6 to 10 feet wide.

The ODD was investigated by the Army in 1990 and 1991 (ESI, 1993); 1994 (USACE, 1994); 1995 (WCFS, 1996); 1997 (IT, 1999a); 1998 and 1999 (IT, 1999b); and January 2002 (USACE, 2001b). During the 1990, 1991, 1994, 1995, 1997, 1998, and 1999 investigations, sediment samples were collected and analyzed for various constituents in the ODD. TPH, metals, PCBs, and pesticides were detected in sediment samples collected from the ODD. Specifically, in 1994, metals, total recoverable petroleum hydrocarbon (TRPH), and TPH-d were detected above baseline concentrations in the Building 41 pump station outfall area.

In January 2002, the Army collected sediment samples from the ODD. The objectives of the sampling were: (1) to investigate the extent of chemicals detected in the previous investigations at the outfalls; (2) to address the downstream extent of contamination from the outfalls; and (3) to characterize the portion of the ODD upstream of the outfalls sufficiently to determine the appropriate remedy. Sampling at the ODD resulted in detections of metals, TPH, and pesticides.

The FFS COPCs for the ODD are listed in Table 3.1-1.

3.1.3.6 Boat Dock

For purposes of this draft ROD/RAP, the Boat Dock was divided into two areas, the Nonchannel Area and the Channel Area.

Nonchannel Area

The Boat Dock is located at the southeast corner of the HAAF Main Airfield Parcel in the coastal salt marsh (see Figure 3.1-1). Before 1965, when the base was active, the launch was maintained at the dock for rescue in the event of an emergency in San Pablo Bay. The Boat Dock had electrical power supplied by two transformers and one or more small, enclosed structures. A gasoline-powered winch was used to lower the launch down a steel track into a dredged channel and turning basin. The facility has since been abandoned and only piers and the main platforms remain.

The Nonchannel Area was investigated by the Army in 1997 (IT, 1999a), 1998 (IT, 1999c), and 1999 (FW, 2000). During these investigations, soil samples were collected and analyzed for various constituents in the Nonchannel Area. PCBs were detected in soil samples collected at the transformer pad area. Metals and pesticides were present in soil samples collected around and beneath the deck structures. PAHs were also detected, but are likely attributable to the creosote in pier pilings.

Investigations during the Comprehensive RI (IT, 1999a) and the remedial design investigation (FW, 2000) characterized the contamination present at the Nonchannel Area. An interim removal action was conducted in 1998 at the transformer pad in the Nonchannel Area, where one or more soil samples contained PCBs at concentrations at or above guidance levels (IT, 1997c). The interim removal action involved the removal of approximately 24 cubic yards of affected soil at the transformer pad, with offsite disposal of the excavated soil and the removal of the transformer pad (IT, 1999c). After excavation, five confirmation soil samples were collected to ensure the achievement of interim removal action guidance levels (concentrations of specific contaminants used to establish excavation limits during interim removal actions). PCBs were not detected in the confirmation samples. After completion of confirmation sampling, soil from a borrow area in the Main Airfield was used to backfill the excavation. Table C1-1.1 of the Comprehensive RI (IT, 1999a) presented the analytical results for the borrow area soil. All chemical concentrations reported for the borrow material are less than the action goals for the coastal salt marsh.

The FFS COPCs for the Boat Dock Nonchannel Area are listed in Table 3.1-1.

Channel Area

The Channel Area extends west from San Pablo Bay to the launch ramp at the Boat Dock, where it bends and continues to extend south to adjacent agricultural land. This portion of the Channel Area received agricultural runoff and stormwater from the Airfield. Aerial photographs suggest that maintenance of the channel and turnaround areas for the dock was discontinued during the 1960s. Because maintenance has stopped, the original contours of the channel leading from the dock to the bay have changed dramatically, as a result of the deposits of silt from San Pablo Bay. Historical photos indicate that the original channel was more than 100 feet wide. The historical depth of the channel is unknown. The turnaround area could accommodate boats up to 40 feet long. Currently, the existing channel is approximately 15 feet wide. The turnaround area is virtually nonexistent and is covered with a dense growth of pickleweed. The channel in this area receives some runoff from the Las Gallinas Valley Sanitary District gray water spraying operation.

The Channel Area was investigated by the Army in 1999 (FW, 2000) and December 2001 (USACE, 2002b). A single sediment sample was collected from the Boat Dock channel surface. The sample contained pesticides, herbicides, PAHs, TPH, VOCs, and metals. In December 2001, the Army collected additional sediment samples from the Channel Area. The objective of the sampling was to ascertain the extent of contamination found at the Boat Dock sufficiently to determine the appropriate remedy. Sampling at the Channel Area indicated the presence of metals.

The FFS COPCs for the Boat Dock Channel Area are listed in Table 3.1-1.

3.1.3.7 Area 14

Area 14 was a barren (or possibly inundated) area identified in a 1941 aerial photograph. The area is located north of the Boat Dock, just east of the east levee (see Figure 3.1-1). This site was identified in the Archive Search Report (USACE, 2003) as ASR Site #14.

The Army investigated area 14 in December 2001 and January 2002. During the investigation, the Army collected soil and sediment samples from Area 14 on a 100-foot grid. The objective of the sampling was to characterize the portions of Area 14 that were not covered with the construction of the runway overrun. Sampling at Area 14 resulted in detections of metals, pesticides, TPH, and PAHs. No debris or rubble, other than the rock and gravel used to support the runway extension and the road, was encountered.

The FFS COPCs for Area 14 are listed in Table 3.1-1.

3.1.3.8 Former Sewage Treatment Plant Outfall

The discharge point of the FSTP is located southeast of the Pump Station Area in the coastal salt marsh. Until 1986, treated effluent water was discharged into San Pablo Bay via the FSTP Outfall Pipe. Now abandoned, this outfall pipe extends approximately 450 feet eastward from the levee into the coastal salt marsh (see Figure 3.1-1). The terminus of the outfall pipeline is near the edge of the vegetated portion of the coastal salt marsh. There is a small outfall basin, and a narrow channel that conveyed the discharge from the pipe across the remainder of the marsh and the unvegetated intertidal mudflats to the open water of San Pablo Bay.

The FSTP Outfall was investigated by the Army in 1991 (ESI, 1993); 1995 (WCFS, 1996); and December 2001 and January 2002 (USACE, 2002b). A sediment sample was collected in the 1991 investigation 50 feet beyond the terminus of the outfall pipe in the channel to assess the contamination of sediments in San Pablo Bay. The sediment sample results showed no elevated concentrations of metals when compared with local background sediment concentrations estimated by ESI. However, elevated levels of mercury were detected at the surface. A sediment sample was collected during the 1995 investigation from the outfall basin. The sediment sample contained metals (including mercury), SVOCs, and PAHs.

In December 2001 and January 2002, the Army collected additional soil and sediment samples from the FSTP Outfall. The objective of the sampling was to investigate the extent of mercury detected in a previous investigation sufficiently to determine the appropriate remedy.

The FFS COPCs for the FSTP Outfall are listed in Table 3.1-1.

TABLE 3.1-1
Coastal Salt Marsh Site Specific COPCs

Contaminants	Action Goals	Antenna Debris Disposal Area	East Levee Construction Debris Disposal Area	High Marsh Nonchannel Cut	High Marsh Proposed Channel Cut	Historic Outfall Drainage Ditch	Outfall Drainage Ditch	Boat Dock Nonchannel Area	Boat Dock Channel	Area 14	FSTP Outfall
Metals											
Arsenic	23										
Barium	188	X							X		
Beryllium	1.68	X		X	X		X				
Boron	71.6										
Cadmium	1.8	X			X	X	X				
Chromium	149										
Cobalt	26.7	X		X	X	X	X			X	
Copper	88.7	X		X					X		X
Lead	46.7	X	X	X	X	X	X	X	X		X
Manganese	1260	X		X		X	X				
Mercury	0.58										X
Nickel	132	X		X	X	X	X				
Silver	1	X		X			X				X
Vanadium	136										
Zinc	169	X	X	X		X	X	X	X		X
Semivolatile Organic Compounds (including PAHs)											
PAHs, total	4.022							X		X	
Pentachlorophenol	0.017						X	X			
Phenol	0.13						X				
Petroleum Hydrocarbons											
TPH-diesel	144	X	X		X		X				
TPH-gasoline/TPH-JP-4	12									X	

TABLE 3.1-1
Coastal Salt Marsh Site Specific COPCs

Contaminants	Action Goals	Antenna Debris Disposal Area	East Levee Construction Debris Disposal Area	High Marsh Nonchannel Cut	High Marsh Proposed Channel Cut	Historic Outfall Drainage Ditch	Outfall Drainage Ditch	Boat Dock Nonchannel Area	Boat Dock Channel	Area 14	FSTP Outfall
Pesticides/PCBs/Dioxins											
BHCs, total	0.0048	X						X			
Chlordanes, total	0.00479	X		X	X		X	X			X
DDTs, total (2)	0.03	X	X	X	X		X	X		X	X
Dichlorprop	0.14					X					
Endrin aldehyde	0.0064	X		X	X		X				
Heptachlor	0.0088	X									
Heptachlor epoxide	0.0088	X						X			
MCPA	7.9	X									
MCPP	3.0	X									
Methoxychlor	0.09							X			
PCBs, total	0.09	X	X	X			X				
Total TCDD TEQ	0.000021		X								

FSTP = Former Sewage Treatment Plant

X = Contaminant identified as COC at site.

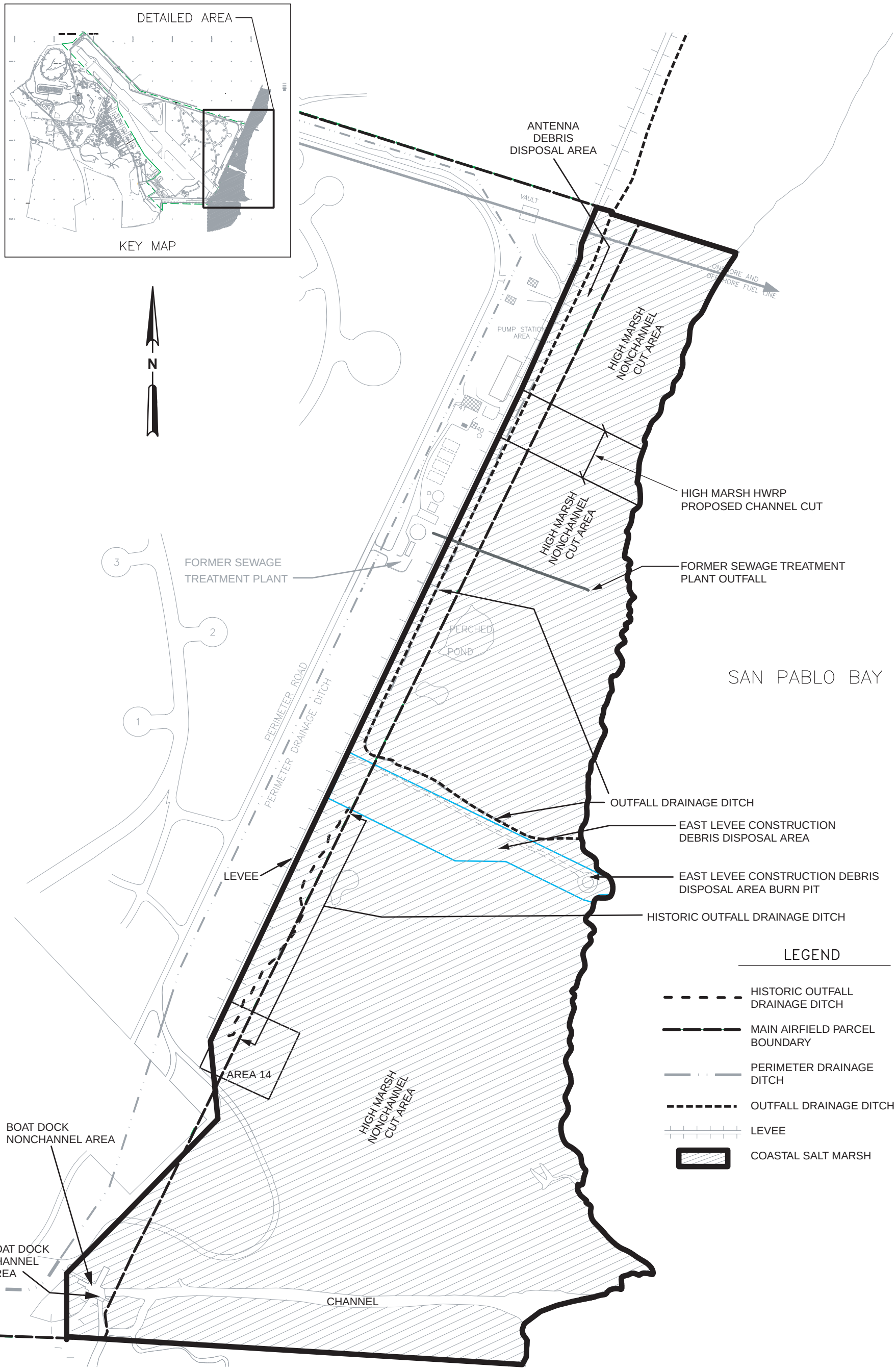

FIGURE 3.1-1
SITE LOCATION MAP
COASTAL SALT MARSH
HAMILTON ARMY AIRFIELD

ROD/RAP

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SECTION 3.2

Overview of Risk Assessment and Action Goals

This section provides an overview of the risk assessment and the process used to establish action goals for the coastal salt marsh sites. Contamination at most of the sites was first evaluated in the risk assessment to make an initial determination of the COPCs, and the levels that pose a risk. The sites were further evaluated in the FFS based on action goals and additional data that had been collected after completion of the risk assessment. The FFS determined which sites would require further action. The following text describes the process used to arrive at these decisions.

