Final

Coastal Salt Marsh Focused Feasibility Study Report

Hamilton Army Airfield

Novato, California

Prepared for

U.S. Army Corps of Engineers

May 2003

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Acronyms and Abbreviations

ARARs	applicable or relevant and appropriate requirements
BCDC	Bay Conservation and Development Commission
bgs	below ground surface
BHC	hexachlorocyclohexane
BRAC	Base Realignment and Closure Act of 1988
CDFG	California Department of Fish and Game
CERCLA	Comprehensive Environmental Resource Compensation and Liability Act
COC	chemical of concern
COPC	chemical of potential concern
CSM	Coastal Salt Marsh
DDT	dichlorodiphenyltrichloroethane
DoD	Department of Defense
DTSC	Department of Toxic Substances Control
DWR	Department of Water Resources
ELCDDA	East Levee Construction Debris Disposal Area
EPA	Environmental Protection Agency
FFS	Focused Feasibility Study
FSTP	Former Sewage Treatment Plant
GSA	General Services Administration
HAAF	Hamilton Army Airfield
HWRP	Hamilton Wetland Restoration Project
MCPP	Mecoprop
mg/L	milligrams per liter
NCP	National Oil and Hazardous Substance Pollution Contingency Plan
NOAA	National Oceanic and Atmospheric Administration
NPL	National Priority List
ODD	Outfall Drainage Ditch

PAH	polynuclear aromatic hydrocarbon
PCB	polychlorinated biphenyls
PDD	Perimeter Drainage Ditch
ppm	parts per million
PQL	practical quantitation limits
RAO	Remedial Action Objective
RI	remedial investigation
ROD/RAP	Record of Decision/Remedial Action Plan
RWQCB	Regional Water Quality Control Board
SARA	Superfund Amendments Reauthorization Act of 1986
SCC	State of California Coastal Conservancy
SCR	site cleanup requirements
SLC	State Lands Commission
STLC	soluble threshold limit concentration
SVOC	semi-volatile organic chemical
SWRCB	State Water Resources Control Board
tbc	to be considered
TCLP	toxicity characteristic leaching procedure
TDS	total dissolved solids
TPH	total petroleum hydrocarbons
TPH-d	total petroleum hydrocarbons-diesel
TPH-g	total petroleum hydrocarbons-gasoline
TRPH	total recoverable petroleum hydrocarbons
TTLC	total threshold limit concentration
UCL	upper confidence limit
USACE	U.S. Army Corps of Engineers
USAF	U.S. Air Force
USFWS	U.S. Fish and Wildlife Service
VOC	volatile organic compound
WDR	Waste Discharge Requirement

Executive Summary

This Focused Feasibility Study (FFS) has been prepared by CH2M HILL for the U.S. Army under contract to the U.S. Army Corps of Engineers (USACE), Sacramento District, Contract No. DACW05-99-D-0021-008, Delivery Order 0008. This FFS was prepared for sites identified within the Hamilton Army Airfield (HAAF) Coastal Salt Marsh (CSM).

HAAF is a former military installation located on a diked and subsided bayfront parcel in the City of Novato, California. The Main Airfield Parcel and other portions of HAAF were identified for operational closure under the Base Realignment and Closure Act of 1988 (BRAC). For the purpose of environmental closure under the Comprehensive Environmental Resource Compensation and Liability Act (CERCLA), the Main Airfield Parcel was divided into two areas, the Inboard Area and the Coastal Salt Marsh Area. The Inboard Area of the former installation is protected by a perimeter levee. The Coastal Salt Marsh Area lies outboard of the perimeter levee and encompasses a marshy area that lies between the perimeter levee and the eastern boundary of the Main Airfield Parcel. The coastal salt marsh habitat continues beyond the Main Airfield Parcel boundary out to San Pablo Bay. This portion of the CSM is located on property owned by the State Lands Commission (SLC) (see Section 1).

This FFS addresses contamination in the entire CSM from the levee out to San Pablo Bay that originated from Department of Defense (DoD) activities at HAAF. The Army prepared a separate FFS for the Inboard Area sites. A majority of the Main Airfield Parcel will be transferred to the State of California Coastal Conservancy (SCC) through the BRAC process and will become part of the Hamilton Wetland Restoration Project (HWRP).

The purpose of the FFS is to identify sites within the CSM that require further action and to develop, evaluate, and recommend an alternative for each CSM site that would protect human health and the environment. To determine which CSM sites require further action, the FFS combines historical and recently collected data on the CSM sites, establishes chemicals of potential concern, develops action goals, and compares concentrations of chemicals of potential concern to action goals. If concentrations or chemicals of potential concern exceed action goals, then further evaluation of the site is necessary. To develop and evaluate recommended alternatives, the FFS establishes remedial action objectives and screens technologies that will protect human health and the environment and be consistent with continued use of the area as a coastal salt marsh/wetland environment. The FFS then evaluates each alternative developed based on the nine criteria specified in the National Oil and Hazardous Substance Pollution Contingency Plan (NCP). The NCP sets forth the evaluation criteria to address the statutory requirements and the additional technical and policy considerations proven to be important for selection of remedial alternatives.

The FFS evaluates eight CSM sites. Based on the evaluation presented in the FFS, site-specific conditions, limited access, and other site constraints, the FFS recommends preferred remedial alternatives for each site, as shown in Table ES-1.

TABLE ES-1
Preferred Remedial Alternative Summary
Focused Feasibility Study – CSM

Site	Alternative 1— No Further Action	Alternative 2— Excavation and Offsite Disposal
Antenna Debris Disposal Area		X
East Levee Construction Debris Disposal Area		X
High Marsh Area		
Proposed HWRP Channel Cut		X
Nonchannel Cut		X
Historic Outfall Drainage Ditch		X
Outfall Drainage Ditch		X
Boat Dock		
Nonchannel Area		X
Channel Area		X
Area 14		X
Former Sewage Treatment Plant Outfall		X

SECTION 1

Introduction

This Focused Feasibility Study (FFS) has been prepared by CH2M HILL for the U.S. Army under contract to the U.S. Army Corps of Engineers (USACE), Sacramento District, Contract No. DACW05-99-D-0021-008, Delivery Order 0008. This FFS was prepared for sites identified within the Hamilton Army Airfield (HAAF) Coastal Salt Marsh (CSM).

This section provides a brief description of HAAF and the CSM, presents the purpose and scope of the FFS, presents the primary documents used in the FFS process, provides the regulatory framework for the FFS, and describes the organization of this report.

1.1 Brief Description of HAAF and the CSM

HAAF is a former military installation located on a diked and subsided bayfront parcel in the City of Novato, Marin County, California (Figure 1-1). HAAF was identified for operational closure under the Base Realignment and Closure Act of 1988 (BRAC). The Inboard Area of the former installation is protected by a perimeter levee. The Coastal Salt Marsh Area lies outboard of the perimeter levee and encompasses a marshy area that lies between the perimeter levee and San Pablo Bay (Figure 1-2). A majority of the CSM is located on property owned by the California State Lands Commission (SLC); however, a portion of the CSM is located on a small strip of HAAF BRAC property located between the perimeter levee and the eastern HAAF property boundary (Figure 1-3).

Using the general process for investigation and remediation provided in the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), the Army has evaluated and investigated all sites within the CSM area (whether on HAAF or SLC land). The Army follows the CERCLA process to evaluate property that may be transferred under the BRAC process (such as the portion of CSM on HAAF property) and other properties that may have been affected by historical military activities (such as the portion of the CSM owned by the SLC).

1.2 Purpose and Scope

The purpose of the FFS is to identify sites within the CSM area that require further action and to develop, evaluate, and recommend alternatives for these CSM sites to protect human health and the environment from past releases of hazardous substances related to historical Department of Defense (DoD) activities. This feasibility study is focused in the sense that development of remedial alternatives was streamlined to consider only applications that are consistent with the continued use of the land for coastal salt marsh habitat.

The objective of this FFS is to recommend appropriate remedies by developing and analyzing remedial alternatives for those sites that require further action. The FFS is based on the results of the human health and ecological risk assessment (U.S. Army, 2001) and other historical investigations (see Section 2.3), process knowledge, and best engineering judgment. The ultimate goal of this effort is to provide a rational basis for the selection and subsequent implementation of a proposed cost-effective remedial alternative for each CSM site to protect public health and the environment. In addition to the FFS, a Record of Decision/Remedial Action Plan (ROD/RAP) has been developed and is available for public comment. The final ROD/RAP will consider comments from the public and include the chosen remedies for each CSM site.

1.3 Primary Documentation for FFS Process

As shown on Figure 1-4, eight sites have been identified in the CSM area:

- Antenna Debris Disposal Area
- East Levee Construction Debris Disposal Area
- High Marsh Area
- Historic Outfall Drainage Ditch
- Outfall Drainage Ditch
- Boat Dock
- Area 14
- Former Sewage Treatment Plant Outfall

A description of each site is provided in Section 2.5. The primary documentation used to support the FFS process for each of these sites is summarized below.

Seven of the eight sites (Antenna Debris Disposal Area, Boat Dock, Outfall Drainage Ditch, Historic Outfall Drainage Ditch, East Levee Construction Debris Disposal Area, High Marsh Area, and the Former Sewage Treatment Plant Outfall) were investigated in numerous studies conducted by the Army between 1987 and 2002. A list of historical investigations within the CSM area is included in Section 2.3. Sample results from the seven sites mentioned above were also evaluated in the human health and ecological risk assessment prepared by USACE (U.S. Army, 2001). The samples collected from the Historic Outfall Drainage Ditch and the Former Sewage Treatment Plant outfall were evaluated in the risk assessment as part of the High Marsh Area. Each of these sites was also evaluated in a supplemental study conducted by the Army (USACE, Sacramento District) in December 2001/January 2002 to gather additional data in support of this FFS. For these seven sites, the historical studies, risk assessment, and information collected in the Army's sampling investigation in December 2001/January 2002 provide the foundation for the FFS process.

Area 14 was identified by the Archive Search Report (ASR) (USACE, 2003) as a potential area of interest subsequent to completion of the human health and ecological risk assessment. Therefore, Area 14 was not evaluated in the human health and ecological risk assessment. For this site, the Army sampling investigation in December 2001/January 2002 provides the foundation for the FFS process.

1.4 Regulatory Framework

The portion of the CSM currently owned by the Army is being transferred in accordance with the BRAC Act (U.S. Public Law 100-526). Prior to transferring federal lands, CERCLA mandates a series of environmental investigations. Although the portions of the CSM owned by the SLC are not being transferred (they are already owned by the SLC), the portion of the CSM owned by the SLC has been evaluated using the same process, given the potential effect of former military activities. The process of environmental investigations at the CSM sites includes identification, assessment, and, as needed, remediation and closure. The assessment of the environmental conditions was conducted through the *Comprehensive Remedial Investigation Report* (IT Corporation [IT], 1999a), the *Biological Testing Data Report* (IT, 2000) an *Interim Removal Action Data Report* (IT, 1999c), the *Remedial Design Investigation Report* (Foster Wheeler [FW], 2000), and the *Human Health and Ecological Risk Assessment* (U.S. Army, 2001). As described in Section 1.3, additional information was collected through a CSM sampling investigation undertaken by the USACE, Sacramento District, in December 2001 and January 2002. This FFS, which is a continuation of the environmental investigation process, is used to develop remedial actions where further action is needed to protect human health and the environment.

The HAAF is not on the National Priority List (NPL) and is not regulated under CERCLA as a Superfund site. The U.S. Army is using its lead agency status and authority under CERCLA to implement the environmental restoration activities at HAAF. The FFS has been prepared in accordance with CERCLA, as amended by the Superfund Amendments Reauthorization Act of 1986 (SARA) (42 USC Section 9601 et seq.), and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) (40 *Code of Federal Regulations* [*CFR*] 300.430). Guidance documents used in the preparation of this FFS report include the NCP and the *Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA* (EPA, 1988a).

The Army will be responsible for conducting the remedial activities proposed through the FFS and the ROD/RAP process.

The regulatory agencies providing oversight in the BRAC closure process for the CSM include:

- California Environmental Protection Agency, Department of Toxic Substances Control (DTSC) will serve as lead regulatory agency because HAAF is not on the NPL
- U.S. Environmental Protection Agency (EPA)
- California Regional Water Quality Control Board (RWQCB)

DTSC and the RWQCB (collectively, the “State”) are regulating the environmental actions at the CSM and will regulate future environmental response actions in accordance with the provisions of California Health and Safety Code. The RWQCB, with DTSC support, will be the lead state agency for oversight of the implementation of the remedial actions, which will be documented in a future ROD/RAP. The RWQCB, as authorized by the Porter Cologne Water Quality Control Act, will adopt site cleanup requirements (SCRs) that will ensure implementation of the final approved ROD/RAP. Through these SCRs, the State will ensure that agreed-upon environmental assurance actions are taken to address residual concentrations of Inboard Area-Wide DDTs and polynuclear aromatic hydrocarbons (PAHs) in soils adjacent to the runway through the imposition of Waste Discharge Requirements (WDRs) governing the implementation of the HWRP.

The agencies involved with the wetlands restoration project at HAAF include:

- Bay Conservation and Development Commission (BCDC)
- State of California Coastal Conservancy (SCC)
- USACE, San Francisco District
- SLC

There are also Resource Trustee agencies involved in the environmental closure process for the CSM property including:

- U.S. Fish and Wildlife Service (USFWS)
- California Department of Fish and Game (CDFG)
- National Oceanic and Atmospheric Administration (NOAA)
- NOAA Fisheries

1.5 Organization of this Report

The remainder of this report is organized into the following sections:

Section 2: Background—provides information on the site history; a summary of the hydrogeological setting, ecological communities, and land use; a summary of historical investigations; a summary of the nature of contamination at the site; a description of each site within the CSM; and a summary of the risk assessment.

Section 3: FFS Screening Process—describes the process used in the FFS to screen sites and determine whether each site requires further evaluation in the FFS (i.e., development and evaluation of alternatives). This section also describes the process for establishing the action goals for each site.

Section 4: Development of Remedial Action Objectives (RAOs)—describes the development of RAOs for the CSM; develops applicable or relevant and appropriate requirements (ARARs); and identifies specific RAOs for each site within the CSM.

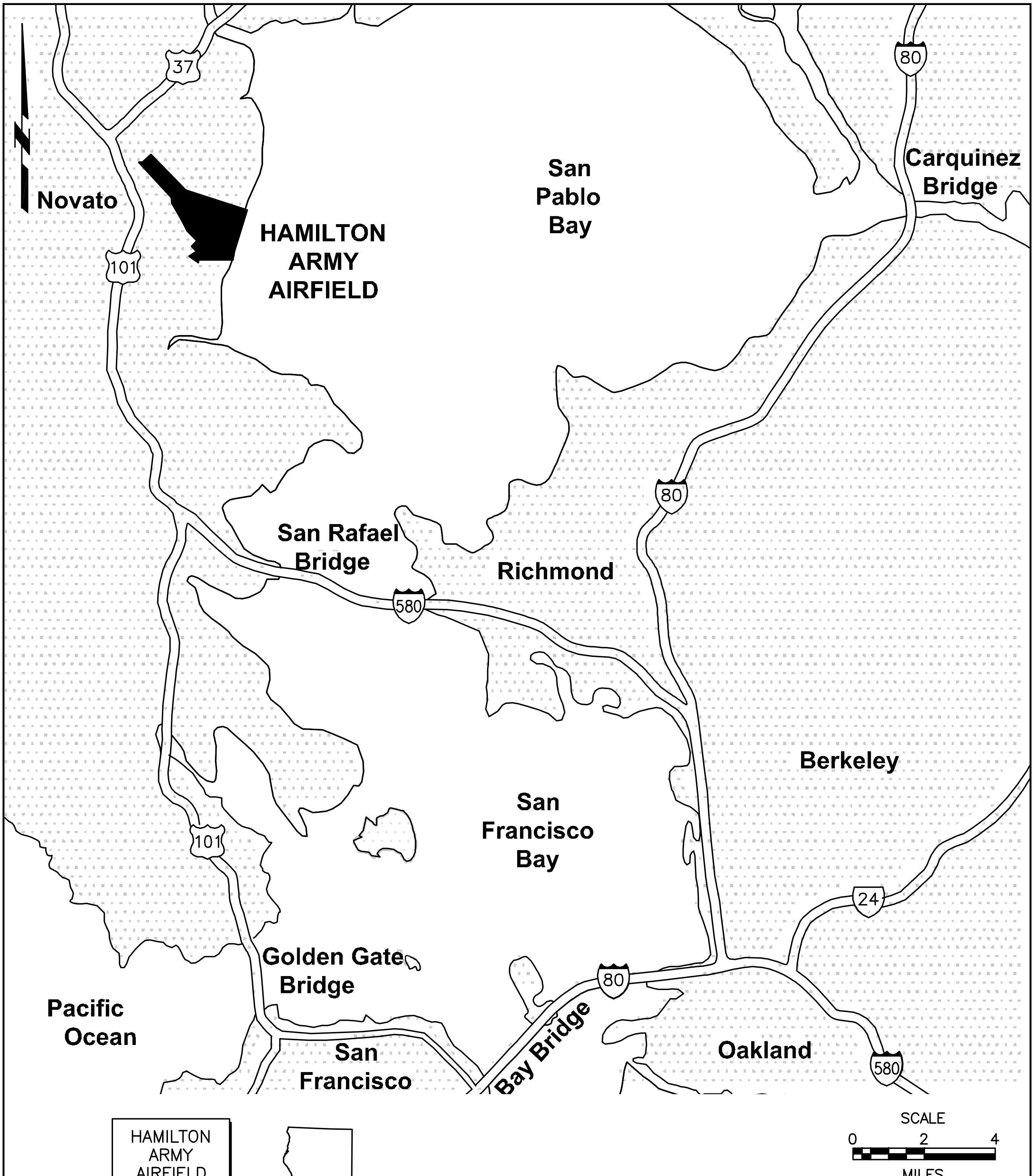
Section 5: Remedial Alternatives—identifies two remedial alternatives for each site within the CSM that passed the screening process in Section 3. Alternatives are No Further Action and Excavation and Offsite Disposal.

Section 6: Detailed Analysis of Alternatives—provides a description of the criteria used to evaluate each remedial alternative, a detailed analysis of each alternative using the specified criteria, and a comparative analysis of each alternative for each site that passed the screening process in Section 3.

Section 7: Conclusions—provides the conclusions of the FFS and recommends a proposed alternative at each site.

Section 8: References—provides a list of references used to support this FFS.

Tables, figures, and appendices are provided to support the sections listed above.



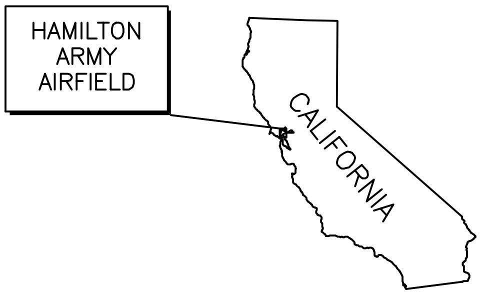


FIGURE 1-1
SITE LOCATION MAP
MAIN AIRFIELD PARCEL
HAMILTON ARMY AIRFIELD

FFS Reference: IT Corporation Figure 1-1 Site Location Map

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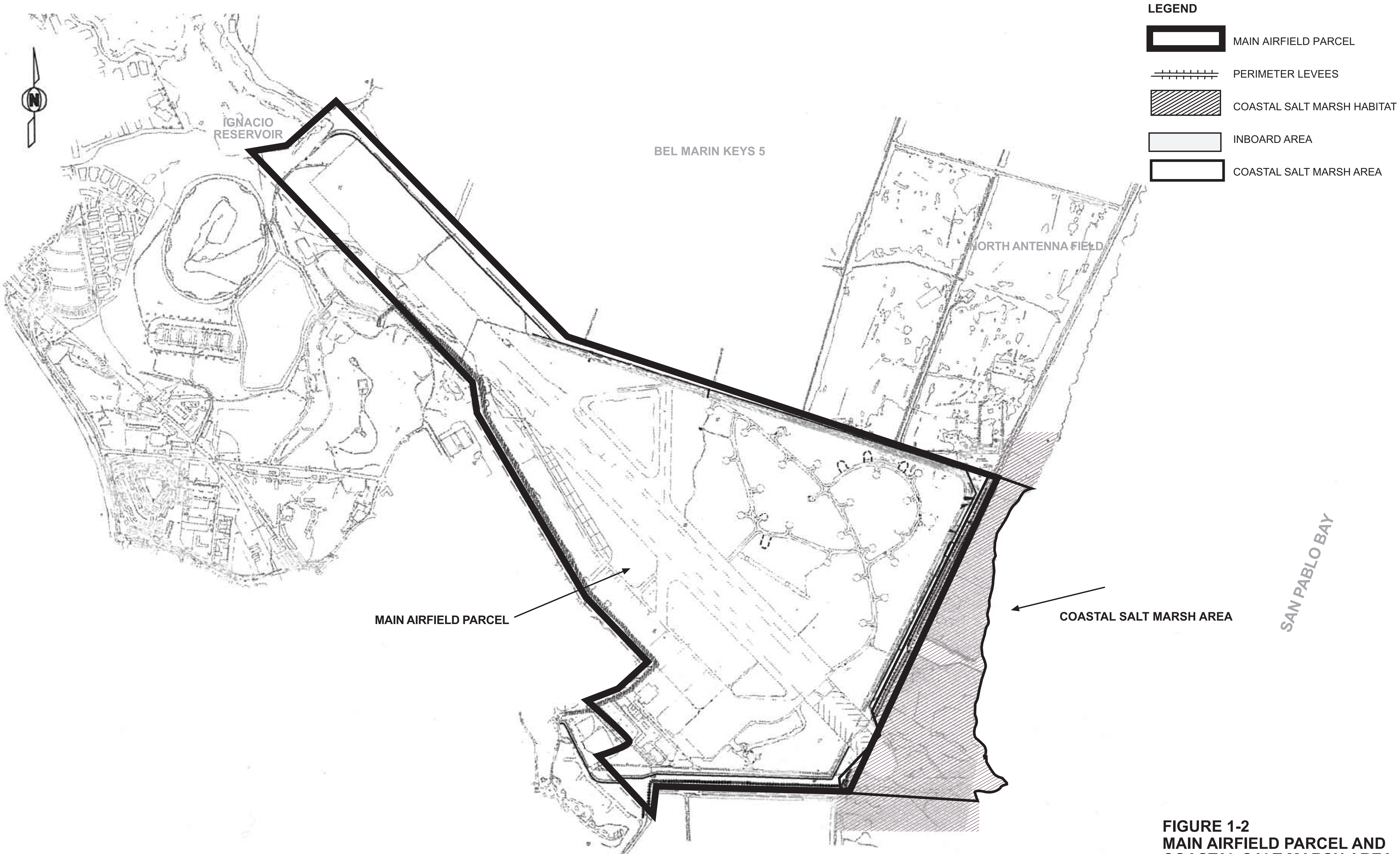

FIGURE 1-2
MAIN AIRFIELD PARCEL AND COASTAL SALT MARSH AREA
HAMILTON ARMY AIRFIELD

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Reference: IT Corporation Figure 1-3 Inboard Sites (DWG No. 762538-B660)

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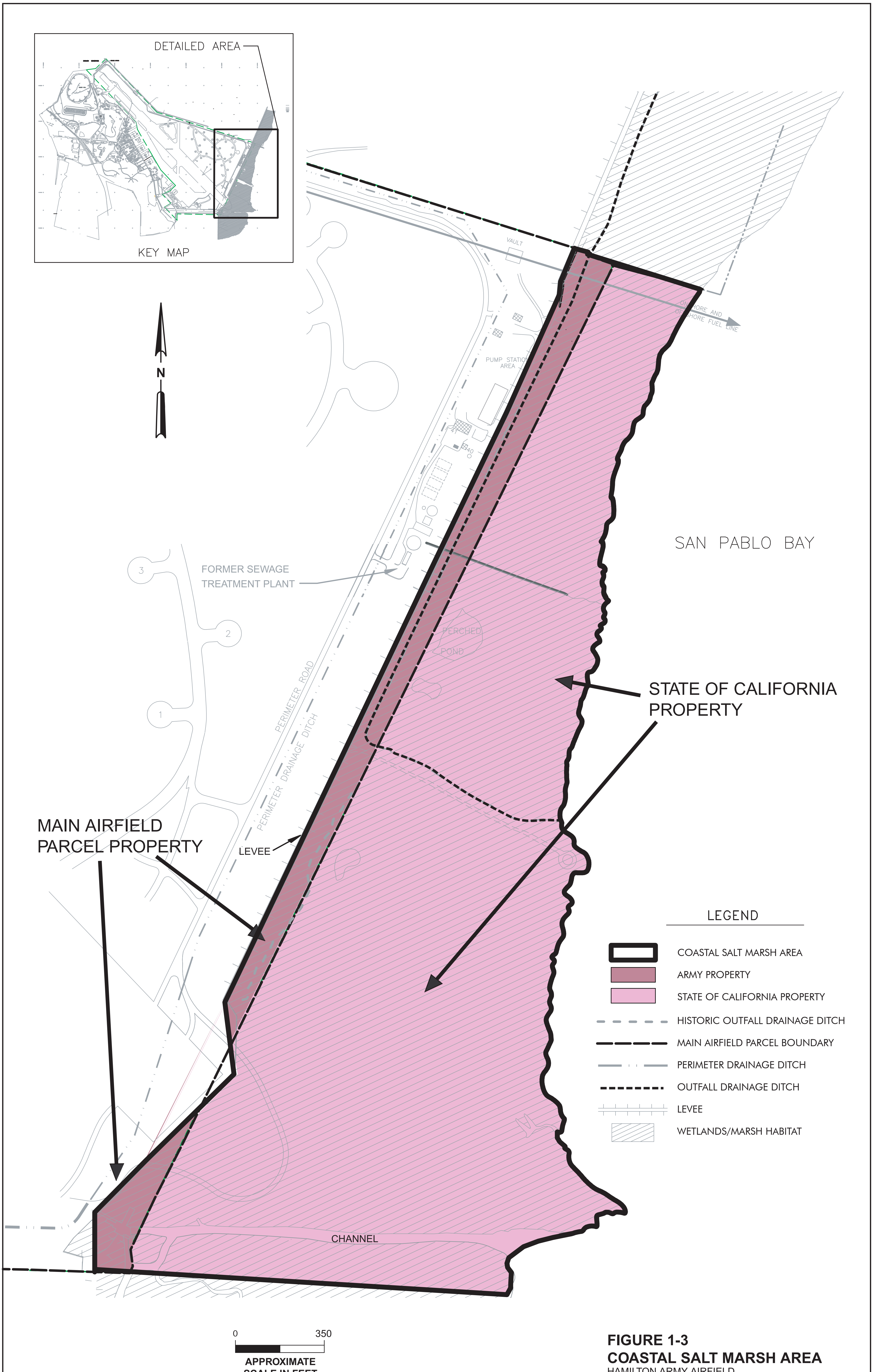

FIGURE 1-3
COASTAL SALT MARSH AREA
HAMILTON ARMY AIRFIELD

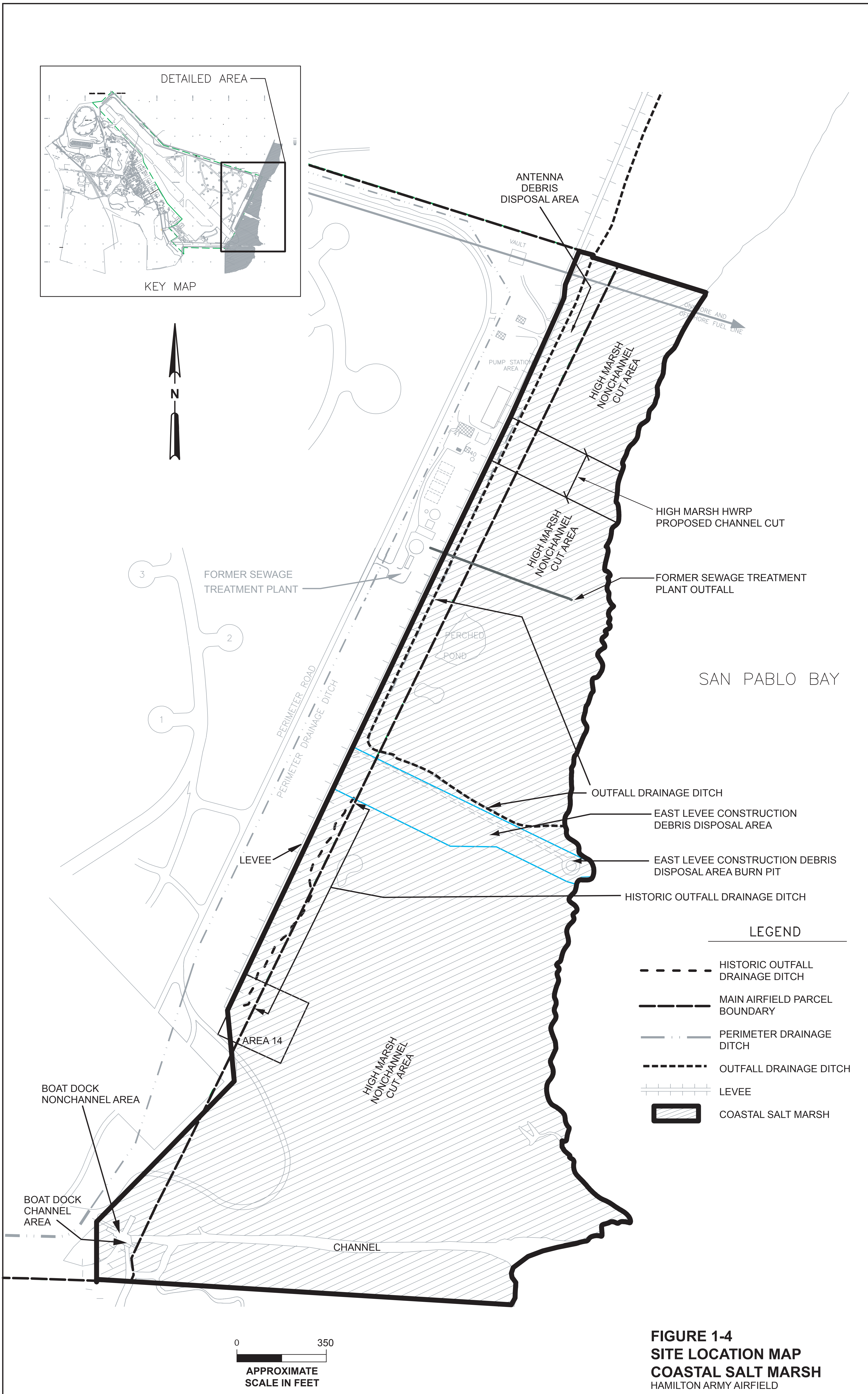

FIGURE 1-4
SITE LOCATION MAP
COASTAL SALT MARSH
HAMILTON ARMY AIRFIELD

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SECTION 2

Background

This section provides a discussion of the CSM history and setting, as well as a description of the sites identified for remedial action.

2.1 Installation History

HAAF is a former military installation located on a diked and subsided bay front parcel in the City of Novato, California. A perimeter levee excludes tidal waters from the Inboard Area of the former installation. The 644-acre Main Airfield Parcel and other parts of HAAF were identified for closure under BRAC. There are 10 acres of the parcel that lie outboard of the perimeter levee in the CSM. The remaining portion of the CSM (78 acres) is located on property owned by the SLC. Some of the sites being addressed in this FFS extend beyond the Army Main Airfield Parcel boundary onto property owned by SLC. Figure 1-4 shows the areas that are the subject of this FFS.

The U.S. Army Air Corps constructed HAAF on reclaimed tidal wetland in 1932. Before 1932, the area was known as Marin Meadows and had been used as ranch and farm land since the Mexican Land Grant (USACE, undated). Military operations began in December 1932. Bombers, transport, and fighter aircraft were based at the airfield. HAAF played a major role in World War II as a training field and staging area for Pacific Theater operations. The Airfield was renamed Hamilton Air Force Base in 1947, when it was transferred to the newly created U.S. Air Force (USAF).

In the mid-1960s, the USAF began to curtail Base operations because of increased complaints about aircraft noise and concerns for air traffic and public safety (Earth Technology Corporation [ETC], 1994). In 1974, the USAF deactivated the Base and initiated transfer of the property to other military or government agencies. In 1975, as part of the transfer process, the residential portion of the installation, along with support facilities, was transferred to the U.S. Navy. The General Services Administration (GSA) took over custodial management of other areas. In 1976, the Army was given permission to use the runway and ancillary facilities and several other buildings for regular Army and Army Reserve operations. A parcel in the hangar area went to the U.S. Coast Guard in 1983. The Army continued to use portions of HAAF on a permit basis until 1984, when the Army officially acquired portions of the airfield and property management responsibilities were transferred to the Presidio of San Francisco. Aircraft operations were again discontinued in 1994 when the base was closed.

Portions of the CSM were used to support Department of Defense operations on the main airfield. Activities within the CSM included emergency rescue operations in San Pablo Bay and disposal of construction debris. Transformers and transformer pads, a winch at the boat dock, and a burn pit at the East Levee Construction Debris Disposal Area (ELCDDA) supported these activities. Additional features of the CSM include the Outfall Drainage Ditch (ODD), which receives stormwater runoff and drainage from the main airfield, and the Former Sewage Treatment Plant (FSTP) Outfall, which received main airfield sanitary and industrial wastes from the FSTP.

2.2 Hydrogeological Setting, Ecological Communities, and Land Uses

This section describes the hydrogeology, land use, biological habitats, and biota currently existing within the CSM. This background information aids in the understanding of past work conducted at the CSM sites and, in part, provides the basis for development of remedial alternatives.

2.2.1 Existing Hydrogeological Setting

Three shallow hydrogeologic units occur within the HAAF Main Airfield Parcel and adjacent CSM: fill, soft Bay Mud, and desiccated Bay Mud. The fill was originally used to reclaim the bay margin lowlands for agriculture and has very similar content and hydrogeological properties to the Bay Mud. A different type of fill referenced in the Remedial Investigation (RI) (IT, 1999a) is the imported construction material used for geotechnical applications and foundation and drainage properties and is not part of the hydrogeologic unit. This type of fill may be found in pipeline trenches and as a bridging layer beneath some of the formerly developed areas. This fill will be referred to as “imported fill.” Permeabilities and groundwater flow characteristics are summarized below:

- Fill materials have moderate to low hydraulic conductivities. Preferential groundwater flow through the fill may be controlled by the distributions of different fill types.
- Soft Bay Mud generally has low hydraulic conductivity. Preferential flow, if existent, is probably horizontal and confined to peat layers or shell lenses, which are discontinuous and limited in aerial extent.
- Desiccated Bay Mud has low hydraulic conductivity with some fracture permeability. The desiccation cracks are potentially transient in nature and may heal or infill during periods of saturation.

2.2.2 Groundwater Use

The HAAF is located in the Novato Creek groundwater basin and is part of the regional San Pablo groundwater basin defined by the drainage entering San Pablo Bay. Existing and potential beneficial uses of groundwater within the Novato Creek basin include municipal and domestic water supply, rare and endangered species preservation, freshwater wildlife habitats, and recreational use (RWQCB, 1995).

As part of the remedial assessment summary for the adjacent GSA Phase II Sale Area (IT, 1998), the available well records at the California Department of Water Resources (DWR) and Marin County Environmental Health were reviewed to evaluate the current regional uses of groundwater within the vicinity of the HAAF. The review included all domestic, industrial, and irrigation supply wells within a 2-mile radius of the airfield and included available DWR well logs and Marin County Environmental Health records. There are 11 supply wells located within a 2-mile radius of the HAAF. Most of the wells in the vicinity of the HAAF are used for domestic or irrigation supply, and all of these wells appear to be outside the influence of historical HAAF activities. Only one well is located within 1 mile of the HAAF property boundary.

Groundwater beneath the Main Airfield Parcel and adjacent CSM is not now, nor is it likely to be, used for drinking water. State Water Resources Control Board (SWRCB) Policy 88-63 specifies that total dissolved solids (TDS) in excess of 3,000 milligrams per liter (mg/L) renders groundwater unsuitable for drinking. The TDS concentrations in groundwater from monitoring wells across the property range from 819 to 18,270 mg/L with an average TDS concentration of 4,898 mg/L (IT, 1999a). These findings indicate that groundwater beneath the Main Airfield Parcel and adjacent CSM is generally unsuitable for drinking because the average TDS concentration exceeds the 3,000 mg/L limit.