3.2.1 Risk Assessment Overview

The Army prepared a baseline risk assessment for coastal salt marsh sites, including the High Marsh, ELCDDA, Boat Dock, ODD, and Antenna Debris Disposal Area (USACE, 2001). Samples collected from the Historic ODD and FSTP Outfall were included in the evaluation of the High Marsh. The overall objective of the risk assessment was to assess the potential for adverse impacts to human health and the environment resulting from the exposure of receptors to contaminants in soil and sediment associated with historical activities in the coastal salt marsh (USACE, 2001).

Current and future land use scenarios were used to assess potential human health risks associated with the coastal salt marsh sites. Recreational use of the coastal salt marsh (or estuary) was the only exposure scenario considered for current and future land at the sites because no significant change in the habitat is anticipated. During the HHERA, the receptors considered for each coastal salt marsh site included marsh recreational users and consumers of recreationally caught fish and shellfish. Given the high certainty associated with future habitat at the coastal salt marsh sites, the ecological risk assessment considered only estuarine biota to characterize risk at these sites.

The HHERA evaluated numerous human health and ecological COPCs and identified COCs. COPCs are chemicals that are identified and evaluated during the risk assessment process because they are specifically related to activities conducted at the site and have the potential to adversely affect human health and/or the environment. COCs are COPCs that were evaluated during the risk assessment and determined to pose unacceptable risk to human health and/or the environment. The COCs identified during the HHERA are presented in Appendix B of the FFS (CH2M HILL, 2003).

3.2.2 Action Goals

The objective of this ROD/RAP is to remove contaminated soils to the maximum extent practical to protect public health and to maintain its wetland function. If any contaminants remaining above action goals are still a concern within the excavated areas, the site will be backfilled to prevent direct exposure to these contaminants. To achieve this objective, action

goals protective of wetland receptors (including sensitive species) are established in this document. The action goals for the coastal salt marsh sites are provided in Table 3.2-1. Numerical values for each action goal are set for various contaminants found at the coastal salt marsh sites. However, action goals apply only to specific contaminants at each site, because the COPCs differ between sites. Table 3.2-1 shows the specific COPCs at each site and the corresponding action goal. The following text describes the process for selecting specific COPCs at the coastal salt marsh sites and the sources for the action goals.

Action goals for the coastal salt marsh sites were established by evaluating the results of the risk assessment along with data collected at the sites following completion of the risk assessment. This process was completed during the FFS and is summarized below.

COPCs for each site were established during the FFS (CH2M HILL, 2003). The FFS considered data evaluated in the risk assessment in addition to data that the Army collected in 2001/2002 following the completion of the risk assessment. The FFS used a statistical approach to calculate the 95th UCL for each contaminant detected at a site. If the 95th UCL for a contaminant at a site was greater than the action goal, then the contaminant was determined to be a FFS COPC. The maximum detections at a site were used for comparison if fewer than 5 samples were collected at a site. This process differs somewhat from the process used for the Inboard Area sites. For the coastal salt marsh sites, each contaminant detected was compared to the action goals without first determining whether the contaminant posed a risk to human health or the environment. The approach is described in more detail in the FFS (CH2M HILL, 2003) and was applied only to sites in the coastal salt marsh where additional sampling had been conducted following the completion of the risk assessment. This approach was used because the risk assessment could not consider data that had been collected following its completion.

Using the approach described, the FFS identified FFS COPCs as contaminants that should be compared to action goals at each coastal salt marsh site (see Table 3.1-1). Detections of these FFS COPCs above action goals are evaluated for remedial actions in this ROD/RAP.

The action goals selected in this ROD/RAP are based on a number of references (see Table 3.2-1). For metals, the primary references are published site-specific ambient concentrations. For SVOCs, including PAHs, the references are the ER-L and values from the risk assessment. Petroleum hydrocarbon action goals are based on the Presidio of San Francisco Saltwater Ecological Protective Zone. Action goals for PCBs and dioxins are derived from the risk assessment. The DDT values were developed in the FFS (CH2M HILL, 2003).

TABLE 3.2-1
Action Goals – Coastal Salt Marsh Sites
Hamilton Main Airfield Parcel ROD/RAP

Contaminant	Action Goals (ppm)[a]	Source[b]
Metals		
Arsenic	23	Site-Specific Sediment Ambient
Barium	188	Site-Specific Sediment Ambient
Beryllium	1.68	Site-Specific Sediment Ambient
Boron	71.6	Site-Specific Sediment Ambient
Cadmium	1.8	Site-Specific Sediment Ambient
Chromium	149	Site-Specific Sediment Ambient
Cobalt	26.7	Site-Specific Sediment Ambient
Copper	88.7	Site-Specific Sediment Ambient
Lead	46.7	ER-L
Manganese	1260	Site-Specific Sediment Ambient
Mercury	0.58	Site-Specific Sediment Ambient
Nickel	132	Site-Specific Sediment Ambient
Silver	1	ER-L
Vanadium	136	Site-Specific Sediment Ambient
Zinc	169	Site-Specific Sediment Ambient
Semivolatile Organic Compounds (including PAHs)		
PAHs, total	4.022	ER-L
Pentachlorophenol	0.017	HHERA—Marine Invertebrate
Phenol	0.13	HHERA—Marine Invertebrate
Petroleum Hydrocarbons		
TPH-dl/TPH-motor oil[c]	144	Presidio—Saltwater Ecological Protective Zone
TPH-g/JP-4	12	Presidio—Saltwater Ecological Protective Zone
Pesticides/Herbicides/PCBs/Dioxins		
BHCs, total	0.0048	Lindane AET (polychaete)
Chlordanes, total	0.00479	PEL
DDTs, total[d]	0.03	RART—California clapper rail
Dichlorprop	0.14	HHERA—California clapper rail
Endrin Aldehyde	0.0064[e]	HHERA—Marine Invertebrate
Heptachlor	0.0088[f]	HHERA—Marine Invertebrate
Heptachlor epoxide	0.0088	HHERA—Marine Invertebrate
MCPA	7.9[g]	HHERA—Marine Invertebrate
MCPP	3.0	PQL

TABLE 3.2-1
Action Goals – Coastal Salt Marsh Sites
Hamilton Main Airfield Parcel ROD/RAP

Contaminant	Action Goals (ppm)[a]	Source[b]
Methoxychlor	0.09	HHERA—Marine Invertebrate
PCBs, total	0.09	HHERA—California clapper rail
Dioxins (Total TCDD TEQ)[h]	0.000021	EPA

NOTE: This is a comprehensive list of action goals. All action goals do not apply at each site.

TCDD = tetrachlorodibenzo-p-dioxin
TEQ = toxicity equivalence

[a] If contamination above the action goals is found in the coastal salt marsh beyond those areas already identified as requiring remediation, the Army and State will determine whether additional or continued excavation is warranted by considering the potential risk to public health and the environment from the residual contaminants and the resulting habitat destruction.

[b] The sources of the action goals are:

- **Metals:** Background concentrations for metals were primarily used as action goals unless the background concentrations were less than available risk-based numbers. Site-specific ambient levels from Appendix A - U.S. Army, 2001, *Final Human Health and Ecological Risk Assessment*; Effects Range-Lows (ER-Ls) from Long, E.R, D.D. MacDonald, S.L. Smith, and F.D Calder, 1995, "Incidence of Adverse Biological Effects within Ranges of Chemical Concentrations in Marine and Estuarine Sediments," *Environmental Management,* 19:81-97; *San Francisco Bay RWQCB Staff Report: Ambient Concentrations of Toxic Chemicals in San Francisco Bay Sediments*, May 1998.
- **Petroleum hydrocarbons:** *Report of Petroleum Hydrocarbon Bioassay and Point-of-Compliance Concentration Determinations; Saltwater Ecological Protection Zone; Presidio of San Francisco, California,* Dated December 1997. The numbers in this report were developed for a similar site with similar ecological receptors.
- **PAHs:** ER-Ls from Long, E.R, D.D. MacDonald, S.L. Smith, and F.D. Calder, 1995, "Incidence of Adverse Biological Effects within Ranges of Chemical Concentrations in Marine and Estuarine Sediments," Environmental Management, 19:81-97. The ER-Ls were used as action goals because the ER-Ls are accepted as being protective of ecological receptors.
- **SVOCs:** US Army, 2001, *Final Human Health and Ecological Risk Assessment.*
- **Pesticides, Herbicides, PCBs, and Dioxins:** Table 5-1 from the US Army, 2001, *Final Human Health and Ecological Risk Assessment* (marine invertebrate–amphipod and California clapper rail); practical quantitation limits (PQLs) from previous sampling events were used when no other ecologically-based numbers were available with achievable detection limits; U.S. EPA, 1993a, *Interim Report on Data and Methods for Assessment of 2,3,7,8-Tetrachlorodibenzo-p-dioxin Risks to Aquatic Life and Associated Wildlife*. (EPA/600/R-93/-055); for lindane and total chlordanes, Screening Quick Reference Tables (SQuiRTs), NOAA, updated September 1999 were used as the best available ecological number when no other references were available. The DDT values were developed in the Coastal Salt Marsh Focused Feasibility Study (CH2M HILL, 2003).

[c] The action goal for TPH diesel/TPH motor oil is also used as the action goal for UHE (unknown hydrocarbons extractable).

[d] The total DDT concentration in the Coastal Salt Marsh Area or Inboard Area shall not exceed 1.0 ppm. Areas with total DDT concentrations greater than 1.0 ppm shall be excavated and disposed of offsite.

[e] The goal for Endrin Ketone is used as a surrogate for Endrin Aldehyde.

[f] The goal for Heptachlor Epoxide is used as a surrogate for Heptachlor.

[g] The goal for 2,4,D is used as a surrogate for MCPA.

[h] Dioxin is only considered a COC at the ELCDDA Burn Pit.

SECTION 3.3

Remedial Action Objectives

RAOs describe the goals that proposed remedial actions are expected to accomplish, such as protecting human health and the environment by eliminating COPCs above action goals and/or eliminating exposures to human and ecological receptors. RAOs, can differ with each specific site, depending on site conditions, exposure scenarios, and receptors. The FFS developed specific RAOs, which are used in the ROD/RAP to guide the development of alternatives for each coastal salt marsh site.