Sampling activities for groundwater are discussed in Appendix A. Based on the findings presented in Appendix A, it is concluded that no further action is required for groundwater. Groundwater is not evaluated further in this FFS report.

2.2.3 Hydrology

HAAF is in the Novato Creek Drainage Basin and Watershed (EIP Associates, 1993). Historically, tidal marsh and mudflats covered the area. The main slough channel drainage system in the HAAF panhandle area (the rectangular area to the east of Ammo Hill and to the northwest of the triangular pond) drained to the northwest into the tidal reaches of Novato Creek (Philip Williams & Associates [PWA], 1998), which then drained into San Pablo Bay. Using a system of levees and drainage ditches, the area that is now HAAF was reclaimed for agricultural use in the late 1800s.

Surface water flow is generally from the upland areas in the west toward the San Pablo Bay in the east. From areas west of HAAF, Pacheco Creek and Arroyo San Jose carry surface water along the northwestern boundary of HAAF. Both Pacheco Creek and Arroyo San Jose discharge into the Ignacio Reservoir, which occupies approximately 120 acres and has a storage capacity of 480 acre-feet (Jones and Stokes Associates [JSA], 1998). The reservoir drains into Novato Creek through a leveed channel with a flap-gate outlet located at the Bel Marin Keys Boulevard bridge.

Stormwater drainage system conduits are distributed in several general areas of the HAAF and convey water to discharge into the Perimeter Drainage Ditch (PDD) (CH2M HILL, 2001). This water is then conveyed over the levee by three pump stations (Buildings 35, 39, and 41) and discharged to the ODD, which empties into San Pablo Bay.

2.2.4 Existing/Future Land Use

The existing habitats in the CSM are discussed below. The CSM will continue to serve as a functioning salt marsh habitat in the future. This FFS evaluates the remedial alternatives based on beneficial use of the CSM as wetlands. Under the future-wetlands end-use project, the CSM will remain a tidal wetland after remediation.

2.2.5 Existing Biological Communities

This section contains descriptions of habitats and biota currently existing within the HAAF Main Airfield Parcel and the adjacent CSM. This summary is not intended to be an exhaustive compilation of plants and wildlife, but rather a list of potential ecological receptors.

Several studies since 1986 have characterized the biological resources (flora and fauna) in the vicinity of the HAAF Main Airfield Parcel. The surveys were conducted in support of environmental impact reports for base closure and subsequent use of BRAC property. The discussions of biological resources in this section are based on reports by EIP Associates (1986 and 1993) and USACE (1994). Information in these reports includes results of botanical field surveys conducted in August 1993 and May 1994, and wildlife surveys conducted in May 1994.

Additional wildlife investigations were conducted in 1997 and 1998 and include the following:

- Bat survey (LSA, 1997a)
- *California Clapper Rail* (*Rallus longirostris obsoletus*) *and California Black Rail* (*Laterallus jamaicensis coturniculus*) *Survey* (LSA, 1998)
- *Burrowing Owl* (*Athene cunicularia*) *Study and Relocation* (LSA, 1997b)
- *Red-legged Frog* (*Rana aurora*) *Survey* (LSA, 1997c)

There are some differences among the various HAAF documents as to which special-status species, of those not actually observed on the property or salt marsh areas, are likely to be present. The *Hamilton Wetland Restoration Plan, Volume II: Final EIR/EIS* (JSA, 1998) lists 56 special-status species and evaluates their potential for occurrence, or reports documented observations. It is concluded from this information that after elimination of species for which habitat is lacking or species that may only incidentally use the site, 14 special-status species are known to occur or are assumed to use suitable habitat at the site. These species include:

- Longfin smelt (*Spirinchus thaleichthys*)
- Central California steelhead (*Oncorhynchus mykiss*)
- Central California Coast Coho salmon (*Oncorhynchus kisutch*)
- Chinook salmon (*Oncorhynchus tshawytscha*)
- Double-crested cormorant (*Phalacrocorax auritus*)
- California brown pelican (*Pelicanus occidentalis californicus*)
- California clapper rail (*Rallus longirostris obsoletus*)
- California black rail (*Laterallus jamaicensis coturniculus*)
- Northern harrier (*Circus cyaneus*)
- White-tailed kite (*Elanus leucurus*)
- Burrowing owl (*Athene cunicularia*)
- Salt marsh common yellowthroat (*Geothlypis trichas sinuosa*)
- San Pablo song sparrow (*Melospiza melodia samuelis*)
- Salt marsh harvest mouse (*Reithrodontomys raviventris*)

Habitats in the Inboard Area consist primarily of upland habitat (grassland) and paved or landscaped areas. Within the Inboard Area, a portion of the site (approximately 0.25 acre) lies within Ignacio Reservoir, which is a wetland created as a mitigation measure. Ignacio Reservoir provides habitat for several species. In addition, a wildlife habitat was established at the northwest end of the site as wetland mitigation for destruction of habitat associated with the construction of a cap over Landfill 26. The Inboard Area (excluding Ignacio Reservoir) also provides habitat for the gopher snake (*Pituophis catenifer*), western fence lizard (*Sceloporus* *occidentalis*), turkey vulture (*Cathartes aura*), red-tailed hawk (*Buteo jamaicensis*), American kestrel (*Falco sparverius*), California quail (*Callipepla californica*), ring-necked pheasant (*Phasianas colchicus*), savannah sparrow (*Passerculus sandwichensis*), western meadowlark (*Sturnella neglecta*), black-tailed jackrabbit (*Lepus bennettii*), desert cottontail (*Sylvilagus audubonii*), black-tailed deer (*Odocoileus hemionus*), coyote (*Canis latrans*), striped skunk (*Mephitis mephitis*), and raccoon (*Procyon lotor*). The western burrowing owl, a species of concern, has previously occurred in the Inboard Area, and several individuals have been captured and relocated offsite. The seasonal wetlands provide foraging habitat for great egrets (*Ardea alba*), red-winged blackbirds (*Agelaius phoeniceus*), shorebirds, killdeer (*Charadrius vociferus*), raccoon, and aquatic garter snakes (*Thamnophis spp.*). Coastal salt marsh and brackish marsh under tidal influence are located between the perimeter levee at the eastern end of the project area and the open water of San Pablo Bay (Figure 1-3). This habitat can be divided into three distinct zones, based on the frequency and duration of tidal inundation (Figure 2-1) (USACE, 2000). These three zones include:

- Low marsh habitat is inundated daily and occupies the elevations between mean tide level and mean high water. In the project area, low marsh is adjacent to the open water of San Pablo Bay and is dominated by California cord grass (*Spartina foliosa*).
- Middle marsh habitat occupies the elevations between mean high water and mean higher high water and is dominated by common pickleweed (*Salicornia sp*). Middle marsh is predominant outboard of the perimeter levee and is inundated frequently throughout each month, although for shorter periods than low marsh.
- High transitional marsh habitat occupies the elevations between mean higher high water and the highest tide level; this habitat is inundated infrequently and for short periods. High marsh habitat occupies a narrow strip along the bay side of the levee and supports plant species that are tolerant of saline conditions, but have not adapted to frequent, long-term inundation. These species include salt grass (*Distichlis spicata*), alkali heath (*Frankenia salina*), fat-hen salt plant (*Atriplex fatula*), and gum plant (*Grindelia sp*).

The tidal coastal salt marsh community provides food, cover, and breeding habitat for many wetland-dependent wildlife species. The dense vegetation and large invertebrate populations typically associated with salt marshes provide ideal nesting and foraging conditions for a variety of bird species including rails, egrets, herons, waterfowl, and shorebirds. In addition to being important habitat for wetland-associated wildlife, the salt marsh community is also a crucial component of the San Pablo Bay ecosystem, providing nutrients and organic matter to the mudflats and open water of the bay. These, in turn, are important habitats for a variety of waterfowl, shorebirds, and other water birds. Wildlife species observed in this habitat include double-crested cormorant, great blue heron (*Ardea herodias*), great egret, American coot (*Fulica americana*), killdeer, northern harrier (*Circus cyaneus*), black rail, California clapper rail, and San Pablo song sparrow. Other species expected to use coastal salt marsh habitat include the longfin smelt, small fish, invertebrates, raccoon, shrews, salt marsh harvest mouse (*Reithrodontomys raviventris*), mallard (*Anas platyrhynchus*), sora (*Porzana carolina*), Virginia rail, the endangered California brown pelican (*Pelecanus occidentalis californicus*), salt marsh yellowthroat (*Geothlypis trichas sinuosa*), and willet (*Catoptrophorus semipalmatus*).

Brackish marsh occurs along portions of the ODD. Because marsh vegetation associated with ditches occurs in narrow linear bands, these habitat areas typically support a lower diversity of wildlife than do larger, more contiguous units of brackish marsh. Drainage ditch banks and channels also provide foraging habitat and cover for species such as herons, egrets, and dabbling ducks, and movement corridors for striped skunks, raccoons, and other species.

2.3 Historical Investigations

Numerous activities were conducted in the CSM between 1987 and 2002. Historical activities included a confirmation study for hazardous waste, remedial investigations, biological testing data studies, and a human health and ecological risk assessment. The following primary documents discuss the findings of these activities.

- *Coastal Salt Marsh December 2001/January 2002 Sampling Report* (USACE, 2002a)—The Army collected additional soil samples at the CSM 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 Area and the Boat Dock Nonchannel Area.
- *Draft Channel Cut Sampling Report, Coastal Salt Marsh* (USACE, 2002b)—The Army conducted this specific investigation to evaluate the soil within the High Marsh Proposed Channel Cut Area.
- *Human Health and Ecological Risk Assessment* (U.S. Army, 2001)—A human health and ecological risk assessment was completed for the CSM 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 Report* (IT, 1999a)—CSM 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 used to determine baseline (or background) concentrations for metals and PAHs in sediment and soil.
- *Final Biological Testing Data Report* (IT, 2000)—Sediment and benthic organism samples were collected from the Outfall Drainage Ditch and marsh plain. Similar samples for comparison also were collected from a nearby marsh channel at China Camp. The samples were analyzed for chemical, toxicological, and physical parameters.
- *1998 Interim Removal Action Data Report* (IT, 1999c)—An interim removal action was conducted at the transformer pad within the Boat Dock Nonchannel Area.

2.4 Nature of Contamination

As described in Section 2.1, portions of the CSM were used to support U.S. Army and U.S. Army Reserve operations on the main airfield. Activities within the CSM area included emergency rescue operations in San Pablo Bay, disposal of construction debris, 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 East Levee Construction Debris Disposal Area supported these activities. Additional features of the CSM area include the ODD, which receives stormwater runoff and drainage from the main airfield, and the FSTP Outfall, which received sanitary wastes from the FSTP. Based on historical investigations, the types of contaminants detected at various sites within the CSM area include:

- Total petroleum hydrocarbons (TPH) diesel (TPH-d) and gasoline (TPH-g)
- Metals
- Dioxins
- Volatile organic compounds (VOCs)
- Semivolatile organic compounds (SVOCs) including PAHs
- Polychlorinated biphenyls (PCBs)
- Pesticides

2.5 Description of Coastal Salt Marsh Sites

This section briefly describes the eight CSM sites evaluated in this FFS. Figure 1-4 shows the general location of each CSM site. Additional detailed information on these sites, including characterization results, can be found in the references summarized in Section 2.3. The baseline risk assessment for HAAF included analysis of data collected from seven of eight CSM sites. The following CSM sites are carried through the FFS for evaluation, as listed below:

- Antenna Debris Disposal Area
- East Levee Construction Debris Disposal Area (divided into two subsites: Burn Pit Area and Nonburn Pit Area)
- High Marsh Area (divided into two sub-sites: Proposed Hamilton Wetland Restoration Project [HWRP] Channel Cut Area and Nonchannel Cut Area)
- Historic ODD
- ODD
- Boat Dock (divided into two sub-sites: Channel Area and Nonchannel Area)
- Area 14
- FSTP Outfall

The following sections describe each CSM site and summarize the types of contaminants (metals, pesticides, TPH, etc.) detected at each site. Detection of a contaminant at a site does not dictate whether remedial action is required. Section 3 discusses concentrations of contaminants in more detail and compares detected concentrations to action goals. Specific information regarding sample locations and individual sample results is also available in the primary reports cited for each CSM site. The purpose of this FFS is to summarize this information and to indicate when alternatives should be developed and evaluated for a site.

2.5.1 Antenna Debris Disposal Area

The Antenna Debris 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 located east of the ODD and one to the west of the ODD (see Figure 1-4). Visual inspection of the areas indicates that the areas contain discarded materials from the former antenna facilities and building materials. The December 2001/January 2002 investigation (USACE, 2002a) found debris to a depth of 8.5 feet below ground surface (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 as ASR Site No. 15.

The western Antenna Debris Area was investigated by the Army in 1995 (Woodward-Clyde Federal Services [WCFS], 1996), 1999 (FW, 2002) and in December 2001/January 2002 (USACE, 2002a). During the 1995 and 1999 investigations, eight soil samples were collected in and near the western area (see Figure 2-2). 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, and PCBs were detected in the sample. Concentrations of chemicals detected are compared to remediation goals in Section 3. No samples were collected from the eastern Antenna Debris Area during the 1995 or 1999 investigations.

In December 2001 and January 2002(USACE, 2002a), the Army collected soil samples from the eastern area and additional samples from the western area (see Figure 2-2). 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. Sampling at the eastern and western areas resulted in detections of metals, pesticides, TPH, and PCBs. Section 3 compares concentrations of chemicals detected to action goals. A list of samples used to characterize the site is provided in Appendix B, Table B-1.

2.5.2 East Levee Construction Debris Disposal Area

The ELCDDA is located on the eastern margin of the Main Airfield Parcel within the CSM and outboard of the east levee. It is bisected by the eastern boundary of the Main Airfield Parcel and lies primarily within land owned by the SLC (see Figure 1-4). The ELCDDA was used from 1961 to 1974, primarily for the disposal of construction debris. A dirt road runs across the northern portion of the ELCDDA extending from the perimeter levee to a burn pit near the shoreline of San Pablo Bay. Pickleweed grows up to the edges of the road. This site was identified in the Archive Search Report as ASR site No. 13.

The ELCDDA includes a burn pit located at the eastern end. The area of the burn pit extends out into San Pablo Bay and has a slightly higher elevation than most of the ELCDDA and the CSM. The nature and quantity of any wastes burned at the site are not known, and no waste materials were evident at the surface or in soil samples collected at the site.

The ELCDDA was investigated by the Army in 1986 (Woodward-Clyde Consultants [WCC], 1987), 1990 (Engineering-Science, Inc. [ESI], 1993), 1994 (USACE, 1994; WCC, 1994), and 1995 (WCFS, 1996), 1997 (IT, 1999a), and December 2001/January 2002 (USACE, 2002a). During these investigations, trench sampling and soil samples were collected and analyzed (see

Figure 2-3). TPH-d, TPH-g, SVOCs, VOCs, PCBs, pesticides, dioxins, and metals have been detected in one or more soil samples from the site. Concentrations of chemicals detected are compared to action goals in Section 3.

In December 2001 and January 2002 (USACE, 2002a), 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 (see Figure 2-4). The objective of the sampling was to investigate the extent of known chemicals detected in the previous investigations at the burn pit and to characterize the extent of contamination at an isolated location on the ELCDDA. Sampling at the ELCDDA indicated the presence of metals. Concentrations of chemicals detected are compared to action goals in Section 3. A list of samples used to characterize the site is provided in Appendix B, Table B-2.

2.5.3 High Marsh Area

As described in Section 2.2.4, three primary habitat zones are present within the CSM (Low Marsh, Middle Marsh, and High Marsh). The High Marsh Areas are located on that portion of the CSM plain that is dominated by middle marsh habitat (pickleweed). The area extends from the northern to southern Main BRAC Airfield Property boundaries and east from the levee nearly to the shoreline of San Pablo Bay. A portion of the High Marsh Area is located within the Main Airfield Parcel (see Figure 1-4).

The Army has investigated several areas within the middle marsh habitat as potential areas of concern (see Figure 2-5 and 2-6). Although the areas are located in the middle marsh habitat, these areas are collectively known as, and are referred to in many of the CSM investigation and planning documents as, the High Marsh Areas. To remain consistent with previous documents, the term High Marsh or High Marsh Areas will be used to refer to areas/sites located outboard of the perimeter levee that are not part of another identified site. For the purposes of this FFS and the development and evaluation of alternatives, the High Marsh Areas have 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 Areas. Samples from the ODD and Historic ODD are not included in the High Marsh Areas. They are discussed and evaluated in Sections 2.5.4 and 2.5.5, respectively.

2.5.3.1 Nonchannel Cut Area

The High Marsh Areas were investigated by the Army in 1991 and 1992 (ESI, 1993), 1994 (USACE, 1994), 1995 (WCFS, 1996), 1997 and 1998 (IT, 1999a), and December 2001/January 2002 (USACE, 2002a). During these investigations, sediment samples were collected and analyzed for a variety of constituents within the Nonchannel Cut Area (see Figure 2-5). The area near the pump station outfalls to the bay was identified in the Archive Search Report as ASR Site No. 16. Various contaminants, including metals and pesticides, have been detected in samples collected in the Nonchannel Cut Area. Concentrations of chemicals detected are compared to action goals in Section 3. A list of samples used to characterize the site is provided in Appendix B., Table B-3.

In December 2001 and January 2002, the Army collected soil and sediment samples from portions of the Nonchannel Cut Area (see Figure 2-5). The objective of the sampling was to characterize copper and manganese contamination at a location on the northern end of the High Marsh, to characterize the extent of metals contamination (particularly lead) on the northern end of the High Marsh, and to characterize the extent of manganese contamination in the central portion of the High Marsh. Sampling at the High Marsh Nonchannel Cut Area sites resulted in detections of metals and pesticides. Concentrations of chemicals detected are compared to action goals in Section 3. A list of samples used to characterize the site is provided in Appendix, B, Table B-3.

2.5.3.2 Proposed Channel Cut Area

The High Marsh was investigated by the Army in 1991 and 1992 (ESI, 1993), 1994 (USACE, 1994), 1995 (WCFS, 1996), 1997 and 1998 (IT, 1999a), and September 2001 (USACE, 2002a). During these investigations, sediment samples were collected and analyzed for a variety of constituents within the Proposed HWRP Channel Cut Area (see Figure 2-6). In 1993, metals were detected above baseline concentration (the cumulative concentration of an analyte present in soil through 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 within the Proposed HWRP Channel Cut Area. In 1995, metals were detected at all sampled locations within the Proposed HWRP Channel Cut Area of the High Marsh. PAHs and two pesticides (chlordane and DDT) were detected within the Proposed HWRP Channel Cut Area. Concentrations of chemicals detected are compared to action goals in Section 3.

In September 2001, the Army conducted a specific investigation to evaluate the soil within the Proposed HWRP 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 HWRP Channel Cut Area. Concentrations of chemicals detected are compared to action goals in Section 3. A list of samples used to characterize the site is provided in Appendix B., Table B-3.

2.5.4 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 boat dock area, where it joins the boat dock channel and runs to San Pablo Bay (see Figure 2-7). 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.

Two sediment samples were collected by the Army in the Historic ODD during the 1995 WCFS investigation (WCFS, 1996). Metals, including cadmium, cobalt, lead, and manganese, were present in the samples. Concentrations of chemicals detected are compared to action goals in Section 3.

The Historic ODD was investigated by the Army in December 2001 (USACE, 2002b). During the investigation, the Army collected soil and sediment samples at 250-foot intervals along the Historic ODD (see Figure 2-7), in order to characterize the extent of contamination. Some metals and pesticides were detected. Concentrations of chemicals detected are compared to action goals in Section 3. A list of samples used to characterize the site is provided in Appendix B, Table B-4.

2.5.5 Outfall Drainage Ditch

The ODD is located on the CSM side of, and parallel to, the east perimeter levee (see Figure 2-8). 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 Bay. The ODD receives water from the airfield stormwater collection system. The water is discharged to the ODD from the pump house area. When the runway extension was constructed, 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 BRAC Property to the northern edge of the ELCDDA. From this point, the ditch makes a 90-degree turn and runs to its discharge point to San Pablo Bay. The ODD is approximately 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, 1998, and 1999 (IT, 1999a); and January 2002 (USACE, 2002b). During these investigations, sediment samples were collected and analyzed for a variety of constituents within the ODD (see Figure 2-8). TPH, metals, PCBs, and pesticides were detected in sediment samples collected from the ODD. Specifically, in 1994, metals, TRPH, and TPH-d were detected in the Building 41 pump station outfall area. Concentrations of chemicals detected are compared to action goals in Section 3.

In January 2002, the Army collected sediment samples from the ODD (see Figure 2-8). The objective of the sampling was to investigate the extent of chemicals detected in the previous investigations at the outfalls, to address the downstream extent of contamination from the outfalls, and to characterize the portion of the ODD upstream of the outfalls. Sampling at the ODD resulted in detections of metals, TPH, and pesticides. Concentrations of chemicals detected are compared to action goals in Section 3. A list of samples used to characterize the site is provided in Appendix B, Table B-5.

2.5.6 Boat Dock

For purposes of this FFS, the boat dock was divided into two areas, the Nonchannel Area and the Channel Area.

2.5.6.1 Nonchannel Area

The boat dock is located at the southeast corner of the Main Airfield Parcel Property within the CSM (see Figure 1-4). 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 and 1998 (IT, 1999a) and in 1999 (FW, 2000). During these investigations, soils samples were collected and analyzed for a variety of constituents within the Nonchannel Area (see Figure 2-9). 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. Concentrations of chemicals detected are compared to action goals in Section 3. A list of samples used to characterize the site is provided in Appendix B, Table B-6.

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 within the Nonchannel Area where one or more soil samples contained PCBs at concentrations at or above guidance levels (IT, 1999a). The interim removal action involved the removal of approximately 24 cubic yards of impacted soil at the transformer pad, with offsite disposal of the excavated soil and the removal of the transformer pad (IT, 1999b). Five confirmation soil samples were collected after excavation to ensure the achievement of interim removal action guidance levels (concentrations of specific contaminants used to establish excavation limits during interim removal actions). There were no PCB detections in the confirmation samples. After completion of confirmation sampling, soil from a borrow area located in the Main Airfield was used to backfill the excavation.

2.5.6.2 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 were discontinued during the 1960s. Since maintenance has stopped, the original contours of the channel leading from the dock to the bay have changed dramatically, as a result of deposition of silt from San Pablo Bay. Construction completion reports from circa 1933 indicate the bottom of the channel was 80 feet wide as constructed (U.S. Army, circa 1933). The depth of the channel as constructed was 5 feet below mean lower low water. The turnaround area was 300 feet by 200 feet as constructed and could accommodate boats up to 40 feet in length. 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, 2002a). Foster Wheeler collected a single sediment sample from the boat dock channel (see Figure 2-9). The sample contained pesticides, herbicides, PAHs, TPH, VOCs, and metals. Concentrations of chemicals detected are compared to action goals in Section 3. Given the significant amount of sedimentation that occurred in the channel following abandonment of the boat dock in the Channel Area, it is not clear whether the sample results characterize current conditions or possible historical affects from the boat dock area.

In December 2001, the Army collected additional sediment samples (USACE, 2002b) from the Channel Area (see Figure 2-9). The objective of the sampling was to determine whether the contamination found in the channel at the boat dock can be attributed to Department of Defense activities. Sampling at the Channel Area indicated the presence of metals. Concentrations of chemicals detected are compared to action goals in Section 3. A list of samples used to characterize the site is provided in Appendix B, Table B-6.

2.5.7 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 2-10). This site was identified in the Archive Search Report (USACE, 2003) as ASR Site No. 14.

The Army investigated Area 14 in December 2001 / January 2002 (USACE, 2002b). 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. Concentrations of chemicals detected are compared to action goals in Section 3. A list of samples used to characterize the site is provided in Appendix B, Table B-7.

2.5.8 Former Sewage Treatment Plant Outfall

The discharge point of the FSTP is located southeast of the Pump Station Area in the CSM. 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 CSM. The terminus of the outfall pipeline is near the edge of the vegetated portion of the CSM. 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 Plant Outfall was investigated by the Army in 1991 (ESI, 1993), 1995 (WCFS, 1996), and December 2001 / January 2002 (USACE, 2002b). ESI collected a sediment sample 50 feet beyond the terminus of the outfall pipe within 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 from the outfall basin (WCFS, 1996) (see Figure 2-11). The sediment sample contained metals (including mercury), SVOCs, and PAHs. Concentrations of chemicals detected are compared to action goals in Section 3.

In December 2001 and January 2002 (USACE, 2002b), the Army collected additional soil and sediment samples from the FSTP Outfall (see Figure 2-11). The objective of the sampling was to investigate the extent of mercury detected in a previous investigation. Concentrations of chemicals detected are compared to action goals in Section 3. A list of samples used to characterize the site is provided in Appendix B, Table B-8.

2.6 Summary of Human Health and Ecological Risk Assessment

The Army prepared a baseline risk assessment for the CSM sites, including the High Marsh ELCDDA, Boat Dock, ODD, and Antenna Debris Disposal Area. 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 effects to human health and the environment resulting from the exposure of receptors to contaminants in soil and sediment that may be associated with historical activities within the CSM sites (U.S. Army, 2001).

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

Because of the high certainty that the future habitat at the CSM sites will be marsh, the ecological risk assessment considered only estuarine biota to characterize risk at these sites. The risk assessment evaluated the following ecological receptors for each CSM site:

- Algae (subtidal marsh)
- Pickleweed (high marsh)
- Amphipods (intertidal marsh)
- Bay shrimp (subtidal marsh)
- Northern anchovies (subtidal marsh)
- Juvenile salmonids (subtidal marsh)
- California clapper rail (intertidal marsh)
- California black rail (intertidal marsh)
- Double-crested cormorant (subtidal marsh)
- Salt marsh harvest mouse (high marsh)

Data results from investigations conducted at the CSM sites were evaluated using EPA guidance documents (EPA, 1998 and 1990) to determine whether they could be used in the risk assessment. Usable data were obtained from the following sources:

- *Final Report Confirmation Study for Hazardous Waste*, *Hamilton Air Force Base*, (WCC, 1987)
- *Final Environmental Investigation Report*, *Hamilton Army Airfield, Volume I* (ESI, 1993)
- *Supplement to the Final Environmental Investigation Report*, *Hamilton Army Airfield, California* (USACE, 1994)
- *Additional Environmental Investigation Report of BRAC Property*, *Hamilton Army Airfield* (WCFS, 1996)
- *Comprehensive Remedial Investigation Report*, *BRAC Property, Hamilton Army Airfield, Novato, California* (IT, 1999a)
- *1998 Interim Removal Action Data Report* (IT, 1999c)
- *Final Biological Testing Data Report* (IT, 2000)
- *Environmental Investigation Report, Onshore Fuel Line*, *BRAC Property* (IT, 1997b)
- *Remedial Design Investigation Final Data Report* (FW, 2000)

The risk assessment evaluated numerous human health and ecological chemicals of potential concern (COPCs) and identified chemicals of concern (COCs) as a result of the evaluation. 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 a potential to adversely impact human health or the environment. COCs are COPCs that were evaluated during the risk assessment and determined to pose unacceptable risk to human health or the environment. The COCs identified during the human health and ecological risk assessment are presented in Appendix C.

The risk assessment also presented target concentrations of chemicals for use in characterizing potential risks to humans and ecological receptors. A target concentration is an estimated upper-bound concentration of a chemical (in either soil or sediment) below which there is very low potential for adverse effects in a specified receptor due to exposures to the chemical. The risk assessment calculated target concentrations to underestimate the probable threshold level at which there is a risk of adverse effect by incorporating conservatively estimated exposure factors, toxicity benchmarks, or other effect levels and associated uncertainty factors to ensure that target concentrations represent acceptable conditions.

Target concentrations incorporate both toxicity and exposure information that is relevant to the exposure scenario for the CSM to establish an acceptable concentration of a chemical in environmental media. They are CSM-receptor-specific because they incorporate exposure assumptions specific to the current and anticipated future habitats and human uses of the CSM.

As described in Section 3, the FFS uses target concentrations from the risk assessment to establish action goals when no other source for these goals was available.

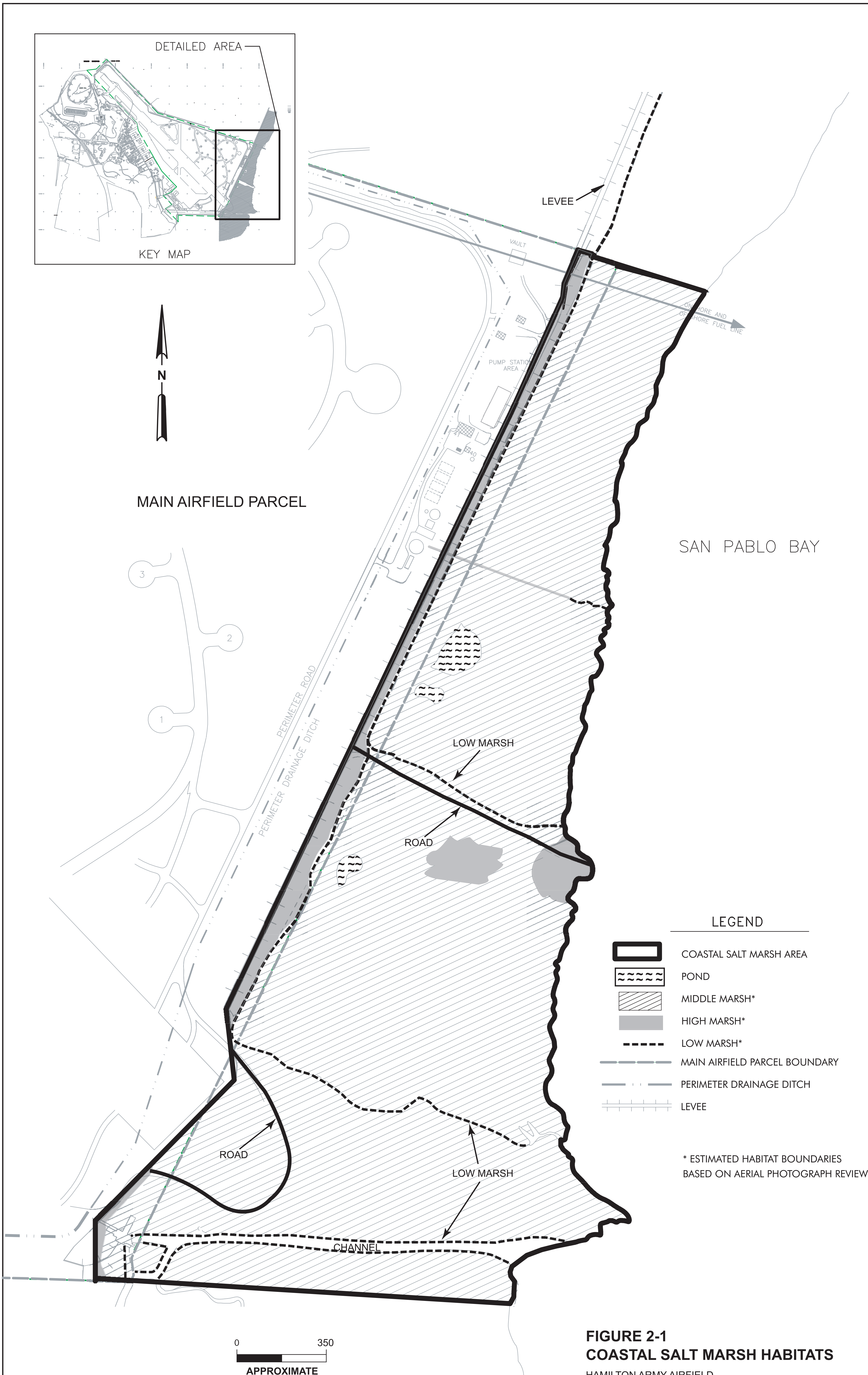


FIGURE 2-1
COASTAL SALT MARSH HABITATS
HAMILTON ARMY AIRFIELD

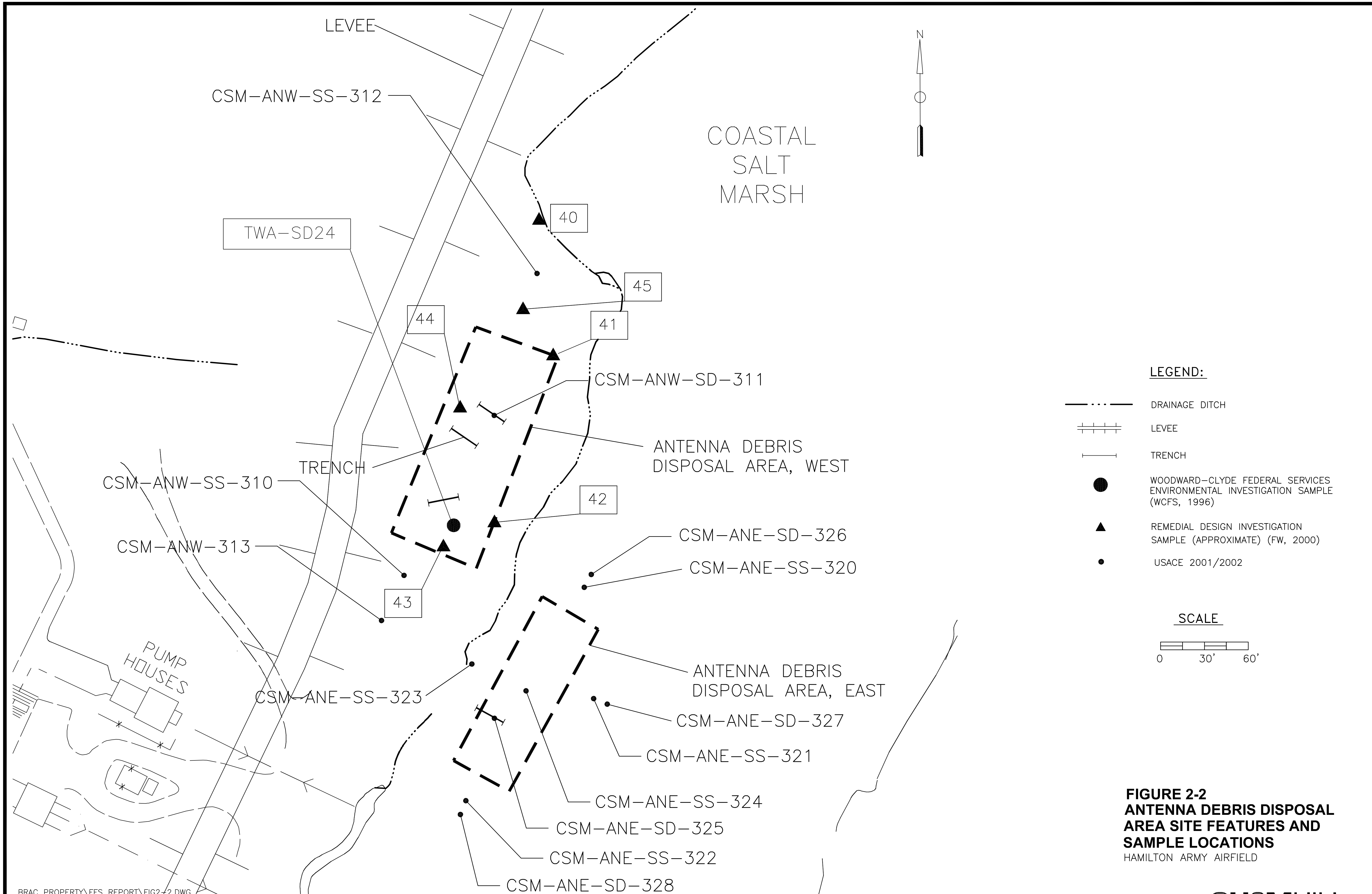


FIGURE 2-2
ANTENNA DEBRIS DISPOSAL AREA SITE FEATURES AND SAMPLE LOCATIONS
HAMILTON ARMY AIRFIELD

CH2MHILL

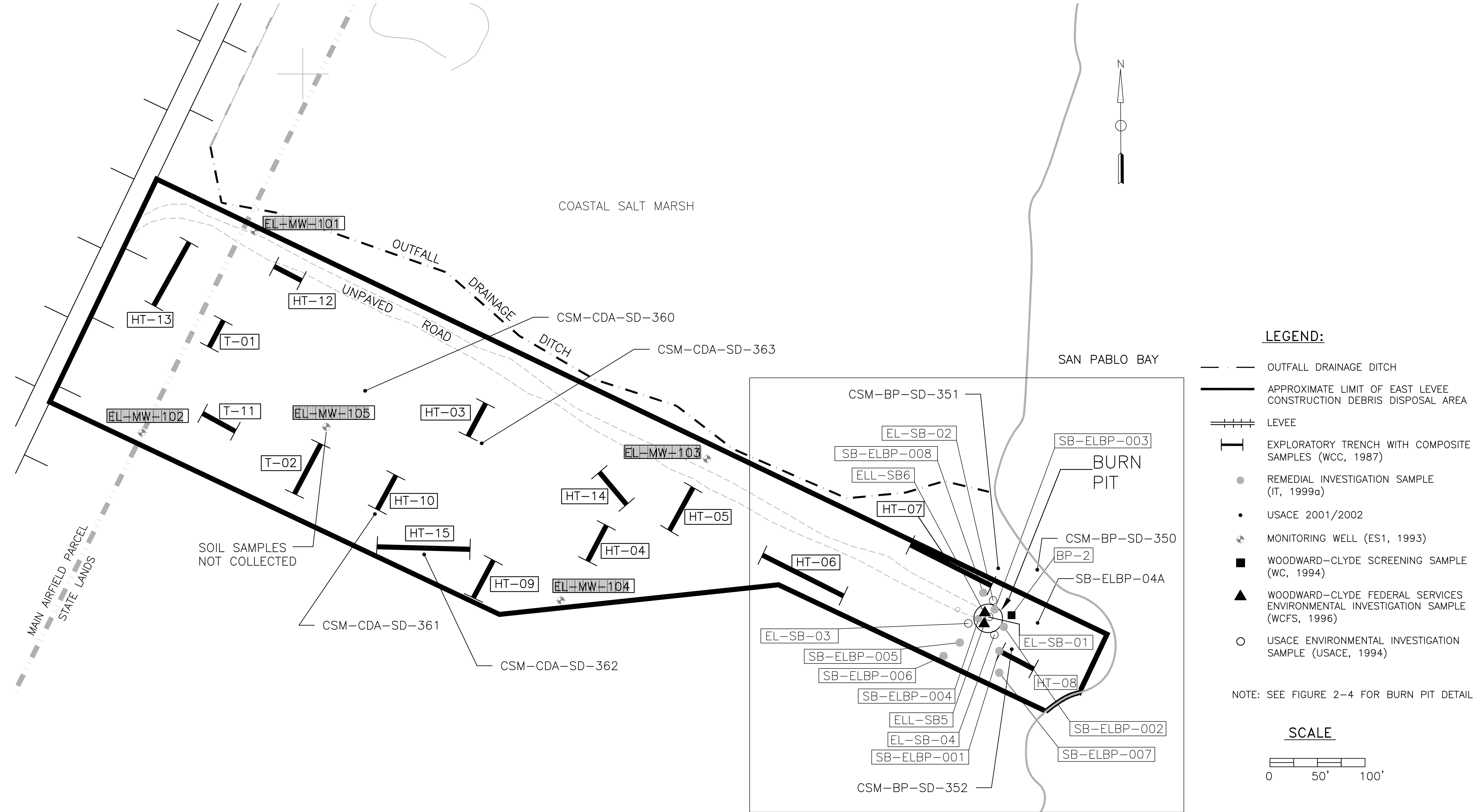


FIGURE 2-3
EAST LEVEE CONSTRUCTION DEBRIS DISPOSAL AREA SITE FEATURES AND SAMPLE LOCATIONS
HAMILTON ARMY AIRFIELD

BRAC PROPERTY\FFS REPORT\FIG2-3.DWG

CH2MHILL

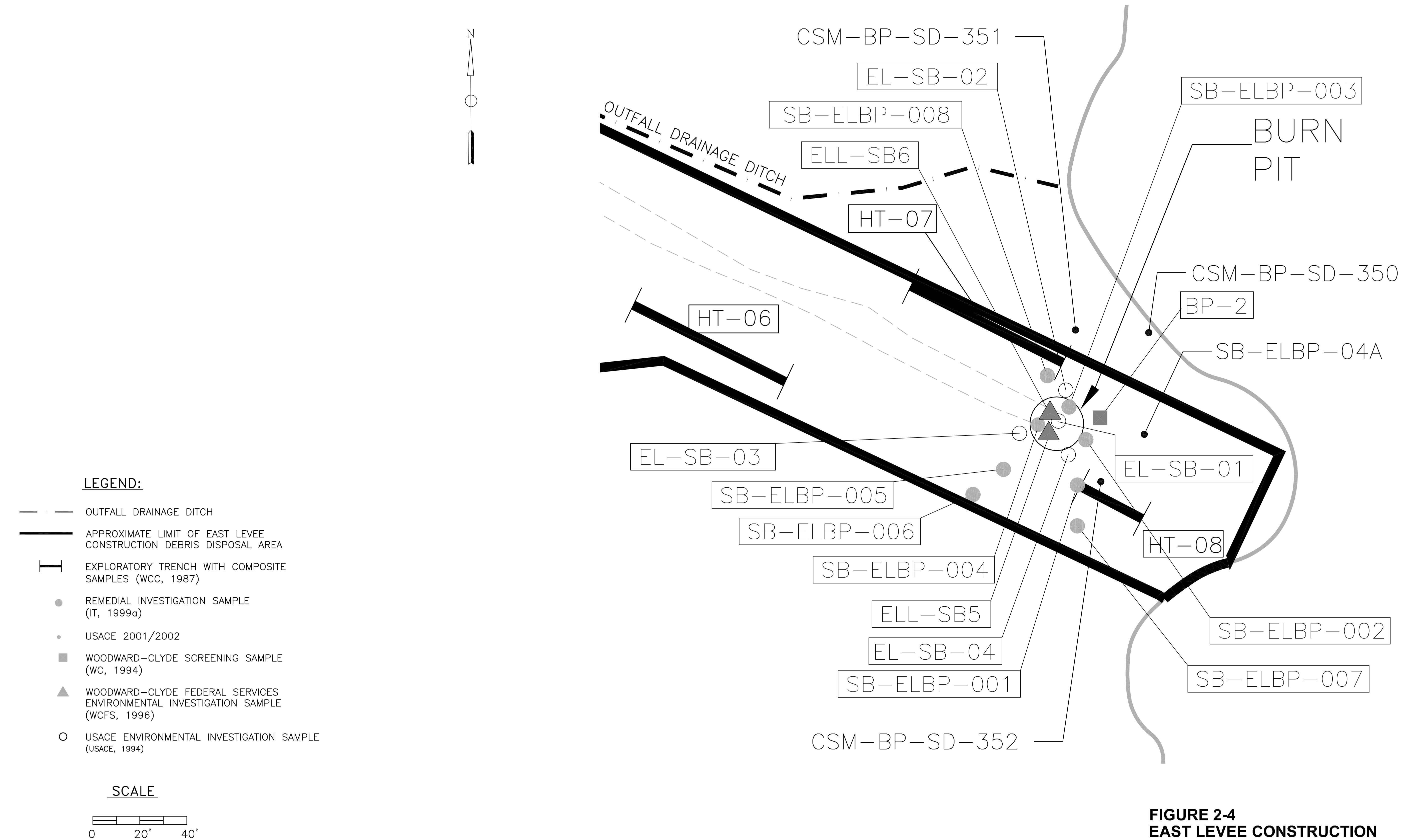


FIGURE 2-4
EAST LEVEE CONSTRUCTION DEBRIS DISPOSAL AREA BURN PIT SITE FEATURES AND SAMPLE LOCATIONS
HAMILTON ARMY AIRFIELD

BRAC PROPERTY\FFS REPORT\FIG2-4.DWG

CH2MHILL

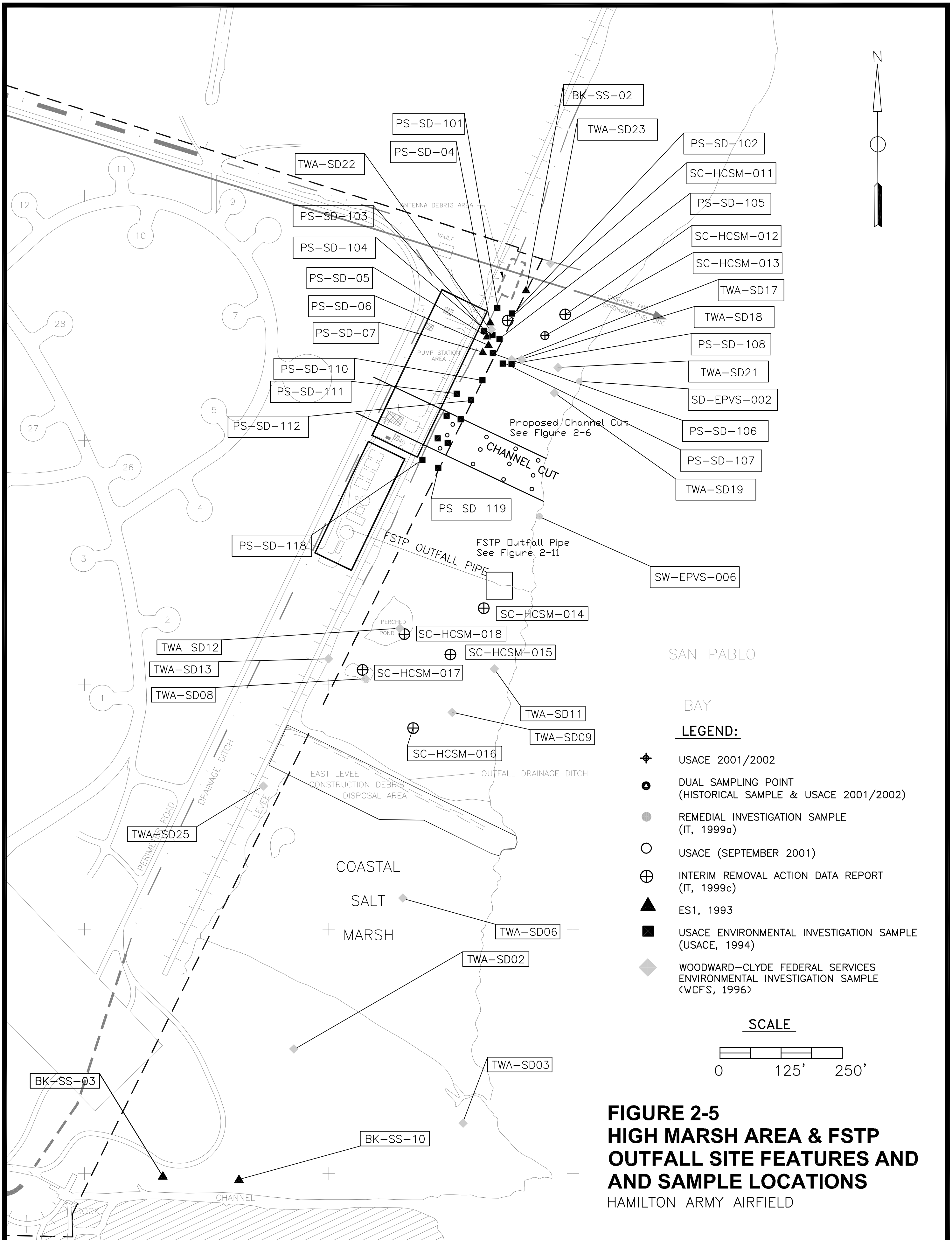
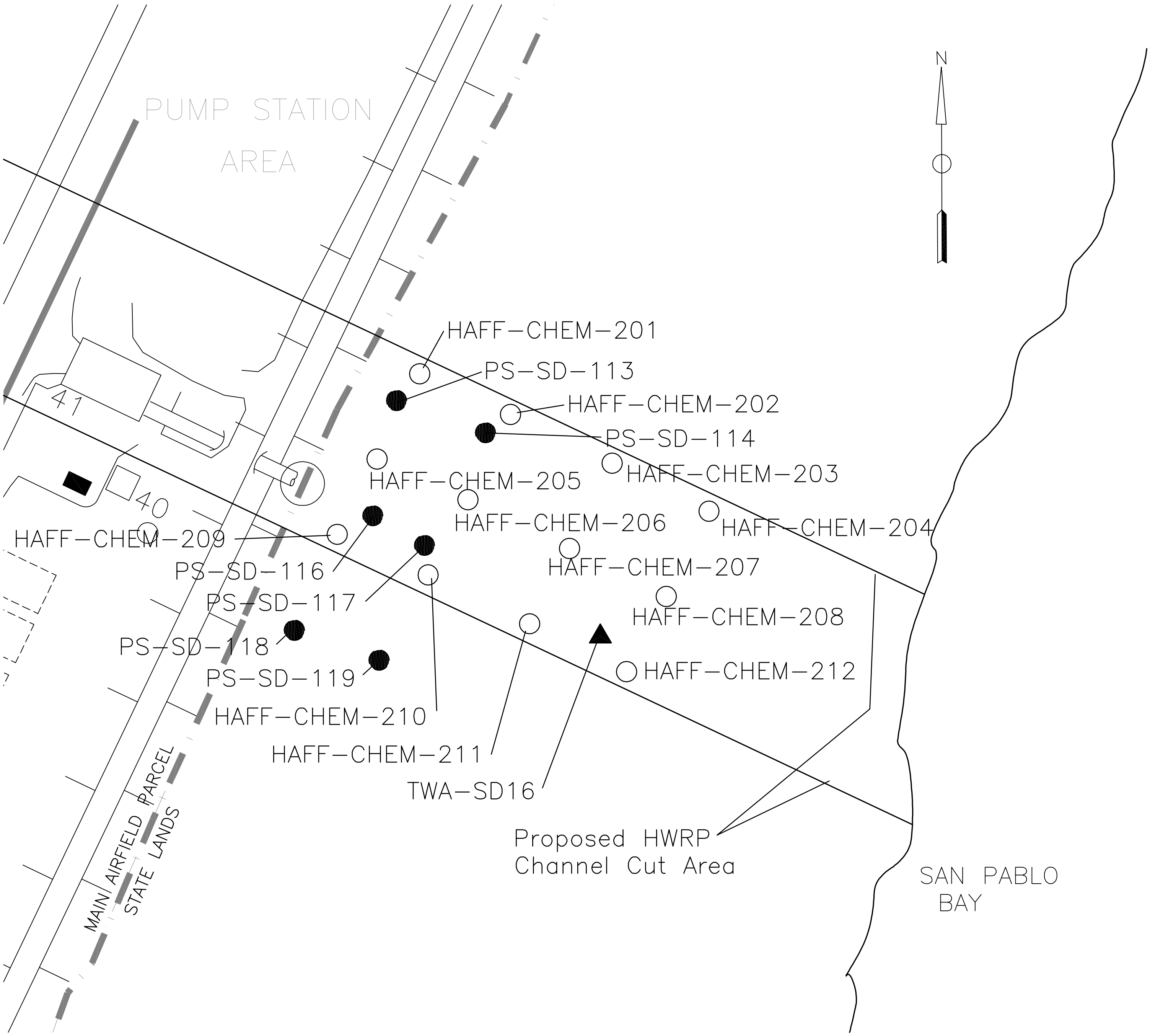


FIGURE 2-5
HIGH MARSH AREA & FSTP OUTFALL SITE FEATURES AND AND SAMPLE LOCATIONS
HAMILTON ARMY AIRFIELD

CH2MHILL

BRAC PROPERTY\FFS REPORT\FIG2-5.DWG



LEGEND:

○ USACE SEPT 2001

● USACE ENVIRONMENTAL INVESTIGATION SAMPLE (USACE, 1994)

▲ WOODWARD-CLYDE FEDERAL SERVICES ENVIRONMENTAL INVESTIGATION SAMPLE (WCFS, 1996)

— — COASTAL SALT MARSH BOUNDARY

SCALE

0 50' 100'

FIGURE 2-6
PROPOSED HWRP CHANNEL CUT SITE FEATURES AND SAMPLE LOCATIONS
HAMILTON ARMY AIRFIELD

BRAC PROPERTY\FFS REPORT\FIG2-6.DWG

CH2MHILL

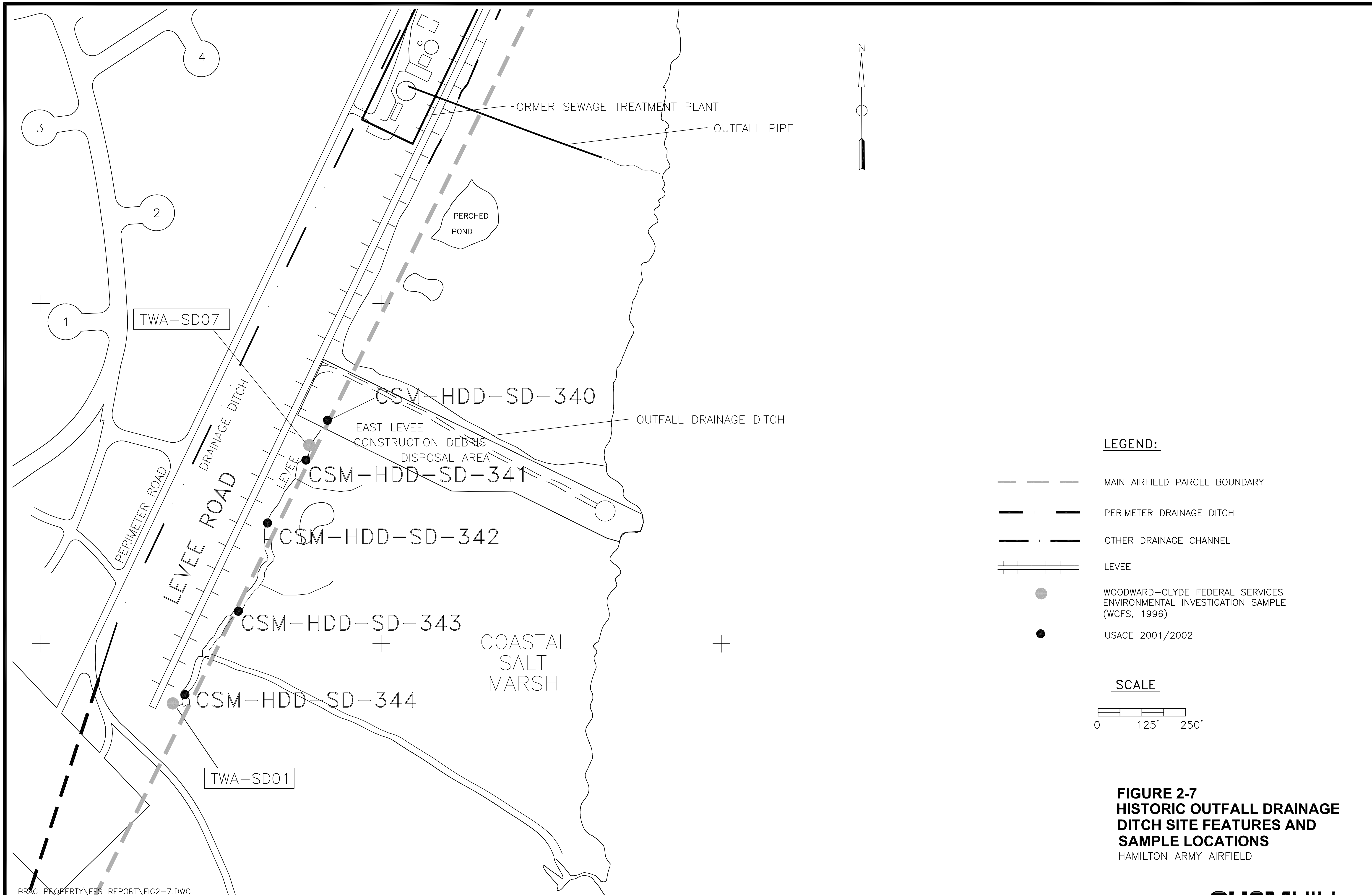


FIGURE 2-7
HISTORIC OUTFALL DRAINAGE DITCH SITE FEATURES AND SAMPLE LOCATIONS
HAMILTON ARMY AIRFIELD

CH2MHILL

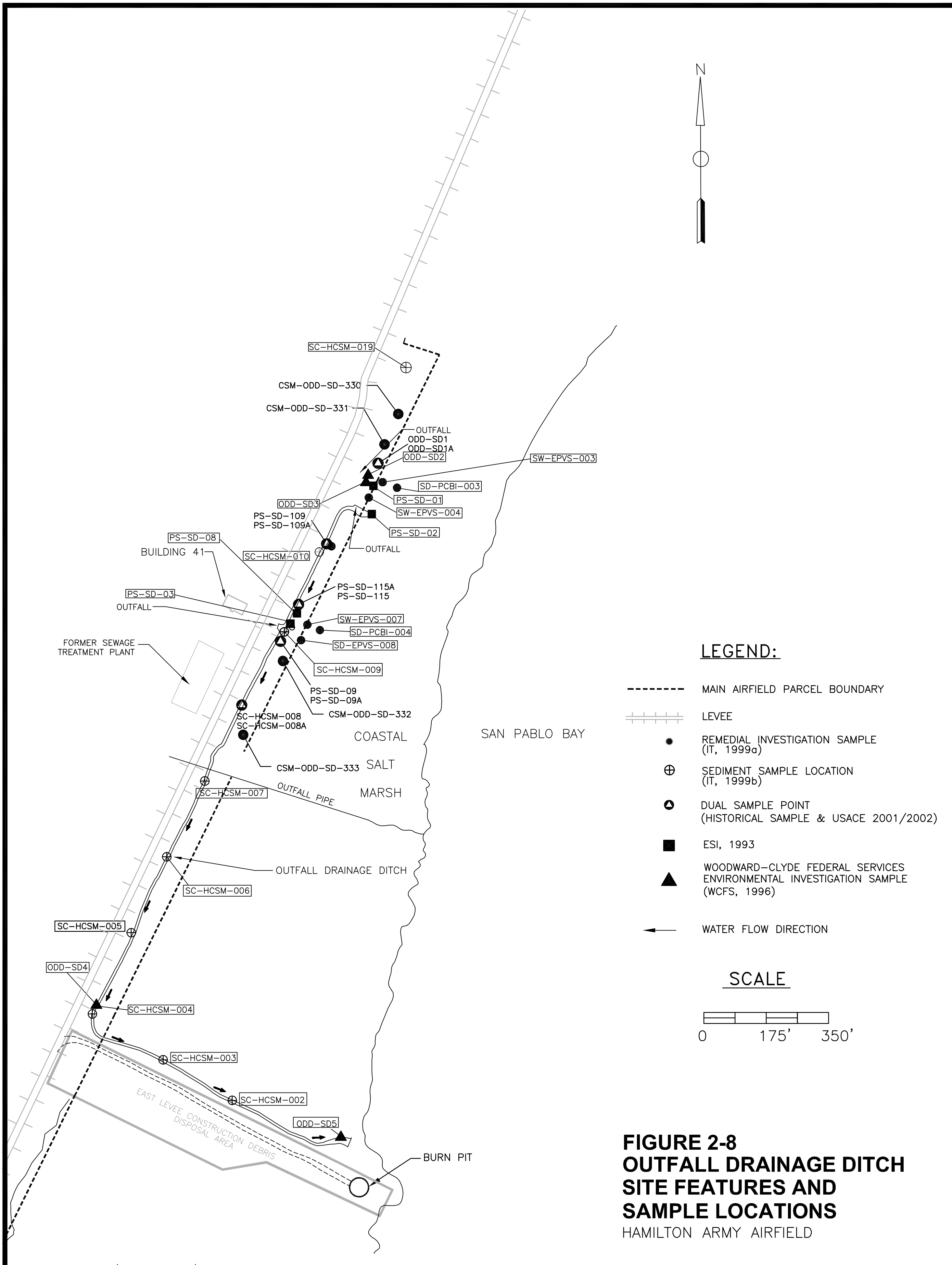


FIGURE 2-8
OUTFALL DRAINAGE DITCH SITE FEATURES AND SAMPLE LOCATIONS
HAMILTON ARMY AIRFIELD

BRAC PROPERTY\FFS REPORT\FIG2-8.DWG

CH2MHILL

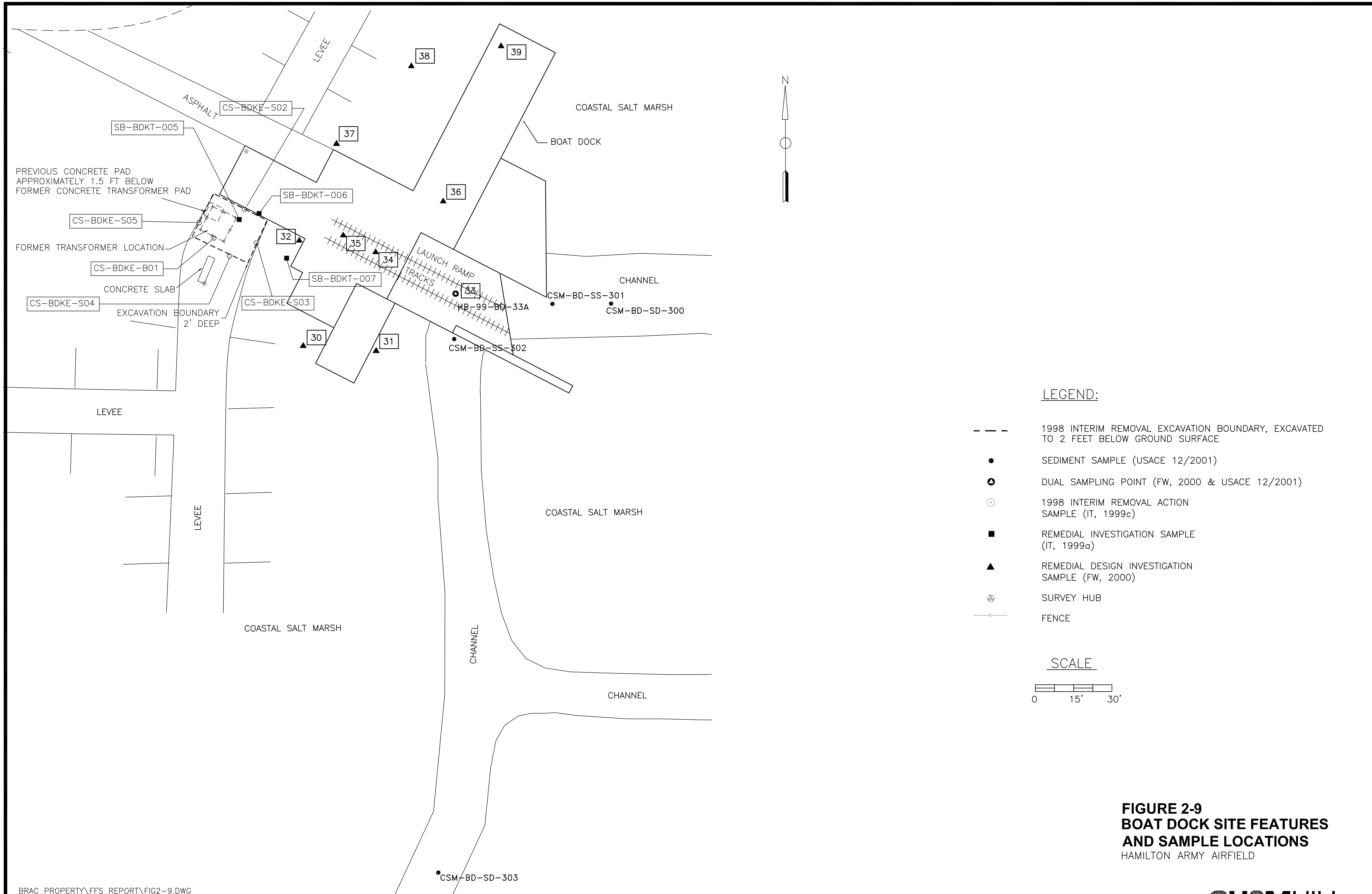


FIGURE 2-9
BOAT DOCK SITE FEATURES AND SAMPLE LOCATIONS
HAMILTON ARMY AIRFIELD

CH2MHILL

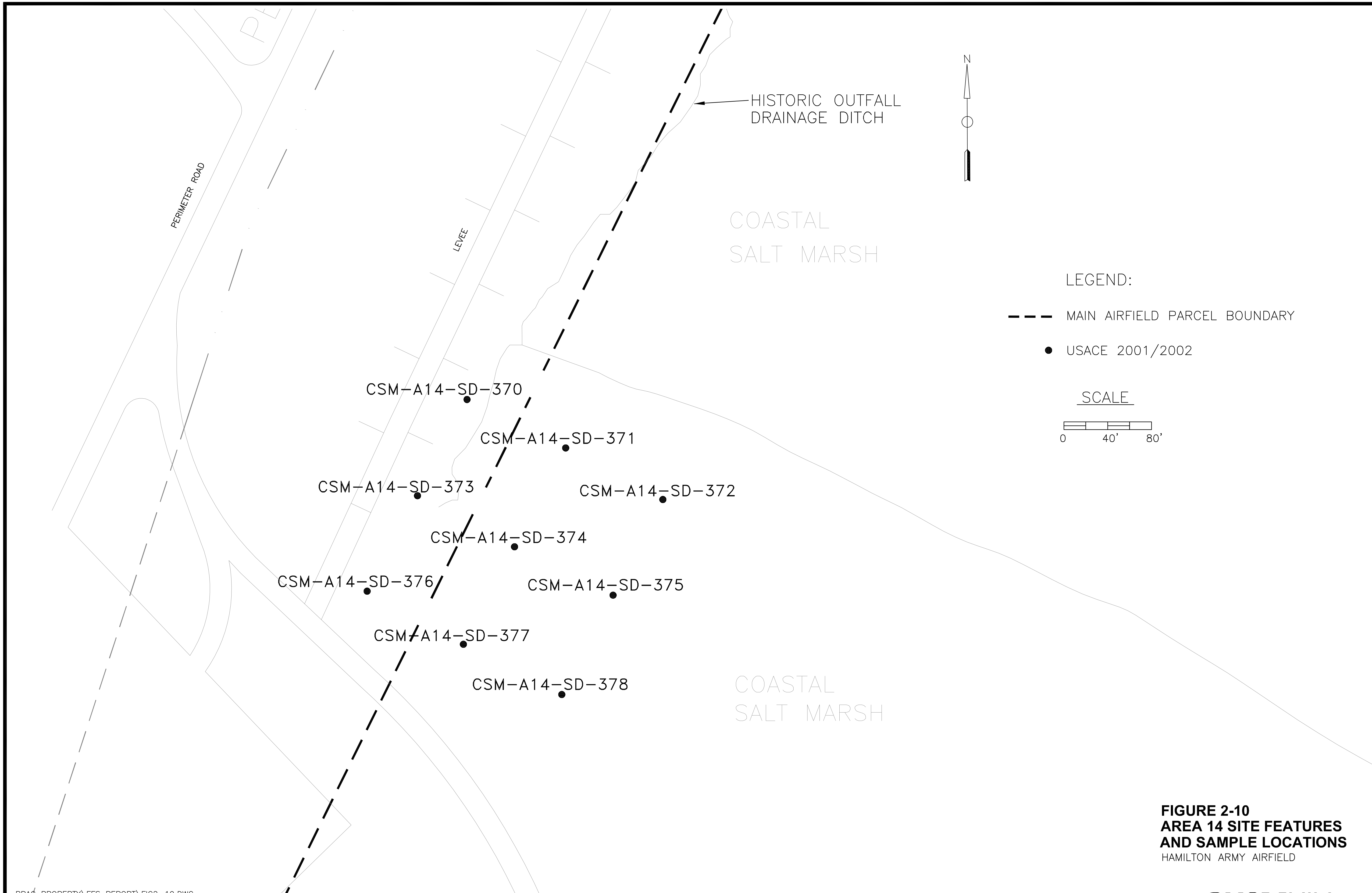


FIGURE 2-10
AREA 14 SITE FEATURES AND SAMPLE LOCATIONS
HAMILTON ARMY AIRFIELD

CH2MHILL

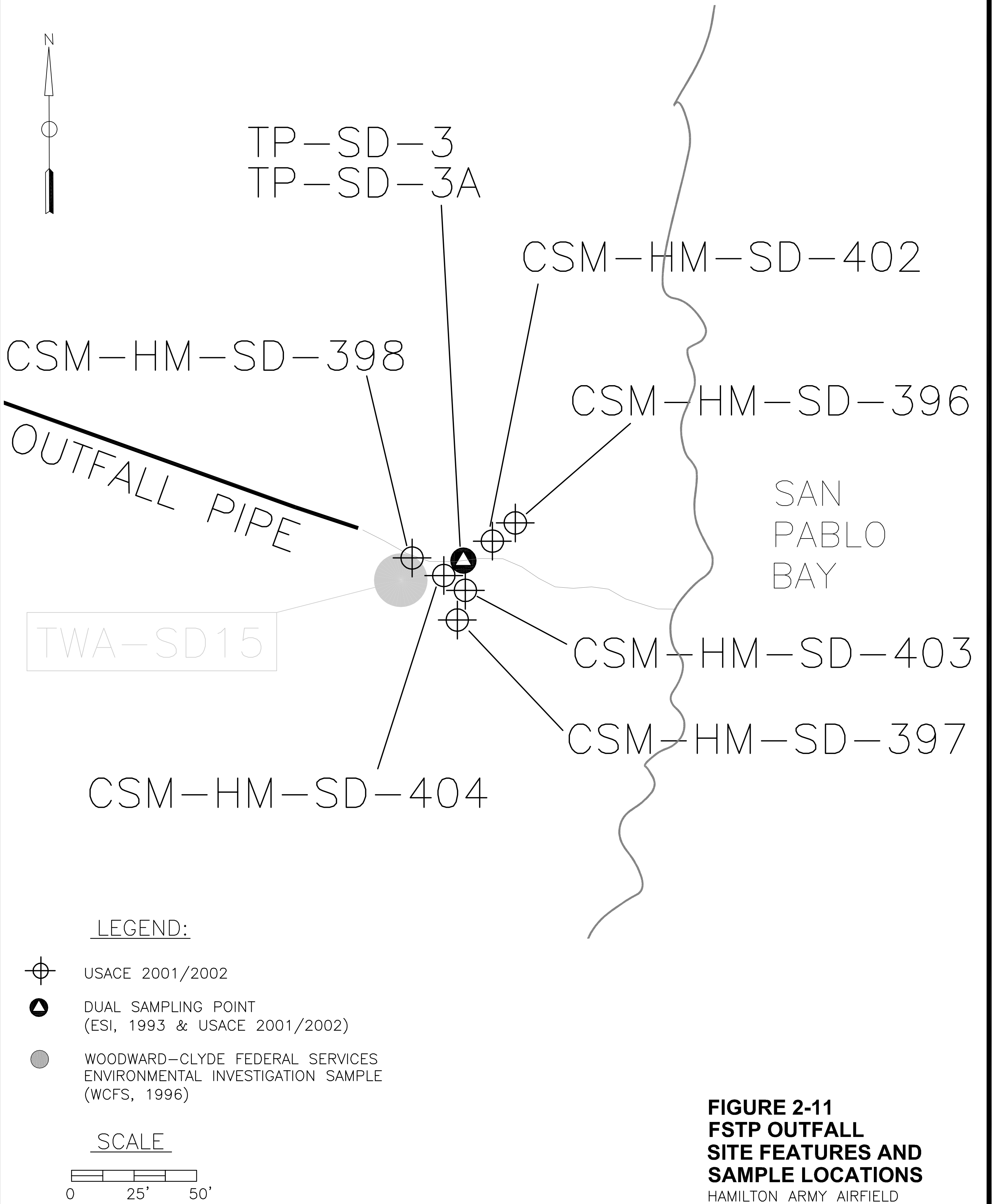


FIGURE 2-11
FSTP OUTFALL
SITE FEATURES AND
SAMPLE LOCATIONS
HAMILTON ARMY AIRFIELD

BRAC PROPERTY\FFS REPORT\FIG2-11.DWG

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SECTION 3

Focused Feasibility Study Screening Process

This section describes the screening process used in the FFS to determine which sites need to be fully evaluated. This process generally compares specific contaminant levels to action goals and determines when alternatives should be developed and evaluated for specific sites. If a site does not progress beyond this screening process, no further action is necessary and the site is not evaluated further in the FFS. If a site progresses beyond this process, alternatives (including the no-action alternative) are fully developed and evaluated for the site. The screening process developed for the CSM sites is described below. This section also identifies action goals, presents the types of contaminants detected at each site, and compares specific detections to action goals.