This section describes the development of RAOs, identifies RAOs for the coastal salt marsh sites, and presents how the different agencies (DTSC, RWQCB, and Army) identify and implement their respective laws and standards for selection of remedies.

3.3.1 Definition of Remedial Action Objectives

RAOs were developed in the FFS to provide a basis for evaluating the ability of the remedial alternatives to comply with ARARs, and to protect human health and the environment in the coastal salt marsh. The RAOs are quantitative and qualitative expressions of goals for protecting human health and the environment. They are expressed in terms of contaminants and media of interest, possible receptors, and associated exposure pathways.

Contaminants considered in establishing RAOs for the coastal salt marsh sites were developed based on the FFS COPCs (CH2M HILL, 2003b). The conceptual model used in the FFS to establish RAOs is the same as the model used in the *Human Health and Ecological Risk Assessment* (USACE, 2001) for the coastal salt marsh (see Section 2.1.1). Current and future land use scenarios for the coastal salt marsh include recreational use (e.g., recreational fishing and shellfish collection). Because of the high certainty of the future ecological habitat of the marsh, the only ecological receptors expected to be present in the future are estuarine receptors.

3.3.2 Identification of Remedial Action Objectives

Protection of human health and the environment in the coastal salt marsh can be accomplished by reducing concentrations of FFS COPCs that are greater than action goals or by controlling or eliminating exposure of receptors to FFS COPCs that are greater than remediation goals.

The RAOs for the coastal salt marsh sites are to prevent or mitigate the exposure of ecological and human receptors to soil/sediment containing concentrations of FFS COPCs that are greater than their respective action goals. Table 3.1-1 provides the action goals established for the coastal salt marsh sites.

3.3.3 Remedy Selection Requirements and Process

State and federal agencies operate under different laws and regulations when selecting remedies for protection of human health and the environment. The State operates under the California Health and Safety Code, while the Army operates under CERCLA. This section describes how the different agencies identify and implement their respective laws and standards for selection of the remedies contained in this ROD/RAP.

3.3.3.1 State Remedy Selection Requirements and Process

The selection of the remedy by DTSC and the RWQCB is based on their authority to approve RAPs as set forth in Section 25356.1 of the California Health and Safety Code. The statutory requirements governing selection of the remedy are also contained in Health and Safety Code, Section 25356.1.5. In summary, any remedy selected in a RAP must be based on, and be no less stringent than, requirements of the NCP, regulations and applicable requirements contained in Division 7 of the Water Code, regulations promulgated thereunder, resolutions issued by SWRCB and the San Francisco Bay Regional Water Quality Control Plan, and applicable provisions of Chapter 6.8 of Division 20 of the Health and Safety Code.

DTSC and the RWQCB generally follow the model used by the NCP in developing information necessary for selecting a remedy. However, the decision selecting the final remedial goals and the remedy to be implemented ultimately constitute an independent exercise of discretion by DTSC and the RWQCB, subject to applicable state laws. Approval of a RAP by DTSC and the RWQCB under Health and Safety Code, Section 25356.1, must consider the following factors:

- Health and safety risks posed by conditions at the site, including scientific data and reports that may have a relationship to the site
- Effect of contamination or pollution levels on present, future, and probable beneficial uses of contaminated, polluted, or threatened resources
- Effect of alternative remedial action measures on the reasonable availability of groundwater resources for present, future, and probable beneficial uses
- Site-specific characteristics, including the potential for offsite migration of hazardous substances, the surface or subsurface soil, and the hydrogeologic conditions, as well as pre-existing background contamination levels
- Cost-effectiveness of alternative remedial action measures
- Potential environmental impacts of alternative remedial action measures

DTSC and the RWQCB have determined that the action goals selected in this ROD/RAP meet the applicable laws and requirements of the State. DTSC and the RWQCB have also determined that the remedies selected in this ROD/RAP are in compliance with the requirements of the California Health and Safety Code. In selecting the remedy, DTSC and the RWQCB have considered the available information for HAAF.

3.3.3.2. Army Remedy Selection Requirements and Process

Pursuant to Section 121(d)(1) of CERCLA, remedial actions must attain a degree of cleanup that protects both human health and the environment, and they must comply with ARARs. Additionally, remedial actions that leave hazardous substances, pollutants, or contaminants onsite must meet standards, requirements, limitations, or criteria that are applicable or relevant and appropriate. Although HAAF is not on the NPL of CERCLA sites, the remedial investigations and remedial actions conducted at the site are required to be consistent with the NCP. As such, this ARARs analysis was developed in a manner consistent with guidance and policy of CERCLA, as amended by SARA. The intent of this ARARs analysis is to identify those federal and more-stringent state regulations that must be considered when evaluating a remedial alternative.

Federal ARARs include requirements under any federal environmental law, while state ARARs include promulgated requirements under state environmental laws that are more stringent than federal ARARs. To be an ARAR, the requirement must meet either of these following requirements (EPA, 1988a):

- **Applicable** requirements are those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under federal or state law that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site.

Or:

- **Relevant and appropriate** requirements are those cleanup standards, standards of control, or other substantive environmental requirements, criteria, or limitations promulgated under federal or state law that, while not specifically "applicable" to a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site, address problems or situations sufficiently similar to those encountered at the site that their use is well-suited to the particular site. A requirement must be both relevant and appropriate to be designated an ARAR.

ARARs are identified on a site-specific basis from information about site-specific chemicals, specific actions that are being considered, and specific features of the site location. For the Army to consider a state requirement to be an ARAR under CERCLA and the NCP, the requirement must be:

- Legally enforceable
- Generally applicable to all circumstances covered by the requirement, not just Superfund sites
- More stringent than the federal regulation

Substantive requirements pertain directly to actions or conditions in the environment. They include restrictions for exposure to certain types of hazardous substances (e.g., chemical-specific ARARs), restrictions on activities in certain locations (e.g., location specific ARARs), and technology-based requirements for actions (e.g., action specific ARARs). For any onsite remedial activity, the administrative portions of the environmental standards criteria or limitations are not ARARs because CERCLA Section

121(e) exempts these actions from permitting requirements. This permit exemption applies to all administrative requirements, whether or not they are styled as permits. Administrative requirements include the approval of or consultation with administrative bodies, issuance of permits, documentation, reporting, recordkeeping, and enforcement.

The three categories of ARARs are described as:

- Chemical-specific ARARs are numerical values that represent a health-based or risk-based standard, or the results of methodologies which, when applied to site-specific conditions, are used to establish the acceptable amount or concentration of a chemical that may be found in, or discharged to, the ambient environment.
- Location-specific ARARs are restrictions on the conduct of activities solely because the site occurs in certain environmentally sensitive areas. Examples include wetlands, floodplains, endangered species habitat, or historically significant resources.
- Action-specific ARARs are technology-based or activity-based requirements or limitations on actions taken with respect to hazardous wastes.

A requirement may not meet the definition of an ARAR as defined above, but still may be useful in determining whether to take action at a site or to what degree action is necessary. This can be particularly true when there are no ARARs for a site, action, or contaminant. Such requirements are called TBC criteria. TBC criteria are nonpromulgated advisories or guidance issued by federal or state government that are not legally binding, but may provide useful information or recommended procedures for remedial action. Although TBCs do not have the status of ARARs, they are considered along with ARARs to establish the required level of cleanup for protection of human health or the environment.

Section 121 (d)(4) of CERCLA provides six specific circumstances in which potential ARARs may be waived. These waivers apply only to meeting ARARs with respect to remedial actions onsite. Other statutory requirements, such as remedies protective of human health and the environment, cannot be waived. Currently, it is not envisioned that any waivers will be requested for the coastal salt marsh sites; however, the circumstances in which potential ARARs could be waived are summarized below for the sake of completeness:

- Interim Measures: The remedial action selected is only part of a total remedial action that will attain such a level or standard of control when completed [Section 121 (d)(4)(A)].
- Greater Risk to Human Health and the Environment: Compliance with such a requirement at the facility will result in greater risk to human health and the environment than alternative options [Section 121 (d)(4)(B)].
- Technical Impracticability: Compliance with such a requirement is technically impractical from an engineering perspective [Section 121 (d)(4)(C)].
- Equivalent Standard of Performance: The remedial action selected will attain a standard of performance that is equivalent to that required under the otherwise applicable standard, requirement, criteria, or limitation, through use of another method or approach [Section 121 (d)(4)(D)].

- Inconsistent Application of State Requirements: With respect to a state standard, requirement, criterion, or limitation, the state has not consistently applied the standard, requirement, criterion, or limitation in similar circumstances at other remedial actions [Section 121 (d)(4)(E)].
- Fund Balancing: The Hazardous Substance Response Fund (Fund) waiver may apply when the selection of a remedial action that attains such level or standard of control will not provide a balance between the need for protection of public health and welfare and the environment at the facility under consideration and the availability of amounts from the Fund to respond to other sites that present or may present a threat to public health or welfare or the environment, considering the relative immediacy of such threats [Section 121 (d)(4)(F)]. The Fund Balancing waiver does not apply because funding for Hamilton is provided by the BRAC Environmental Restoration Account.

The ARARs for this ROD/RAP were developed using the following guidelines and documents:

- *CERCLA Compliance with Other Laws Manual, Part I: Interim Final* (EPA, 1988b)
- *CERCLA Compliance with Other Laws Manual, Part II: Clean Air Act and Other Environmental Statutes and State Requirements* (EPA, 1989)
- *California State Water Resources Control Board ARARs Under CERCLA* (SWRCB, 1992)
- *Considering Wetlands at CERCLA Sites* (EPA, 1994)

3.3.3.3 Chemical-Specific ARARs and TBCs

Chemical-specific ARARs include those requirements that regulate the release to, or presence in, the environment of materials possessing certain chemical or physical characteristics or containing specified chemical compounds. These requirements generally set health- or risk-based concentration limits or discharge limitations for specific chemicals. When a specific chemical is subject to more than one discharge or exposure limit, the more stringent of the requirements is used. Potential chemical-specific ARARs were evaluated on the basis of contaminants and the media impacted. The potential requirements were reviewed and deemed not applicable, relevant, or appropriate to establishing cleanup goals. However, chemical-specific requirements may be applicable, relevant, or appropriate to actions to be taken at the site. Therefore, a discussion of chemical-specific ARARs that apply only to specific actions that may be taken to clean up the site is provided under action-specific ARARs.

Because there are no promulgated chemical-specific ARARs that can be applied as soil or sediment action goals, a variety of TBC criteria have been considered. The chemical-specific TBCs for the coastal salt marsh sites are presented in Table 3.3-1. The sources for the TBCs follow:

- ER-Ls from E. R. Long, D. D. MacDonald, S. L. Smith, and F. D. Calder, 1995, "Incidence of Adverse Biological Effects within Ranges of Chemical Concentrations in Marine and Estuarine Sediments," *Environmental Management*, 19: 81-97.
- Report of Petroleum Hydrocarbon Bioassay and Point-of-Compliance Concentration Determinations; Saltwater Ecological Protection Zone; Presidio of San Francisco, California, December 1997.

3.3.3.4 Location-Specific ARARs

Location-specific ARARs are those requirements that relate to the geographical position or physical condition of the site. These requirements may limit the type of remedial action that can be implemented or may impose additional constraints on some remedial alternatives. Potential location-specific ARARs for the site are summarized in Table 3.3-2. The major location-specific ARARs that could affect remedial actions in the coastal salt marsh are discussed in more detail below.

Clean Water Act (Section 404)

Section 404 of the CWA, 33 U.S.C. §1344, requires a permit for the discharge of dredged or fill material into waters of the United States. Activities associated with investigation activities that might trigger Section 404 requirements include placement of fill into wetlands following excavation and confirmation sampling and construction of temporary roads in the wetland area. Runoff of excavated materials into the wetlands may also occur. The *Guidelines for Specification of Disposal of Sites for Dredged or Fill Material* [40 CFR Part 230, Section 404(b)(1)] define requirements that limit the discharge of dredged or fill material into the aquatic environment or aquatic ecosystems. These guidelines specify consideration of activities that have less adverse impacts. They prohibit discharges that would result in exceedance of surface water quality standards, exceedance of toxic effluent standards, and jeopardization of threatened or endangered species. Actions that can be taken to minimize potential adverse impacts of the discharge on the aquatic ecosystem are specified in Subpart H of 40 CFR 230, and include:

- Confining the discharge's effects on aquatic biota
- Avoiding disruptions of periodic water inundation patterns
- Selection of disposal site and method of discharge
- Minimizing or preventing standing pools of water

In addition, under CWA, Section 401, every applicant for a federal permit or license for any activity that may result in a discharge to a water body, e.g., Section 404 Permit, must obtain State Water Quality Certification (Certification) that the proposed activity will comply with state water quality standards.