3.1 Screening Process for CSM Sites

The following steps were conducted for the FFS screening effort:

- For each site, data used in the risk assessment was combined with data collected by the Army in December 2001/January 2002. The combined data sets were reviewed and verified.
- For each site and each analyte, if more than five samples were collected, the 95th UCL was calculated for the combined data set. The 95th UCL is the 95th percent upper confidence limit of the arithmetic mean concentration for the analyte. The data were assumed to be normally distributed. This assumption is typical for field data such as these because it results in a conservative estimate of the reasonable maximum exposure concentration.
- For each site with more than five samples, the 95th UCL for each analyte was compared to action goals. If fewer than five samples were collected, the maximum detections were compared to the action goals. If the 95th UCL was greater than the site maximum, the site maximum was for comparison. If the 95th UCL (or the maximum detection, if maximum was used) was greater than the action goal, the analyte was identified as an FFS chemical of potential concern (COPC).
- The screening process then compared individual sample results for each FFS COPC to its action goal and defined the area of the site that needs action.
- RAOs and ARARs were developed (see Section 4).
- Remedial alternatives were developed (see Section 5).
  - Alternative 1 – No Further Action
  - Alternative 2 – Excavation and Offsite Disposal
- A detailed and comparative analysis of the remedial alternatives was conducted (see Section 6).
- Preferred alternatives were recommended for each CSM site (see Section 7).

The FFS screening and alternative selection process is shown on Figure 3-1.

Because combined data from the risk assessment and data from the Army studies in 2001 and 2002 were not evaluated in the risk assessment (U.S. Army, 2001), no FFS COCs were developed for these sites. COCs are those contaminants that a risk assessment has determined may pose a risk to receptors at a specific site. Instead, the FFS developed COPCs and did not conduct an additional risk assessment to further screen the COPCs. The COPC process compares each contaminant detected to action goals, without first considering whether the contaminant may actually pose a risk to human health or the environment. FFS COPCs for the CSM sites are identified in Table 3-1. (All tables in this section are provided at the end of the section.)

When the data sets used in the risk assessment are similar to the combined data sets for a site, the FFS does consider COCs developed in the risk assessment (U.S. Army, 2001) in the process of selecting recommended alternatives for each site (see Section 6).

Metals that occur at concentrations comparable to ambient concentrations were not considered to be releases and were not included as FFS COPCs. In addition, seven inorganic constituents were not considered as FFS COPCs because they were classified as the following:

- Essential nutrients (i.e., calcium, iron, magnesium, potassium, and sodium)
- Naturally occurring and abundant rock-forming minerals (i.e., aluminum, calcium, iron, magnesium, potassium, and sodium)
- Abundant constituents of salt water (i.e., calcium, chloride, magnesium, and sodium)

3.2 Action Goals

Environmental action contaminant concentration goals (action goals) protective of wetland receptors were established for this FFS by the Army, DTSC, and RWQCB. The action goals are based primarily on site-specific ambient concentrations, in combination with RWQCB-developed numbers for San Francisco Bay Ambient sediments and NOAA effects-range low (ER-L) sediment concentrations. A summary of the rationale for using various references for action goals is provided below.

When available, risk-based numbers were used as action goals unless the risk-based numbers were more stringent than background concentrations. Site-specific ambient levels from Appendix A - U.S. Army, 2001, *Final Human Health and Ecological Risk Assessment* are also used. 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, were used as risk-based numbers in instances where the risk-based numbers were above background. San Francisco Bay RWQCB Staff Report: Ambient Concentrations of Toxic Chemicals in San Francisco Bay Sediments, May 1998, was used where site-specific background numbers were not available.

Action goals for petroleum hydrocarbons are taken from the 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.

Action goals for PAHs are taken from 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.

Action goals for SVOCs are risk-based goals and are taken from the U.S. Army, 2001, *Final Human Health and Ecological Risk Assessment*.

Action goals for pesticides, herbicides, PCBs, and dioxins are taken from various sources including Table 5-1 from the U.S. Army, 2001, *Final Human Health and Ecological Risk Assessment* (marine invertebrate–amphipod and California clapper rail). Practical quantitation limits (PQLs) from previous sampling events are used when no other ecologically based numbers were available with achievable detection limits. Action goals for lindane are from the Screening Quick Reference Tables (SQuiRTs), NOAA, updated September 1999. This value was used as the best available ecological number when no other references were available. The DDT action goals are developed in Appendix D of this FFS.

Table 3-2 presents these action goals. An important component of the FFS screening processes is to compare the concentrations of FFS COPCs to action goals.

As described in Section 3.1, if the concentration detected for an FFS COPC is above an action goal, then alternatives are developed and evaluated for the site. If contaminant levels for all FFS COPCs at a site are below action goals, then no remedial actions are required.

Several contaminants were detected in the CSM at levels and frequency of detections that were determined not to pose a significant risk to human health or the environment. Action goals were not established for these contaminants. These contaminants are listed below:

1,1,1-trichloroethane
1,1,2-trichloroethane
1,1,2,2-trichloroethane
1,2-dicholorobenzene
1,3-dichlorobenzene
1,4-dichlorobenzene
1,1-dichloroethane
1,2-dichloroethane
cis-1,2-dichloroethene
trans-1,2-dichloroethene
1,2-dichloropropane
cis-1,3-dichloropropene
trans-1,3-dichloropropene
1,4-dichlorobenzene
2-butanone
2,4-D and 2,4-DB
2,4,5 – T

Chloroethane
Chloroform
Chloromethane
Dibromochloroethane
Dicamba
Dichlorodifluoromethane
Dieldrin
Dinoseb
Endosulfan I and II
Endosulfan Sulfate
Endrin and Endrin Keytone
Ethylbenzene
Freon 113
Lithium
Methylene chloride
Molybdenum
Selenium

2,4,5-TP (silvex)
2-hexanone
4-methyl-2-pentanone
Acetone
Aldrin
Antimony
Benzene
Bromodichloromethane
Bromoform
Bromomethane
Carbon disulfide
Carbon tetrachloride
Chlorobenzene
Styrene
Tetrachloroethene
Thallium
Tin
Titanium
Toluene
Toxaphene
Trichloroethylene
Trichlorofluoromethane
Vinyl acetate
Vinyl chloride
Xylenes (total)

These contaminants are not evaluated in the FFS.

3.3 Summary of Sites to be Evaluated in This Focused Feasibility Study

The FFS screening process indicates that alternatives need to be developed and evaluated for all eight CSM sites. Concentrations of at least some FFS COPCs exceed action goals at each site.

Concentrations of FFS COPCs that exceed action goals at the Antenna Debris Disposal Area are presented in Tables 3-3 A to 3-3 C. Concentrations of FFS COPCs that exceed action goals at the ELCDDA are presented in Tables 3-4 A to 3-4 C. Concentrations of FFS COPCs that exceed action goals at the High Marsh Area - Nonchannel Cut Area are presented in Tables 3-5 A and 3-5 B. Concentrations of FFS COPCs that exceed action goals at the High Marsh Area - Proposed HWRP Channel Cut Area are presented in Tables 3-6 A to 3-6 C. Concentrations of FFS COPCs that exceed action goals at the Historic ODD are presented in Tables 3-7 A and 3-7 B. Concentrations of FFS COPCs that exceed action goals at the Outfall Drainage Ditch are presented in Tables 3-8 A to 3-8 D. Concentrations of FFS COPCs that exceed action goals at the Boat Dock Nonchannel Area are presented in Tables 3-9 A to 3-9 C. Concentrations of FFS COPCs that exceed action goals at the Boat Dock Channel Area are presented in Table 3-10. Concentrations of FFS COPCs that exceed action goals at Area 14 are presented in Tables 3-11 A to 3-11 D. Concentrations of FFS COPCs that exceed action goals at the FSTP Outfall are presented in Tables 3-12 A and 3-12 B. Concentrations that are above action goals are shown in the tables in ***bold Italic***.

TABLE 3.-1
Coastal Salt Marsh Site-Specific FFS COPCs
Coastal Salt Marsh FFS

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
Coastal Salt Marsh Site-Specific FFS COPCs
Coastal Salt Marsh FFS

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

Action Goal units are ppm

X = Chemical identified as an FFS COPC for a site

TABLE 3-2
Action Goals – Coastal Salt Marsh Sites
Coastal Salt Marsh FFS

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

TABLE 3-2
Action Goals – Coastal Salt Marsh Sites
Coastal Salt Marsh FFS

Contaminant	Action Goals (ppm)[a]	Source[b]
MCPP	3.0	PQL
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. Action goals are applied to the site specific FFS COPCs identified for each site.

TCDD = tetrachlorodibenzo-p-dioxin
TEQ = toxicity equivalence

[a] If contamination above the action goals is found in the CSM 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, 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 are developed in Appendix D of this FFS.

[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 CSM shall not exceed 1.0 ppm. Areas with total DDT concentrations greater than 1 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.

TABLE 3-3 A
Antenna Debris Disposal Area
Detections of FFS COPCs Above Action Goals—Metals
Coastal Salt Marsh Focused Feasibility Study

Sample ID	Action Goal	CSM-ANE-SD-325	CSM-ANE-SD-326		CSM-ANE-SD-327		CSM-ANE-SD-328		CSM-ANE-SS-320		CSM-ANE-SS-321		CSM-ANE-SS-322		CSM-ANE-SS-323	CSM-ANE-SS-324	CSM-ANW-SD-312
Metals / Depth		5 FT	0 FT	2 FT	0 FT	2 FT	0 FT	2 FT	0 FT	2 FT	0 FT	2 FT	0 FT	2 FT	0 FT	0 FT	0 FT
Barium	188	131	134	117	76.3 J	62.9 J	88 J	88.3 J	133	57.3 J	115	59.8 J	120	87.9 J	130	96.2 J	***238***
Beryllium	1.68	***3.9***	***3.7***	***4.3***	***4.2***	1.2	***2.8***	***3***	***3.8***	0.6	***3.6***	0.8	***3.4***	***3***	***2.5***	1.4	2
Cadmium	1.8	***4.1 J-***	***4.1***	***3.2***	***2.3***	1.4	0.9	***2.2***	0.7	NA	***3.3***	NA	***4.1***	0.4 J	1.4	1.2	1.2
Cobalt	26.7	***47.3***	***146***	***322***	***98.6***	18.2	***53.1***	***49.1***	***71.9***	15.8	23.4	18.1	***41.4***	***37.4***	***76.5***	***30***	***37.1***
Copper	88.7	***108***	***93.5***	***227***	***90.9***	66.4	83.2	87.8	***90.8***	66	83.2	62.7	***116***	85.3	60.9	51.8	***260***
Lead	46.7	***475***	***194***	***361***	***91.8***	33.8	***190***	***447***	***435***	24.6	***116 J-***	24	***389 J-***	***108 J-***	***188***	***175 J-***	***611***
Manganese	1,260	279	***6,170***	***4,310***	***4,400***	252	***1,850***	***2,710***	***4,220***	303	264	227	1,200	***314***	***4,890***	***1,320***	***1,720***
Nickel	132	***248***	***323***	***345***	***396***	120	***190***	***188***	***230***	105	***187***	92.9	***198***	***204***	***342***	***154***	***164***
Silver	1	***1***	***2.1***	***1.1***	0.9	0.047 J	0.6	***1.9***	***2***	0.1 J	0.5	0.05 J	0.9	0.084 J	***1.2***	0.4 J	***1.8***
Zinc	169	***233***	***297***	***442***	***276***	125	***203***	***212***	***234***	95.9	***236***	84.8	***249***	168	***198***	145	***1,000***

Sample ID	Action Goal	CSM-ANW-SD-311	CSM-ANW-SD-313	CSM-ANW-SS-310		CSM-ANW-SS-312	TWA-SD24	44	40	40	41	42	43	44	45
Metals / Depth		10 FT	0 FT	0 FT	2 FT	2 FT	2 FT	3 FT	0 FT	0 FT	0 FT	0 FT	0 FT	0 FT	0 FT
Barium	188	134	92.4 J	***253 J***	84.2	155	NA	28.7 A	186 A	NA	110 A	83.2 A	***586 A***	***1,370 A***	115 A
Beryllium	1.68	***2.7***	***2.4***	1.5	0.8	0.4 J	NA	0.41 A	NA	***2.5 A***	***2.1 A***	***2.2 A***	0.86 A	0.71 A	1.7 A
Cadmium	1.8	***4.2 J***	1	0.5	NA	0.7	NA	0.34 J+	***6.9 A***	NA	1.5 A	1.5 A	***3.9 A***	***3.7 A***	***1.9 A***
Cobalt	26.7	***181***	18.4	21.7	16.6	7 J	NA	9.9 J	NA	***55.8 A***	***99.5 A***	***39 A***	19.3 A	25.4 A	***33.6 A***
Copper	88.7	***89.9***	55.7	71	50.9	***180***	NA	28.3 J+	***95.1 A***	NA	63.2 A	***122 A***	***726 A***	***432 A***	87.7 A
Lead	46.7	***154***	***161***	***1,140***	***100 J-***	335	***297***	14.1 J+	***248 A***	NA	46 A	***117 A***	***2,100 A***	***643 A***	***352 A***
Manganese	1,260	***7,440***	309	726	562	428	420	287 A	NA	999 A	***5,170 A***	***1,670 A***	897 A	1,080 A	***1,570 A***
Nickel	132	***323***	110	105	85.8	43.5	46.6	51.6 A	NA	***229 A***	***246 A***	***211 A***	86.2 A	108 A	***144 A***
Silver	1	0.5 J	NA	0.5	0.068 J	0.3 J	NA	0.14 A	***1.5 J***	NA	0.43 J	0.61 J	***2.2 J***	0.53 J	0.78 J
Zinc	169	***276***	***214***	***632***	143	***490***	***537***	70.4	NA	***551***	***213***	***406***	***2,700***	***2,930***	***641***

Notes:
NA = Not analyzed
Values listed in ***Bold Italic*** exceed action goal levels.
All units are in ppm.

TABLE 3-3 B
Antenna Debris Disposal Area
Detections of FFS COPCs Above Action Goals—Petroleum Hydrocarbons
Coastal Salt Marsh Focused Feasibility Study

Analyte / Sample ID / Depth	Action Goal	CSM-ANE-SD-325	CSM-ANW-SD-311
		5 FT	10 FT
Diesel Range Hydrocarbons	**144**	NA	***370*** N
Motor Oil	**144**	***2,900***	NA

Notes:
NA = Not analyzed
Values listed in ***Bold Italic*** exceed action goal levels.
All units are in ppm.

TABLE 3-3 C
Antenna Debris Disposal Area
Detections of FFS COPCs Above Action Goals—Pesticides and PCBs
Coastal Salt Marsh Focused Feasibility Study

Analyte / Sample ID / Depth	Action Goal	CSM-ANE-SD-325	CSM-ANE-SD-326		CSM-ANE-SD-327		CSM-ANE-SD-328		CSM-ANE-SS-320		CSM-ANE-SS-321		CSM-ANE-SS-322		CSM-ANE-SS-323	CSM-ANE-SS-324
		5 FT	0 FT	2 FT	0 FT	2 FT	0 FT	2 FT	0 FT	2 FT	0 FT	2 FT	0 FT	2 FT	0 FT	0 FT
Chlordanes total	**0.005**	NA	NA	NA	NA	NA	NA	***0.044***	NA	NA	***0.035***	NA	***0.29***	NA	***0.031***	***0.94***
DDTs total	**0.03**	***3.46***	0.0069	0.0084	0.0087	NA	0.0204	***4.51***	NA	0.0019	***0.3064***	NA	***6.39***	***0.0543***	***1.13***	***0.8***
Endrin aldehyde	**0.006**	NA	NA	NA	NA	NA	NA	***0.02*** JN	NA	NA	0.0038 J-	NA	NA	0.0017 J	***0.0098***	NA
Heptachlor	**0.009**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	***0.062*** J-
Heptachlor epoxide	**0.009**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	***0.1*** J-
MCPA	**7.9**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MCPP	**3**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methoxychlor	**0.09**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.02 JN
PCBs total	**0.09**	***0.200164***	***0.1592495***	***0.6810261***	0.0003269	0.00007868	***0.962974***	***0.6039***	***0.4313431***	***0.2025***	***0.5398***	0.00252541	***2.188048***	***0.1968532***	***0.4635514***	***0.1385073***

Analyte / Sample ID / Depth	Action Goal	CSM-ANW-312	CSM-ANW-SD-311	CSM-ANW-SS-310		CSM-ANW-SS-312		CSM-ANW-SS-313	44	40	41	42	43	44	45
		0 FT	10 FT	0 FT	2 FT	0 FT	2 FT	0 FT	2.5 FT	0 FT	0 FT	0 FT	0 FT	0 FT	0 FT
Chlordanes total	**0.005**	***0.0391***	NA	***0.01***	0.0026	NA	***0.0143***	NA	***0.043***	***1***	0.0036	***0.0189***	***0.026***	***0.012***	NA
DDTs total	**0.03**	***1.08***	***0.2062***	***0.076***	0.0298	NA	***0.177***	NA	***0.405***	***1***	***0.076***	***0.117***	***0.135***	***0.315***	***1.81***
Endrin aldehyde	**0.006**	***0.0075*** J-	NA	0.0015 J	NA	NA	0.0032	NA	NA	NA	NA	NA	NA	NA	NA
Heptachlor	**0.009**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Heptachlor epoxide	**0.009**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MCPA	**7.9**	NA	NA	NA	NA	NA	NA	NA	NA	***71*** J	NA	NA	NA	NA	NA
MCPP	**3**	NA	NA	NA	NA	NA	NA	NA	NA	***27*** J	NA	NA	NA	NA	NA
Methoxychlor	**0.09**	NA	NA	NA	NA	NA	0.005 N	NA	NA	NA	NA	NA	NA	NA	NA
PCBs total	**0.09**	NA	0.026867	0.0288088	0.022322	***0.5989***	***0.3765***	0.0726284	NA	NA	NA	NA	NA	NA	NA

Notes:
NA = Not analyzed
Values listed in ***Bold Italic*** exceed action goal levels.
All units are in ppm.

TABLE 3-4 A
East Levee Construction Debris Disposal Area
Detections of FFS COPCs Above Action Goals—Metals
Coastal Salt Marsh Focused Feasibility Study

Analyte / Sample ID	Action Goal	CSM-CDA-SD-360		CSM-CDA-SD-361		CSM-CDA-SD-362		CSM-CDA-SD-363		EL-MW-101	EL-MW-102	EL-MW-103	EL-MW-104
Analyte / **Depth**		**0 FT**	**2 FT**	**0 FT**	**2 FT**	**0 FT**	**2 FT**	**0 FT**	**2 FT**	**0.5 FT**	**0.5 FT**	**1.5 FT**	**0.5 FT**
Lead	46.7	16.1	20.4	***1,280***	***49.4***	***81.7***	***51.4***	33.8	***75.7***	***52***	18.5	43	***96***
Zinc	169	75.4	44.3	***270***	114	70.5	88.2	99.3	97.1	97.8	101	92.7	***327***

Analyte / Sample ID	Action Goal	EL-SB-01			EL-SB-02		EL-SB-03			EL-SB-04		HT-03		HT-04	
Analyte / **Depth**		**3.5 - 4 FT**	**6.5 - 7 FT**	**11 - 11.5 FT**	**6.5 FT**	**10.5 - 11 FT**	**2 - 2.5 FT**	**9 FT**	**10.5 - 11 FT**	**2.5 - 3 FT**	**9 - 9.5 FT**	**2 FT**	**4 FT**	**2 FT**	**4 FT**
Lead	46.7	24.6	22.2	***77.1***	27.8	10.6	***59.8***	10.9	***119***	***60.1***	22.6	10.3	***51.3***	14.8	***76.9***
Zinc	169	40.9	56.3	104	83.6	90	52.5	18.8	114	86.8	61.7	70	***175.5***	95	***194***

Analyte / Sample ID	Action Goal	HT-05		HT-06		HT-07		HT-08		HT-09		HT-10		HT-12	
Analyte / **Depth**		**2 FT**	**4 FT**	**2 FT**	**4 FT**	**2 FT**	**4 FT**	**2 FT**	**4 FT**	**2 FT**	**4 FT**	**2 FT**	**4 FT**	**2 FT**	**4 FT**
Lead	46.7	30	***58.8***	NA	NA	8.3	NA	***71***	***70.5***	***47.5***	NA	***375***	33.8	5	9
Zinc	169	125	***242***	64	100	72	94	***528.5***	***286.5***	***200***	***408.5***	***855***	84	74.5	137.5

Analyte / Sample ID	Action Goal	HT-13		HT-14		HT-15		SB-ELBP-001	SB-ELBP-002	SB-ELBP-003	SB-ELBP-004	SB-ELBP-005	HT-01		HT-02		HT-11	
Analyte / **Depth**		**2 FT**	**4 FT**	**2 FT**	**4 FT**	**2 FT**	**4 FT**	**2 FT**	**2 FT**	**2 FT**	**2 FT**	**2 FT**	**2 FT**	**4 FT**	**2 FT**	**4 FT**	**2 FT**	**4 FT**
Lead	46.7	13.8	10	46.3	15.8	***343.8***	***50***	***160 A***	9.6	12.9	9.1	40.6	NA	NA	38.8	NA	11.8	NA
Zinc	169	48	43	***223.5***	51	***670***	***299***	NA	NA	NA	NA	NA	71.5	72.5	***219***	69.5	64.5	***200***

Notes:
NA = Not analyzed
Values listed in ***Bold Italic*** exceed action goal levels.
All units are in ppm.

TABLE 3-4 B
East Levee Construction Debris Disposal Area
Detections of FFS COPCs Above Action Goals—Petroleum Hydrocarbons
Coastal Salt Marsh Focused Feasibility Study

Analyte / Sample ID	Action Goal	EL-SB-01		EL-SB-03		EL-SB-04
Analyte / **Depth**		**6.5 – 7 FT**	**11 – 11.5 FT**	**2 – 2.5 FT**	**10.5 – 11 FT**	**9 – 9.5 FT**
Diesel Range Hydrocarbons	144	***402***	***218***	***149***	***723***	***456***

Notes:
NA = Not analyzed
Values listed in ***Bold Italic*** exceed action goal levels.
All units are in ppm.

TABLE 3-4 C
East Levee Construction Debris Disposal Area
Detections of FFS COPCs Above Action Goals—Pesticides/PCBs/Dioxins
Coastal Salt Marsh Focused Feasibility Study

Sample ID	Action Goal	BP-2		CSM-CDA-SD-363	SB-ELBP-001	SB-ELBP-003		SB-ELBP-004			SB-ELBP-005	SB-ELBP-008	SB-ELBP-04A	
Analyte / Depth		**6 FT**	**12 FT**	**2 FT**	**2 FT**	**2 FT**	**2 FT**	**2 FT**	**2 FT**	**2 FT**	**2 FT**	**3 FT**	**0 FT**	**3 FT**
DDTs total	0.03	NA	NA	NA	0.008	NA	0.0057	NA	NA	***0.094***	NA	NA	NA	NA
Total Dioxin Equivalents	0.000021	0.0000029093	0.0000072169	NA	NA	NA	NA	NA	NA	NA	NA	NA	***0.000928301***	***0.023475983***
PCBs total	0.09	NA	NA	***0.1676426***	***0.12***	0.075	0.055	***0.35***	***0.28***	NA	0.048	***0.17***	NA	NA

Notes:
NA = Not analyzed
Values listed in ***Bold Italic*** exceed action goal levels.
All units are in ppm.

TABLE 3-5 A
High Marsh Nonchannel Cut
Detections of FFS COPCs Above Action Goals—Metals
Coastal Salt Marsh Focused Feasibility Study

Sample ID	Action Goal	BK-SS-02			BK-SS-03		BKSS10	CSM-HM-SD-390		CSM-HM-SD-391		CSM-HM-SD-392		CSM-HM-SD-393		CSM-HM-SD-394	
Analyte / **Depth**		**0.5 FT**	**1.17 FT**	**2 FT**	**0.5 FT**	**2 FT**	**1.5 FT**	**0 FT**	**3 FT**	**0 FT**	**3 FT**	**0 FT**	**3 FT**	**0 FT**	**1.5 FT**	**0 FT**	**1.5 FT**
Beryllium	1.68	***2.36***	1.2	0.945	NA	NA	1.19	0.9	1	0.9	0.9	***2.5***	1	***4.2***	0.8	***2.1***	1
Cobalt	26.7	***60.6***	21.5	***27.9***	17.2	20.4	22.3	20	***30.8***	16.9	18.2	22.1	19.7	***47.1***	***35.8***	14.5	19.3
Copper	88.7	***92.7***	70.9	62.2	66.7	75	80.8	70.4	58.8	66.4	52.2	80.6	80.5	***92.6***	70.2	77	64.2
Lead	46.7	***70***	42	32	28.1	41.2	38	24.6	36.9	23	17.7 J	***105***	30.4	***288***	23.7	***57.6***	30
Manganese	1,260	***2,510***	652	***1,450***	627	370	437	1,110	544	340	288	329	296	***1,370***	215	230	243
Nickel	132	***222***	119	119	104	118	125	98.2	111	97.3	81.6	***146***	110	***173***	***185***	99.6	103
Silver	1	NA	NA	NA	NA	NA	NA	0.098 J	0.2 J	0.046 J	NA	0.4 J	0.084 J	0.8	0.2 J	0.4 J	0.041 J
Zinc	169	***255***	157	115	139	149	160	99.8	109	89	68.2	166	136	***197***	88.7	135	90.7

Sample ID	Action Goal	CSM-HM-SD-395		CSM-HM-SD-399		CSM-HM-SD-400		CSM-HM-SD-401		SW-EPVS-006	SD-EPVS-002	SC-HCSM-011	SC-HCSM-012	SC-HCSM-013	SC-HCSM-014	SC-HCSM-015	SC-HCSM-016
Analyte / **Depth**		**0 FT**	**1.5 FT**	**0 FT**	**1.5 FT**	**0 FT**	**1.5 FT**	**0 FT**	**1.5 FT**	**0 FT**	**0 FT**	**0.5 FT**	**0.5 FT**	**0.5 FT**	**0.5 FT**	**0.5 FT**	**0.5 FT**
Beryllium	1.68	***2***	0.9	1	1	1	0.8	0.9	1	NA	NA	***2.7*** *A*	***2.8*** *A*	***2.4*** *A*	NA	NA	NA
Cobalt	26.7	21.8	22.7	16.1	15.2	25.1	23.3	17.4	17.6	19.7 A	***29*** *A*	***62.5*** *A*	***50.7*** *A*	***46.2*** *A*	23.3 A	***36.8*** *A*	***60.9*** *A*
Copper	88.7	***88.9***	57	50.9	70.1	64.1	82.2	63.6	61.9	48.2 J-	58 J-	***96.2*** *A*	58 A	58.2 A	61.4 A	56.4 A	56.6 A
Lead	46.7	38.3	27.9	26.6	25.5	21.7	27.1	23.2	24.1	26.5 A	***72.2*** *A*	***71*** *A*	***84.8*** *A*	***65.8*** *A*	26.3 A	36.6 A	30.7 A
Manganese	1,260	228	309	614	261	255	302	241	513	NA	NA	927 A	1,230 A	1,220 A	922 A	1,030 A	***12,200*** *A*
Nickel	132	117	104	95.1	86.9	111	112	89.5	90.8	81.7 J-	117 J-	***199*** *A*	***248*** *A*	***191*** *A*	126 A	***137*** *A*	***171*** *A*
Silver	1	0.4 J	0.03 J	NA	0.4 J	NA	0.2 J	0.094 J	0.082 J	0.69 J	***1.1*** *J*	NA	NA	NA	NA	NA	NA
Zinc	169	155	101	99.8	159	86.5	95.1	79.9	89.7	92.7 J-	141 J-	***251*** *A*	***213*** *A*	***186*** *A*	144 A	136 A	153 A

Sample ID	Action Goal	PS-SD-104		PS-SD-105		PS-SD-106		PS-SD-107		PS-SD-108		PS-SD-110		PS-SD-111		PS-SD-112	
Analyte / **Depth**		**0.2 FT**	**1.17 FT**	**0.2 FT**	**1.17 FT**	**0.2 FT**	**1.17 FT**	**0.2 FT**	**1.17 FT**	**0.2 FT**	**1.17 FT**	**0.2 FT**	**1.17 FT**	**0.2 FT**	**1.17 FT**	**0.2 FT**	**1.17 FT**
Beryllium	1.68	***6.76***	***4.35***	***4.05***	***3.35***	***4.28***	***2.11***	***5.46***	***5.92***	***4.94***	***2.48***	***3.39***	***4.13***	***3.63***	1.34	***4.36***	***2.1***
Cobalt	26.7	***162***	***95.5***	***96.2***	23	***80.1***	16.7	***82.9***	***45.4***	***146***	***28***	***80.9***	25.7	23.1	21	***155***	18.4
Copper	88.7	78.8	***89.8***	70.9	***100***	80.5	86.5	***105***	***169***	70.7	65.4	68.7	***95.5***	75.5	***90.2***	75.5	61.9
Lead	46.7	***172***	***557***	***263***	***311***	***426***	***1,020***	***469***	***1,230***	***299***	***343***	***172***	***332***	***138***	***502***	***173***	***69.7***
Manganese	1,260	***7,640***	***2,820***	***4,920***	550	***3,610***	500	***3,520***	***1,440***	***7,220***	1,050	***3,290***	725	593	697	***7,140***	303
Nickel	132	***548***	***225***	***395***	***180***	***269***	64.3	***296***	***217***	***487***	***132***	***287***	***147***	***226***	***132***	***502***	120
Silver	1	NA	NA	NA	NA	***1.71***	NA	NA	NA	NA	NA	NA	NA	NA	***2.12***	NA	NA
Zinc	169	***446***	***253***	***343***	***224***	***291***	132	***355***	***388***	***382***	160	***240***	***207***	***231***	***195***	***381***	167

TABLE 3-5 A
High Marsh Nonchannel Cut
Detections of FFS COPCs Above Action Goals—Metals
Coastal Salt Marsh Focused Feasibility Study

Sample ID	Action Goal	TWA-SD08		TWA-SD09	TWA-SD11	TWA-SD12			TWA-SD13	TWA-SD17			TWA-SD18		TWA-SD19	
Analyte / Depth		0.5 FT	2 FT	0.5 FT	0.5 FT	0.5 FT	2 FT	3 FT	0.5 FT	0.5 FT	2 FT	3 FT	0.5 FT	2.5 FT	0.5 FT	2 FT
Beryllium	1.68	***1.7***	0.9	1.6	0.63	1.3	0.83	0.92	NA	***8.6***	1.4	***4.8***	***3.2***	1	0.76	1.3
Cobalt	26.7	***33.1***	15.3	***74.4***	17	23.1	17.2	16.6	23.8	***83.3***	18.4	***81***	20.3	13.6	13.3	***80.5***
Copper	88.7	***120***	61.2	73.9	61.6	76	66.4	69.4	NA	***493***	58.2	85.9	***90.3***	65.2	73.5	***92.9***
Lead	46.7	***62***	30.5	***71***	33.4	***48***	19.7	36.2	NA	***1,540***	***307***	***323***	NA	36.4	38.5	***65.4***
Manganese	1,260	519	248	479	315	410	255	340	NA	***3,030***	301	***3,370***	541	228	246	340
Nickel	132	***202***	95.6	89.4	80.8	***148***	103	106	119	***248***	114	***298***	115	83.6	91.5	***266***
Silver	1	NA	NA	NA	NA	NA	NA	NA	NA	***6.2***	NA	***3.3***	NA	0.2 J	NA	NA
Zinc	169	***196***	95	***227***	106	144	84.5	101	***173***	***572***	111	***273***	***174***	92	114	***259***

Sample ID	Action Goal	SC-HCSM-017	SC-HCSM-018	HCSM-016A	PS-SD-04	PS-SD-05	PS-SD-06	PS-SD-07	PS-SD-101		PS-SD-102		PS-SD-103	
Analyte / Depth		0.5 FT	0.5 FT	1.5 FT	0 FT	0 FT	0 FT	0 FT	0.2 FT	1.17 FT	0.2 FT	1.17 FT	0.2 FT	1.17 FT
Beryllium	1.68	NA	NA	1	***3.68***	***3.04***	***7.21***	***4.17***	***2.68***	NA	***1.98***	***1.83***	***2.7***	1.51
Cobalt	26.7	***53.2*** A	***93.4*** A	17.3	***53***	***48.2***	***94.7***	***89.3***	***73.8***	14.1	***71.5***	***27.4***	***60.7***	21
Copper	88.7	***154*** A	***149*** A	67	78.6	84.4	***131***	85.4	51.4	21.5	60.8	69.1	***152***	63.1
Lead	46.7	***190*** A	***254*** A	26.3	***60***	***82***	***890***	***140***	***165***	***94.8***	***62.2***	***59.3***	***95.1***	***123***
Manganese	1,260	392 A	793 A	359	***1,980***	***1,940***	***4,100***	***4,700***	***3,370***	901	***2,710***	553	***1,900***	714
Nickel	132	***242*** A	***338*** A	98.7	***218***	***193***	***265***	***310***	***284***	74.4	***264***	130	***215***	96.1
Silver	1	NA	NA	NA	NA	NA	***6.61***	NA	NA	NA	NA	NA	NA	NA
Zinc	169	***250*** A	***375*** A	99.4	***248***	***234***	***349***	***287***	***240***	***170***	***230***	165	***285***	144

Sample ID	Action Goal	PS-SD-118		PS-SD-119		TWA-SD02		TWA-SD03		TWA-SD06		TWA-SD21		TWA-SD22			TWA-SD23				TWA-SD25
Analyte / Depth		0.2 FT	1.17 FT	0.2 FT	1.17 FT	0.5 FT	2 FT	0.5 FT	2 FT	0.5 FT	2 FT	0 FT	0.5 FT	0.5 FT	2 FT	3 FT	0 FT	0.5 FT	2 FT	3 FT	0.5 FT
Beryllium	1.68	***5.75***	***5.74***	***2.96***	1.55	1.5	0.87	0.99	0.98	0.37	0.67	***2.3***	NA	***7.2***	***4***	1.4	***6.6***	NA	1.1	1	0.61
Cobalt	26.7	***140***	***35.9***	***80.3***	25.3	***43***	18.1	12.9	20	5.3	15.9	NA	***48.2***	***80.8***	***147***	25.5	NA	***85.2***	***28.1***	19.2	7.3
Copper	88.7	***96.1***	73.9	75.3	59.4	***388***	***98.5***	77	65.2	81.2	68.6	81.6	NA	***133***	***1190***	67.9	***1,600***	NA	***533***	72.2	43.4
Lead	46.7	***108***	***454***	***112***	***87.6***	***49.6***	31	***47.3***	42	12.9	34	NA	30.2	***559***	***231***	30.2	NA	***82.3***	30.2	24.1	***594***
Manganese	1,260	***8,410***	246	***3,050***	320	***1,380***	425	297	378	152	380	NA	***1,520***	***3,700***	***9,510***	348	NA	***5,200***	826	592	349
Nickel	132	***579***	***279***	***255***	131	***154***	86.5	102	***139***	47	97.5	***162***	NA	***270***	***456***	119	***800***	NA	***133***	95.5	40.2
Silver	1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	***4.5***	NA	NA	NA	NA	NA	0.1 J	NA
Zinc	169	***406***	***363***	***235***	***195***	***505***	142	127	143	78.7	116	168	NA	***334***	***1,160***	130	NA	***215***	***356***	101	77.7

Notes:
NA = Not analyzed
Values listed in ***Bold Italic*** exceed action goal levels.
All units are in ppm.

TABLE 3-5 B
High Marsh Nonchannel Cut
Detections of FFS COPCs Above Action Goals—Pesticides/PCBs
Coastal Salt Marsh Focused Feasibility Study

Analyte	Action Goal	CSM-HM-SD-393	CSM-HM-SD-394	CSM-HM-SD-395		SC-HCSM-011	SC-HCSM-011	SC-HCSM-012	SC-HCSM-013	SC-HCSM-014	SC-HCSM-015
Depth		0 FT	0 FT	0 FT	1.5 FT	0.5 FT	0.5 FT	0.5 FT	0.5 FT	0.5 FT	0.5 FT
Chlordanes total	0.00479	***0.097***	NA	NA	NA	NA	0.0042	***0.0078***	***0.0087***	NA	NA
DDTs total	0.03	***1.51***	0.0158	0.0149	0.0024	NA	***0.139***	***0.227***	***0.228***	NA	NA
Endrin aldehyde	0.0064	***0.016*** *N*	NA	NA	NA	NA	NA	NA	NA	NA	NA
PCBs total	0.09	NA	NA	NA	NA	0.02	0.057733	***0.14977***	***0.14076***	0.010641	0.01329

Analyte	Action Goal	SC-HCSM-016	SC-HCSM-017	SC-HCSM-018	PS-SD-06	PS-SD-07	TWA-SD17		TWA-SD18A	TWA-SD22
Depth		0.5 FT	0.5 FT	0.5 FT	0 FT	0 FT	2 FT	3 FT	2.5 FT	0.5 FT
Chlordanes total	0.00479	NA	NA	NA	NA	NA	NA	NA	***0.0198***	***1.3***
DDTs total	0.03	NA	NA	NA	***3***	***0.94***	***5.64***	***2.72***	***0.162***	***3.32***
Endrin aldehyde	0.0064	NA	NA	NA	NA	NA	NA	NA	0.0034 J-	NA
PCBs total	0.09	0.008768	0.0258	0.05058	NA	NA	NA	NA	NA	NA

Notes:
NA = Not analyzed
Values listed in ***Bold Italic*** exceed action goal levels.
All units are in ppm.

TABLE 3-6 A
High Marsh Area—Proposed HWRP Channel Cut Area
Detections of FFS COPCs Above Action Goals—Metals
Coastal Salt Marsh Focused Feasibility Study

Analyte (Sample ID / Depth)	Action Goal	HAAF CHEM 201			HAAF CHEM 202			HAAF CHEM 203			HAAF CHEM 204			HAAF CHEM 205			HAAF CHEM 206			HAAF CHEM 207			HAAF CHEM 208			HAAF CHEM 209			HAAF CHEM 210			HAAF CHEM 211		
		1 FT	2 FT	4 FT	1 FT	2 FT	4 FT	1 FT	2 FT	4 FT	1 FT	2 FT	4 FT	1 FT	2 FT	4 FT	1 FT	2 FT	4 FT	1 FT	2 FT	4 FT	1 FT	2 FT	4 FT	1 FT	2 FT	4 FT	1 FT	2 FT	4 FT	1 FT	2 FT	4 FT
Beryllium	1.68	***6.8***	1.1	1.2	1.2	NA	1	***1.7 J***	NA	1.1	NA	NA	NA	***2.6***	NA	1.1	1	1	NA	0.9	NA	NA	1.5	NA	NA	1.5	1.4	NA	1	NA	NA	1.1	NA	NA
Cadmium	1.8	***2.9***	NA	1.2	***2.4***	1.7	1.5	***1.9***	1.2	1.3	1.6	***1.8***	1.3	***3.8***	***2.6***	***2.4***	***2***	***2.3***	***2.2***	***2.2***	***2.2***	***2.5***	***3***	***2.6***	***2.7***	***1.9***	***2***	***2.1***	***2.8***	1	1.3	***2.4***	1.1	1.5
Cobalt	26.7	***115***	NA	NA	NA	***32.2***	***30.6***	NA	22.7	NA	NA	NA	NA	***46.2***	NA	22.6	***36.5***	NA	NA	19	NA	NA	21.7	***27.2***	NA	***36.5***	***32.5***	***29.9***	NA	***30.7***	NA	19.9	20.8	NA
Lead	46.7	***796***	NA	NA	NA	NA	NA	39.1	NA	NA	NA	NA	NA	***77.7***	NA	NA	NA	NA	18.8 J	NA	NA	NA	38.4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	132	***235***	94.8	114	105	***172***	***176***	103	106 J	103 J	77.2 J	88.7	90.8	***182***	97.4	104	***166***	86.3	80.3	108	90.2	106	111	117	92.6	***152***	***145***	***136***	106	119	87.2	102	95.2	80.1

Analyte (Sample ID / Depth)	Action Goal	HAAF CHEM 212			HAAF CHEM COMP 201-204	HAAF CHEM COMP 205-208	HAAF CHEM COMP 209-212	PS-SD-113		PS-SD-114		PS-SD-116		PS-SD-117		TWA-SD16	
		1 FT	2 FT	4 FT	2.5 FT	2.5 FT	2.5 FT	0.2 FT	1.17 FT	0.2 FT	1.17 FT	0.2 FT	1.17 FT	0.2 FT	1.17 FT	0.5 FT	2 FT
Beryllium	1.68	0.9	NA	NA	***1.9***	a	1.5	***3.61***	***2.58***	***2.39***	***1.99***	***3.54***	***3.63***	***2.56***	***3.56***	***7***	0.96
Cadmium	1.8	***2.7***	1.6	1.6	***2.6***	***2.2***	***2***	NA	NA	NA	1.52	NA	***1.99***	NA	***2.02***	NA	NA
Cobalt	26.7	NA	NA	NA	26.4	NA	NA	***104***	16.1	***55.9***	16.9	***64.3***	20.5	***99.3***	24.6	17.8	18.5
Lead	46.7	NA	NA	NA	***115 J***	NA	***49.5***	***78.6***	***356***	***80.7***	***118***	***154***	***537***	7	***160***	***66.9***	27.5
Nickel	132	94.3	87.8	93.5	***147 J***	86	113	***376***	116	***243***	123	***269***	***186.5***	***361***	***159***	***144***	112

Notes:
NA = Not analyzed
Values listed in ***Bold Italic*** exceed action goal levels.
All units are in ppm.

TABLE 3-6 B
High Marsh Area—Proposed HWRP Channel Cut Area
Detections of FFS COPCs Above Action Goals—Petroleum Hydrocarbons
Coastal Salt Marsh Focused Feasibility Study

Analyte (Sample ID / Depth)	Action Goal	HAAF CHEM 201			HAAF CHEM 202			HAAF CHEM 203			HAAF CHEM 204			HAAF CHEM 205			HAAF CHEM 206		
		1 FT	2 FT	4 FT	1 FT	2 FT	4 FT	1 FT	2 FT	4 FT	1 FT	2 FT	4 FT	1 FT	2 FT	4 FT	1 FT	2 FT	4 FT
Motor Oil	144	***1,100***	80	82	36	21	19 J	39	25	32	45	48	81	***890***	52	59	19 J	20 J	24

Analyte (Sample ID / Depth)	Action Goal	HAAF CHEM 207			HAAF CHEM 208			HAAF CHEM 209			HAAF CHEM 210			HAAF CHEM 211			HAAF CHEM 212			HAAF CHEM COMP 201-204	HAAF CHEM COMP 205-208	HAAF CHEM COMP 209-212
		1 FT	2 FT	4 FT	1 FT	2 FT	4 FT	1 FT	2 FT	4 FT	1 FT	2 FT	4 FT	1 FT	2 FT	4 FT	1 FT	2 FT	4 FT	2.5 FT	2.5 FT	2.5 FT
Motor Oil	144	11 J	20 J	29	46	38	30	36	50	76 J-	16 J	15 J	18	19	21	24 J	14 J	47	30	***180***	52	39

Notes:
NA = Not analyzed
Values listed in ***Bold Italic*** exceed action goal levels.
All units are in ppm.

TABLE 3-6 C
High Marsh Area—Proposed HWRP Channel Cut Area
Detections of FFS COPCs Above Action Goals—Pesticides/PCBs
Coastal Salt Marsh Focused Feasibility Study

Sample ID	Action Goal	HAAF CHEM 201			HAAF CHEM 202		HAAF CHEM 204	HAAF CHEM 205			HAAF CHEM 208	HAAFCHM 209		HAAFCHM 210			HAAF CHEM COMP 201-204	HAAF CHEM COMP 205-208	HAAF CHEM COMP 209-212
Analyte / Depth		1 FT	2 FT	4 FT	1 FT	2 FT	1 FT	1 FT	2 FT	4 FT	1 FT	1 FT	2 FT	1 FT	2 FT	4 FT	2.5 FT	2.5 FT	2.5 FT
Chlordanes total	0.00479	***0.41***	NA	NA	NA	NA	NA	***0.32***	NA	NA	0.0022	NA	NA	NA	NA	0.0028	***0.01***	NA	NA
DDTs total	0.03	***9.9***	0.0065	0.013	0.0089	0.0034	***0.054***	***2.68***	0.015	0.0022	0.0062	0.019	0.0088	0.0036	0.003	***0.181***	***0.9072***	0.0026	***0.0301***
Endrin aldehyde	0.0064	***0.097***	NA	0.0028 J	NA	NA	NA	***0.059***	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:
NA = Not analyzed
Values listed in ***Bold Italic*** exceed action goal levels.
All units are in ppm.

TABLE- 3-7 A
Historic Outfall Drainage Ditch
Detections of FFS COPCs Above Action Goals—Metals
Coastal Salt Marsh Focused Feasibility Study

Sample ID	Action Goal	CSM-HDD-SD-340			CSM-HDD-SD-341			CSM-HDD-SD-342			CSM-HDD-SD-343			CSM-HDD-SD-344			TWA-SD1	TWA-SD7		
Analyte / Depth		**0 FT**	**3 FT**	**4 FT**	**0 FT**	**2 FT**	**3.5 FT**	**0 FT**	**1 FT**	**2.5 FT**	**0 FT**	**1 FT**	**2.5 FT**	**0 FT**	**1 FT**	**2.5 FT**	**0.5 FT**	**0.5 FT**	**2 FT**	**3 FT**
Cadmium	1.8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	***3.3***	***11.5***	***6.9***
Cobalt	26.7	11.5	19.7	21.9	21.2	22.3	18.9	22.1	20	23.3	17.5	18.5	18.3	21.3	18.5	20.8	17.4	***41.2***	***136***	***91.2***
Lead	46.7	NA	17.5 J	19.6 J	21.5 J-	***229*** J-	22.6 J-	29 J-	25.9 J-	30.5	22.6	19.1 J	18.9 J	23.2	20.6 J-	18 J	16.2	***88.7***	***121***	***59***
Manganese	1,260	567	534	611	691	658	643	723	623	705	842	875	659	735	655	666	1020	***3,360***	***18,200***	***5,870***
Nickel	132	75.3	89 J-	101	99.5	112	98.5	105	104	112	88.5	81.9	91.5	96.6	91.9	93.4	68.7	***187***	***546***	***283***
Zinc	169	76.5	89.2	102	109	139	113	141	114	147	110	95.1	95.7	110	98.4	91	87.3	***306***	***647***	***296***

Notes:
NA = Not analyzed
Values listed in ***Bold Italic*** exceed action goal levels.
All units are in ppm.

TABLE 3-7 B
Historic Outfall Drainage Ditch
Detections of FFS COPCs Above Action Goals—Pesticides/PCBs
Coastal Salt Marsh Focused Feasibility Study

Sample ID	Action Goal	CSM-HDD-SD-340		CSM-HDD-SD-341		CSM-HDD-SD-342		CSM-HDD-SD-343	CSM-HDD-SD-344	TWA-SD7
Analyte / Depth		**0 FT**	**3 FT**	**0 FT**	**2 FT**	**0 FT**	**1 FT**	**1 FT**	**0 FT**	**0.5 FT**
Dichlorprop	0.14	NA	NA	NA	NA	NA	NA	NA	NA	***1.7***

Notes:
NA = Not analyzed
Values listed in ***Bold Italic*** exceed action goal levels.
All units are in ppm.

TABLE 3-8 A
Outfall Drainage Ditch
Detections of FFS COPCs Above Action Goals—Metals
Coastal Salt Marsh Focused Feasibility Study

Sample ID	Action Goal	CSM-ODD-SD-330		CSM-ODD-SD-331		CSM-ODD-SD-332	CSM-ODD-SD-333	HB-4655	HB-4656	HB-4658	HB-4671	HB-4690	HB-6418
Analyte / **Depth**		**0 FT**	**1.5 FT**	**0 FT**	**1.5 FT**	**0 FT**	**0 FT**	**1 FT**	**1 FT**	**1 FT**	**0 FT**	**0 FT**	**0.5 FT**
Beryllium	1.68	***2.8***	***3.2***	1	1.5	***4.9***	***6.8***	NA	NA	NA	NA	NA	NA
Cadmium	1.8	***2.8***	***18.6***	NA	NA	NA	***9.5***	NA	1.1 A	1.5 A	1.7 A	1.4 A	NA
Cobalt	26.7	***40.7***	22.2	***34.6***	***30.4***	***46.8***	***199***	18.3 A	NA	20.5 A	***33.8*** A	26.4 A	***26.9*** A
Lead	46.7	***398***	***752***	27.4	36.5	***512***	***407***	NA	43.7 A	32.8 A	***71*** A	42.1 A	36.9 A
Manganese	1,260	532	***1,280***	317	396	973	***4,100***	NA	NA	NA	NA	NA	856 A
Nickel	132	***212***	114	***162***	***132***	***156***	***637***	NA	84.1 A	93.8 A	128 A	102 J-	***143*** A
Silver	1	0.4 J	***8.3***	0.2 J	0.2 J	0.8	***3.1***	NA	0.3 J	0.33 J	0.63 J	0.31 J	NA
Zinc	169	***215***	***222***	134	147	***190***	***366***	90.8 J-	NA	107 J-	132 J-	90.5 J-	159 A

Sample ID	Action Goal	HB-6420	HB-6422	HB-6424	HB-6426	HB-6428	HB-6430	HB-6447	ODD-SD1		ODD-SD1A	ODD-SD2	
Analyte / **Depth**		**0.5 FT**	**0.5 FT**	**0.5 FT**	**0.5 FT**	**0.5 FT**	**0.5 FT**	**0.5 FT**	**0.5 FT**	**1.5 FT**	**2.5 FT**	**0.5 FT**	**1.5 FT**
Beryllium	1.68	NA	1.4 A	1.6 A	NA	1.3 A	NA	***3.9***	***2.1***	***3.3***	***2.5***	***2.5***	1.2
Cadmium	1.8	NA	NA	NA	NA	NA	NA	***15***	NA	NA	1.2	***2.4***	NA
Cobalt	26.7	***28.1*** A	***37.5*** A	26.3 A	***32.1*** A	***35.5*** A	24.4 A	***93.5***	***47.6***	***135***	***51.8***	***54.5***	18.4
Lead	46.7	35.1 A	***50.5*** A	44.6 A	36.4 A	***49.3*** A	17.6 A	***602***	***66.6***	***196***	***88***	***88***	***55.1***
Manganese	1,260	***1,410*** A	714 A	783 A	1170 A	723 A	700 A	1,250	585	***5,170***	735	426	347
Nickel	132	***135*** A	***165*** A	***140*** A	***148*** A	***145*** A	111 A	***390***	***164***	***261***	***187***	***191***	84
Silver	1	NA	NA	NA	NA	NA	NA	***6.6***	NA	NA	0.2 J	NA	NA
Zinc	169	148 A	***171*** A	***176*** A	162 A	139 A	100 A	***454***	***177***	***212***	***171***	***204***	107

Sample ID	Action Goal	ODD-SD3		ODD-SD4		ODD-SD5		PS013SS2	PS014SS2	PS015SS2	PS020SS1	PS021DS1	PS021SS1
Analyte / **Depth**		**0.5 FT**	**1.5 FT**	**0.5 FT**	**1.5 FT**	**0.5 FT**	**1.5 FT**	**0 FT**	**0 FT**	**0 FT**	**0 FT**	**0 FT**	**0 FT**
Beryllium	1.68	1.3	0.93	1.6	1.4	0.92	0.53	1.62	***2.17***	0.909	***2.32***	NA	***2.2***
Cadmium	1.8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt	26.7	***27.9***	23.3	***30.4***	22.5	22.8	13.8	***56.1***	***43.9***	21.1	***55.9***	NA	***38.3***
Lead	46.7	42.8	34.3	38	32.7	29.1	9.7	***90***	***59***	23.3	43	***79***	NA
Manganese	1,260	778	821	547	1120	591	418	***1,640***	845	504	***3,000***	NA	***1,850***
Nickel	132	124	118	130	109	114	74.5	***180***	***155***	77.7	***219***	NA	***161***
Silver	1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	169	156	152	158	144	116	68.9	***223***	***202***	90.9	***215***	NA	***183***

TABLE 3-8 A
Outfall Drainage Ditch
Detections of FFS COPCs Above Action Goals—Metals
Coastal Salt Marsh Focused Feasibility Study

Analyte / Sample ID / Depth	Action Goal	PS-109-SS		PS-115-SS		PS-SD-09A		PS-SD-109A	PS-SD-115A	SC-HCSM-008A
		0.2 FT	1.17 FT	0.2 FT	1.17 FT	1.5 FT	2.5 FT	2.5 FT	2.5 FT	1.5 FT
Beryllium	1.68	***4.93***	***3.01***	***3.47***	***2.8***	0.9	0.9	0.9	1.1	0.9
Cadmium	1.8	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt	26.7	***72.4***	16.7	***57.1***	***77.3***	16.6	14.9	17.8	20.7	14.6
Lead	46.7	***219***	***319***	***197***	***602***	NA	12.8 J	22.4	26.5	11.1 J
Manganese	1,260	***3,160***	280	***2,470***	***2,340***	747	520	483	714	381
Nickel	132	***254***	121	***196***	***145***	75.2	66.1	86.5	101	69.4
Silver	1	NA	NA	NA	NA	NA	NA	0.087	0.1 J	NA
Zinc	169	***263***	167	***226***	***197***	68.7	61	92.4	105	60

Notes:
NA = Not analyzed
Values listed in ***Bold Italic*** exceed action goal levels.
All units are in ppm.

TABLE 3-8 B
Outfall Drainage Ditch
Detections of FFS COPCs Above Action Goal— Petroleum Hydrocarbons
Coastal Salt Marsh Focused Feasibility Study

Analyte / Sample ID / Depth	Action Goal	CSM-ODD-SD-330		CSM-ODD-SD-331		CSM-ODD-SD-332	CSM-ODD-SD-333	ODD-SD1A	PS-109-SS	PS-SD-09A		PS-SD-109A	PS-SD-115A	SC-HCSM-008A
		0 FT	1.5 FT	0 FT	1.5 FT	0 FT	0 FT	2.5 FT	1.17 FT	1.5 FT	2.5 FT	2.5 FT	2.5 FT	1.5 FT
Diesel Range Hydrocarbons	144	NA	***4,600*** JN	NA	NA	NA	NA	NA	***796***	NA	19 JN	NA	53	NA
Motor Oil	144	***9,500*** JN	NA	76	74 JN	***1,400***	***15,000*** N	***10,000***	NA	22 JN	NA	71 N	NA	21 JN

Notes:
NA – Not analyzed
Values listed in ***Bold Italic*** exceed action goal levels
All units are in ppm

TABLE 3-8 C
Outfall Drainage Ditch
Detections of FFS COPCs Above Action Goals—SVOCs
Coastal Salt Marsh Focused Feasibility Study

Analyte / Sample ID	Action Goal	HB-6418	HB-6420	HB-6422	HB-6424	HB-6426	HB-6447	ODD-SD2	ODD-SD3	PS013SS1	PS-115-SS	
Depth		0.5 FT	0.5 FT	0.5 FT	0.5 FT	0.5 FT	0.5 FT	0.5 FT	0.5 FT	0.5 FT	0.2 FT	1 - 1.17 FT
Pentachlorophenol	0.017	NA	NA	NA	NA	NA	NA	NA	NA	NA	***2.76***	***1.79***
Phenol	0.13	NA	NA	NA	NA	NA	NA	NA	NA	NA	***3.06***	***2.34***

Notes:
NA = Not analyzed
Values listed in ***Bold Italic*** exceed action goal levels.
All units are in ppm.

TABLE 3-8 D
Outfall Drainage Ditch
Detections of FFS COPCs Above Action Goals—Pesticides/PCBs
Coastal Salt Marsh Focused Feasibility Study)

Analyte / Sample ID	Action Goal	CSM-ODD-SD-330		CSM-ODD-SD-331		CSM-ODD-SD-332	CSM-ODD-SD-333	HB-4513	HB-4567	HB-4568	HB-4690	HB-6418	HB-6420	HB-6422	HB-6424	HB-6426	HB-6428
Depth		0 FT	1.5 FT	0 FT	1.5 FT	0 FT	0 FT	0.5 FT	0.5 FT	0.5 FT	0 FT	0.5 FT	0.5 FT	0.5 FT	0.5 FT	0.5 FT	0.5 FT
Chlordanes total	0.00479	***0.13***	NA	NA	NA	***0.25***	***0.061***	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DDTs total	0.03	***3.2***	***4.79***	0.0197	0.0063	***2.83***	***11.01***	0.0131	***0.83***	0.0073	***0.12***	NA	NA	***0.4***	NA	0.025	***0.1***
Endrin aldehyde	0.0064	***0.021*** J	NA	NA	NA	***0.041*** N	***0.028*** N	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PCBs total	0.09	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.02761	0.01585	0.04072	0.03534	0.02647	***0.10027***

Analyte / Sample ID	Action Goal	HB-6430	HB-6447	HB-6591	HB-6591	HB-6592	ODD-SD1		ODD-SD1A	ODD-SD2		ODD-SD3		ODD-SD4	PS013SS1	PS021DS1	PS-SD-109A	PS-SD-115A
Depth		0.5 FT	0.5 ft	0.5 FT	NONE	NONE	0.5 FT	1.5 FT	2.5 FT	0.5 FT	1.5 FT	0.5 FT	1.5 FT	5 FT	0.5 FT	0 FT	3.5 FT	3.5 FT
Chlordanes total	0.00479	NA	NA	0.003	NA	0.003	NA	NA	***0.038***	NA	NA	NA	NA	NA	NA	NA	NA	NA
DDTs total	0.03	NA	***1.8***	***0.501***	NA	***0.34***	***0.69***	***1.98***	***0.878***	***0.2***	***0.9491***	***1.32***	***0.38***	***0.034***	***0.25***	***1.4***	0.003	0.0239
Endrin aldehyde	0.0064	NA	NA	NA	NA	NA	NA	NA	0.0051	NA	NA	NA	NA	NA	NA	NA	NA	NA
PCBs total	0.09	0.02132	***1.6941***	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:
NA = Not analyzed
Values listed in ***Bold Italic*** exceed action goal levels.
All units are in ppm.

TABLE 3-9 A
Boat Dock Nonchannel Area
Detections of FFS COPCs Above Action Goals—Metals
Coastal Salt Marsh Focused Feasibility Study

Analyte — Sample ID / Depth	Action Goal	30	31	32	34	35	36	37	38	39
		0 FT	0 FT	0 FT	0 FT	0 FT	0 FT	0 FT	0 FT	0 FT
Lead	46.7	30.4 A	27.4 A	***103 A***	***50 A***	***158 A***	***59.9 A***	***349 A***	22.8 A	34 A
Zinc	169	138 J	159 J	***872 J***	160 J	***200 J***	***319 J***	***249 J***	53.9 J	159 J

Notes:
NA = Not analyzed
Values listed in ***Bold Italic*** exceed action goal levels.
All units are in ppm.

TABLE 3-9 B
Boat Dock Nonchannel Area
Detections of FFS COPCs Above Action Goals—SVOCs
Coastal Salt Marsh Focused Feasibility Study

Analyte — Sample ID / Depth	Action Goal)	30	31	32	34	35	36	36	37	38	38	39
		0 FT	0 FT	0 FT	0 FT	0 FT	0 FT	0 FT	0 FT	0 FT	0 FT	0 FT
PAHs total	4.022	0.166	0.381	3.035	***4.246***	***14.72***	***17.908***	NA	2.7	0.191	0.115	***23.092***

Notes:
NA = Not analyzed
Values listed in ***Bold Italic*** exceed action goal levels.
All units are in ppm.

TABLE 3-9 C
Boat Dock Nonchannel Area
Detections of FFS COPCs Above Action Goals—Pesticides/PCBs/Dioxins
Coastal Salt Marsh Focused Feasibility Study

Analyte — Sample ID / Depth	Action Goal	30	32	35	36	37	38	38	39
		0 FT	0 FT	0 FT	0 FT	0 FT	0 FT	0 FT	0 FT
BHCs total	0.0048	NA	NA	NA	NA	NA	NA	NA	***0.34***
Chlordanes total	0.00479	0.0018	***0.0195***	NA	NA	***0.0077***	NA	***0.005***	NA
DDTs total	0.03	NA	***0.0527***	***0.0337***	***0.074***	***0.46***	***0.14***	***0.24***	***0.074***
Heptachlor epoxide	0.0088	NA	NA	NA	NA	***0.011*** *J+*	***0.017*** *A*	NA	NA
Methoxychlor	0.09	NA	NA	0.023 A	NA	NA	NA	NA	***0.62*** *J+*

Notes:
NA = Not analyzed
Values listed in ***Bold Italic*** exceed action goal levels.
All units are in ppm.

TABLE 3-10
Boat Dock Channel Area
Detections of FFS COPCs Above Action Goals—Metals
Coastal Salt Marsh Focused Feasibility Study

Analyte / Sample ID / Depth	Action Goal	CSM-BD-SD-300		CSM-BD-SD-301		CSM-BD-SS-302		CSM-BD-SS-303		HB-99-BD-33A		HB-99-SD-33
		0 FT	3 FT	0 FT	3 FT	0 FT	3 FT	0 FT	3 FT	1 FT	3 FT	0 FT
Barium	188	65.2 J	65.4 J	66.4 J	65.6 J	60.3 J	66.7 J	69.2 J	70 J	81.5 J	67.9 J	***1,060 A***
Copper	88.7	80.7	79.5	79.9	78.3	77.9	77.5	81.6	74.3	***95.1***	79.4	***348 J+***
Lead	46.7	28.4	28.3	28.6	27.8	28.4	27.6	29.9	26	33.1	28.8	***1,980 J+***
Zinc	169	139	138	136	136	136	135	141	129	160	139	***1,740 J+***

Notes:
NA = Not analyzed
Values listed in ***Bold Italic*** exceed action goal levels.
All units are in ppm.

TABLE 3-11 A
Area 14
Detections of FFS COPCs Above Action Goals—Metals
Coastal Salt Marsh Focused Feasibility Study

Sample ID	Action Goal	CSM-A14-SD-370	CSM-A14-SD-371	CSM-A14-SD-372		CSM-A14-SD-373	CSM-A14-SD-374			CSM-A14-SD-375	CSM-A14-SD-376			CSM-A14-SD-377	CSM-A14-SD-378
Analyte / **Depth**		**2 FT**	**2 FT**	**2 FT**	**4 FT**	**2 FT**	**0 FT**	**2 FT**	**4 FT**	**2 FT**	**0 FT**	**2 FT**	**4 FT**	**2 FT**	**2 FT**
Cobalt	26.7	8.9 J	**33.8**	16.6	21.7	8.8 J	24.1	20.7	16.7	***93.3***	13.6	6.9 J	3.7 J	NA	9.3 J

Notes:
NA = Not analyzed
Values listed in ***Bold Italic*** exceed action goal levels.
All units are in ppm.

TABLE 3-11 B
Area 14
Detections of FFS COPCs Above Action Goals—Petroleum Hydrocarbons
Coastal Salt Marsh Focused Feasibility Study

Sample ID	Action Goal	CSM-A14-SD-370			CSM-A14-SD-372		CSM-A14-SD-373	CSM-A14-SD-374			CSM-A14-SD-376	CSM-A14-SD-378
Analyte / **Depth**		**0 FT**	**2 FT**	**4 FT**	**2 FT**	**4 FT**	**2 FT**	**0 FT**	**2 FT**	**4 FT**	**0 FT**	**2 FT**
Motor Oil	144	110 N	***660***	***310 N***	28	35	95	56	70	29	53	26

Notes:
NA = Not analyzed
Values listed in ***Bold Italic*** exceed action goal levels.
All units are in ppm.

TABLE 3-11 C
Area 14
Detections of FFS COPCs Above Action Goals—SVOCs
Coastal Salt Marsh Focused Feasibility Study

Sample ID	Action Goal	CSM-A14-SD-370	CSM-A14-SD-371	CSM-A14-SD-372		CSM-A14-SD-373	CSM-A14-SD-374			CSM-A14-SD-375	CSM-A14-SD-376		CSM-A14-SD-377	CSM-A14-SD-378
Analyte / **Depth**		**2 FT**	**2 FT**	**2 FT**	**4 FT**	**2 FT**	**0 FT**	**2 FT**	**4 FT**	**2 FT**	**0 FT**	**4 FT**	**2 FT**	**2 FT**
PAHs total	4.022	0.7049	0.2849	0.2248	0.5935	0.2898	2.4685	0.7425	0.2904	0.472	***35.207***	0.004	0.0279	0.0581

Notes:
NA = Not analyzed
Values listed in ***Bold Italic*** exceed action goal levels.
All units are in ppm.

TABLE 3-11 D
Area 14
Detections of FFS COPCs Above Action Goals—Pesticides/PCBs/Dioxins
Coastal Salt Marsh Focused Feasibility Study

Analyte / Sample ID	Action Goal	CSM-A14-SD-370	CSM-A14-SD-371	CSM-A14-SD-372	CSM-A14-SD-373	CSM-A14-SD-374			CSM-A14-SD-375	CSM-A14-SD-376			CSM-A14-SD-377	CSM-A14-SD-378
Depth		**2 FT**	**2 FT**	**2 FT**	**2 FT**	**0 FT**	**2 FT**	**4 FT**	**2 FT**	**0 FT**	**2 FT**	**4 FT**	**2 FT**	**2 FT**
DDTs total	0.03	***0.1012***	NA	NA	***0.1816***	0.0135	NA	NA	NA	***0.35***	0.0049	0.0056	0.0124	NA

Notes:
NA = Not analyzed
Values listed in ***Bold Italic*** exceed action goal levels.
All units are in ppm.

TABLE 3-12 A
Former Sewage Treatment Plant Outfall
Detections of FFS COPCs Above Action Goals—Metals
Coastal Salt Marsh Focused Feasibility Study

Analyte / Sample ID / Depth	Action Goal	CSM-HM-SD-396		CSM-HM-SD-397		CSM-HM-SD-398		TP-SD03	TP-SD03A		TWA-SD15		
		0 FT	**1.5 FT**	**0 FT**	**1.5 FT**	**0 FT**	**1.5 FT**	**0 FT**	**0 FT**	**1.5 FT**	**0.5 FT**	**2 FT**	**3 FT**
Copper	**88.7**	***133***	78.1	80.5	83.7	84.1	73.7	80.4	***159***	72.2	61.5	60.6	41.2
Lead	**46.7**	***54.5***	44	32.6	44.2	27.4	26.3	45.8	***171***	40.5	30.9	26.3	10.4
Mercury	**0.58**	***1.2***	***0.6***	0.5	0.4	***1***	0.3	***8.4***	***6***	0.5	0.46	***0.59***	0.25
Silver	**1**	***23.2***	***3.5***	0.8	***5***	***1.3***	0.2 J	NA	***20.1***	0.2 J	NA	NA	NA
Zinc	**169**	***229***	142	146	163	137	106	145	***255***	114	129	109	61.7

Notes:
NA = Not analyzed
Values listed in ***Bold Italic*** exceed action goal levels.
All units are in ppm.

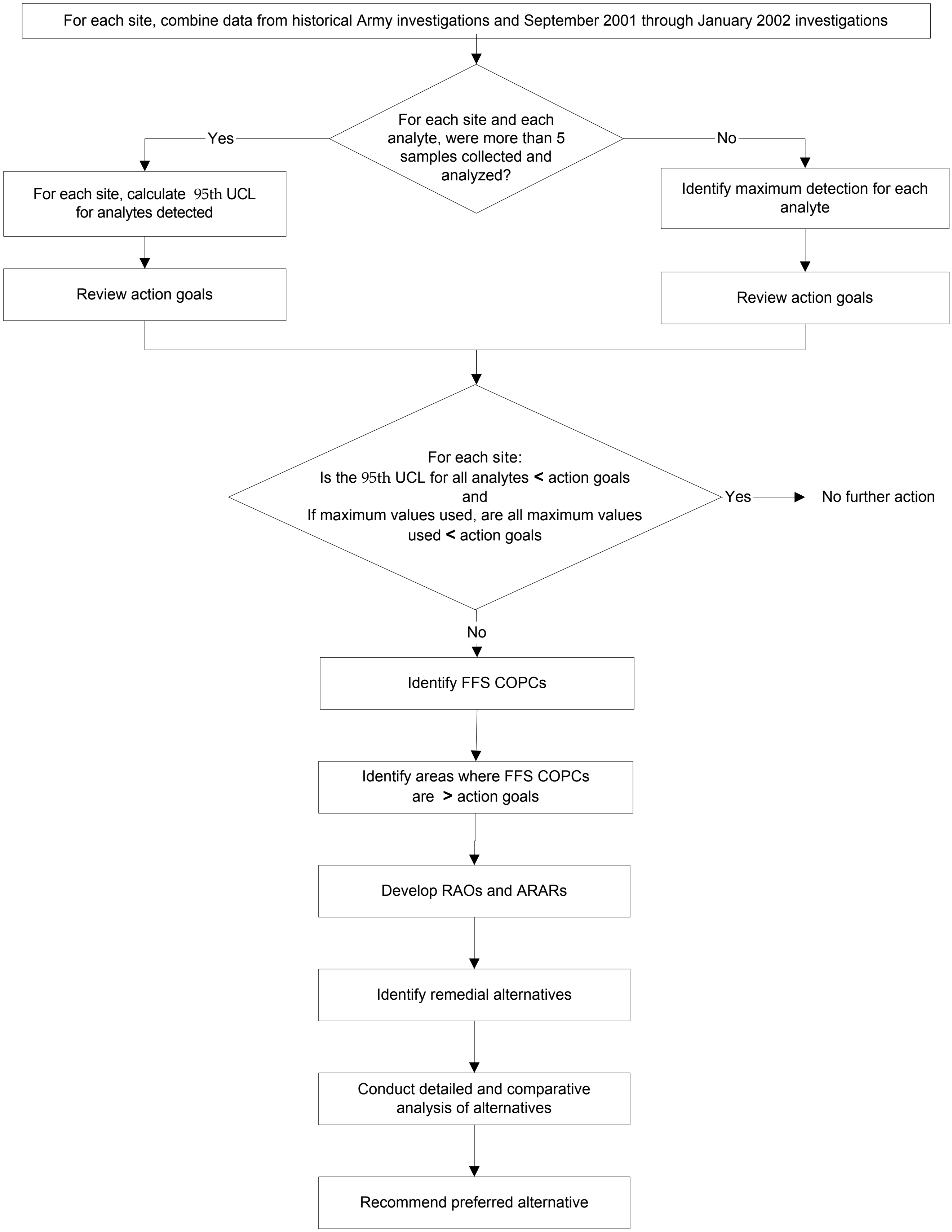
TABLE 3-12 B
Former Sewage Treatment Plant Outfall
Detections of FFS COPCs Above Action Goals—Pesticides/PCBs/Dioxins
Coastal Salt Marsh Focused Feasibility Study

Analyte / Sample ID / Depth	Action Goal	TP-SD03A
		0 FT
Chlordanes total	0.00479	***0.0055***
DDTs total	0.03	***0.063***

Notes:
NA = Not analyzed
Values listed in ***Bold Italic*** exceed action goal levels.
All units are in ppm.

Figure 3-1

CSM Focused Feasibility Study Site Screening and Alternative Selection Process



SECTION 4

Development of Remedial Action Objectives

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 FFS COPCs above action goals 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 develops specific RAOs, which were used to guide the development of proposed alternatives for each CSM site. The development of RAOs is a critical prerequisite to the development of remedial alternatives.

This section provides a definition of RAOs and describes the development of RAOs, presents how the different agencies (DTSC, RWQCB, and Army) identify and implement their respective laws and standards for evaluating remedial actions, and identifies RAOs for the CSM sites.

4.1 Definition and Development of RAOs

RAOs are quantitative and qualitative expressions of goals for protecting human health and the environment. They are often expressed in terms of contaminants and media of interest, possible receptors, and associated exposure pathways. RAOs can be accomplished by reducing the concentrations of residual contaminants that are greater than their remediation goals or by controlling or eliminating the exposure of receptors to specific residual contaminants that are greater than their remediation goals. The RAOs are developed in this 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 CSM.

The RAOs were developed in the FFS using the same conceptual model used in the Human Health and Ecological Risk Assessment (U.S. Army, 2001) for the CSM (see Section 2.6). Current and future land use scenarios considered in developing RAOs for the CSM sites included human receptors recreational use of the CSM (recreational fishing and shellfish collection). Due to the high certainty of the future ecological habitat of the site, the only ecological receptors expected to be present in the future are estuarine receptors. The RAO development process also evaluated the FFS COPCs and action goals established in Sections 3.1 and 3.2 and ARARs (developed below). Chemical-specific, location-specific, and action-specific ARARs identified for this FFS are presented in Section 4.3. RAOs for each CSM site are identified in Section 4.4.