Executive Order on Protection of Wetlands

The Executive Order on Protection of Wetlands, Executive Order No. 11990, requires that federal agencies avoid, to the extent possible, adverse impacts associated with the destruction or loss of wetlands, and avoid support of new construction in wetlands if a practicable alternative exists. EPA's regulations to implement this Executive Order are set forth in 40 CFR §6.302(a). In addition, EPA has developed guidance entitled *Policy on Floodplains and Wetlands Assessments for CERCLA Actions* (EPA, 1985). Wetlands will be encountered and affected during field activities, and these requirements are applicable.

San Francisco Bay Water Quality Control Plan Basin Plan

Chapter 2 (page 2-6) of the Basin Plan provides a discussion of wetlands in San Francisco Bay and their beneficial uses. Waters of the State of California, as defined by the Porter-Cologne Act, are "any water, surface or underground, including saline waters, within the boundaries of the State." Wetlands water quality control is, therefore, clearly within the jurisdiction of the State and Regional Boards.

Chapter 4 (page 4-49) of the Basin Plan addresses wetlands protection and management and incorporates several state directives to protect wetlands. These directives include (1) the Governor's Executive Order W-59-93, which has a goal of ensuring "no overall net loss of wetlands," achieving a "long-term net gain in the quantity, quality and permanence of wetlands acreage and values;" (2) Senate Concurrent Resolution No. 28, which expresses the intent of the State legislature to preserve, restore, and enhance California's wetlands; and (3) California Water Code, Section 13142.5, which states that "Highest priority shall be given to improving or eliminating discharges that adversely affect…wetland, estuaries and other biologically sensitive sites." These directives are applicable because the remediation proposed in the coastal salt marsh will directly affect resources the State is responsible for protecting; and thus, temporal and potentially permanent impacts must be considered in the selection of the remedy and addressed in its implementation.

3.3.3.5 Action-Specific ARARs

California Toxics Rule

Under Section 303(c)(2)(B) of the CWA, states must adopt numeric criteria for the priority toxic pollutants listed under Section 307(a) if those pollutants could be reasonably expected to interfere with the designated uses of State's waters. In April 1991, California adopted numeric criteria for priority toxic pollutants in the State's Inland Surface Water Plans and Enclosed Bays and Estuaries Plans. In 1994, a California State court ordered California to rescind these water quality control plans (the Basin Plans remained in effect). California remained subject to the National Toxics Rule promulgated in 1992 for certain waters and pollutants.

In May 2000, EPA promulgated the California Toxics Rule to replace the criteria that were rescinded by the State court. The National Toxics Rule also remains in effect in California for certain water bodies and pollutants. The water quality criteria promulgated under the California Toxics Rule are considered relevant and appropriate to water bodies.

San Francisco Bay Water Quality Control Plan

The State of California, as authorized by EPA, established water quality objectives for the protection of groundwater and surface water under the Porter-Cologne Water Quality Control Act. These water quality objectives were established by the California RWQCB for each basin and are based on the beneficial use(s) of the waters. The Water Quality Control Plan (also known as the Basin Plan) for the San Francisco Bay establishes beneficial uses for groundwater and surface water, as well as water quality objectives (the "criteria" under the CWA) designed to protect those beneficial uses. The Basin Plan describes implementation plans and other control measures designed to ensure compliance with statewide plans and policies and provides comprehensive water quality planning (RWQCB, 1995).

The coastal salt marsh is a wetland area within San Pablo Bay. Table 2-10 of the Basin Plan lists and specifies beneficial uses for 34 significant wetland areas within the region, including those wetlands located in San Pablo Bay (RWQCB, 1995). The beneficial uses listed for San Pablo Bay wetland areas are as follows:

- Estuarine habitat
- Fish migration and spawning
- Ocean, commercial, and sport fishing

- Preservation of rare and endangered species
- Water contact and noncontact recreation
- Wildlife habitat

The narrative and numerical water quality objectives contained in the Basin Plan are considered applicable in order to protect the beneficial uses of the coastal salt marsh and San Pablo Bay, and are directly enforceable by the State under the Porter-Cologne Water Quality Control Act.

Hazardous Waste Characterization

The action-specific ARARs that affect soil and sediment characterization and disposal include the requirements for identification of hazardous waste found in Title 22 of the CCR, Division 4.5, Chapter 11. A waste is a hazardous waste under both RCRA and California law if it exhibits any of the characteristics of ignitability, corrosivity, reactivity, or toxicity identified in 22 CCR 66261.21, 66261.22(a)(1), 66261.22(a)(2), 66261.23, and 66261.24(a)(1), or if it is listed as a hazardous waste in Article 4 of Chapter 11. In addition, under the California RCRA-authorized program, wastes can be classified as California-only hazardous wastes if they exceed the STLC or the TTLC values contained in 22 CCR 66261.24(a)(2).

The numerical values presented in 22 CCR 66261.24 (a)(1) and (a)(2) are not considered action goals but are compared to contaminant concentrations in excavated materials to determine how the material should be managed. In other words, the TCLP, TTLC, and STLC criteria are not compared to in situ contaminant concentrations in soil or sediment, but rather are compared to the soil or sediment after it has been excavated (i.e., after the waste has been "generated"). If wastes generated at HAAF are characterized as hazardous waste, the regulations that govern the treatment, storage, and disposal of hazardous waste will be applicable. These requirements are found at Division 4.5 of Title 22 of the CCR.

If contaminant concentrations in excavated materials are less than the TCLP, TTLC, or STLC, but still contain contaminants that could cause degradation of surface or groundwater, these materials may be considered a designated waste. A designated waste is defined in Section 13173 of the California Water Code as a nonhazardous waste that consists of, or contains, pollutants that, under ambient environmental conditions at a waste management unit, could be released in concentrations exceeding applicable water quality objectives, or that could reasonably be expected to affect beneficial uses of the waters of the state, as contained in the appropriate state water quality control plan. The *Designated Level Methodology for Waste Classification and Cleanup Level Determination* (Central Valley RWQCB October 1986, Updated June 1989) provides a methodology for calculating levels for specific constituents of a waste that provides a site-specific indication of the water quality impairment potential of the waste. As a result, wastes that contain contaminants above these calculated levels would be characterized as designated wastes. Removal actions proposed at HAAF may include disposal of designated waste to an offsite landfill. Title 27 CCR 20210 requires that designated waste be discharged to Class I or Class II waste management units.

The action-specific ARARs for the coastal salt marsh sites are summarized in Table 3.3-3.

TABLE 3.3-1
Chemical-Specific TBC Criteria for Developing Action Goals

Contaminants	TBC Value (ppm)[b]
Metals	
Lead	46.7[a]
Silver	1.0
Semivolatile Organic Compounds (including PAHs)	
PAHs, total	4.022
Petroleum Hydrocarbons	
TPH-d/TPH-motor	144
TPH-g/JP-4	12
Pesticides/Dioxins and Furans	
Chlordanes, total[d]	0.00479
DDTs, total[c]	0.03
Dioxins (total TCDD TEQ)[d]	0.000021

[a] Effects range-low

[b] The sources of the action goals are:

- **Metals:** Background concentrations for metals were primarily used as action goals unless the background concentrations were less than available risk-based numbers. Site-specific ambient levels from Appendix A - U.S. Army, 2001, *Final Human Health and Ecological Risk Assessment*; Effects Range-Lows (ER-Ls) from Long, E.R, D.D. MacDonald, S.L. Smith, and F.D. Calder, 1995, "Incidence of Adverse Biological Effects within Ranges of Chemical Concentrations in Marine and Estuarine Sediments," *Environmental Management,* 19:81-97; *San Francisco Bay RWQCB Staff Report: Ambient Concentrations of Toxic Chemicals in San Francisco Bay Sediments*, May 1998.
- **Petroleum hydrocarbons:** *Report of Petroleum Hydrocarbon Bioassay and Point-of-Compliance Concentration Determinations; Saltwater Ecological Protection Zone; Presidio of San Francisco, California,* Dated December 1997. The numbers in this report were developed for a similar site with similar ecological receptors.
- **PAHs:** ER-Ls from Long, E.R, D.D. MacDonald, S.L. Smith, and F.D. Calder, 1995, "Incidence of Adverse Biological Effects within Ranges of Chemical Concentrations in Marine and Estuarine Sediments," Environmental Management, 19:81-97. The ER-Ls were used as action goals because the ER-Ls are accepted as being protective of ecological receptors.
- **Pesticides:** The DDT values were developed in the Coastal Salt Marsh Focused Feasibility Study (CH2M HILL, 2003).

[c] The total DDT concentration in the Inboard Area shall not exceed 1.0 ppm. Areas with total DDT concentrations greater than 1.0 ppm shall be excavated and disposed of offsite.

[d] **Pesticides, Herbicides, PCBs, and Dioxins:** Table 5-1 from the US Army, 2001*, Final Human Health and Ecological Risk Assessmen*t (marine invertebrate—amphipod and California clapper rail); practical quantitation limits (PQLs) from previous sampling events were used when no other ecologically-based numbers were available with achievable detection limits; U.S. EPA, 1993a, *Interim Report on Data and Methods for Assessment of 2,3,7,8-Tetrachlorodibenzo-p-dioxin Risks to Aquatic Life and Associated Wildlife*. (EPA/600/R-93/-055); for lindane and total chlordane, Screening Quick Reference Tables (SquiRTs), NOAA, updated September 1999 were used as the best available ecological number when no other references were available.

RART = Regulatory Agencies and Resources Trustees

TCDD = tetrachlorodibenzo-p-dioxin

TEQ = toxicity equivalence

TABLE 3.3-2
Location-Specific ARARs for the Coastal Salt Marsh Sites

Source	Citation	ARAR Status	Description of ARARs
California Toxics Rule	40 CFR 131.38	Relevant and Appropriate	Contains criteria for priority toxic pollutants in the State of California for inland surface waters and enclosed bays and estuaries, except in those waters subject to objectives in SFRWQCB's 1986 Basin Plan.
California Endangered Species Act	Title 14, CCR 670.1, 670.2, and 670.5	Applicable	Contains standards for the identification and protection of listed or proposed threatened or endangered plants or animals.
Federal Endangered Species Act	50 CFR 402	Applicable	Contains standards for the identification and protection of current or possible future-listed threatened or endangered plants or animals. Section 7 requires federal agencies to consult the U.S. Fish and Wildlife Service to ensure that actions do not jeopardize listed species or adversely modify their critical habitat. Section 9 prohibits taking of endangered species, while Section 10 permits incidental takes.
Federal Clean Water Act	40 CFR 230.3, Section 404—Definition of Wetlands	Applicable	Authorized the USACE to delineate wetlands.
	40 CFR 230.10(a) to 230.10(c)	Applicable	Restrictions on Discharge: If there is a practicable alternative that would have a lesser impact on the wetlands, fill materials should not be discharged at the wetland. Any discharge that occurs should not cause a violation of a state water quality objective or a significant degradation of water quality.
	USACE, Public Notice 92-7: Interim Testing Procedures for Evaluating Dredged Material Disposed of in San Francisco Bay	Relevant and Appropriate	Reassures that all wetland creation, uplands disposal, or dredging projects complete certain notifications and listings.
	Section 401, 33 U.S.C. 1341	Applicable	State Water Quality Certification—wetland destruction, alteration would require a 404 permit and this certification assures that the proposed activity will comply with state water quality standards.
Coastal Zone Management Act	16 USC 1456	Relevant and Appropriate	Establishes the authority of the BCDC to regulate construction and other activities within 100 feet inland from highest tidal action.
Rivers and Harbors Act	33 CFR 323.1, Parts 320, 325, and 328	Relevant and Appropriate	Gives the USACE permitting authority over the discharge of dredged materials into the waters of the United States. In addition, the USACE must permit any work within historically navigable waters, including behind levees.