Analytical data and other information used to facilitate the development of RAOs for this FFS were obtained from the following references:

- *Final Report Confirmation Study for Hazardous Waste*, Hamilton Air Force Base, (WCC, 1987)
- *Final Environmental Investigation Report*, Hamilton Army Airfield, Volume I (ESI, 1993)

- *Supplement to the Final Environmental Investigation Report*, Hamilton Army Airfield, California (USACE, 1994)
- *Additional Environmental Investigation Report of BRAC Property*, Hamilton Army Airfield (WCFS, 1996)
- *Comprehensive Remedial Investigation Report*, BRAC Property, Hamilton Army Airfield, Novato, California (IT, 1999a)
- *Interim Removal Action Data Report* (IT, 1999c)
- *Final Biological Testing Data Report* (IT, 2000)
- *Environmental Investigation Report, Onshore Fuel Line, BRAC Property* (IT, 1997b)
- *Remedial Design Investigation Final Data Report* (FW, 2000)
- *Coastal Salt Marsh December 2001/January 2002 Sampling Report, Hamilton Army Airfield* (USACE, 2002a)
- *Coastal Salt Marsh August Sampling Report*, Hamilton Army Airfield (USACE, 2002c)

4.2 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 FFS considers these different laws and regulations in establishing RAOs and recommending remedies for the CSM sites in this FFS. This section provides background information on how the different agencies will identify and implement their respective laws and standards to select final remedies that will be presented in a future ROD/RAP.

4.2.1 State Remedy Selection Requirements and Process

The final selection of remedies by DTSC and the RWQCB in a future ROD/RAP will be 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

The factors listed above were considered in establishing RAOs and evaluating and proposing remedies in this FFS.

4.2.2. Army Remedy Selection Requirements and Process

The Army conducts remedial actions under CERCLA. 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, the ARARs analysis provided in Section 4.3 was developed in a manner consistent with guidance and policy of CERCLA, as amended by SARA.

4.3 Applicable or Relevant and Appropriate Requirements

The ARARs listed in the following sections have been identified by the Army as potential ARARs; the determination of ARARs is an ongoing process, with a final determination to be presented in the ROD/RAP. Therefore, reference to the term ARARs in subsequent sections of this report implies the ARARs are only potential in nature at this stage of the CERCLA process and will continue to evolve through the ROD/RAP. ARARs may be added, deleted, or have a revised status as the result of the document revision process.

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 To Be Considered (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 CSM 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 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)

4.3.1 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 affected. 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 CSM sites are presented in Table 4-1. 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.

4.3.2 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 4-2. The major location-specific ARARs that could affect remedial actions in the CSM 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
- Selecting 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 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 CSM 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.

4.3.3 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 soluble threshold limit concentration (STLC) or the total threshold limit concentration (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 toxicity characteristic leaching procedure (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 CSM sites are summarized in Table 4-3.

4.4 Identification of Remedial Action Objectives

Protection of human health and the environment in the CSM 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 action goals.

The RAOs for the CSM 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 3-2 provides the action goals established for the CSM sites. The following subsections contain summaries of the RAOs for each CSM site requiring evaluation in the FFS.

4.4.1 Antenna Debris Disposal Area

The RAOs for the Antenna Debris Disposal Area are to prevent or mitigate the exposure of ecological and human receptors to soil/sediment containing concentrations of FFS COPCs (barium, beryllium, cadmium, cobalt, copper, lead, manganese, nickel, zinc, TPH-diesel endrin aldehyde, MCPP, total DDTs, total BHCs, total chlordanes, and total PCBs) that are greater than their respective action goals.

4.4.2 East Levee Construction Debris Disposal Area

The RAOs for the ELCDDA are to prevent or mitigate the exposure of ecological receptors to soil/sediment containing concentrations of FFS COPCs (lead, zinc, TPH-diesel, total DDTs, total PCBs, and total dioxins equivalents) that are greater than their respective action goals.

4.4.3 High Marsh Area

4.4.3.1 Proposed HWRPChannel Cut Area

The RAOs for the Proposed HWRP Channel Cut Area are to prevent or mitigate the exposure of ecological or human health receptors to soil containing concentrations of FFS COPCs (beryllium, cadmium, cobalt, lead, nickel, TPH-motor oil, endrin aldehyde, total DDTs, and total chlordanes) that are greater than their respective action goals.

4.4.3.2 Nonchannel Cut Area

The RAOs for the Nonchannel Cut Area are to prevent or mitigate the exposure of ecological or human receptors to soil containing concentrations of FFS COPCs (beryllium, copper, lead, nickel, silver, zinc, endrin aldehyde, total DDTs, total chlordanes, and total PCBs) that are greater than their respective action goals. RAOs for the Nonchannel Cut Area were not established for the site-specific FFS COPCs of cobalt and manganese. Cobalt and manganese were not detected at concentrations or frequencies that indicate there is a significant risk.

4.4.4 Historic ODD

The RAOs for the Historic ODD are to prevent or mitigate the exposure of ecological or human health receptors to soil containing concentrations of FFS COPCs (cadmium, cobalt, lead, manganese, nickel, zinc, and dichloroprop) that are greater than their action goals.

4.4.5 Outfall Drainage Ditch

The RAOs for the ODD are to prevent or mitigate the exposure of ecological or human receptors to soil containing concentrations of FFS COPCs (beryllium, cadmium, cobalt, lead, manganese, nickel, silver, zinc, TPH-diesel, total DDTs, total, chlordanes, endrin aldehyde, pentachlorophenol, phenol, and total PCBs) that are greater than their respective action goals.

4.4.6 Boat Dock

4.4.6.1 Boat Dock Nonchannel Area

The RAOs for the Boat Dock Nonchannel Area are to prevent or mitigate the exposure of ecological or human receptors to soil containing concentrations of FFS COPCs (lead, zinc, total DDTs, pentachlorophenol, total BHCs, total chlordanes, and total PAHs) that are greater than their respective action goals.

4.4.6.2 Boat Dock Channel Area

The RAOs for the Boat Dock Channel Area are to prevent or mitigate the exposure of ecological or human health receptors to soil containing concentrations of FFS COPCs (barium, copper, lead, and zinc) that are greater than their respective action goals.

4.4.7 Area 14

The RAOs for Area 14 are to prevent or mitigate the exposure of ecological or human health receptors to soil containing concentrations of FFS COPCs (TPH-gasoline, total PAHs, and total DDTs) that are greater than their respective action goals. RAOs for Area 14 were not established for the site-specific FFS COPC cobalt. Cobalt was not detected at concentrations or frequencies that indicate there is a significant risk.

4.4.8 Former Sewage Treatment Plant Outfall

The RAOs for the Former Sewage Treatment Plant Outfall are to prevent or mitigate the exposure of ecological or human health receptors to soil containing concentrations of FFS COPCs (copper, lead, mercury, silver, zinc, total DDTs, and total chlordanes) that are greater than their respective action goals.

TABLE 4-1
Chemical-Specific TBC Criteria for Developing Action Goals

Contaminants	TBC Value (ppm)
Metals	
Lead	46.7[a]
Silver	1.0[c]
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	0.00479
DDTs, total	0.03
Dioxins (total TCDD TEQ)	0.000021

[a] Effects range-low
RART = Regulatory Agencies and Resources Trustees
TCDD = tetrachlorodibenzo-p-dioxin
TEQ = toxicity equivalence

TABLE 4-2
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 4-2
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 4-3
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 4-3
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 4-3
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 4-3
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 4-3
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 5

Remedial Alternatives

This section presents the remedial alternatives developed for this FFS. The remedial alternatives were developed for each CSM site that requires further action. These CSM sites include sites that passed the screening process described in Section 3.

The following remedial alternatives were developed 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

These remedial alternatives emphasize, to the extent practicable, the application of proven treatment technologies that are capable of restoring affected media to a degree compatible with wetland functions.

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 wetland functions. In the high marsh environment, capping would raise the ground surface to a level higher than the optimum zone for pickleweed growth. In subtidal or intertidal environments, capping would significantly alter the drainage patterns in the wetland. Therefore, capped areas in the CSM would not be compatible with wetland functions. Similarly, in-situ soil stabilization or solidification would result in surface soils that are unsuitable for pickleweed growth. For these reasons, capping and in-situ soil stabilization/solidification will not be considered further in the alternatives analysis.

Excavation with onsite disposal was also considered, but is not compatible with wetland functions. Although excavation of contaminated sediments from the CSM would be effective in remediating CSM sites, onsite disposal of that material would require the construction of a treatment or containment area, such as an engineered cap or landfill. Construction of such an area for onsite disposal of contaminated soil would significantly affect the function of the wetland area.

Below is a detailed description of each remedial alternative. Site-specific considerations for each alternative are identified in the detailed evaluation of alternatives provided in Section 6.

5.1 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.

5.2 Alternative 2 – Excavation and Offsite Disposal

Under this alternative, contaminated soil above action goals will be excavated and disposed of at an appropriate offsite landfill facility. Table 3-2 lists the action goals for sites that have been determined to require excavation. Excavation at the CSM 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 CSM 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 CSM 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. 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.

5.2.1 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

5.2.2 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 site would be monitored until pickleweed or natural vegetation is fully reestablished through natural processes. 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 CSM 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 2.2.5. 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 CSM 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.

SECTION 6

Detailed Analysis of Alternatives

This section presents a detailed analysis of the alternatives developed and described in Section 5. The purpose of the detailed analysis is to provide decision-makers with sufficient information to adequately compare the alternatives, select an appropriate remedy for each site, and demonstrate achievement of RAOs and statutory requirements of the ARARs.

6.1 Introduction

The NCP sets forth nine evaluation criteria to address the statutory requirements and the additional technical and policy considerations proven to be important for selection of remedial alternatives. These evaluation criteria serve as the basis for conducting the detailed analysis during this FFS and for subsequently selecting appropriate remedial actions.

The first two criteria, overall protection of human health and the environment and compliance with ARARs, are termed threshold criteria. Alternatives that do not protect human health and the environment or do not comply with ARARs (or justify a waiver) will not meet statutory requirements for selection of a remedy and, therefore, will be eliminated from further consideration. The next five criteria (long-term effectiveness and permanence; reduction of toxicity, mobility, and volume; short-term effectiveness; implementability; and cost) are balancing criteria upon which the remedy selection primarily will be based. CERCLA guidance for conducting feasibility studies lists appropriate questions to be addressed when evaluating an alternative against the balancing criteria (EPA, 1988a). These questions were addressed during the detailed analysis process to provide a consistent basis for evaluation of each of the alternatives. The final two criteria (state acceptance and community acceptance) will be evaluated in the Decision Document.

The U.S. Army is using its lead agency status and authority under CERCLA to implement the environmental restoration activities at HAAF. This FFS is being prepared in accordance with the statutory requirements of the CERCLA, as amended, in an effort to provide protection of human health and the environment.

6.2 Assessment Criteria

Nine CERCLA evaluation criteria were evaluated in this FFS and include:

- Overall protection of human health and the environment
- Compliance with ARARs
- Long-term effectiveness and permanence
- Reduction of toxicity, mobility, and volume
- Short-term effectiveness
- Implementability
- Cost
- State acceptance
- Community acceptance

The following sections describe the elements of the nine evaluation criteria used for detailed analysis of the remedial alternatives.

6.2.1 Overall Protection of Human Health and the Environment

This evaluation criterion assesses whether each alternative provides adequate protection of human health and the environment. Protection encompasses such concepts as reduction of risk to acceptable levels, either by concentration reduction or by elimination of potential for exposure, and minimization of threats introduced by actions during remediation, if any. There is substantial overlap between the protection evaluation criterion and the criteria of compliance with ARARs, long-term effectiveness and permanence, and short-term effectiveness. This criterion is a threshold requirement and the primary objective of the remedial program.

6.2.2 Compliance with Applicable or Relevant and Appropriate Requirements

Each alternative is assessed for attainment of federal and state ARARs. When an ARAR can not be met, the basis for justifying an allowed waiver must be presented. Each of the following is addressed for each alternative during the detailed analysis of ARARs:

- Compliance with chemical-specific ARARs, such as salt water aquatic life protection concentrations
- Compliance with location-specific ARARs, such as wetland regulations
- Compliance with action-specific ARARs, such as closure and post-closure requirements

6.2.3 Long-Term Effectiveness and Permanence

This criterion addresses the results of a remedial action in terms of risk remaining at the site after RAOs have been met. The primary focus of this evaluation is the extent and effectiveness of the controls that may be required to manage the risk posed by untreated residual contamination. The following components of the criterion are addressed for each alternative.

- Magnitude of residual risk: This factor assesses the risk from residual FFS COPCs at the conclusion of the proposed activities. The characteristics of the residual FFS COPCs will be considered to the degree that they remain hazardous, taking into account their volume, toxicity, mobility, and propensity to bioaccumulate.
- Adequacy and reliability of controls: This factor assesses the adequacy and suitability of controls, if any, that are used to manage FFS COPCs that remain at the site. It also assesses the long-term reliability of management controls for providing continued protection from residuals and includes an assessment of potential needs for replacement of technical components of the alternative.

6.2.4 Reduction of Toxicity, Mobility, or Volume

This criterion addresses the statutory preference for selecting remedial actions that employ treatment technologies, which permanently and significantly reduce toxicity, mobility, or volume of the contaminants. Permanent and significant reduction can be achieved through destruction of toxic contaminants, reduction of total mass, irreversible reduction in contaminant mobility, or reduction of total volume of contaminated media. This evaluation focuses on the following specific factors for each of the alternatives:

- Treatment processes the remedy will employ, and the materials they will treat
- Amount of hazardous materials that will be destroyed or treated, including how the principal threat(s) will be addressed
- Degree of expected reduction in toxicity, mobility, or volume through treatment as measured as a percentage of reduction
- Degree to which the treatment will be irreversible
- Type and quantity of treatment residuals that will remain following treatment
- Whether the alternative will satisfy the statutory preference for treatment as a principal element

6.2.5 Short-Term Effectiveness

Under this criterion, alternatives are evaluated with respect to their effects on human health and the environment during the construction and implementation phases of the remedial action. The following factors are addressed for each alternative.

- Protection of the community during remedial actions to address any risk that results from implementation, such as fugitive dusts, transportation of hazardous materials, or air-quality impacts from emissions.
- Protection of workers during construction and implementation.
- Environmental impacts that may result from the construction and implementation of the remedial action.
- The amount of time until the RAOs are achieved.

6.2.6 Implementability

The implementability criterion addresses the technical and administrative feasibility of implementing an alternative and the availability of the required services and materials. Implementability refers to the technical, administrative, and environmental feasibility of implementing an alternative, and the availability of various materials and services required during implementation.

6.2.7 Cost

The detailed cost analysis of alternatives involves estimating the expenditures required to complete each measure in terms of both capital costs and annual operation and maintenance costs. Once these values have been identified and a present worth calculated for each alternative, a comparative evaluation can be made.

Cost estimates for each alternative are based on site-specific conceptual designs and are expressed in terms of year 2003 dollars. An estimate of this type, according to EPA guidance document (1988a), is usually expected to be accurate within plus 50 percent and minus 30 percent.

Estimates of the area and volume of the potentially contaminated soil are presented in Appendix E. Computational methodologies and detailed cost estimates for each CSM site are also presented in Appendix E.

6.2.8 State Acceptance

This evaluation criterion addresses the technical and administrative issues and concerns the State of California may have regarding the selected remedy. This criterion is usually addressed during the approval of the decision document (Record of Decision/Remedial Action Plan [ROD/RAP]), after comments have been received on the Draft ROD/RAP.

6.2.9 Community Acceptance

This evaluation criterion addresses the issues and concerns the public may have regarding each of the alternatives. As with state acceptance, this criterion is usually addressed during approval of the ROD/RAP, after comments have been received on the Draft ROD/RAP. Comments have not been received on these documents, so a summary of community acceptance has not been included in this comparative analysis.

6.3 Detailed Analysis of Alternatives

The following section presents an evaluation of the site-specific remedial action alternatives:

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

The evaluation of the alternatives for the first seven of the nine evaluation criteria is based on the continued use of the CSM as a wetland habitat. For the purpose of evaluating impacts to the CSM environment, it is assumed that pickleweed habitat is present over the entire CSM area (except in subtidal/intertidal areas). Because pickleweed habitat is not currently present along the levee and in some isolated areas of the CSM, this approach will result in a conservative over-estimate of the total average of pickleweed habitat that could be potentially impacted by remedial activities. Two criteria, state acceptance and community acceptance, will be evaluated following receipt of comments on the Draft ROD/RAP.

The tables and figures for this section (Tables 6-1, 6-2, and 6-3 and Figures 6-1, 6-1a, 6-2 and 6-3) are provided at the end of this section. The figures provide sample locations, sample identification numbers, and the proposed remediation areas. To provide a comprehensive overview of the CSM sampling efforts and proposed remediation areas, the figures divide the CSM into three areas: the northern, central and southern portions. The tables and maps are organized to provide analytical results for the specific portions of the CSM. For example, the analytical results for samples shown on Figure 6-1, CSM Northern Section, can be found in Table 6-1. Figure 6-1a illustrates the overlapping proposed excavations within the northern portion of the CSM. Analytical results in the tables are provided for contaminants listed in Table 3-2 – Action Goals- Coastal Salt Marsh Sites.

6.3.1 Antenna Debris Disposal Area

The following section presents the detailed evaluation for the No Further Action and Excavation and Offsite Disposal remedial alternatives for the Antenna Debris Disposal Area. The Antenna Debris Disposal Area is located in the northern section of the CSM. Figure 6-1 identifies the areas where remedial action is proposed in the northern section. Figure 6-1a shows the overlapping proposed excavations for multiple sites within this section of the CSM. Table 6-1 provides analytical results for the samples located in the northern section of the CSM including the Antenna Debris Disposal Area. Analytical results are provided for compounds for which action goals have been established.

6.3.1.1 Alternative 1 – No Further Action

Description

Alternative 1 is No Further Action. No actions would be initiated to control potential site-related risks. 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.

Assessment

Overall Protection of Human Health and the Environment. The No Further Action alternative would not be protective of human health and the environment in the short or long term. This alternative would not meet RAOs. Under this alternative, marsh receptors would be exposed to FFS COPCs above action goals. No additional threats would be introduced by this alternative.

Compliance with Applicable or Relevant and Appropriate Requirements. The No Further Action alternative does not achieve location-specific ARARs. Most of the location- specific ARARs regulate or apply to activities that would be conducted to carry out remedial actions. However, no actions would take place under this alternative, therefore most of the location-specific ARARs do not apply. Other location-specific ARARS such as the California Fish and Game Code Section 5650 and 5652 (preventing releases of materials that would have a negative impact on species or habitat) would not be met by this alternative. The FFS COPCs would remain in place, and exposure would not be controlled or monitored. Since action is not proposed, there are no action-specific ARARs identified for this alternative There are no promulgated chemical-specific ARARs for soil. The chemical specific TBC criteria listed in Table 4-1 would not be met because action goals would not be met.

Long-Term Effectiveness and Permanence. The No Further Action alternative is not expected to be effective in the long term because no remedial actions are proposed. FFS COPCs above action goals would remain in place, and potential exposure to FFS COPCs would not be controlled or monitored.

Reduction of Toxicity, Mobility, or Volume. The No Further Action alternative does not include any treatment to reduce toxicity, mobility, or volume. Soil containing FFS COPCs would remain in place.

Short-Term Effectiveness. No remedial actions are proposed; therefore the RAOs would not be achieved. Since no remedial actions are proposed under this alternative, there would not be any short-term risks to the public, worker, and/or environment.

Implementability. The No Further Action alternative would not have implementation obstacles because remedial actions are not proposed. Implementation of this alternative does not introduce additional risks.

Cost. No costs would be associated with implementing the No Further Action alternative.

6.3.1.2 Alternative 2 – Excavation and Offsite Disposal

Description

Alternative 2 is Excavation and Offsite Disposal. Actions to meet RAOs would consist of the excavation and removal of soil where FFS COPCs are present above action goals. Proposed areas for excavation are shown on Figures 6-1 and 6-1a. Under this alternative, soil would be removed where residual concentrations of FFS COPCs are above action goals. 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.

Excavated soil would be transported to a staging area, transferred to larger trucks, then transported and disposed of at an approved offsite landfill. Confirmation samples would be collected as necessary to verify that the site achieves RAOs. These samples could be collected as pre-design investigation samples that would be collected before excavation to determine the extent of the excavation geometry. Alternately the samples could be collected following excavation activities.

Activities will be conducted in a manner that is sensitive to impacts on plants and animals. Prior to construction activities, a Work Plan will be prepared to identify activities that may be necessary to protect sensitive species. These activities could include construction and maintenance of exclusion fences around the work area to prevent salt marsh harvest mice from entering the area and construction and maintenance of fish barriers to prevent water from entering and exiting the ODD that runs through this area during the period of excavation, reducing the risk of fish entrapment in the dry channel.

Assessment

Overall Protection of Human Health and the Environment. The Excavation and Offsite Disposal alternative would remove soil containing FFS COPCs at concentrations above action goals and, therefore, would meet RAOs by eliminating exposure of marsh receptors to FFS COPCs detected above action goals and meeting ARARS (see below). It is believed that this alternative would be protective of human health and the environment.

Excavation activities would introduce some potential short-term ecological risk due to the use of heavy machinery and damage of coastal salt marsh habitat. It is estimated that 0.25 acres of pickleweed habitat would be temporarily damaged due to construction activities. No temporary access roads are required, therefore, no temporary damage is expected due to equipment access to the site. Recovery of this habitat is expected to occur in the short term (within 2 years). Although wildlife protection measures will be implemented, wildlife species, such as the salt marsh harvest mouse, may be inadvertently killed or injured by this alternative.

Compliance with Applicable or Relevant and Appropriate Requirements. There are no promulgated chemical-specific ARARs for soil. However, the Excavation and Offsite Disposal alternative is expected to satisfy chemical-specific TBC guidance criteria by meeting the action goals listed in Table 4-1. This alternative will also meet location- and action-specific ARARs. The location- and action-specific ARARs would be achieved through implementation of appropriate plans that would be developed during the design process prior to conducting remedial actions. These plans will describe the necessary procedures and management practices necessary to meet the location and action specific ARARs listed in Table 4-2. Procedures and practices described in the various plans will address proper characterization, handling, and transportation of hazardous waste; proper protection and identification of sensitive plant and animal species; authority for approving construction and activities in the coastal salt marsh; discharges of water to San Pablo Bay; and appropriate dust suppression and air monitoring during remedial activities.

Long-Term Effectiveness and Permanence. The Excavation and Offsite Disposal alternative is expected to be effective in the long term because soil containing FFS COPCs above action goals would be physically removed from the site. Removal of the soil would be confirmed with confirmation samples as necessary. Excavation would provide the greatest degree of effectiveness and permanence because the concentrations of FFS COPCs detected above action goals would be removed from the site and disposed of at an appropriate offsite facility.

Reduction of Toxicity, Mobility, or Volume. The Excavation and Offsite Disposal alternative does not 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.

Short-Term Effectiveness. Excavation would achieve the RAOs at the completion of the removal and disposal activities. There is a potential for release of fugitive dusts during the remedial action activities; however, this would be mitigated by developing and implementing appropriate health and safety procedures. Additionally, there may be short-term risks to the public and/or workers during excavation activities through exposure, handling, and transport of the contaminated materials. Potential risks to construction and maintenance workers can be controlled and minimized through proper health and safety procedures.

Operations associated with the excavations would introduce some potential short-term human health risk due to the potential for direct contact or inhalation of the contaminants by workers during excavation activities. However, these risks can be controlled and minimized through proper health and safety procedures.

Implementability. The Excavation and Offsite Disposal alternative technology is well established and is technically and administratively implementable. However, the presence of site-specific obstacles, such as sensitive habitat may complicate excavation, removal, and backfill activities.

In addition, the depth of debris at the Antenna Debris Disposal Area may be too deep to excavate completely without encountering physical constraints (unstable sidewalls and water in the excavation). Shoring the excavation walls and pumping groundwater seeping into the excavated area may not be adequate to accomplish the removal activities at depth.

Cost. Cost estimates are provided in Appendix E. These costs are order-of-magnitude level estimates consistent with EPA requirements for a feasibility study for which cost estimates have an accuracy of plus 50 percent to minus 30 percent. The estimated cost for the Excavation and Offsite Disposal alternative is $248,500.

The cost estimates have been prepared from the best available data at the time of the estimate for guidance in project evaluation and implementation. The final cost of the project would depend on the actual labor and material costs, actual site conditions, final project scope and design, productivity, competitive market conditions, final project schedule, and other variable factors. As a result, the final project costs may vary from those presented in this FFS.

6.3.2 East Levee Construction Debris Disposal Area

The following section presents the detailed evaluation for the No Further Action and Excavation and Offsite Disposal remedial alternatives for the East Levee Construction Debris Disposal Area. The East Levee Construction Debris Disposal Area is located in the central portion of the CSM. Figure 6-2 identifies the area where remediation is proposed within the central portion, including the East Levee Construction Debris Disposal Area. Table 6-2 provides analytical results for the samples located in the central portion of the CSM. Analytical results are provided for compounds for which action goals have been established.

6.3.2.1 Alternative 1 – No Further Action

Description

Alternative 1 is No Further Action. No actions would be initiated to control potential site-related risks. 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.

Assessment

Overall Protection of Human Health and the Environment. The No Further Action alternative would not be protective of human health and the environment in the short or long term. This alternative would not meet RAOs. Under this alternative, the marsh receptors would be exposed to FFS COPCs above action goals. No additional threats would be introduced by this alternative.

Compliance with Applicable or Relevant and Appropriate Requirements. The No Further Action alternative does not achieve location-specific ARARs. Most of the location- specific ARARs regulate or apply to activities that would be conducted to carry out remedial actions. However, no actions would take place under this alternative, therefore most of the location-specific ARARs do not apply. Other location-specific ARARS such as the California Fish and Game Code Section 5650 and 5652 (preventing releases of materials that would have a negative impact on species or habitat) would not be met by this alternative. The FFS COPCs would remain in place, and exposure would not be controlled or monitored. Since action is not proposed, there are no action-specific ARARs identified for this alternative

There are no promulgated chemical-specific ARARs for soil. The chemical specific TBC criteria listed in Table 4-1 would not be met because action goals would not be met.

Long-Term Effectiveness and Permanence. The No Further Action alternative is not expected to be effective in the long term because no remedial actions are proposed. FFS COPCs above action goals would remain in place. Potential exposure to FFS COPCs would not be controlled or monitored.

Reduction of Toxicity, Mobility, or Volume. The No Further Action alternative does not include any treatment to reduce toxicity, mobility, or volume Soil containing FFS COPCs would remain in place.

Short-Term Effectiveness. No remedial actions are proposed; therefore, the RAOs would not be achieved. Since no remedial actions are proposed, there would not be any short-term risks to the public, worker, and/or environment.

Implementability. The No Further Action alternative would not have implementation obstacles because remedial actions are not proposed. Implementation of this alternative does not introduce additional risks.

Cost. No costs would be associated with implementing the No Further Action alternative.

6.3.2.2 Alternative 2 – Excavation and Offsite Disposal

Description

Alternative 2 is Excavation and Offsite Disposal. Actions to meet RAOs would consist of the excavation and removal of soil where FFS COPCs are present above action goals. Proposed areas of excavation are shown on Figure 6-2 Under this alternative, soil would be removed where residual concentrations of FFS COPCs are above action goals.

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.

Excavated soil would be transported to a staging area, transferred to larger trucks, then transported and disposed of at an approved offsite landfill. Confirmation samples would be collected as necessary to verify that the site achieves RAOs. These samples could be collected as pre-design investigation samples that would be collected before excavation to determine the extent of the excavation geometry. Alternately the samples could be collected following excavation activities.

Activities will be conducted in a manner that is sensitive to impacts on plants and animals. Prior to construction activities, a Work Plan will be prepared to identify activities that may be necessary to protect sensitive species. These activities could include construction and maintenance of exclusion fences around the work area to prevent salt marsh harvest mice from entering the area and construction and maintenance of fish barriers to prevent water from entering and exiting the excavation, reducing the risk of fish entrapment in the excavation at the margin of San Pablo Bay.

Prior to excavation, a recently constructed aboveground pipeline that crosses the site will need to be dismantled and moved to provide access to the burn pit. This pipeline will be returned to its original position once excavation activities are finished.

Assessment

Overall Protection of Human Health and the Environment. The Excavation and Offsite Disposal alternative would remove soil containing FFS COPCs at concentrations above action goals and, therefore, would meet RAOs by eliminating exposure of marsh receptors to FFS COPCs detected above action goals. It is believed this alternative would be protective of human health and the environment.

Excavation activities would introduce some potential short-term ecological risk due to the use of heavy machinery and damage of coastal salt marsh habitat. It is estimated that 0.39 acres of pickleweed habitat will be temporarily damaged due to construction activities. Approximately 0.0.05 acres would be temporarily damaged due to equipment access to the site, and 0.34 acres would be damaged due to excavation. Recovery of this habitat is expected to occur in the short term (within 2 years). Although wildlife protection measures will be implemented, wildlife species, such as the salt marsh harvest mouse, may be inadvertently killed or injured by this alternative.

Long-Term Effectiveness and Permanence. The Excavation and Offsite Disposal alternative is expected to be effective in the long term because soil containing FFS COPCs above action goals would be physically removed from the site. Removal of the soil would be confirmed with confirmation samples as necessary. Excavation would provide the greatest degree of effectiveness and permanence because the concentrations of FFS COPCs detected above action goals would be removed from the site and disposed of at an appropriate offsite facility.

Compliance with Applicable or Relevant and Appropriate Requirements. There are no promulgated chemical-specific ARARs for soil. However, the Excavation and Offsite Disposal alternative is expected to satisfy chemical-specific TBC guidance criteria by meeting the action goals listed in Table 4-1. This alternative will also meet location- and action-specific ARARs. The location- and action-specific ARARs would be achieved through implementation of appropriate plans that would be developed during the design process prior to conducting remedial actions. These plans will describe the necessary procedures and management practices necessary to meet the location and action specific ARARs listed in Table 4-2. Procedures and practices described in the various plans will address proper characterization, handling, and transportation of hazardous waste; proper protection and identification of sensitive plant and animal species; authority for approving construction and activities in the coastal salt marsh; discharges of water to San Pablo Bay; and appropriate dust suppression and air monitoring during remedial activities.

Reduction of Toxicity, Mobility, or Volume. The Excavation and Offsite Disposal alternative does not 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.

Short-Term Effectiveness. Excavation would achieve the RAOs at the completion of the removal and disposal activities. There is a potential for release of fugitive dusts during the remedial action activities; however, this would be mitigated by developing and implementing appropriate health and safety procedures. Additionally, there may be short-term risks to the public and/or workers during excavation activities through exposure, handling, and transport of the contaminated materials. Potential risks to construction and maintenance workers can be controlled and minimized through proper health and safety procedures.

Operations associated with the excavations would introduce some potential short-term human health risk due to the potential for direct contact or inhalation of the contaminants by workers during excavation activities. However, these risks can be controlled and minimized through proper health and safety procedures.

Implementability. The Excavation and Offsite Disposal alternative technology is well established and is technically and administratively implementable. However, the presence of site-specific obstacles, such as sensitive habitat may complicate excavation, removal, and backfill activities.

In addition, the depth of contamination at the East Levee Construction Debris Disposal Area burn pit may be too deep to excavate completely without encountering site constraints including excavation wall stability and water seepage into the excavation. Shoring the excavation walls and pumping groundwater seeping into the excavated area may not be adequate to accomplish the removal activities at depth .

Cost. Cost estimates are provided in Appendix E. These costs are order-of-magnitude level estimates consistent with EPA requirements for a feasibility study for which cost estimates have an accuracy of plus 50 percent to minus 30 percent. The estimated cost for the Excavation and Offsite Disposal alternative is $942,000.

The cost estimates have been prepared from the best available data at the time of the estimate for guidance in project evaluation and implementation. The final cost of the project would depend on the actual labor and material costs, actual site conditions, final project scope and design, productivity, competitive market conditions, final project schedule, and other variable factors. As a result, the final project costs may vary from those presented in this FFS.

6.3.3 High Marsh Area

6.3.3.1 Nonchannel Cut Area

The following section presents the detailed evaluation for the No Further Action and Excavation and Offsite Disposal remedial alternatives for the High Marsh Area – Nonchannel Cut Area. The High Marsh Area – Nonchannel Cut Area is located in the northern, central and southern sections of the CSM. Figures 6-1, 6-2 and 6-3 identify the areas where remedial action is proposed in the northern, central and southern sections. Figure 6-1a shows the overlapping proposed excavations for multiple sites within the northern section. Table 6-1, 6-2, and 6-3 provide analytical results for the samples located in the northern, central, and southern sections of the CSM respectively including the High Marsh Area – Nonchannel Cut Area. Analytical results are provided for compounds for which action goals have been established.

Alternative 1 – No Further Action

Description

Alternative 1 is No Further Action. No actions would be initiated to control potential site-related risks. 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.

Assessment

Overall Protection of Human Health and the Environment. The No Further Action alternative would not be protective of human health and the environment in the short or long term. This alternative would not meet RAOs. Under this alternative, marsh receptors would be exposed to FFS COPCs above action goals. No additional threats would be introduced by this alternative.

Compliance with Applicable or Relevant and Appropriate Requirements. The No Further Action alternative does not achieve location-specific ARARs. Most of the location- specific ARARs regulate or apply to activities that would be conducted to carry out remedial actions. However, no actions would take place under this alternative, therefore most of the location-specific ARARs do not apply. Other location-specific ARARS such as the California Fish and Game Code Section 5650 and 5652 (preventing releases of materials that would have a negative impact on species or habitat) would not be met by this alternative. The FFS COPCs would remain in place, and exposure would not be controlled or monitored. Since action is not proposed, there are no action-specific ARARs identified for this alternative There are no promulgated chemical-specific ARARs for soil. The chemical specific TBC criteria listed in Table 4-1 would not be met because action goals would not be met.

Long-Term Effectiveness and Permanence. The No Further Action alternative is not expected to be effective in the long term because no remedial actions are proposed. FFS COPCs above action goals would remain in place. Potential exposure to FFS COPCs would not be controlled or monitored.

Reduction of Toxicity, Mobility, or Volume. The No Further Action alternative does not include any treatment to reduce toxicity, mobility, or volume. Soil containing FFS COPCs above action goals would remain in place.

Short-Term Effectiveness. No remedial actions are proposed; therefore, the RAOs would not be achieved. Since no remedial actions are proposed, there would not be any short-term risks to the public, worker, and/or environment.

Implementability. The No Further Action alternative would not have implementation obstacles because remedial actions are not proposed. Implementation of this alternative does not introduce additional risks.

Cost. No costs would be associated with implementing the No Further Action alternative.

Alternative 2 – Excavation and Offsite Disposal

Description

Alternative 2 is Excavation and Offsite Disposal. Actions to meet RAOs would consist of the excavation and removal of soil where FFS COPCs are present above action goals. Proposed areas of excavation are shown on Figures 6-1, 6-2 and 6-3. Under this alternative, soil would be removed where residual concentrations of FFS COPCs are above action goals.

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.

Excavated soil would be transported to a staging area, transferred to larger trucks, then transported and disposed of at an approved offsite landfill. Confirmation samples would be collected as necessary to verify that the site achieves RAOs. These samples could be collected as pre-design investigation samples that would be collected before excavation to determine the extent of the excavation geometry. Alternately the samples could be collected following excavation activities.

Activities will be conducted in a manner that is sensitive to impacts on plants and animals. Prior to construction activities, a Work Plan will be prepared to identify activities that may be necessary to protect sensitive species. These activities could include construction and maintenance of exclusion fences around the work area to prevent salt marsh harvest mice from entering the area and construction and maintenance of fish barriers if necessary to prevent water from entering and exiting excavations thereby reducing the risk of fish entrapment in excavations.

Assessment

Overall Protection of Human Health and the Environment. The Excavation and Offsite Disposal alternative would remove soil containing FFS COPCs at concentrations above action goals and, therefore, would meet RAOs by eliminating exposure of marsh receptors to FFS COPCs detected above action goals. It is believed this alternative would be protective of human health and the environment.

Excavation activities would introduce some potential short-term ecological risk due to the use of heavy machinery and damage of coastal salt marsh habitat. It is estimated that 2.71 acres of pickleweed habitat will be temporarily damaged due to construction activities. Approximately 0.05 acres would be temporarily damaged due to equipment access to the site, and 2.66 acres would be damaged due to excavation. Recovery of this habitat is expected to occur in the short term (within 2 years). Although wildlife protection measures will be implemented, wildlife species, such as the salt marsh harvest mouse, may be inadvertently killed or injured by this alternative.

Compliance with Applicable or Relevant and Appropriate Requirements. There are no promulgated chemical-specific ARARs for soil. However, the Excavation and Offsite Disposal alternative is expected to satisfy chemical-specific TBC guidance criteria by meeting the action goals listed in Table 4-1. This alternative will also meet location- and action-specific ARARs. The location- and action-specific ARARs would be achieved through implementation of appropriate plans that would be developed during the design process prior to conducting remedial actions. These plans will describe the necessary procedures and management practices necessary to meet the location and action specific ARARs listed in Table 4-2. Procedures and practices described in the various plans will address proper characterization, handling, and transportation of hazardous waste; proper protection and identification of sensitive plant and animal species; authority for approving construction and activities in the coastal salt marsh; discharges of water to San Pablo Bay; and appropriate dust suppression and air monitoring during remedial activities.

Long-Term Effectiveness and Permanence. The Excavation and Offsite Disposal alternative is expected to be effective in the long term because soil containing FFS COPCs above action goals would be physically removed from the site. Removal of the soil would be confirmed with confirmation samples as necessary. Excavation would provide the greatest degree of effectiveness and permanence because the concentrations of FFS COPCs detected above action goals would be removed from the site and disposed of at an appropriate offsite facility.

Reduction of Toxicity, Mobility, or Volume. The Excavation and Offsite Disposal alternative does not 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.

Short-Term Effectiveness. Excavation would achieve the RAOs at the completion of the removal and disposal activities. There is a potential for release of fugitive dusts during the remedial action activities; however, this would be mitigated by developing and implementing appropriate health and safety procedures. Additionally, there may be short-term risks to the public and/or workers during excavation activities through exposure, handling, and transport of the contaminated materials. Potential risks to construction and maintenance workers can be controlled and minimized through proper health and safety procedures.

Operations associated with the excavations would introduce some potential short-term human health risk due to the potential for direct contact or inhalation of the contaminants by workers during excavation activities. However, these risks can be controlled and minimized through proper health and safety procedures.

Implementability. The Excavation and Offsite Disposal alternative technology is well established and is technically and administratively implementable. However, the presence of site-specific obstacles, such as sensitive habitat may complicate excavation, removal, and backfill activities.

Cost. Cost estimates are provided in Appendix E. These costs are order-of-magnitude level estimates consistent with EPA requirements for a feasibility study for which cost estimates have an accuracy of plus 50 percent to minus 30 percent. The estimated cost for the Excavation and Offsite Disposal alternative is $1,333,000.

The cost estimates have been prepared from the best available data at the time of the estimate for guidance in project evaluation and implementation. The final cost of the project would depend on the actual labor and material costs, actual site conditions, final project scope and design, productivity, competitive market conditions, final project schedule, and other variable factors. As a result, the final project costs may vary from those presented in this FFS.

6.3.3.2 Proposed HWRP Channel Cut Area

The following section presents the detailed evaluation for the No Further Action and Excavation and Offsite Disposal remedial alternatives for the Proposed HWRP Channel Cut Area. The Proposed HWRP Channel Cut Area is located in the central portion of the CSM. Figure 6-2 identifies the area where remediation is proposed within the central area, including the Proposed HWRP Channel Cut Area. Table 6-2 provides analytical results for the samples located in the central portion of the CSM. Analytical results are provided for compounds for which action goals have been established.

Alternative 1 – No Further Action

Description

Alternative 1 is No Further Action. No actions would be initiated to control potential site-related risks. 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.

Assessment

Overall Protection of Human Health and the Environment. The No Further Action alternative would not be protective of human health and the environment in the short or long term. This alternative would not meet RAOs. Under this alternative, marsh receptors would be exposed to FFS COPCs above action goals that would remain in place. No additional threats would be introduced by this alternative.

Compliance with Applicable or Relevant and Appropriate Requirements. The No Further Action alternative does not achieve location-specific ARARs. Most of the location- specific ARARs regulate or apply to activities that would be conducted to carry out remedial actions. However, no actions would take place under this alternative, therefore most of the location-specific ARARs do not apply. Other location-specific ARARS such as the California Fish and Game Code Section 5650 and 5652 (preventing releases of materials that would have a negative impact on species or habitat) would not be met by this alternative. The FFS COPCs would remain in place, and exposure would not be controlled or monitored. Since action is not proposed, there are no action-specific ARARs identified for this alternative There are no promulgated chemical-specific ARARs for soil. The chemical specific TBC criteria listed in Table 4-1 would not be met because action goals would not be met.

Long-Term Effectiveness and Permanence. The No Further Action alternative is not expected to be effective in the long term because no remedial actions are proposed. FFS COPCs above actiongoals would remain in place. Potential exposure to FFS COPCs would not be controlled or monitored.

Reduction of Toxicity, Mobility, or Volume. The No Further Action alternative does not include any treatment to reduce toxicity, mobility, or volume. Soil containing FFS COPCs above action goals would remain in place.

Short-Term Effectiveness. No remedial actions are proposed; therefore, the RAOs would not be achieved. Since no remedial actions are proposed, there would not be any short-term risks to the public, worker, and/or environment.

Implementability. The No Further Action alternative would not have implementation obstacles because remedial actions are not proposed. Implementation of this alternative does not introduce additional risks.

Cost. No costs would be associated with implementing the No Further Action alternative.

Alternative 2 – Excavation and Offsite Disposal

Description

Alternative 2 is Excavation and Offsite Disposal. Actions to meet RAOs would consist of the excavation and removal of soil where FFS COPCs are present above action goals. Proposed areas of excavation are shown on Figure 6-2. Under this alternative, soil would be removed where residual concentrations of FFS COPCs are above action goals.

Excavation at the channel cut 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.

Excavated soil would be transported to a staging area, transferred to larger trucks, then transported and disposed of at an approved offsite landfill. Confirmation samples would be collected as necessary to verify that the site achieves RAOs. These samples could be collected as pre-design investigation samples that would be collected before excavation to determine the extent of the excavation geometry. Alternately the samples could be collected following excavation activities.

Activities will be conducted in a manner that is sensitive to impacts on plants and animals. Prior to construction activities, a Work Plan will be prepared to identify activities that may be necessary to protect sensitive species. These activities could include construction and maintenance of exclusion fences around the work area to prevent salt marsh harvest mice from entering the area and construction and maintenance of fish barriers to prevent water from entering and exiting the channel during the period of excavation, reducing the risk of fish entrapment in the dry channel.

Assessment

Overall Protection of Human Health and the Environment. The Excavation and Offsite Disposal alternative would remove soil containing FFS COPCs at concentrations above action goals and, therefore, would meet RAOs and would eliminate exposure of marsh receptors to FFS COPCs detected above action goals. It is believed this alternative would be protective of human health and the environment.

Excavation activities would introduce some potential short-term ecological risk due to the use of heavy machinery and damage of coastal salt marsh habitat. It is estimated that 0.82 acres of pickleweed habitat will be temporarily damaged due to construction activities. Approximately 0.05 acres would be temporarily damaged due to equipment access to the site, and 0.78 acres would be damaged due to excavation.

Compliance with Applicable or Relevant and Appropriate Requirements. There are no promulgated chemical-specific ARARs for soil. However, the Excavation and Offsite Disposal alternative is expected to satisfy chemical-specific TBC guidance criteria by meeting the action goals listed in Table 4-1. This alternative will also meet location- and action-specific ARARs. The location- and action-specific ARARs would be achieved through implementation of appropriate plans that would be developed during the design process prior to conducting remedial actions. These plans will describe the necessary procedures and management practices necessary to meet the location and action specific ARARs listed in Table 4-2. Procedures and practices described in the various plans will address proper characterization, handling, and transportation of hazardous waste; proper protection and identification of sensitive plant and animal species; authority for approving construction and activities in the coastal salt marsh; discharges of water to San Pablo Bay; and appropriate dust suppression and air monitoring during remedial activities.

Long-Term Effectiveness and Permanence. The Excavation and Offsite Disposal alternative is expected to be effective in the long term because soil containing FFS COPCs above action goals would be physically removed from the site. Removal of the soil would be confirmed with confirmation samples as necessary. Excavation would provide the greatest degree of effectiveness and permanence because the concentrations of FFS COPCs detected above action goals would be removed from the site and disposed of at an appropriate offsite facility.

Reduction of Toxicity, Mobility, or Volume. The Excavation and Offsite Disposal alternative does not 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.

Short-Term Effectiveness. Excavation would achieve the RAOs at the completion of the removal and disposal activities. There is a potential for release of fugitive dusts during the remedial action activities; however, this would be mitigated by developing and implementing appropriate health and safety procedures. Additionally, there may be short-term risks to the public and/or workers during excavation activities through exposure, handling, and transport of the contaminated materials. Potential risks to construction and maintenance workers can be controlled and minimized through proper health and safety procedures.

Operations associated with the excavations would introduce some potential short-term human health risk due to the potential for direct contact or inhalation of the contaminants by workers during excavation activities. However, these risks can be controlled and minimized through proper health and safety procedures.

Implementability. The Excavation and Offsite Disposal alternative technology is well established and is technically and administratively implementable. However, the presence of site-specific obstacles, such as sensitive habitat may complicate excavation, removal, and backfill activities.

Cost. Cost estimates are provided in Appendix E. These costs are order-of-magnitude level estimates consistent with EPA requirements for a feasibility study for which cost estimates have an accuracy of plus 50 percent to minus 30 percent. The estimated cost for the Excavation and Offsite Disposal alternative is $520,600.

The cost estimates have been prepared from the best available data at the time of the estimate for guidance in project evaluation and implementation. The final cost of the project would depend on the actual labor and material costs, actual site conditions, final project scope and design, productivity, competitive market conditions, final project schedule, and other variable factors. As a result, the final project costs may vary from those presented in this FFS.

6.3.4 Historic Outfall Drainage Ditch

The following section presents the detailed evaluation for the No Further Action and Excavation and Offsite Disposal remedial alternatives for the Historic ODD. The Historic ODD is located in the southern portion of the CSM. Figure 6-3 identifies the area where remediation is proposed within the southern area, including the Historic ODD. Table 6-3 provides analytical results for the samples located in the southern portion of the CSM. Analytical results are provided for compounds for which action goals have been established.

6.3.4.1 Alternative 1 – No Further Action

Description

Alternative 1 is No Further Action. No actions would be initiated to control potential site-related risks. 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.

Assessment

Overall Protection of Human Health and the Environment. The No Further Action alternative would not be protective of human health and the environment in the short or long term. This alternative would not meet RAOs. Under this alternative, marsh receptors would be exposed to FFS COPCs above action goals. No additional threats would be introduced by this alternative.

Compliance with Applicable or Relevant and Appropriate Requirements. The No Further Action alternative does not achieve location-specific ARARs. Most of the location- specific ARARs regulate or apply to activities that would be conducted to carry out remedial actions. However, no actions would take place under this alternative, therefore most of the location-specific ARARs do not apply. Other location-specific ARARS such as the California Fish and Game Code Section 5650 and 5652 (preventing releases of materials that would have a negative impact on species or habitat) would not be met by this alternative. The FFS COPCs would remain in place, and exposure would not be controlled or monitored. Since action is not proposed, there are no action-specific ARARs identified for this alternative There are no promulgated chemical-specific ARARs for soil. The chemical specific TBC criteria listed in Table 4-1 would not be met because action goals would not be met.

Long-Term Effectiveness and Permanence. The No Further Action alternative is not expected to be effective in the long term because no remedial actions are proposed. FFS COPCs above action goals would remain in place and potential exposure to FFS COPCs would not be controlled or monitored.

Reduction of Toxicity, Mobility, or Volume. The No Further Action alternative does not include any treatment to reduce toxicity, mobility, or volume. Soil containing FFS COPCs above action goals would remain in place.

Short-Term Effectiveness. No remedial actions are proposed; therefore, the RAOs would not be achieved. Since no remedial actions are proposed, there would not be any short-term risks to the public, worker, and/or environment.

Implementability. The No Further Action alternative would not have implementation obstacles because remedial actions are not proposed. Implementation of this alternative does not introduce additional risks.

Cost. No costs would be associated with implementing the No Further Action alternative.

6.3.4.2 Alternative 2 – Excavation and Offsite Disposal

Description

Alternative 2 is Excavation and Offsite Disposal. Actions to meet RAOs would consist of the excavation and removal of soil where FFS COPCs are present above action goals. Proposed areas of excavation are shown on Figure 6-3 . Under this alternative, soil would be removed where residual concentrations of FFS COPCs are above action goals.

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.

Excavated soil would be transported to a staging area, transferred to larger trucks, then transported and disposed of at an approved offsite landfill. Confirmation samples would be collected as necessary to verify that the site achieves RAOs. These samples could be collected as pre-design investigation samples that would be collected before excavation to determine the extent of the excavation geometry. Alternately the samples could be collected following excavation activities.

Activities will be conducted in a manner that is sensitive to impacts on plants and animals. Prior to construction activities, a Work Plan will be prepared to identify activities that may be necessary to protect sensitive species. These activities could include construction and maintenance of exclusion fences around the work area to prevent salt marsh harvest mice from entering the area and construction and maintenance of fish barriers to prevent water from entering and exiting the channel during the period of excavation, reducing the risk of fish entrapment in the dry channel.

Assessment

Overall Protection of Human Health and the Environment. The Excavation and Offsite Disposal alternative would remove soil containing FFS COPCs at concentrations above action goals and, therefore, would meet RAOs by eliminating exposure of marsh receptors to FFS COPCs detected above action goals. It is believed that this alternative would be protective of human health and the environment.

Excavation activities would introduce some potential short-term ecological risk due to the use of heavy machinery and damage of coastal salt marsh habitat. It is estimated that 0.21 acres of pickleweed habitat will be permanently damaged due to construction activities. No temporary access roads will be needed. However approximately 0.21 acres would be permanently damaged due to excavation of 6 inches of material along the sides of the

Historic ODD. Although wildlife protection measures will be implemented, wildlife species, such as the salt marsh harvest mouse, may be inadvertently killed or injured by this alternative.

Compliance with Applicable or Relevant and Appropriate Requirements. There are no promulgated chemical-specific ARARs for soil. However, the Excavation and Offsite Disposal alternative is expected to satisfy chemical-specific TBC guidance criteria by meeting the action goals listed in Table 4-1. This alternative will also meet location- and action-specific ARARs. The location- and action-specific ARARs would be achieved through implementation of appropriate plans that would be developed during the design process prior to conducting remedial actions. These plans will describe the necessary procedures and management practices necessary to meet the location and action specific ARARs listed in Table 4-2. Procedures and practices described in the various plans will address proper characterization, handling, and transportation of hazardous waste; proper protection and identification of sensitive plant and animal species; authority for approving construction and activities in the coastal salt marsh; discharges of water to San Pablo Bay; and appropriate dust suppression and air monitoring during remedial activities.

Long-Term Effectiveness and Permanence. The Excavation and Offsite Disposal alternative is expected to be effective in the long term because soil containing FFS COPCs above action goals would be physically removed from the site. Removal of the soil would be confirmed with confirmation samples from the bottom of the channel as necessary. Excavation would provide the greatest degree of effectiveness and permanence because the concentrations of FFS COPCs detected above action goals would be removed from the site and disposed of at an appropriate offsite facility.

Reduction of Toxicity, Mobility, or Volume. The Excavation and Offsite Disposal alternative does not 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.

Short-Term Effectiveness. Excavation would achieve the RAOs at the completion of the removal and disposal activities. There is a potential for release of fugitive dusts during the remedial action activities; however, this would be mitigated by developing and implementing appropriate health and safety procedures. Additionally, there may be short-term risks to the public and/or workers during excavation activities through exposure, handling, and transport of the contaminated materials. Potential risks to construction and maintenance workers can be controlled and minimized through proper health and safety procedures.

Operations associated with the excavations would introduce some potential short-term human health risk due to the potential for direct contact or inhalation of the contaminants by workers during excavation activities. However, these risks can be controlled and minimized through proper health and safety procedures.

Implementability. The Excavation and Offsite Disposal alternative technology is well established and is technically and administratively implementable. However, the presence of site-specific obstacles, such as sensitive habitat , may complicate excavation, removal, and backfill activities.

Cost. Cost estimates are provided in Appendix E. These costs are order-of-magnitude level estimates consistent with EPA requirements for a feasibility study for which cost estimates have an accuracy of plus 50 percent to minus 30 percent. The estimated cost for the Excavation and Offsite Disposal alternative is $138,000.

The cost estimates have been prepared from the best available data at the time of the estimate for guidance in project evaluation and implementation. The final cost of the project would depend on the actual labor and material costs, actual site conditions, final project scope and design, productivity, competitive market conditions, final project schedule, and other variable factors. As a result, the final project costs may vary from those presented in this FFS.

6.3.5 Outfall Drainage Ditch

The following section presents the detailed evaluation for the No Further Action and Excavation and Offsite Disposal remedial alternatives for the ODD. The ODD is located in the northern and central sections of the CSM. Figures 6-1 and 6-2 identify the areas where remedial action is proposed in the northern and central sections. Figure 6-1a shows the overlapping proposed excavations for multiple sites within the northern section. Table 6-1, and 6-2, provide analytical results for the samples located in the northern and central sections of the CSM respectively including the ODD. Analytical results are provided for compounds for which action goals have been established. The portion of the ODD in the Antenna Debris Disposal Area is discussed in Section 6.3.1.

6.3.5.1 Alternative 1 – No Further Action

Description

Alternative 1 is No Further Action. No actions would be initiated to control potential site-related risks. 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.

Assessment

Overall Protection of Human Health and the Environment. The No Further Action alternative would not be protective of human health and the environment in the short or long term. This alternative would not meet RAOs. Under this alternative, marsh receptors would be exposed to FFS COPCs above action goals. No additional threats would be introduced by this alternative.

Compliance with Applicable or Relevant and Appropriate Requirements. The No Further Action alternative does not achieve location-specific ARARs. Most of the location- specific ARARs regulate or apply to activities that would be conducted to carry out remedial actions. However, no actions would take place under this alternative, therefore most of the location-specific ARARs do not apply. Other location-specific ARARS such as the California Fish and Game Code Section 5650 and 5652 (preventing releases of materials that would have a negative impact on species or habitat) would not be met by this alternative. The FFS COPCs would remain in place, and exposure would not be controlled or monitored. Since action is not proposed, there are no action-specific ARARs identified for this alternative There are no promulgated chemical-specific ARARs for soil. The chemical specific TBC criteria listed in Table 4-1 would not be met because action goals would not be met.

Long-Term Effectiveness and Permanence. The No Further Action alternative is not expected to be effective in the long term because no remedial actions are proposed. FFS COPCs above action goals would remain in place. Potential exposure to FFS COPCs would not be controlled or monitored.

Reduction of Toxicity, Mobility, or Volume. The No Further Action alternative does not include any treatment to reduce toxicity, mobility, or volume. Soil containing FFS COPCs above action goals would remain in place.

Short-Term Effectiveness. No remedial actions are proposed; therefore, the RAOs would not be achieved. Since no remedial actions are proposed, there would not be any short-term risks to the public, worker, and/or environment.

Implementability. The No Further Action alternative would not have implementation obstacles because remedial actions are not proposed. Implementation of this alternative does not introduce additional risks.

Cost. No costs would be associated with implementing the No Further Action alternative.

6.3.5.2 Alternative 2 – Excavation and Offsite Disposal

Description

Alternative 2 is Excavation and Offsite Disposal. Actions to meet RAOs would consist of the excavation and removal of soil where FFS COPCs are present above action goals. Proposed areas of excavation are shown on Figures 6-1 and 6-2. Under this alternative, soil would be removed where residual concentrations of FFS COPCs are above action goals.

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.

Excavated soil would be transported to a staging area, transferred to larger trucks, then transported and disposed of at an approved offsite landfill. Confirmation samples would be collected as necessary to verify that the site achieves RAOs. These samples could be collected as pre-design investigation samples that would be collected before excavation to determine the extent of the excavation geometry. Alternately the samples could be collected following excavation activities.

Activities will be conducted in a manner that is sensitive to impacts on plants and animals. Prior to construction activities, a Work Plan will be prepared to identify activities that may be necessary to protect sensitive species. These activities could include construction and maintenance of exclusion fences around the work area to prevent salt marsh harvest mice from entering the area and construction and maintenance of fish barriers to prevent water from entering and exiting the channel during the period of excavation, reducing the risk of fish entrapment in the dry channel.

Assessment

Overall Protection of Human Health and the Environment. The Excavation and Offsite Disposal alternative would remove sediment containing FFS COPCs at concentrations above actiongoals, and would meet RAOs by eliminating exposure of marsh receptors to FFS COPCs detected above action goals It is believed that this alternative is protective of human health and the environment.

Excavation activities would introduce some potential short-term ecological risk due to the use of heavy machinery and damage of coastal salt marsh habitat. It is estimated that 0.89 acres of pickleweed habitat will be temporarily or permanently damaged due to construction activities. Approximately 0.06 acres would be temporarily damaged due to equipment access to the site, and 0.83 acres would be permanently damaged due to excavation and removal of 6 inches of material along the sides of the ODD. Recovery of the habitat due to equipment access is expected to occur in the short term (within 2 years). Although wildlife protection measures will be implemented, wildlife species, such as the salt marsh harvest mouse, may be inadvertently killed or injured by this alternative.

Compliance with Applicable or Relevant and Appropriate Requirements. There are no promulgated chemical-specific ARARs for soil. However, the Excavation and Offsite Disposal alternative is expected to satisfy chemical-specific TBC guidance criteria by meeting the action goals listed in Table 4-1. This alternative will also meet location- and action-specific ARARs. The location- and action-specific ARARs would be achieved through implementation of appropriate plans that would be developed during the design process prior to conducting remedial actions. These plans will describe the necessary procedures and management practices necessary to meet the location and action specific ARARs listed in Table 4-2. Procedures and practices described in the various plans will address proper characterization, handling, and transportation of hazardous waste; proper protection and identification of sensitive plant and animal species; authority for approving construction and activities in the coastal salt marsh; discharges of water to San Pablo Bay; and appropriate dust suppression and air monitoring during remedial activities.

Long-Term Effectiveness and Permanence. The Excavation and Offsite Disposal alternative is expected to be effective in the long term because soil containing FFS COPCs above action goals would be physically removed from the site. Removal of the soil would be confirmed with confirmation samples from the bottom of the ditch as necessary. Excavation would provide the greatest degree of effectiveness and permanence because the concentrations of FFS COPCs detected above action goals would be removed from the site and disposed of at an appropriate offsite facility.

Reduction of Toxicity, Mobility, or Volume. The Excavation and Offsite Disposal alternative does not 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.

Short-Term Effectiveness. Excavation would achieve the RAOs at the completion of the removal and disposal activities. There is a potential for release of fugitive dusts during the remedial action activities; however, this would be mitigated by developing and implementing appropriate health and safety procedures. Additionally, there may be short-term risks to the public and/or workers during excavation activities through exposure, handling, and transport of the contaminated materials. Potential risks to construction and maintenance workers can be controlled and minimized through proper health and safety procedures.

Operations associated with the excavations would introduce some potential short-term human health risk due to the potential for direct contact or inhalation of the contaminants by workers during excavation activities. However, these risks can be controlled and minimized through proper health and safety procedures.

Implementability. The Excavation and Offsite Disposal alternative technology is well established and is technically and administratively implementable. However, the presence of site-specific obstacles, such as sensitive habitat, may complicate excavation, removal, and backfill activities.

Cost. Cost estimates are provided in Appendix E. These costs are order-of-magnitude level estimates consistent with EPA requirements for a feasibility study for which cost estimates have an accuracy of plus 50 percent to minus 30 percent. The estimated cost for the Excavation and Offsite Disposal alternative is $266,000.

The cost estimates have been prepared from the best available data at the time of the estimate for guidance in project evaluation and implementation. The final cost of the project would depend on the actual labor and material costs, actual site conditions, final project scope and design, productivity, competitive market conditions, final project schedule, and other variable factors. As a result, the final project costs may vary from those presented in this FFS.

6.3.6 Boat Dock

6.3.6.1 Nonchannel Area

The following section presents the detailed evaluation for the No Further Action and Excavation and Offsite Disposal remedial alternatives for the Boat Dock – Nonchannel Area. The Boat Dock - Nonchannel Area is located in the southern portion of the CSM. Figure 6-3 identifies the area where remediation is proposed within the southern area, including the Boat Dock – Nonchannel Area. Table 6-3 provides analytical results for the samples located in the southern portion of the CSM. Analytical results are provided for compounds for which action goals have been established.

Alternative 1 – No Further Action

Description

Alternative 1 is No Further Action. No actions would be initiated to control potential site-related risks. 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.

Assessment

Overall Protection of Human Health and the Environment. The No Further Action alternative would not be protective of human health and the environment in the short or long term. This alternative would not meet RAOs. Under this alternative marsh receptors would be exposed to FFS COPCs above action goals. No additional threats would be introduced by this alternative.

Compliance with Applicable or Relevant and Appropriate Requirements. The No Further Action alternative does not achieve location-specific ARARs. Most of the location- specific

ARARs regulate or apply to activities that would be conducted to carry out remedial actions. However, no actions would take place under this alternative, therefore most of the location-specific ARARs do not apply. Other location-specific ARARS such as the California Fish and Game Code Section 5650 and 5652 (preventing releases of materials that would have a negative impact on species or habitat) would not be met by this alternative. The FFS COPCs would remain in place, and exposure would not be controlled or monitored. Since action is not proposed, there are no action-specific ARARs identified for this alternative There are no promulgated chemical-specific ARARs for soil. The chemical specific TBC criteria listed in Table 4-1 would not be met because action goals would not be met.

Long-Term Effectiveness and Permanence. The No Further Action alternative is not expected to be effective in the long term because no remedial actions are proposed. FFS COPCs above action goals would remain in place and potential exposure to FFS COPCs would not be controlled or monitored.

Reduction of Toxicity, Mobility, or Volume. The No Further Action alternative does not include any treatment to reduce toxicity, mobility, or volume. Soil containing FFS COPCs above action goals would remain in place.

Short-Term Effectiveness. No remedial actions are proposed; therefore, the RAOs would not be achieved. Since no remedial actions are proposed, there would not be any short-term risks to the public, worker, and/or environment.

Implementability. The No Further Action alternative would not have implementation obstacles because remedial actions are not proposed. Implementation of this alternative does not introduce additional risks.

Cost. No costs would be associated with implementing the No Further Action alternative.

Alternative 2 – Excavation and Offsite Disposal

Description

Alternative 2 is Excavation and Offsite Disposal. Actions to meet RAOs would consist of the excavation and removal of soil where soil where FFS COPCs are present above action goals. Proposed excavation areas are shown on Figure 6-3. Under this alternative, soil would be removed where residual concentrations of FFS COPCs are above action goals.

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.

Excavated soil would be transported to a staging area, transferred to larger trucks, then transported and disposed of at an approved offsite landfill. Confirmation samples would be collected as necessary to verify that the site achieves RAOs. These samples could be collected as pre-design investigation samples that would be collected before excavation to determine the extent of the excavation geometry. Alternately the samples could be collected following excavation activities.

Activities will be conducted in a manner that is sensitive to impacts on plants and animals. Prior to construction activities, a Work Plan will be prepared to identify activities that may be necessary to protect sensitive species. These activities could include construction and maintenance of exclusion fences around the work area to prevent salt marsh harvest mice from entering the area .

Assessment

Overall Protection of Human Health and the Environment. The Excavation and Offsite Disposal alternative would remove soil containing FFS COPCs at concentrations above action goals and, therefore, would meet RAOs by eliminating exposure of marsh receptors to FFS COPCs detected above action goals. It is believed this alternative is protective of human health and the environment.

Excavation activities would introduce some potential short-term ecological risk due to the use of heavy machinery and damage of coastal salt marsh habitat. It is estimated that 0.036 acres of pickleweed habitat will be temporarily damaged due to construction activities. Approximately 0.01 acres would be temporarily damaged due to equipment access to the site, and 0.026 acres would be damaged due to excavation. Recovery of this habitat is expected to occur in the short term (within 2 years). Although wildlife protection measures will be implemented, wildlife species, such as the salt marsh harvest mouse, may be inadvertently killed or injured by this alternative.

Compliance with Applicable or Relevant and Appropriate Requirements. There are no promulgated chemical-specific ARARs for soil. However, the Excavation and Offsite Disposal alternative is expected to satisfy chemical-specific TBC guidance criteria by meeting the action goals listed in Table 4-1. This alternative will also meet location- and action-specific ARARs. The location- and action-specific ARARs would be achieved through implementation of appropriate plans that would be developed during the design process prior to conducting remedial actions. These plans will describe the necessary procedures and management practices necessary to meet the location and action specific ARARs listed in Table 4-2. Procedures and practices described in the various plans will address proper characterization, handling, and transportation of hazardous waste; proper protection and identification of sensitive plant and animal species; authority for approving construction and activities in the coastal salt marsh; discharges of water to San Pablo Bay; and appropriate dust suppression and air monitoring during remedial activities.

Long-Term Effectiveness and Permanence. The Excavation and Offsite Disposal alternative is expected to be effective in the long term because soil containing FFS COPCs above actiongoals would be physically removed from the site. Removal of the soil would be confirmed with confirmation samples as necessary. Excavation would provide the greatest degree of effectiveness and permanence because the concentrations of FFS COPCs detected above action goals would be removed from the site and disposed of at an appropriate offsite facility.

Reduction of Toxicity, Mobility, or Volume. The Excavation and Offsite Disposal alternative does not 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.

Short-Term Effectiveness. Excavation would achieve the RAOs at the completion of the removal and disposal activities. There is a potential for release of fugitive dusts during the remedial action activities; however, this would be mitigated by developing and implementing appropriate health and safety procedures. Additionally, there may be short-term risks to the public and/or workers during excavation activities through exposure, handling, and transport of the contaminated materials. Potential risks to construction and maintenance workers can be controlled and minimized through proper health and safety procedures.

Operations associated with the excavations would introduce some potential short-term human health risk due to the potential for direct contact or inhalation of the contaminants by workers during excavation activities. However, these risks can be controlled and minimized through proper health and safety procedures.

Implementability. The Excavation and Offsite Disposal alternative technology is well established and is technically and administratively implementable. However, the presence of site-specific obstacles, such as the boat dock structure and sensitive habitat may complicate excavation, removal, and backfill activities.

Cost. Cost estimates are provided in Appendix E. These costs are order-of-magnitude level estimates consistent with EPA requirements for a feasibility study for which cost estimates have an accuracy of plus 50 percent to minus 30 percent. The estimated cost for the Excavation and Offsite Disposal alternative is $46,300.

The cost estimates have been prepared from the best available data at the time of the estimate for guidance in project evaluation and implementation. The final cost of the project would depend on the actual labor and material costs, actual site conditions, final project scope and design, productivity, competitive market conditions, final project schedule, and other variable factors. As a result, the final project costs may vary from those presented in this FFS.

6.3.6.2 Channel Area

The following section presents the detailed evaluation for the No Further Action and Excavation and Offsite Disposal remedial alternatives for the Boat Dock – Channel Area. The Boat Dock - Channel Area is located in the southern portion of the CSM. Figure 6-3 identifies the area where remediation is proposed within the southern area, including the Boat Dock – Channel Area. Table 6-3 provides analytical results for the samples located in the southern portion of the CSM. Analytical results are provided for compounds for which action goals have been established.

Alternative 1 – No Further Action

Description

Alternative 1 is No Further Action. No actions would be initiated to control potential site-related risks. 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.

Assessment

Overall Protection of Human Health and the Environment. The No Further Action alternative would not be protective of human health and the environment in the short or long term. This alternative would not meet RAOs. Under this alternative, marsh receptors would be exposed to FFS COPCs above action goals that would remain in place. No additional threats would be introduced by this alternative.

Compliance with Applicable or Relevant and Appropriate Requirements. The No Further Action alternative does not achieve location-specific ARARs. Most of the location- specific ARARs regulate or apply to activities that would be conducted to carry out remedial actions. However, no actions would take place under this alternative, therefore most of the location-specific ARARs do not apply. Other location-specific ARARS such as the California Fish and Game Code Section 5650 and 5652 (preventing releases of materials that would have a negative impact on species or habitat) would not be met by this alternative. The FFS COPCs would remain in place, and exposure would not be controlled or monitored. Since action is not proposed, there are no action-specific ARARs identified for this alternative There are no promulgated chemical-specific ARARs for soil. The chemical specific TBC criteria listed in Table 4-1 would not be met because action goals would not be met.

Long-Term Effectiveness and Permanence. The No Further Action alternative is not expected to be effective in the long term because no remedial actions are proposed. FFS COPCs above remediation goals would remain in place and potential exposure to FFS COPCs would not be controlled or monitored.

Reduction of Toxicity, Mobility, or Volume. The No Further Action alternative does not include any treatment to reduce toxicity, mobility, or volume. Soil containing FFS COPCs above action goalswould remain in place.

Short-Term Effectiveness. No remedial actions are proposed; therefore, the RAOs would not be achieved. Since no remedial actions are proposed, there would not be any short-term risks to the public, worker, and/or environment.

Implementability. The No Further Action alternative would not have implementation obstacles because remedial actions are not proposed. Implementation of this alternative does not introduce additional risks.

Cost. No costs would be associated with implementing the No Further Action alternative.

Alternative 2 – Excavation and Offsite Disposal

Description

Alternative 2 is Excavation and Offsite Disposal. Actions to meet RAOs would consist of the excavation and removal of soil where FFS COPCs are present above action goals. The proposed excavation area is shown on Figure 6-3. Under this alternative, soil would be removed where residual concentrations of FFS COPCs are above action goals. A portion of the ramp supporting the tracks on the boat dock would need to be removed prior to 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.

Excavated soil would be transported to a staging area, transferred to larger trucks, then transported and disposed of at an approved offsite landfill. Confirmation samples would be collected as necessary to verify that the site achieves RAOs. These samples could be collected as pre-design investigation samples that would be collected before excavation to determine the extent of the excavation geometry. Alternately the samples could be collected following excavation activities.

Activities will be conducted in a manner that is sensitive to impacts on plants and animals. Prior to construction activities, a Work Plan will be prepared to identify activities that may be necessary to protect sensitive species. These activities could include construction and maintenance of exclusion fences around the work area to prevent salt marsh harvest mice from entering the area and construction and maintenance of fish barriers to prevent water from entering and exiting the channel during the period of excavation, reducing the risk of fish entrapment in the dry channel.

Assessment

Overall Protection of Human Health and the Environment. The Excavation and Offsite Disposal alternative would remove soil containing FFS COPCs at concentrations above action goals and, therefore, would meet RAOs by eliminating potential exposure of marsh receptors to FFS COPCs above action goals. This alternative is believed to be protective of human health and the environment. It is believed this alternative is protective of human health and the environment.

Excavation activities would introduce some potential short-term ecological risk due to the use of heavy machinery and damage of coastal salt marsh habitat. It is estimated that 0.034 acres of pickleweed habitat will be temporarily damaged due to construction activities. Approximately 0.02 acres would be temporarily damaged due to equipment access to the site via temporary roads, and 0.014 acres would be damaged due to excavation. Recovery of this habitat is expected to occur in the short term (within 2 years). Although wildlife protection measures will be implemented, wildlife species, such as the salt marsh harvest mouse, may be inadvertently killed or injured by this alternative.

Compliance with Applicable or Relevant and Appropriate Requirements. There are no promulgated chemical-specific ARARs for soil. However, the Excavation and Offsite Disposal alternative is expected to satisfy chemical-specific TBC guidance criteria by meeting the action goals listed in Table 4-1. This alternative will also meet location- and action-specific ARARs. The location- and action-specific ARARs would be achieved through implementation of appropriate plans that would be developed during the design process prior to conducting remedial actions. These plans will describe the necessary procedures and management practices necessary to meet the location and action specific ARARs listed in Table 4-2. Procedures and practices described in the various plans will address proper characterization, handling, and transportation of hazardous waste; proper protection and identification of sensitive plant and animal species; authority for approving construction and activities in the coastal salt marsh; discharges of water to San Pablo Bay; and appropriate dust suppression and air monitoring during remedial activities.

Long-Term Effectiveness and Permanence. The Excavation and Offsite Disposal alternative is expected to be effective in the long term because soil containing FFS COPCs above action goals would be physically removed from the site. Removal of the soil would be confirmed with confirmation samples as needed. Excavation would provide the greatest degree of effectiveness and permanence because the concentrations of FFS COPCs detected above action goals would be removed from the site and disposed of at an appropriate offsite facility.

Reduction of Toxicity, Mobility, or Volume. The Excavation and Offsite Disposal alternative does not 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.