TABLE 3.3-2
Location-Specific ARARs for the Coastal Salt Marsh Sites

Source	Citation	ARAR Status	Description of ARARs
California Fish and Game Code	Section 1900—California Native Plant Protection Act Sections 3503.5, 3511, 4700, and 5050	Applicable	Contains standards for the identification and protection of plants by the act. Identifies and protects certain birds, mammals, reptiles, and amphibians.
California Fish and Game Code	Section 2080	Relevant and Appropriate	Action must be taken to conserve native plants. There can be no releases and/or actions that would have a deleterious effect on species or habitat. This section prohibits the taking, importation, or sale of any endangered or threatened species.
California Fish and Game Code	Section 2090 – 2096	TBC	These code sections comprise Article 4 of Chapter 1.5 of the California Endangered Species Act. These sections make provisions concerning Department coordination and consultation with the state and federal agencies and with project applicants.
California Fish and Game Code	Section 5650 and 5652	Relevant and Appropriate	It is unlawful to deposit in, permit to pass into, or place where it can pass into the waters of the state, any material listed in the code. Actions must be taken if toxic materials are placed where they can enter waters of the state. There can be no releases that would have a deleterious effect on species or habitat.
Fish and Game Code Addenda	Fish and Game Commission Wetlands Policy (adopted 1987)	TBC	Actions must be taken to ensure that “no net loss” of wetlands acreage or habitat value occurs. Actions must be taken to restore and enhance California’s wetland acreage and habitat value.

TABLE 3.3-3
Action-Specific ARARs for the Coastal Salt Marsh Sites

Source	Standard, Requirement, Criterion, or Limitation	ARAR Status	Description of ARARs
Federal			
Federal Clean Water Act	40 CFR 122—EPA Administered Permit Programs: The National Pollution Discharge Elimination System; 40 CFR 122.26; 40 CFR 122.41(d); 40 CFR 122.41(e); 40 CFR 122.44(d)	Relevant and Appropriate	Requirements to ensure storm water discharges from remedial action activities do not contribute to a violation of surface water quality standards. All reasonable steps must be taken to minimize or prevent discharges which have a reasonable likelihood of causing adverse impacts on surface water quality (40 CFR 122.41[d]). Discharges into surface water must achieve federal and state water quality standards (40 CFR 122.44[d]).
State of California Hazardous Waste			
California Hazardous Waste Control Law	Title 22, Division 4.5 (Environmental Health Standards for Management of Hazardous Waste), Chapter 11 (Identification and Listing of Hazardous Waste); 22 CCR 66261.1 through 22 CCR 66261.126	Relevant and Appropriate[a]	Defines hazardous waste and includes procedures for identifying hazardous waste.
California Hazardous Waste Control Law	Title 22, Division 4.5 (Environmental Health Standards for Management of Hazardous Waste), Chapter 12 (Standards Applicable to Generators of Hazardous Waste), Article 3 (Pre-Transport Requirements); 22 CCR 66262.30 through 66262.34	Relevant and Appropriate[a]	These standards establish requirements for generators of hazardous waste located in California. Prior to transportation, containers would be packaged, labeled, marked, and placarded in accordance with RCRA and Department of Transportation requirements. Accumulation of hazardous wastes onsite for longer than 90 days would be subject to RCRA requirements for storage facilities. These requirements are applicable to hazardous waste that is stored temporarily onsite prior to offsite disposal.
California Hazardous Waste Control Law	Title 22, Division 4.5 (Environmental Health Standards for Management of Hazardous Waste), Chapter 14 (Standards for Owners and Operators of Hazardous Waste Transfer, Treatment, Storage, and Disposal Facilities), Article 9 (Use and Management of Containers); 22 CCR 66264.171 through 22 CCR 66264.178	Relevant and Appropriate[a]	Soil will need to be managed as a hazardous waste only if it is classified as a hazardous waste. The treatment, storage, and disposal requirements for hazardous wastes include: using containers to store the recovered product that are compatible with this material (22 CCR 66264.172); using containers that are in good condition (22 CCR 66264.171); segregating the waste from incompatible wastes (22 CCR 66264.177); inspecting the containers (22 CCR 66264.176); providing adequate secondary containment for the water stored (22 CCR 66264.175); closing containers during transfer (22 CCR 66264.173); and removing all hazardous material at closure (22 CCR 66264.178).

TABLE 3.3-3
Action-Specific ARARs for the Coastal Salt Marsh Sites

Source	Standard, Requirement, Criterion, or Limitation	ARAR Status	Description of ARARs
California Hazardous Waste Control Law	Title 22, Division 4.5 (Environmental Health Standards for Management of Hazardous Waste), Chapter 14 (Standards for Owners and Operators of Hazardous Waste Transfer, Treatment, Storage, and Disposal Facilities), Article 12 (Waste Piles); 22 CCR 66264.250 through 22 CCR 66264.259	Relevant and Appropriate[a]	Delineates requirements for the management of waste piles for hazardous waste. This regulation is applicable to sites where excavated materials are classified as hazardous wastes and managed in waste piles. These regulations include 22 CCR 66264.251—Design and Operating Requirements; 22 CCR 66264.254—Monitoring and Inspection; 22 CCR 66264.256—Special Requirements for Ignitable or Reactive Waste; 22 CCR 66264.257—Special Requirements for Incompatible Wastes; 22 CCR 66264.258—Closure and Post-Closure Care; and 22 CCR 66264.259—Special Requirements for Hazardous Wastes F020, F021, F022, F023, F026, and F027. If hazardous waste will be managed in accordance with the standards stated in these sections of the regulation.
California Hazardous Waste Control Law	Title 22, Division 4.5 (Environmental Health Standards for Management of Hazardous Waste), Chapter 18 (Land Disposal Restrictions), Article 1 (General); 22 CCR 66268.1 through 22 CCR 66268.9	Relevant and Appropriate[a]	Provides the purpose, scope, and applicability of LDRs. The title of the sections of the regulations are: 22 CCR 66268.3—Dilution Prohibited as a Substitute for Treatment; 22 CCR 66268.7—Waste Analysis and Record Keeping; and 22 CCR 66268.9—Special Rules Regarding Wastes that Exhibit a Characteristic. If hazardous waste is land disposed within the meaning of the LDRs, the hazardous waste will be managed in accordance with the standards stated in applicable sections of the regulation. Only applicable if hazardous wastes are disposed of or treated in an area not designated as a CAMU or disposed of or treated beyond the area of contamination.
California Hazardous Waste Control Law	Title 22, Division 4.5 (Environmental Health Standards for Management of Hazardous Waste), Chapter 18 (Land Disposal Restrictions), Article 3 (Prohibitions on Land Disposal); 22 CCR 66268.30 through 22 CCR 66268.35	Relevant and Appropriate[a]	These standards are applicable to sites where excavated material is classified as hazardous waste and is disposed of or treated in an area not designated as a CAMU. If hazardous waste is land disposed within the meaning of the LDRs, the hazardous waste will be managed in accordance with the standards stated in these sections of the regulation.
California Hazardous Waste Control Law	Title 22, Division 4.5 (Environmental Health Standards for Management of Hazardous Waste), Chapter 18 (Land Disposal Restrictions), Article 5 (Prohibitions on Storage); 22 CCR 66268.50	Relevant and Appropriate[a]	This standard is applicable to sites where excavated material is classified as hazardous waste. The standard provides prohibitions on storage of restricted wastes. If hazardous waste is land disposed within the meaning of the LDRs, the hazardous waste will be managed in accordance with the standards stated in these sections of the regulation.

TABLE 3.3-3
Action-Specific ARARs for the Coastal Salt Marsh Sites

Source	Standard, Requirement, Criterion, or Limitation	ARAR Status	Description of ARARs
State of California Air			
California Clean Air Act	BAAQMD, Regulation 6 (Particulate Matter and Visible Emissions)	Applicable	This regulation limits visible emissions, particulate emissions by weight, and emissions from sulfuric acid plants and sulfur recovery units. This regulation is applicable to any remedial action activity which may discharge air contaminants as defined by the rule.
	BAAQMD, Regulation 7 (Odorous Substances)	Applicable	This regulation limits odorous emissions per complaints received from persons on properties where the emissions did not occur and places maximum concentration limits on certain organic emissions.
State of California Surface Water, Groundwater, and Soil			
California Water Code	SWRCB Order 99-08-DWQ (General order for stormwater management at construction sites)	Applicable	Must identify the sources of sediment and other pollutants that affect the quality of storm water discharges and implement practices to reduce these discharges. Storm water discharges from construction sites must meet pollutant limits and standards. The narrative effluent standard includes the requirements to implement BMPs and/or appropriate pollution prevention control practices. Inspections of the construction site prior to anticipated storm events and after actual storm events need to be conducted to identify areas contributing to storm water discharge and evaluated for the effectiveness of best management practices and other control practices. Applies to construction sites five acres or greater in size. It also applies to smaller sites that are part of a larger common plan of development or sale. Administrative portions of this permit are not applicable in accordance with CERCLA.
Porter-Cologne Water Quality Control Act (California Water Code Sections 13240)	San Francisco Bay Basin (Region 2) Water Quality Control Plan	Applicable	Establishes water quality objectives, including narrative and numerical standards that protect the beneficial uses of surface waters and groundwaters in the region. Establishes beneficial uses of affected water bodies.
Porter-Cologne Water Quality Control Act (California Water Code Sections 13000, 13140, 13240)	SWRCB Resolution 68-16	Applicable	The resolution establishes requirements for activities involving discharges of contamination directly into surface waters or groundwater. According to the RWQCB, this resolution requires that high-quality surface and groundwater be maintained to the maximum extent possible.

TABLE 3.3-3
Action-Specific ARARs for the Coastal Salt Marsh Sites

Source	Standard, Requirement, Criterion, or Limitation	ARAR Status	Description of ARARs
Porter-Cologne Water Quality Control Act (California Water Code Sections 13000, 13140, 13240)	SWRCB Resolution 68-16	Applicable	The resolution establishes requirements for activities involving discharges of contamination directly into surface waters or groundwater. According to the RWQCB, this resolution requires that high-quality surface and groundwater be maintained to the maximum extent possible.
Porter-Cologne Water Quality Control Act (California Water Code Sections 13000, 13140, 13240)	SWRCB Resolution 88-63	Applicable	Specifies that, with certain exceptions, all ground and surface waters have the beneficial use of municipal or domestic water supply. Applies in determining beneficial uses for waters that may be affected by discharges of waste. SWRCB Resolution 88-63 applies to all sites that may be affected by discharges of waste to groundwater or surface water. The resolution specifies that, with certain exceptions, all groundwater and surface waters have beneficial use of municipal or domestic water supply. These exceptions include, among others, if: (1) the TDS exceed 3,000 mg/L or (2) the water source does not provide sufficient water to supply a single well capable of producing an average sustained yield of 200 gallons per day. In the case of HAAF, both these exceptions apply; therefore, groundwater below the site may not be considered suitable for municipal or domestic water supplies.
Porter-Cologne Water Quality Control Act (California Water Code Sections 13140 - 13147, 13172, 13260, 13263, 13267, 13304)	Title 27 (Environmental Protection), Division 2 (Solid Waste), Chapter 1, Article 1 (General) 27 CCR 20090(d)	Applicable	Actions taken by or at the direction of public agencies to clean up from unauthorized releases are exempt from Title 27, except that wastes removed from the immediate place of release and discharged to land must be managed in accordance with classification (Title 27 CCR, Section 20200) and siting requirements of Title 27. Wastes contained or left in place must comply with Title 27 to the extent feasible.
Porter-Cologne Water Quality Control Act (California Water Code Sections 13140 - 13147, 13172, 13260, 13263, 13267, 13304)	Title 27 (Waters), Division 2 (Solid Waste), Chapter 3 (Criteria for waste Management Units), Article 2 (Waste Classification and Management) 27 CCR, 20200, 20210, 20220, and 20230	Applicable	Waste Classification: Wastes must be classified as: hazardous waste, designated waste, nonhazardous solid waste, or inert waste. A hazardous waste can only be discharged to a Class I facility (unless a variance is applicable under Title 22 regulations). A designated waste can be discharged to a Class I or Class II facility. A nonhazardous solid waste can be discharged to a Class I, II, or III facility. Inert wastes do not need to be sent to a classified facility.

TABLE 3.3-3
Action-Specific ARARs for the Coastal Salt Marsh Sites

Source	Standard, Requirement, Criterion, or Limitation	ARAR Status	Description of ARARs
Other State of California TBCs			
Resolution 92-145	Interim Final Sediment Screening Criteria and Testing Requirements for Wetland Creation and Upland Beneficial Reuse dated December 1992, Resolution No. 92-145 (referenced in the San Francisco Bay Region Water Quality Control Plan, approved in 1995).	TBC	In this Resolution, the RWQCB established screening criteria guidelines to be used to evaluate the appropriateness of using dredged material for beneficial purposes.
	Draft Staff Report titled Beneficial Reuse of Dredged Materials: Sediment Screening and Testing Guidelines dated May 2000.	TBC	This document is an update of the December 1992 document described above. These guidelines fall into the category of TBC.

[a] The Army interprets these as relevant and appropriate; DTSC interprets them as applicable.

SECTION 3.4

Evaluation and Selection of Alternatives

This section summarizes the evaluation and selection of remedial alternatives presented in the FFS (CH2M HILL, 2003a) for each coastal salt marsh site. The following remedial alternatives were developed in the FFS by assembling remedial technologies compatible with wetland functions into treatment options that meet RAOs:

- Alternative 1, No Further Action
- Alternative 2, Excavation and Offsite Disposal

Some alternatives, such as capping and in situ soil stabilization/solidification were considered but then eliminated from further evaluation because they are not compatible with wetlands functions. Excavation with onsite disposal was also considered, but is not compatible with wetlands functions.

The sections below describe the remedial alternatives, and their selection for each site. The rationale for adopting the selected alternative is also provided.

3.4.1 Remedial Alternatives

The two remedial alternatives evaluated in detail in the FFS were No Further Action, and Excavation and Offsite Disposal. These alternatives are described below.

3.4.1.1 Alternative 1, No Further Action

In accordance with the NCP (40 CFR 300), CERCLA guidance (EPA, 1988a), and under Chapter 6.8 of Division 20 of the California Health and Safety Code, a No Further Action alternative was developed for evaluation at each site. Under this alternative, no further action would be taken and there would be no restrictions placed on the use of the site.

The No Further Action alternative reflects leaving a site in its current condition. In the analysis presented below, it is intended that this option be included only as a comparison to other alternatives. This alternative will not be selected for any of the sites requiring remedial action, because it would not meet RAOs.

3.4.1.2 Alternative 2, Excavation and Offsite Disposal

Under this alternative, contaminated soils above action goals will be excavated and disposed of at an appropriate offsite landfill facility. Table 3.2-1 (at the end of Section 3.2) lists the action goals for sites that have been determined to require excavation. Excavation at the coastal salt marsh sites will continue until the action goals have been achieved, or until it is determined by joint agreement of the State and Army that further excavation is impractical, or until the point at which the State and the Army agree that the remaining contamination is shown not to pose an unacceptable risk to human health and the environment.

Activities in the coastal salt marsh will be conducted in a manner that is sensitive to impacts on plants and animals. Except in the area proposed as a channel cut by the HWRP, the

excavated areas in the coastal salt marsh will be backfilled with clean onsite soil or re-handled dredged material of similar physical characteristics.

Institutional controls in the form of land use restrictions will be required where contamination remains above action goals. These institutional controls include:

- Grading, excavation, and intrusive activities must be conducted pursuant to a plan approved by the State.
- The property shall not be used for residences, schools, daycare facilities, hospitals, hospices, or other similar sensitive uses.

State and federal agencies must have access to the property. The property owner shall provide access, on an as-needed basis, minimizing any interference with the implementation, operation, or maintenance of the ecosystem restoration project. Appropriate federal and state agencies and their officers, agents, employees, contractors, and subcontractors will have the right, upon reasonable notice, to enter the property where it is necessary to carry out response actions or other activities consistent with the purposes of this ROD/RAP. Appropriate federal and state agencies and their officers, agents, employees, contractors, and subcontractors will also have the right, upon reasonable notice, to enter adjoining property where it is necessary to carry out response actions or other activities consistent with the purposes of this ROD/RAP.

Remedial Goals

Alternative 2 serves three purposes:

- To prevent human or ecological contact with contaminated soil/sediment
- To prevent migration of contamination
- To minimize long-term impact to habitat

Primary Action

Implementation of this alternative would consist of excavation and offsite disposal of site soils, as well as sampling to confirm removal of contaminated soils from the affected site. Sites that are not channel areas would be backfilled to grade with clean soil. The following paragraphs describe the primary activities and general design considerations for Alternative 2.

Equipment mobilization and establishment of staging areas and access to the sites targeted for remedial action. Staging areas would be established on the airfield inboard property for heavy equipment, decontamination, and soil transfer from offroad trucks to highway transport trucks. Some sites can be reached on existing roadways in the coastal salt marsh or directly from the levee. For areas that are not accessible by existing roadways, temporary roads will be constructed. Low-impact methods will be used when practicable. The temporary roadway material will be removed as equipment is demobilized from each site.

Preconstruction biological surveying. Preconstruction surveying and trapping may be necessary to ensure that no sensitive species are present on the excavation sites. Sensitive species are discussed in Section 1.4.5. Noise, vibration, visual-related, and proximity-related disturbances associated with project construction could adversely affect sensitive species. Mitigation measures may include erecting barrier exclusion fencing to impede salt marsh harvest mice from entering the construction area, avoiding construction during the breeding

period for the clapper rail (February 1 through August 31), and placing fish barriers at waterways that are connected to excavation sites. Additional mitigation measures may be identified during remedial design.

Excavation of site material. Contaminated material would be excavated using standard construction equipment. Equipment will be chosen that exhibits low impact to habitat and high efficiency. Where possible, excavation activities will be conducted within the excavation areas to avoid temporary construction of access roads. Excavation will continue until the action goals are achieved, or until it is determined by joint agreement of the State and Army that further excavation is impractical, or until the point at which the State and the Army agree that the remaining contamination is shown to not pose an unacceptable risk to human health and the environment. Excavation in saturated conditions may result in the production of excess water in the excavation site through seepage of groundwater. This water would be disposed of properly.

Storage and disposal of site material. Excavated materials would need to be classified, stored onsite, and disposed of in a suitable offsite location. Waste profiling would be required to determine classification of the waste. Soil blending may be required to reduce moisture content of the excavated materials. Soil would be classified for disposal before blending. Soil would then be disposed of in an approved landfill, based on waste classification.

Confirmation sampling. Confirmation samples would be collected to verify that action goals are met. These samples could be collected as predesign investigation samples that would be collected before excavation to determine the extent of the excavation geometry. Alternatively, confirmation samples could be collected following excavation activities. Once the confirmation sampling shows that all remaining contaminant concentrations have been reduced below action goals, the site can be backfilled.

Backfill operations. Except in the area proposed as a channel cut by the HWRP, the excavated areas in the coastal salt marsh will be backfilled with clean onsite soil or re-handled dredge material of similar physical characteristics. For sites in the high marsh environment, backfilled excavations will be contoured to eliminate topographic depressions and promote the reestablishment of native vegetation. The site is expected to revegetate naturally, and seeding or planting is not anticipated.

Postconstruction monitoring. Postconstruction observations will include physical observations to check for reestablishment of the vegetation on the site, if applicable. Monitoring to address contaminants will be required where appropriate.

3.4.2 Evaluation of Alternatives

The remedial alternatives were evaluated based on the nine criteria set forth in the NCP. These evaluation criteria served as the basis for conducting the detailed analysis during the FFS and for selecting via this ROD/RAP a remedial action appropriate for the coastal salt marsh. Refer to Section 4.0 of the FFS (CH2M HILL, 2003a) for an in-depth review of all criteria.

The first two criteria, overall protection of human health and the environment and compliance with ARARs, are threshold criteria. Alternatives that do not meet the threshold criteria are eliminated from further evaluation. The remedy selection is based primarily on the next five criteria:

- Long-term effectiveness and permanence
- Reduction of toxicity, mobility, and volume
- Short-term effectiveness
- Implementability
- Cost

The remaining criteria, State (support agency) acceptance and community acceptance, will be evaluated following receipt of comments on this ROD/RAP.

The list below analyzes the alternatives against the nine criteria. Alternative 1 is carried forward only as a comparison to other alternatives. This alternative will not be selected for any of the sites requiring remedial action because it would not meet RAOs.

1. **Overall Protection of Human Health and the Environment**
   Alternative 1, which involves no additional remedial activity to protect human health or the environment, does not meet this objective. Alternative 2 protects human health and the environment by removing the contamination at each site until the action goals are achieved, or until it is determined by joint agreement of the State and Army that further excavation is impractical, or until the point at which the State and the Army agree that the remaining contamination is shown not to pose an unacceptable risk to human health and the environment.

2. **Compliance with Applicable Requirements**
   Alternative 2 is expected to satisfy these criteria because it will meet the location and action-specific ARARs. A description of how Alternative 2 meets the ARARs is contained in the FFS. While there are no chemical-specific ARARs for residual contamination at HAAF, chemical-specific TBC criteria are proposed for the site. Alternative 2 will meet the criteria by removing contamination above action goals. Alternative 1 does not meet these criteria.

3. **Long-Term Effectiveness and Permanence**
   Alternative 2 provides a high degree of long-term effectiveness because the contamination will be removed from the site, or if contamination is left in place, exposure of receptors to remaining contaminants will be prevented. Alternative 1 is not effective in the long term.

4. **Reduction of Toxicity, Mobility, and Volume through Treatment**
   None of the alternatives involve treatment to reduce toxicity, mobility, or volume of contaminants. Soils at HAAF have a high clay content, and treatment options for contaminated soil with a high clay content are not practical.

5. **Short-Term Effectiveness**
   Alternative 2 has the potential for short-term impacts on the community, workers, and environment because it involves excavation in a sensitive habitat, stockpiling, blending of soils to reduce water content, if necessary, and transportation to an offsite disposal facility. Fugitive dusts can be created during this process, but will be controlled using

water, as necessary. Risk of worker exposure can be mitigated by following safety protocols during excavation activities. No short-term impacts are expected from Alternative 1.

6. **Implementability**
   There are no obstacles associated with implementing Alternative 1. Alternative 2 includes a few obstacles because this alternative uses excavation to reduce contamination. Excavation activities can be difficult because the stability of excavation areas and impact to habitat for access must be considered. However, excavation is a well-established remedial action and activities can be completed safely.

7. **Cost**
   Estimated project costs for Alternative 2 are listed in Table 3.4-1 (included at the end of this section). There are no costs for Alternative 1. The cost analysis includes estimated expenditures required to complete the remediation in terms of both capital costs and annual operations and maintenance. Cost estimates are based on estimated excavation volumes and monitoring and are expressed in terms of 2003 dollars.

8. **State (Support Agency) Acceptance**
   RWQCB and DTSC hereby determine, based on the substantial evidence in the administrative record, that this ROD/RAP has been properly noticed, circulated for public review and comment, and approved in accordance with the requirements of Sections 25356.1 and 25356.1.5 of the Health and Safety Code Chapter 6.8 of Division 20, the Porter Cologne Water Quality Control Act, and all other applicable State laws.

9. **Community Acceptance**
   Community acceptance refers to the public's general response to the alternatives described in the draft ROD/RAP. The community will have the opportunity to comment in writing on the ROD/RAP during a 45-day comment period. There will also be an opportunity for the public to ask questions and make comments at a meeting to be held during the 45-day comment period.

3.4.3 Comparative Analysis of Selected Alternatives

This section summarizes the basis for the selected alternative for each coastal salt marsh site. For each site, the selected alternative satisfies the statutory requirements of CERCLA Sections 121 and 120(a)(4), as amended by SARA, and California Health and Safety Code Section 25356.1.5, which requires response actions approved by RWQCB and/or DTSC under Chapter 6.8 of Division 20 of the California Health and Safety Code, in that the following mandates are attained:

- The selected remedy is protective of human health and environment.
- The selected remedy complies with federal and state requirements that are legally applicable or relevant and appropriate to the remedial action.
- The selected remedy is cost-effective.

A number of the coastal salt marsh sites are adjacent to each other, or are in proximity (see Figure 3.4-1, included following the tables at the end of this section). Given the proximity of

sites, there is overlap in some of the excavation boundaries proposed in the alternatives selected below. The total volume of soil to be excavated at the coastal salt marsh sites, along with the total area of excavations, is presented in Section 3.4.5. In addition, Section 3.4.5 provides an estimate of the total area of pickleweed habitat that may be affected as a result of carrying out the selected alternatives for the coastal salt marsh sites.

3.4.3.1 Antenna Debris Disposal Area

Alternative 2, Excavation and Offsite Disposal, is the preferred alternative for the Antenna Debris Disposal Area. The Excavation and Offsite Disposal alternative would remove soil containing FFS COPCs at concentrations above action goals. The excavated area would be backfilled with clean soil or re-handled dredged material with physical characteristics similar to the soil removed from the coastal salt marsh. The alternative would meet RAOs by removing FFS COPCs above action goals.

Excavation boundaries were established to address soil containing FFS COPCs at concentrations above action goals. A summary of the minimum, maximum, and average values for FFS COPCs remaining at the Antenna Debris Disposal Area are shown below. This information was considered in the process of selecting Alternative 2 and establishing excavation boundaries for the Antenna Debris Disposal Area.

Minimum, Maximum, and Average Values for FFS COPCs — Antenna Debris Disposal Area

COPC	Number of Samples	Minimum Value	Maximum Value	Average Value	Action Goal
Barium	28	28.7	1,370	176	188
Beryllium	28	0.4	4.3	2.2	1.68
Cadmium	25	0.34	6.9	2.30	1.8
Cobalt	28	7	322	58	26.7
Copper	28	28.3	726	130	88.7
Lead	29	14.1	2,100	330	46.7
Manganese	29	227	7,440	1,931	1,260
Nickel	29	43.5	396	182	132
Silver	29	0.047	2.2	0.82	1
Zinc	29	70.4	2,930	169	169
Diesel Range Hydrocarbons	29	370	370	370	144
Endrin aldehyde	20	0.0015	0.02	0.0076	0.0064
Heptachlor	20	0.062	0.062	0.062	0.0088
Heptachlor epoxide	20	0.1	0.1	0.100	0.0088
MCPA	7	71	71	71	7.9
MCPP	6	27	27	27	3.0
Motor Oil	2	2,900	2,900	2,900	144
PCBs Total	21	0.00007868	2.19	0.38	0.09

Minimum, Maximum, and Average Values for FFS COPCs — Antenna Debris Disposal Area

COPC	Number of Samples	Minimum Value	Maximum Value	Average Value	Action Goal
DDTs Total	28	0.0019	6.39	0.92	0.03
BHCs Total	27	0.003	0.61	0.166	0.0048
Chlordanes Total	27	0.0026	1	0.17	0.00479

Units are in ppm.
MCPA = methyl chlorophenoxy acetic acid
MCPP = mecoprop

Alternative 1, No Further Action, was not selected because it would not meet RAOs.

3.4.3.2 East Levee Construction Debris Disposal Area

Alternative 2, Excavation and Offsite Disposal, is the preferred alternative for the ELCDDA. The Excavation and Offsite Disposal alternative would remove soil containing FFS COPCs at concentrations above action goals. The excavated area would be backfilled with clean onsite soil or re-handled dredged material with physical characteristics similar to the soil removed from the coastal salt marsh. The alternative would meet RAOs by removing FFS COPCs above action goals.

The area recommended for excavation is shown on Figure 3.4-1. Excavation boundaries were established to address soil containing FFS COPCs at concentrations above action goals. A summary of the minimum, maximum, and average values for FFS COPCs remaining at the ELCDDA are shown below. This information was considered in the process of selecting Alternative 2 and establishing excavation boundaries for the ELCDDA.

Minimum, Maximum, and Average Values for FFS COPCs — East Levee Construction Debris Disposal Area

COPC	Number of Samples	Minimum Value	Maximum Value	Average Value	Action Goal
Lead	57	5	1,280	79	46.7
Zinc	52	18.8	855	154	169
Diesel Range Hydrocarbons	19	149	723	390	144
Total Dioxin Equivalents	4	0.087E-05	0.015E-05	0.006E-05	2.1E-05
PCBs Total	19	0.048	0.35	0.16	0.09
DDTs Total	9	0.0057	0.094	0.036	0.03

Units are in ppm.

Alternative 1, No Further Action, was not selected because the alternative would not meet RAOs.

3.4.3.3 High Marsh Area

Nonchannel Cut Area

Alternative 2, Excavation and Offsite Disposal, is the preferred alternative for the Nonchannel Cut Area. The Excavation and Offsite Disposal alternative would remove soil containing FFS COPCs at concentrations above action goals. The excavated area would be backfilled with clean onsite soil or re-handled dredged material with physical characteristics similar to the soil removed from the coastal salt marsh. The alternative would meet RAOs by removing FFS COPCs above action goals.

The area recommended for excavation is shown on Figure 3.4-1. Excavation boundaries were established to address soil containing FFS COPCs at concentrations above action goals. A summary of the minimum, maximum, and average values for FFS COPCs remaining at the Nonchannel Cut Area are shown below. This information was considered in the process of selecting Alternative 2 and establishing excavation boundaries for the Nonchannel Cut Area.

Minimum, Maximum, and Average Values for FFS COPCs — High Marsh Nonchannel Cut

COPC	Number of Samples	Minimum Value	Maximum Value	Average Value	Action Goal
Beryllium	93	0.37	8.6	2.43	1.68
Cobalt	95	5.3	162	43	26.7
Copper	95	21.5	1,600	118	88.7
Lead	95	12.9	1,540	169	46.7
Manganese	93	152	12,200	1,616	1,260
Nickel	95	18	800	181	132
Silver	95	0.03	6.61	1.20	1
Zinc	95	57.3	1,160	205	169
Endrin aldehyde	7	0.0034	0.016	0.010	0.0064
PCBs Total	10	0.008768	0.507021	0.10	0.09
DDTs Total	29	0.0024	5.64	1.38	0.03
Chlordanes Total	22	0.0042	1.3	0.24	0.00479

Units are in ppm.

Alternative 1, No Further Action, was not selected because it would not meet RAOs.

Proposed Channel Cut

Alternative 2, Excavation and Offsite Disposal, is the preferred alternative for the Proposed Channel Cut. The Excavation and Offsite Disposal alternative would remove soil containing FFS COPCs at concentrations above action goals. The alternative would meet RAOs by removing FFS COPCs above action goals.

The area recommended for excavation is shown on Figure 3.4-1. Excavation boundaries were established to address soil containing FFS COPCs at concentrations above action goals. A summary of the minimum, maximum, and average values for FFS COPCs remaining at the

Proposed Channel Cut are shown below. This information was considered in the process of selecting Alternative 2 and establishing excavation boundaries for the Proposed Channel Cut.

Minimum, Maximum, and Average Values for FFS COPCs – High Marsh Channel Cut

COPC	Number of Samples	Minimum Value	Maximum Value	Average Value	Action Goal
Beryllium	49	0.9	7	2.11	1.68
Cadmium	49	1	3.8	2.04	1.8
Cobalt	49	16.1	115	37	26.7
Lead	49	7	796	160	46.7
Nickel	49	77.2	376	133	132
Endrin aldehyde	39	0.0028	0.097	0.053	0.0064
Motor Oil	39	11	1100	89	144
DDTs Total	39	0.0022	9.9	0.77	0.03
Chlordanes Total	39	0.0022	0.41	0.149	0.00479

Units are in ppm.

Alternative 1, No Further Action, was not selected because it would not meet RAOs.

3.4.3.4 Historic Outfall Drainage Ditch

Alternative 2, Excavation and Offsite Disposal, is the preferred alternative for the Historic ODD. The Excavation and Offsite Disposal alternative would remove soil containing FFS COPCs at concentrations above action goals. The alternative would meet RAOs by removing FFS COPCs above action goals.

The area recommended for excavation is shown on Figure 3.4-1. Excavation boundaries were established to address soil containing FFS COPCs at concentrations above action goals. A summary of the minimum, maximum, and average values for FFS COPCs remaining at the Historic ODD are shown below. This information was considered in the process of selecting Alternative 2 and establishing excavation boundaries for the Historic ODD.

Minimum, Maximum, and Average Values for FFS COPCs — Historic ODD

COPC	Number of Samples	Minimum Value	Maximum Value	Average Value	Action Goal
Cadmium	19	3.3	11.5	7.23	1.8
Cobalt	19	11.5	136	31	26.7
Lead	19	16.2	229	45	46.7
Manganese	19	534	18,200	2,034	1,260
Nickel	19	68.7	546	133	132
Zinc	19	76.5	647	156	169
Dichlorprop	3	1.7	1.7	1.70	0.14

Units are in ppm.

Alternative 1, No Further Action, was not selected because it would not meet RAOs.

3.4.3.5 Outfall Drainage Ditch

Alternative 2, Excavation and Offsite Disposal, is the preferred alternative for the ODD. The Excavation and Offsite Disposal alternative would remove soil containing FFS COPCs at concentrations above action goals. The alternative would meet RAOs by removing FFS COPCs above action goals.

The area recommended for excavation is shown on Figure 3.4-1. Excavation boundaries were established to address soil containing FFS COPCs at concentrations above action goals. A summary of the minimum, maximum, and average values for FFS COPCs remaining at the ODD are shown below. This information was considered in the process of selecting Alternative 2 and establishing excavation boundaries for the ODD.

Minimum, Maximum, and Average Values for FFS COPCs — Outfall Drainage Ditch

COPC	Number of Samples	Minimum Value	Maximum Value	Average Value	Action Goal
Beryllium	39	0.53	6.8	2.14	1.68
Cadmium	43	1.1	18.6	5.52	1.8
Cobalt	43	13.8	199	41	26.7
Lead	43	9.7	752	133	46.7
Manganese	39	280	5,170	1,171	1,260
Nickel	43	66.1	637	155	132
Silver	30	0.087	8.3	1.54	1
Zinc	43	60	454	163	169
Diesel Range Hydrocarbons	26	19	4,600	1,367	144
Endrin aldehyde	13	0.0051	0.041	0.024	0.0064
Motor Oil	12	21	15,000	4,018	144
Pentachlorophenol	19	1.79	2.76	2.28	0.017
Phenol	19	2.34	3.06	2.70	0.13
PCBs, Total	8	0.0159	1.6941	0.25	0.09
DDTs, Total	45	0.003	11.01	1.22	0.03
Chlordanes, Total	15	0.003	0.25	0.081	0.00479

Units are in ppm.

Alternative 1, No Further Action, was not selected because it would not meet RAOs.

3.4.3.6 Boat Dock

Nonchannel Area

Alternative 2, Excavation and Offsite Disposal, is the preferred alternative for the Nonchannel Area. The Excavation and Offsite Disposal alternative would remove soil

containing FFS COPCs at concentrations above action goals. The excavated area would be backfilled with clean onsite soil or re-handled dredged material with physical characteristics similar to the soil removed from the coastal salt marsh. The alternative would meet RAOs by removing FFS COPCs above action goals.

The area recommended for excavation is shown on Figure 3.4-1. Excavation boundaries were established to address soil containing FFS COPCs at concentrations above action goals. A summary of the minimum, maximum, and average values for FFS COPCs remaining at the Nonchannel Area of the Boat Dock are shown below. The following information was considered in the process of selecting Alternative 2 and establishing excavation boundaries for the Nonchannel Area of the Boat Dock.

Minimum, Maximum, and Average Values for FFS COPCs — Boat Dock Nonchannel Area

COPC	Number of Samples	Minimum Value	Maximum Value	Average Value	Action Goal
Lead	9	22.8	349	93	46.7
Zinc	9	53.9	872	257	161
Heptachlor epoxide	7	0.011	0.017	0.014	0.0088
Methoxychlor	9	0.023	0.62	0.32	0.09
PAHs Total	10	0.115	23.092	6.7	4.022
DDTs Total	10	0.0337	0.46	0.15	0.03
BHCs Total	9	0.34	0.34	0.34	0.0048
Chlordanes Total	7	0.0018	0.0195	0.009	0.00479

Units are in ppm

Alternative 1, No Further Action, was not selected because it would not meet RAOs.

Channel Area

Alternative 2, Excavation and Offsite Disposal, is the preferred alternative for the Channel Area. The Excavation and Offsite Disposal alternative would remove soil containing FFS COPCs at concentrations above action goals. The alternative would meet RAOs by removing FFS COPCs above action goals.

The area recommended for excavation is shown on Figure 3.4-1. Excavation boundaries were established to address soil containing FFS COPCs at concentrations above action goals. A summary of the minimum, maximum, and average values for FFS COPCs remaining at the Channel Area of the Boat Dock are shown below. This information was considered in the process of selecting Alternative 2 and establishing excavation boundaries for the Channel Area of the Boat Dock.

Minimum, Maximum, and Average Values for FFS COPCs — Boat Dock Channel Area

COPC	Number of Samples	Minimum Value	Maximum Value	Average Value	Action Goal
Barium	11	60.3	1,060	158	188
Copper	11	74.3	348	105	88.7
Lead	11	26	1,980	206	46.7
Zinc	11	129	1,740	284	169

Units are in ppm.

Alternative 1, No Further Action, was not selected because it would not meet RAOs.

3.4.3.7 Area 14

Alternative 2, Excavation and Offsite Disposal, is the preferred alternative for Area 14. The Excavation and Offsite Disposal alternative would remove soil containing FFS COPCs at concentrations above action goals. The excavated area would be backfilled with clean onsite soil or re-handled dredged material with physical characteristics similar to the soil removed from the coastal salt marsh. The alternative would meet RAOs by removing FFS COPCs above action goals.

The area recommended for excavation is shown on Figure 3.4-1. Excavation boundaries were established to address soil containing FFS COPCs at concentrations above action goals. A summary of the minimum, maximum, and average values for FFS COPCs remaining at Area 14 are shown below. This information was considered in the process of selecting Alternative 2 and establishing excavation boundaries for Area 14.

Minimum, Maximum, and Average Values for FFS COPCs — Area 14

COPC	Number of Samples	Minimum Value	Maximum Value	Average Value	Action Goal
Cobalt	14	3.7	93.3	21	26.7
Motor Oil	16	26	660	134	144
PAHs Total	14	0.004	35.207	3.18	4.022
DDTs Total	14	0.0049	0.35	0.10	0.03

Units are in ppm.

Alternative 1, No Further Action, was not selected because this alternative would not meet RAOs.

3.4.3.8 Former Sewage Treatment Plant Outfall and Pipe

Alternative 2, Excavation and Offsite Disposal, is the preferred alternative for the FSTP Outfall and Pipe. Alternative 2 would remove soil containing FFS COPCs at concentrations above action goals. The excavated area would be backfilled with clean onsite soil or re-handled dredged material with physical characteristics similar to the soil removed from the coastal salt marsh. The alternative would meet RAOs by removing FFS COPCs above action goals.

The FSTP pipeline may contain residual COCs, so it is being removed as part of this action. The wooden pipeline support structure will not be removed. The pipeline will be disposed of at an appropriate facility.

The area recommended for excavation is shown on Figure 3.4-1. Excavation boundaries were established to address soil containing FFS COPCs at concentrations above action goals. A summary of the minimum, maximum, and average values for FFS COPCs remaining at the FSTP Outfall and Pipe are shown below. This information was considered in the process to select Alternative 2 and establish excavation boundaries for the FSTP Outfall and Pipe.

Minimum, Maximum, and Average Values for FFS COPCs — Former Sewage Treatment Plant Outfall

COPC	Number of Samples	Minimum Value	Maximum Value	Average Value	Action Goal
Copper	12	41.2	159	84	88.7
Lead	12	10.4	171	46	46.7
Mercury	12	0.25	8.4	1.68	0.58
Silver	12	0.2	23.2	6.8	1
Zinc	12	61.7	255	145	169
DDTs Total	4	0.063	0.063	0.063	0.03
Chlordanes Total	4	0.0055	0.0055	0.006	0.00479

Units are in ppm.

Alternative 1, No Further Action, was not selected because it would not meet RAOs.

3.4.4 Estimated Excavation Volume/Area and Impact on Coastal Salt Marsh Habitat

Alternative 2, Excavation and Offsite Disposal, was selected for all of the coastal salt marsh sites. Implementation of this alternative is expected to result in excavation of a total of 30,165 cubic yards of soil/sediment. The total short-term impact to the salt marsh habitat from excavation activities and equipment access is estimated to be 5.81 acres. Significant short-term impacts, including damage and destruction of habitat, will occur as a result of remediation activities at each coastal salt marsh site. It is expected that the habitat will fully reestablish itself naturally within 2 years. Specific monitoring procedures for habitat recovery will be developed in conjunction with the appropriate state and federal agencies during the remedial design process. Alternative 2 is not expected to have a long-term impact on the habitat in the coastal salt marsh, except at the Historic ODD and ODD, where the margins of the ditches may be excavated and removed. The long-term impact at these sites is expected to affect 0.26 acres.

A total of approximately 6.07 acres of coastal salt marsh habitat is expected to be temporarily or permanently affected by remediation activities. The actual number of acres impacted at a specific site may vary when field activities are conducted. The final footprint of excavation activities will be determined as part of the remedial design and/or confirmation sampling conducted during remedial activities.

TABLE 3.4-1
Comparative Analysis Summary

Site	Alternative	Evaluation Criteria Rankings				Cost	Short-Term Effectiveness	Implementability	Regulatory Agency Acceptance	Community Acceptance
		Overall Protection of Human Health and the Environment	Compliance with State and Federal Requirements	Long-Term Effectiveness and Permanence	Reduction of TMV Through Treatment					
Antenna Debris Disposal Area	1	NA	NA	NA	NA	NA	High	High	Low	TBD
	2	High	High	High	High	$248,500	Medium	Medium	High	TBD
East Levee Construction Debris Disposal Area	1	NA	NA	NA	NA	NA	High	High	Low	TBD
	2	High	High	High	High	$942,000	Medium	Medium	High	TBD
High Marsh Area Proposed HWRP Channel Cut	1	NA	NA	NA	NA	NA	High	High	Low	TBD
	2	High	High	High	High	$520,700	High	High	High	TBD
High Marsh Area Non Channel Cut	1	NA	NA	NA	NA	NA	High	High	Low	TBD
	2	High	High	High	High	$1,334,000	High	High	High	TBD
Historic Outfall Drainage Ditch	1	NA	NA	NA	NA	NA	High	High	Low	TBD
	2	High	High	High	High	$138,000	Medium	Medium	High	TBD
Outfall Drainage Ditch	1	NA	NA	NA	NA	NA	High	High	Low	TBD
	2	High	High	High	High	$266,000	Medium	Medium	High	TBD
Boat Dock	1	NA	NA	NA	NA	NA	High	High	Low	TBD
	2	High	High	High	High	$73,200	Medium	Medium	High	TBD
Area 14	1	NA	NA	NA	NA	NA	High	High	Low	TBD
	2	High	High	High	High	$225,000	Medium	Medium	High	TBD
FSTP Outfall and Pipe	1	NA	NA	NA	NA	NA	High	High	Low	TBD
	2	High	High	High	High	$217,300	Medium	Medium	High	TBD

NA = not applicable
TBD = to be determined

Alternative 1—No Further Action
Alternative 2—Excavation and Offsite Disposal

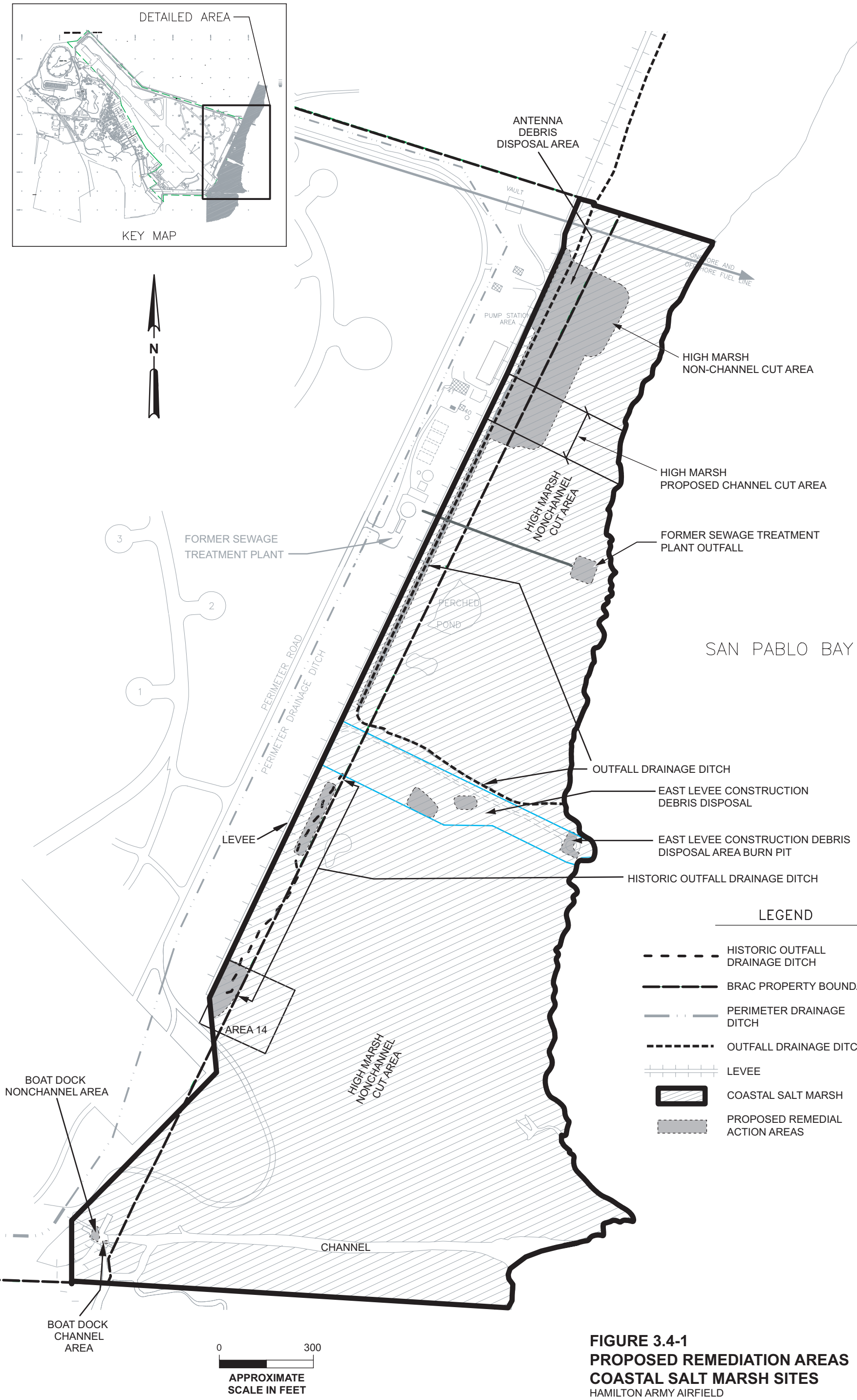

FIGURE 3.4-1
PROPOSED REMEDIATION AREAS
COASTAL SALT MARSH SITES
HAMILTON ARMY AIRFIELD

ROD/RAP

CH2MHILL

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