Short-Term Effectiveness. Excavation would achieve the RAOs at the completion of the removal and disposal activities. There is a potential for release of fugitive dusts during the remedial action activities; however, this would be mitigated by developing and implementing appropriate health and safety procedures. Additionally, there may be short-term risks to the public and/or workers during excavation activities through exposure, handling, and transport of the contaminated materials. Potential risks to construction and maintenance workers can be controlled and minimized through proper health and safety procedures.

Operations associated with the excavations would introduce some potential short-term human health risk due to the potential for direct contact or inhalation of the contaminants by workers during excavation activities. However, these risks can be controlled and minimized through proper health and safety procedures.

Implementability. The Excavation and Offsite Disposal alternative technology is well established and is technically and administratively implementable. However, the presence of site-specific obstacles, such as the boat dock structure and sensitive habitat may complicate excavation, removal, and backfill activities.

Cost. Cost estimates are provided in Appendix E. These costs are order-of-magnitude level estimates consistent with EPA requirements for a feasibility study for which cost estimates have an accuracy of plus 50 percent to minus 30 percent. The estimated cost for the Excavation and Offsite Disposal alternative is $62,100.

The cost estimates have been prepared from the best available data at the time of the estimate for guidance in project evaluation and implementation. The final cost of the project would depend on the actual labor and material costs, actual site conditions, final project scope and design, productivity, competitive market conditions, final project schedule, and other variable factors. As a result, the final project costs may vary from those presented in this FFS.

6.3.7 Area 14

The following section presents the detailed evaluation for the No Further Action and Excavation and Offsite Disposal remedial alternatives for Area 14. Area 14 is located in the southern portion of the CSM. Figure 6-3 identifies the area where remediation is proposed within the southern CSM, including Area 14. Table 6-3 provides analytical results for the samples located in the southern portion of the CSM. Analytical results are provided for compounds for which action goals have been established.

6.3.7.1 Alternative 1 – No Further Action

Description

Alternative 1 is No Further Action. No actions would be initiated to control potential site-related risks. 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.

Assessment

Overall Protection of Human Health and the Environment. The No Further Action alternative would not be protective of human health and the environment in the short or long term. This alternative would not meet RAOs. Under this alternative, marsh receptors would be exposed to FFS COPCs above action goals that would remain in place. No additional threats would be introduced by this alternative.

Compliance with Applicable or Relevant and Appropriate Requirements. The No Further Action alternative does not achieve location-specific ARARs. Most of the location- specific ARARs regulate or apply to activities that would be conducted to carry out remedial actions. However, no actions would take place under this alternative, therefore most of the location-specific ARARs do not apply. Other location-specific ARARS such as the California Fish and Game Code Section 5650 and 5652 (preventing releases of materials that would have a negative impact on species or habitat) would not be met by this alternative. The FFS COPCs would remain in place, and exposure would not be controlled or monitored. Since action is not proposed, there are no action-specific ARARs identified for this alternative There are no promulgated chemical-specific ARARs for soil. The chemical specific TBC criteria listed in Table 4-1 would not be met because action goals would not be met.

Long-Term Effectiveness and Permanence. The No Further Action alternative is not expected to be effective in the long term because no remedial actions are proposed. FFS COPCs above action goals would remain in place and potential exposure to FFS COPCs would not be controlled or monitored.

Reduction of Toxicity, Mobility, or Volume. The No Further Action alternative does not include any treatment to reduce toxicity, mobility, or volume. Soil containing FFS COPCs above action goals would remain in place.

Short-Term Effectiveness. No remedial actions are proposed; therefore, the RAOs would not be achieved. Since no remedial actions are proposed, there would not be any short-term risks to the public, worker, and/or environment.

Implementability. The No Further Action alternative would not have implementation obstacles because remedial actions are not proposed. Implementation of this alternative does not introduce additional risks.

Cost. No costs would be associated with implementing the No Further Action alternative.

6.3.7.2 Alternative 2 – Excavation and Offsite Disposal

Description

Alternative 2 is Excavation and Offsite Disposal. Actions to meet RAOs would consist of the excavation and removal of soil where FFS COPCs are present above action goals. Proposed excavation areas are shown on Figure 6-3. Under this alternative, soil would be removed where residual concentrations of FFS COPCs are above action goals.

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.

Excavated soil would be transported to a staging area, transferred to larger trucks, then transported and disposed of at an approved offsite landfill. Confirmation samples would be collected as necessary to verify that the site achieves RAOs. These samples could be collected as pre-design investigation samples that would be collected before excavation to determine the extent of the excavation geometry. Alternately the samples could be collected following excavation activities.

Activities will be conducted in a manner that is sensitive to impacts on plants and animals. Prior to construction activities, a Work Plan will be prepared to identify activities that may be necessary to protect sensitive species. These activities could include construction and maintenance of exclusion fences around the work area to prevent salt marsh harvest mice from entering the area .

Assessment

Overall Protection of Human Health and the Environment. The Excavation and Offsite Disposal alternative would remove soil containing FFS COPCs at concentrations above action goals and, therefore, would meet RAOs. Under this alternative, FFS COPCs above action goals would be removed to meet RAOs and would eliminate exposure of marsh receptors to FFS COPCs greater than action goals. It is believed this alternative would be protective of human health and the environment.

Excavation activities would introduce some potential short-term ecological risk due to the use of heavy machinery and damage of coastal salt marsh habitat. It is estimated that 0.29 acres of pickleweed habitat will be temporarily damaged due to construction activities. Approximately 0.03 acres would be temporarily damaged due to equipment access to the site, and 0.26 acres would be damaged due to excavation. Recovery of this habitat is expected to occur in the short term (within 2 years). Although wildlife protection measures will be implemented, wildlife species, such as the salt marsh harvest mouse, may be inadvertently killed or injured by this alternative.

Compliance with Applicable or Relevant and Appropriate Requirements. There are no promulgated chemical-specific ARARs for soil. However, the Excavation and Offsite Disposal alternative is expected to satisfy chemical-specific TBC guidance criteria by meeting the action goals listed in Table 4-1. This alternative will also meet location- and action-specific ARARs. The location- and action-specific ARARs would be achieved through implementation of appropriate plans that would be developed during the design process prior to conducting remedial actions. These plans will describe the necessary procedures and management practices necessary to meet the location and action specific ARARs listed in Table 4-2. Procedures and practices described in the various plans will address proper characterization, handling, and transportation of hazardous waste; proper protection and identification of sensitive plant and animal species; authority for approving construction and activities in the coastal salt marsh; discharges of water to San Pablo Bay; and appropriate dust suppression and air monitoring during remedial activities.

Long-Term Effectiveness and Permanence. The Excavation and Offsite Disposal alternative is expected to be effective in the long term because soil containing FFS COPCs above action goals would be physically removed from the site. Removal of the soil would be confirmed with confirmation samples as necessary. Excavation would provide the greatest degree of effectiveness and permanence because the concentrations of FFS COPCs detected above action goals would be removed from the site and disposed of at an appropriate offsite facility.

Reduction of Toxicity, Mobility, or Volume. The Excavation and Offsite Disposal alternative does not 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.

Short-Term Effectiveness. Excavation would achieve the RAOs at the completion of the removal and disposal activities. There is a potential for release of fugitive dusts during the remedial action activities; however, this would be mitigated by developing and implementing appropriate health and safety procedures. Additionally, there may be short-term risks to the public and/or workers during excavation activities through exposure, handling, and transport of the contaminated materials. Potential risks to construction and maintenance workers can be controlled and minimized through proper health and safety procedures.

Operations associated with the excavations would introduce some potential short-term human health risk due to the potential for direct contact or inhalation of the contaminants by workers during excavation activities. However, these risks can be controlled and minimized through proper health and safety procedures.

Implementability. The Excavation and Offsite Disposal alternative technology is well established and is technically and administratively implementable. However, the presence of site-specific obstacles, such as sensitive habitat may complicate excavation, removal, and backfill activities.

Cost. Cost estimates are provided in Appendix E. These costs are order-of-magnitude level estimates consistent with EPA requirements for a feasibility study for which cost estimates have an accuracy of plus 50 percent to minus 30 percent. The estimated cost for the Excavation and Offsite Disposal alternative is $224,800.

The cost estimates have been prepared from the best available data at the time of the estimate for guidance in project evaluation and implementation. The final cost of the project would depend on the actual labor and material costs, actual site conditions, final project scope and design, productivity, competitive market conditions, final project schedule, and other variable factors. As a result, the final project costs may vary from those presented in this FFS.

6.3.8 Former Sewage Treatment Plant Outfall

The following section presents the detailed evaluation for the No Further Action and Excavation and Offsite Disposal remedial alternatives for the FSTP Outfall. The FSTP Outfall is located in the central portion of the CSM. Figure 6-2 identifies the area where remediation is proposed within the central area, including the FSTP Outfall. Table 6-2 provides analytical results for the samples located in the central portion of the CSM. Analytical results are provided for compounds for which action goals have been established.

6.3.8.1 Alternative 1 – No Further Action

Description

Alternative 1 is No Further Action. No actions would be initiated to control potential site-related risks. 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.

Assessment

Overall Protection of Human Health and the Environment. The No Further Action alternative would not be protective of human health and the environment in the short or long term. This alternative would not meet RAOs. Under this alternative, marsh receptors would be exposed to FFS COPCs above action goals. No additional threats would be introduced by this alternative.

Compliance with Applicable or Relevant and Appropriate Requirements. The No Further Action alternative does not achieve location-specific ARARs. Most of the location- specific ARARs regulate or apply to activities that would be conducted to carry out remedial actions. However, no actions would take place under this alternative, therefore most of the location-specific ARARs do not apply. Other location-specific ARARS such as the California Fish and Game Code Section 5650 and 5652 (preventing releases of materials that would have a negative impact on species or habitat) would not be met by this alternative. The FFS COPCs would remain in place, and exposure would not be controlled or monitored. Since action is not proposed, there are no action-specific ARARs identified for this alternative There are no promulgated chemical-specific ARARs for soil. The chemical specific TBC criteria listed in Table 4-1 would not be met because action goals would not be met.

Long-Term Effectiveness and Permanence. The No Further Action alternative is not expected to be effective in the long term because no remedial actions are proposed. FFS COPCs above action goals would remain in place. Potential exposure to FFS COPCs would not be controlled or monitored.

Reduction of Toxicity, Mobility, or Volume. The No Further Action alternative does not include any treatment to reduce toxicity, mobility, or volume. Soil containing FFS COPCs above action goals would remain in place.

Short-Term Effectiveness. No remedial actions are proposed; therefore, the RAOs would not be achieved. Since no remedial actions are proposed, there would not be any short-term risks to the public, worker, and/or environment.

Implementability. The No Further Action alternative would not have implementation obstacles because remedial actions are not proposed. Implementation of this alternative does not introduce additional risks.

Cost. No costs would be associated with implementing the No Further Action alternative.

6.3.8.2 Alternative 2 – Excavation and Offsite Disposal

Description

Alternative 2 is Excavation and Offsite Disposal. Actions to meet RAOs would consist of the excavation and removal of soil where FFS COPCs are present above action goals. Proposed excavation areas are shown on Figure 6-2. Under this alternative, soil would be removed where residual concentrations of FFS COPCs are above action goals.

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. Excavated soil would be transported to a staging area, transferred to larger trucks, then transported and disposed of at an approved offsite landfill. Confirmation samples would be collected as necessary to verify that the site achieves RAOs. These samples could be collected as pre-design investigation samples that would be collected before excavation to determine the extent of the excavation geometry. Alternately the samples could be collected following excavation activities.

Activities will be conducted in a manner that is sensitive to impacts on plants and animals. Prior to construction activities, a Work Plan will be prepared to identify activities that may be necessary to protect sensitive species. These activities could include construction and maintenance of exclusion fences around the work area to prevent salt marsh harvest mice from entering the area and construction and maintenance of fish barriers to prevent water from entering and exiting the channel during the period of excavation, reducing the risk of fish entrapment in the dry channel.

Assessment

Overall Protection of Human Health and the Environment. The Excavation and Offsite Disposal alternative would remove soil containing FFS COPCs at concentrations above action goals and, therefore, would meet RAOs by eliminating exposure of marsh receptors to FFS COPCs detected above action goals. It is believed this alternative would be protective of human health and the environment.

Excavation activities would introduce some potential short-term ecological risk due to the use of heavy machinery and damage of coastal salt marsh habitat. It is estimated that 0.22 acres of pickleweed habitat will be temporarily damaged due to construction activities. Approximately 0.15 acres would be temporarily damaged due to equipment access to the site, and 0.07 acres would be damaged due to excavation. Recovery of this habitat is expected to occur in the short term (within 2 years). Although wildlife protection measures will be implemented, wildlife species, such as the salt marsh harvest mouse, may be inadvertently killed or injured by this alternative.

Compliance with Applicable or Relevant and Appropriate Requirements. There are no promulgated chemical-specific ARARs for soil. However, the Excavation and Offsite Disposal alternative is expected to satisfy chemical-specific TBC guidance criteria by meeting the action goals listed in Table 4-1. This alternative will also meet location- and action-specific ARARs. The location- and action-specific ARARs would be achieved through implementation of appropriate plans that would be developed during the design process prior to conducting remedial actions. These plans will describe the necessary procedures and management practices necessary to meet the location and action specific ARARs listed in Table 4-2. Procedures and practices described in the various plans will address proper characterization, handling, and transportation of hazardous waste; proper protection and identification of sensitive plant and animal species; authority for approving construction and activities in the coastal salt marsh; discharges of water to San Pablo Bay; and appropriate dust suppression and air monitoring during remedial activities.

Long-Term Effectiveness and Permanence. The Excavation and Offsite Disposal alternative is expected to be effective in the long term because soil containing FFS COPCs above action goals would be physically removed from the site. Excavation would provide the greatest degree of effectiveness and permanence because the concentrations of FFS COPCs detected above action goals would be removed from the site and disposed of at an appropriate offsite facility.

Reduction of Toxicity, Mobility, or Volume. The Excavation and Offsite Disposal alternative does not 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.

Short-Term Effectiveness. Excavation would achieve the RAOs at the completion of the removal and disposal activities. There is a potential for release of fugitive dusts during the remedial action activities; however, this would be mitigated by developing and implementing appropriate health and safety procedures. Additionally, there may be short-term risks to the public and/or workers during excavation activities through exposure, handling, and transport of the contaminated materials. Potential risks to construction and maintenance workers can be controlled and minimized through proper health and safety procedures.

Operations associated with the excavations would introduce some potential short-term human health risk due to the potential for direct contact or inhalation of the contaminants by workers during excavation activities. However, these risks can be controlled and minimized through proper health and safety procedures.

Implementability. The Excavation and Offsite Disposal alternative technology is well established and is technically and administratively implementable. However, the presence of site-specific obstacles, such as sensitive habitat may complicate excavation, removal, and backfill activities.

Cost. Cost estimates are provided in Appendix E. These costs are order-of-magnitude level estimates consistent with EPA requirements for a feasibility study for which cost estimates have an accuracy of plus 50 percent to minus 30 percent. The estimated cost for the Excavation and Offsite Disposal alternative is $217,300.

The cost estimates have been prepared from the best available data at the time of the estimate for guidance in project evaluation and implementation. The final cost of the project would depend on the actual labor and material costs, actual site conditions, final project scope and design, productivity, competitive market conditions, final project schedule, and other variable factors. As a result, the final project costs may vary from those presented in this FFS.

6.4 Comparative Analysis

The comparative analysis of remedial alternatives evaluated the relative performance of each alternative with respect to nine specific evaluation criteria presented in Section 6.2. The purpose of the comparative analysis was to identify the advantages and disadvantages of each alternative so that key tradeoffs can be identified.

The first two criteria (overall protectiveness of human health and the environment and compliance with ARARs) serve as threshold determinations in that they must be met by any alternative for it to be eligible for selection. The long-term effectiveness and permanence; reduction of toxicity, mobility, and volume; short-term e5ffectiveness; implementability; cost, state acceptance, and community acceptance criteria are compared such that major tradeoffs among the alternatives are realized and weighed in the decision-making process. Table 6-1 presents a summary of the comparative analysis.

Table 6-1. Analytical Results for Samples Located in the Northern Section of the Coastal Salt Marsh
Coastal Salt Marsh Focused Feasibility Study
Inorganics

Sample Location	Sample ID	Arsenic	Barium	Beryllium	Boron	Cadmium	Chromium	Cobalt	Copper	Lead	Manganese	Mercury	Nickel	Silver	Vanadium	Zinc
40	HB-99-SO-40	NA	186 A	NA	NA	6.9 A	NA	NA	95.1 A	248 A	NA	0.54 A	NA	1.5 J	NA	NA
40	HB-99-SO-40X	53.3 A	NA	2.5 A	47.5 A	NA	135 A	55.8 A	NA	NA	999 A	NA	229 A	NA	87.1 A	551 A
41	HB-99-SO-41	13.3 A	110 A	2.1 A	34.6 A	1.5 A	106 A	99.5 A	63.2 A	46 A	5170 A	0.34 A	246 A	0.43 J	97.5 A	213 A
42	HB-99-SO-42	10.8 A	83.2 A	2.2 A	30.5 A	1.5 A	69.4 A	39 A	122 A	117 A	1670 A	0.24 A	211 A	0.61 J	57.3 A	406 A
43	HB-99-SO-43	13.5 A	586 A	0.86 A	29.5 A	3.9 A	62.5 A	19.3 A	726 A	2100 A	897 A	0.12 A	86.2 A	2.2 J	46 A	2700 A
44	HB-99-SO-2-3-44	4.4 J	28.7 A	0.41 A	15.3 A	0.34 J+	52.6 J	9.9 J	28.3 J+	14.1 J+	287 A	0.61 A	51.6 A	0.14 A	40.9 J+	70.4 J+
44	HB-99-SO-2-3-44RE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
44	HB-99-SO-44	13.6 A	1370 A	0.71 A	25.3 A	3.7 A	57.9 A	25.4 A	432 A	643 A	1080 A	0.06 A	108 A	0.53 J	54 A	2930 A
45	HB-99-SO-45	8.6 A	115 A	1.7 A	19.8 A	1.9 A	62.3 A	33.6 A	87.7 A	352 A	1570 A	1.2 A	144 A	0.78 J	53.5 A	641 A
BK-SS-02	BK004SS1	9.66	151	2.36	NA	1.2 †	169	60.6	92.7	70	2510	NA	222	0.803 †	162	255
BK-SS-02	BK005SS1	17.5	127	1.2	NA	1.2 †	135	21.5	70.9	42	652	NA	119	0.803 †	140	157
BK-SS-02	BK006SS1	11.6	107	0.945	NA	1.2 †	112	27.9	62.2	32	1450	NA	119	0.803 †	120	115
CSM-ANE-SD-325	CSM-ANE-SD-325-5	23.6	131	3.9	39	4.1 J-	90.3	47.3	108	475	279	0.4	248	1	76	233
CSM-ANE-SD-326	CSM-ANE-SD-326-0	21.5	134	3.7	23.6	4.1	105	146	93.5	194	6170	0.6	323	2.1	82.6	297
CSM-ANE-SD-326	CSM-ANE-SD-326-2	22.2	117	4.3	31.5	3.2	142	322	227	361	4310	0.5	345	1.1	61.5	442
CSM-ANE-SD-327	CSM-ANE-SD-327-0	12.4	76.3 J	4.2	43.1	2.3	89	98.6	90.9	91.8	4400	0.5	396	0.9	70.3	276
CSM-ANE-SD-327	CSM-ANE-SD-327-2	8.2	62.9 J	1.2	32.9	1.4	107	18.2	66.4	33.8	252	0.5	120	0.047 J	98.4	125
CSM-ANE-SD-328	CSM-ANE-SD-328-0	10.3	88 J	2.8	15.9 J	0.9	83.6	53.1	83.2	190	1850	0.6	190	0.6	52	203
CSM-ANE-SD-328	CSM-ANE-SD-328-2	12.4	88.3 J	3	11.5 J	2.2	95.9	49.1	87.8	447	2710	0.5	188	1.9	42.3	212
CSM-ANE-SS-320	CSM-ANE-SS-320-0	15.6	133	3.8	31	0.7	136	71.9	90.8	435	4220	0.7	230	2	52.9	234
CSM-ANE-SS-320	CSM-ANE-SS-320-2	8.8	57.3 J	0.6	29.5	0.5 U	103	15.8	66	24.6	303	0.4	105	0.1 J	96.8	95.9
CSM-ANE-SS-321	CSM-ANE-SS-321-0	10.2	115	3.6	36.8 J+	3.3	100	23.4	83.2	116 J-	264	0.5	187	0.5	86.3	236
CSM-ANE-SS-321	CSM-ANE-SS-321-2	15.2	59.8 J	0.8	27.9	0.5 U	99	18.1	62.7	24	227	0.4	92.9	0.05 J	102	84.8
CSM-ANE-SS-322	CSM-ANE-SS-322-0	8.2	120	3.4	29.3 J+	4.1	142	41.4	116	389 J-	1200	0.2	198	0.9	60.4	249
CSM-ANE-SS-322	CSM-ANE-SS-322-2	10.8	87.9 J	3	32 J+	0.4 J	116	37.4	85.3	108 J-	314	0.2	204	0.084 J	86.6	168
CSM-ANE-SS-323	CSM-ANE-SS-323-0	10.6	130	2.5	25.8	1.4	68.3	76.5	60.9	188	4890	0.4	342	1.2	54.8	198
CSM-ANE-SS-324	CSM-ANE-SS-324-0	9.3	96.2 J	1.4	18.1 J+	1.2	93.1	30	51.8	175 J-	1320	0.5	154	0.4 J	43.6	145
CSM-ANW-312	CSM-ANW-312-0	12.5	238	2	35.9 J	1.2	67.9	37.1	260	611	1720	0.6	164	1.8	53.8	1000
CSM-ANW-313	CSM-ANW-SD-313-0	13.4	92.4 J	2.4	39.9	1	80.2	18.4	55.7	161	309	0.2 U	110	0.5 U	72.9	214
CSM-ANW-SD-311	CSM-ANW-SD-311-10	20.9	134	2.7	27.1	4.2 J-	89.9	181	89.9	154	7440	0.5	323	0.5 J	80.8	276
CSM-ANW-SS-310	CSM-ANW-SS-310-0	6.6	253	1.5	18.2 J	0.5	56.5	21.7	71	1140	726	0.1	105	0.5	54.1	632
CSM-ANW-SS-310	CSM-ANW-SS-310-2	6.7	84.2 J	0.8	29.1 J+	0.5 U	89.8	16.6	50.9	100 J-	562	0.062 J	85.8	0.068 J	72.4	143
CSM-ANW-SS-312	CSM-ANW-SS-312-0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CSM-ANW-SS-312	CSM-ANW-SS-312-2	4.3 J	155	0.4 J	16.6 J	0.7	24.1	7 J	180	335	428	0.1	43.5	0.3 J	23.7	490
CSM-HM-SD-390	CSM-HM-SD-390-0	14.8	67.8 J	0.9	23.1	0.5 U	106	20	70.4	24.6	1110	0.4	98.2	0.098 J	102	99.8
CSM-HM-SD-390	CSM-HM-SD-390-3	17.8	60.6 J	1	19.3 J	0.2 J	83.6	30.8	58.8	36.9	544	0.2	111	0.2 J	75.7	109
CSM-HM-SD-391	CSM-HM-SD-391-0	13.9	66.4 J	0.9	27.7	0.5 U	112	16.9	66.4	23	340	0.4	97.3	0.046 J	111	89
CSM-HM-SD-391	CSM-HM-SD-391-3	15.2	61.9 J	0.9	23.2	0.5 U	86.6	18.2	52.2	17.7 J	288	0.4	81.6	0.5 U	93.7	68.2
CSM-HM-SD-392	CSM-HM-SD-392-0	13.2	87 J	2.5	25.4	0.5 U	105	22.1	80.6	105	329	0.4	146	0.4 J	96.5	166
CSM-HM-SD-392	CSM-HM-SD-392-3	14.3	57.7 J	1	23.9	0.5 U	103	19.7	80.5	30.4	296	0.4	110	0.084 J	97.7	136
CSM-HM-SD-393	CSM-HM-SD-393-0	20.8	83.6 J	4.2	23.1	0.5 U	114	47.1	92.6	288	1370	0.4	173	0.8	64.5	197
CSM-HM-SD-393	CSM-HM-SD-393-1.5	15.5	50.7 J	0.8	30.8	0.5 U	94.6	35.8	70.2	23.7	215	0.4	185	0.2 J	96	88.7
CSM-HM-SD-394	CSM-HM-SD-394-0	16.6	77.4 J	2.1	21.5	0.5 U	97.5	14.5	77	57.6	230	0.6	99.6	0.4 J	88.4	135
CSM-HM-SD-394	CSM-HM-SD-394-1.5	10.5	64.8 J	1	32.3	0.5 U	111	19.3	64.2	30	243	0.4	103	0.041 J	110	90.7
CSM-HM-SD-395	CSM-HM-SD-395-0	8.5	82.5 J	2	28.2	0.1 J	95.2	21.8	88.9	38.3	228	0.6	117	0.4 J	79.2	155
CSM-HM-SD-395	CSM-HM-SD-395-1.5	30	60.3 J	0.9	22	0.5 U	86.4	22.7	57	27.9	309	0.4	104	0.03 J	89.9	101
CSM-ODD-SD-330	CSM-ODD-SD-330-0	12.6	134	2.8	24.7	2.8	139	40.7	95.7	398	532	1.3	212	0.4 J	63.4	215
CSM-ODD-SD-330	CSM-ODD-SD-330-1.5	18.1	122	3.2	29.6	18.6	133	22.2	122	752	1280	1.4	114	8.3	55.3	222
CSM-ODD-SD-331	CSM-ODD-SD-331-0	53.7	49.4 J	1	26.7	0.5 U	89.7	34.6	76.7	27.4	317	0.6	162	0.2 J	91.6	134
CSM-ODD-SD-331	CSM-ODD-SD-331-1.5	21.2	58.6 J	1.5	28.7	0.5 U	94.7	30.4	86.7	36.5	396	0.4	132	0.2 J	93.9	147
CSM-ODD-SD-332	CSM-ODD-SD-332-0	23.6	153	4.9	38.4	0.5 U	165	46.8	108	512	973	0.5	156	0.8	60.8	190
CSM-ODD-SD-333	CSM-ODD-SD-333-0	18.3	156	6.8	59.7	9.5	123	199	111	407	4100	0.7	637	3.1	63.7	366

Table 6-1. Analytical Results for Samples Located in the Northern Section of the Coastal Salt Marsh
Coastal Salt Marsh Focused Feasibility Study
Inorganics

Sample Location	Sample ID	Arsenic	Barium	Beryllium	Boron	Cadmium	Chromium	Cobalt	Copper	Lead	Manganese	Mercury	Nickel	Silver	Vanadium	Zinc
HAAF CHM 203	HAAF CHM 203-1.0	14 J	186 U	1.7 J	37 U	1.9	92.6	19 U	68.9	39.1	216	0.6	103	0.9 U	87.3	134
HAAF CHM 204	HAAF CHM 204-1.0	21.7 J	39.7 J	1.1 U	14	1.6	50.1	23 U	47.4	45 UJ	226 U	0.2 U	77.2 J	0.2 J	56	80.6
HAAF CHM 204	HAAF CHM 204-2.0	15.8 J	54.8 J	1.3 U	50 U	1.8	93.5	25 U	65.6	50 U	447	0.5	88.7	1.3 U	96	98.7
HAAF CHM 204	HAAF CHM 204-4.0	21.7 J	57.8 J	1.1 U	43 U	1.3	97	21 U	68.7	43 U	367	0.4	90.8	1.1 U	95.3	105
HAAFCHM 201	HAAFCHM 201-1.0	27.4 J	93.2 J	6.8	52 U	2.9	184	115	103	796	4930	0.8	235	1.3 U	47.3	210
HAAFCHM 201	HAAFCHM 201-2.0	14.3 J	57.3 J	1.1	43 U	1.1 U	100	22 U	68.1	43	508	0.4	94.8	1.1 U	96.3	132
HAAFCHM 201	HAAFCHM 201-4.0	16 J	67.5 J	1.2	47 U	1.2	114	24 U	78.8	47 U	440	0.7	114	1.2 U	108	150
HAAFCHM 202	HAAFCHM 202-1.0	16.7 J	55.8 J	1.2	40 U	2.4	91.5	20 U	60.3	40 U	264	0.6	105	1 U	84.3	126
HAAFCHM 202	HAAFCHM 202-2.0	23.7 J	57.6 J	1.1 U	43 U	1.7	101	32.2	68.2	43 U	224	0.4	172	1.1 U	101	96.6
HAAFCHM 202	HAAFCHM 202-4.0	16.9 J	63.1 J	1	42 U	1.5	109	30.6	58.5	42 U	246	0.4	176	1 U	111	103
HAAFCHM 203	HAAFCHM 203-2.0	11.9 J	54.5 J	1 U	39 U	1.2	87.5	22.7	52	39 U	275	0.4	106 J	1 U	88.1	81.6
HAAFCHM 203	HAAFCHM 203-4.0	15.6 J	65.9 J	1.1	42 U	1.3	98.5	21 U	59.2	42 U	238	0.4	103 J	1.1 U	97.7	88.6
HAAFCHM 205	HAAFCHM 205-1.0	17.8 J	73.9 J	2.6	47 U	3.8	106	46.2	77.2	77.7	300	0.5	182	1.2 U	93.2	159
HAAFCHM 205	HAAFCHM 205-2.0	14.2 J	52.4 J	1.2 U	47 U	2.6	97.4	24 U	56.1	47 U	443	0.2	97.4	0.1 J	85.8	106
HAAFCHM 205	HAAFCHM 205-4.0	28.9 J	62.8 J	1.1	43 U	2.4	110	22.6	79.6	43 U	489	0.4	104	0.1 J	105	148
HAAFCHM 206	HAAFCHM 206-1.0	18.4 J	55.7 J	1	40 U	2	96.6	36.5	62.1	40 U	220	0.4	166	0.1 J	92	85.2
HAAFCHM 206	HAAFCHM 206-2.0	10 UJ	60.9 J	1	42 U	2.3	101	21 U	51.8	42 U	237	0.4	86.3	1 U	93.6	77.3
HAAFCHM 206	HAAFCHM 206-4.0	13.1 J	61.3 J	1.1 U	44 U	2.2	99.1	22 U	53.8	18.8 J	398	0.4	80.3	0.2 J	101	74.6
HAAFCHM 207	HAAFCHM 207-1.0	14.1 J	53.6 J	0.9	37 U	2.2	99.8	19	71.3	37 U	241	0.5	108	0.1 J	92.1	133
HAAFCHM 207	HAAFCHM 207-2.0	19.6 J	60.2 J	1.1 U	44 U	2.2	104	22 U	63.1	44 U	1770	0.4	90.2	0.038 J	106	87.3
HAAFCHM 207	HAAFCHM 207-4.0	16.3 J	61.3 J	1.1 U	45 U	2.5	102	23 U	68.1	45 U	258	0.5	106	0.2 J	98.6	102
HAAFCHM 208	HAAFCHM 208-1.0	22.1 J	92.6 J	1.5	37 U	3	93.1	21.7	68.8	38.4	269	0.6	111	0.9	92	150
HAAFCHM 208	HAAFCHM 208-2.0	15.5 J	63 J	1.1 U	43 U	2.6	108	27.2	80.2	43 U	377	0.4	117	0.1 J	103	123
HAAFCHM 208	HAAFCHM 208-4.0	15 J	60.8 J	1.2 U	49 U	2.7	105	25 U	67.5	49 U	613	0.5	92.6	0.2 J	103	94.8
HAAFCHM 209	HAAFCHM 209-1.0	16.8 J	58.4 J	1.5	43 U	1.9	92.1	36.5	64	43 U	290	0.2	152	0.1 J	81.4	147
HAAFCHM 209	HAAFCHM 209-2.0	23.7 J	53.5 J	1.4	45 U	2	94.8	32.5	74.5	45 U	372	0.7	145	0.1 J	90.7	177
HAAFCHM 209	HAAFCHM 209-4.0	14.6 J	57.3 J	1.3 U	52 U	2.1	104	29.9	82.8	52 U	331	0.5	136	0.2 J	101	165
HAAFCHM 210	HAAFCHM 210-1.0	14 J	61.5 J	1	40 U	2.8	101	20 U	60.1	40 U	259	0.4	106	1 U	99.2	141
HAAFCHM 210	HAAFCHM 210-2.0	27.3 J	74.9 J	1 U	40 U	1	89.5	30.7	57.2	40 U	246	0.4	119	0.065 J	87.9	86.7
HAAFCHM 210	HAAFCHM 210-4.0	14.3 J	61.5 J	1.1 U	43 U	1.3	87.8	21 U	57.5	43 U	237	0.4	87.2	1.1 U	90.4	78
HAAFCHM 211	HAAFCHM 211-1.0	26.7 J	188 U	1.1	38 U	2.4	94.5	19.9	60.9	38 U	282	0.6	102	0.041 J	95.1	155
HAAFCHM 211	HAAFCHM 211-2.0	13.5 J	70.4 J	1 U	18.3 J	1.1	86.3	20.8	53.4	38 U	210	0.4	95.2	0.05 J	83.8	76.9
HAAFCHM 211	HAAFCHM 211-4.0	1.2 UJ	53.3 J	1.2 U	49 U	1.5	91.6	25 U	53.8	49 U	479	0.5	80.1	1.2 U	93.6	73.5
HAAFCHM 212	HAAFCHM 212-1.0	13.9 J	60.3 J	0.9	38 U	2.7	102	19 U	69.1	38 U	266	0.6	94.3	0.091 J	100	106
HAAFCHM 212	HAAFCHM 212-2.0	12.2 J	68.1 J	1.2 U	47 U	1.6	103	23 U	68.3	47 U	275	0.5	87.8	0.07 J	104	95.5
HAAFCHM 212	HAAFCHM 212-4.0	16.4 J	67.1 J	1.2 U	47 U	1.6	105	23 U	66.6	47 U	442	0.5	93.5	0.054 J	106	96.3
HCSM-016A	HCSM-016A-1.5	17.7	60.7 J	1	32.1	0.5 U	108	17.3	67	26.3	359	0.4	98.7	0.5 U	102	99.4
ODD-SD1	ODD-SD1-05	8.4	NA	2.1	30.1 †	1.5 †	56.8	47.6	58.4	66.6	585	0.31	164	NA	49.4	177
ODD-SD1	ODD-SD1-15	26.1	NA	3.3	59.2	1.5 †	109	135	79	196	5170	0.48	261	NA	99.9	212
ODD-SD1A	ODD-SD1A-2.5	12.4	68.4 J	2.5	36.9	1.2	73.5	51.8	121	88	735	0.2	187	0.2 J	76.3	171
ODD-SD2	ODD-SD2-05	12	NA	2.5	33.7	2.4	80.2	54.5	97.7	88	426	0.26 †	191	NA	57.4	204
ODD-SD2	ODD-SD2-15	13.7	NA	1.2	24	0.86	59.3	18.4	44.7	55.1	347	0.21	84	NA	52.5	107
ODD-SD3	ODD-SD3-05	14.2	NA	1.3	32.3	1.1 †	96.5	27.9	79.1	42.8	778	0.34	124	NA	81.7	156
ODD-SD3	ODD-SD3-15	12.9	NA	0.93	36.7	1.3 †	104	23.3	81.1	34.3	821	0.26	118	NA	89.7	152
PS-SD-01	PS013SS1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PS-SD-01	PS013SS2	16.4 †	115	1.62	99.4	1.2 †	93.7	56.1	72.9	90	1640	0.267	180	0.803 †	93.5	223
PS-SD-02	PS014SS1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PS-SD-02	PS014SS2	16.4 †	90.2	2.17	61.6	1.2	107	43.9	78.9	59	845	0.366	155	0.803 †	98.6	202
PS-SD-03	PS015SS1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PS-SD-03	PS015SS2	16.4 †	68	0.909	41.8	1.2 †	59	21.1	37.2	23.3	504	0.19	77.7	0.803 †	64	90.9
PS-SD-04	PS016SS1	10.3	132	3.68	NA	1.2 †	115	53	78.6	60	1980	NA	218	0.803 †	110	248
PS-SD-05	PS017SS1	13.5	126	3.04	NA	1.2 †	123	48.2	84.4	82	1940	NA	193	0.803 †	112	234

Table 6-1. Analytical Results for Samples Located in the Northern Section of the Coastal Salt Marsh
Coastal Salt Marsh Focused Feasibility Study
Inorganics

Sample Location	Sample ID	Arsenic	Barium	Beryllium	Boron	Cadmium	Chromium	Cobalt	Copper	Lead	Manganese	Mercury	Nickel	Silver	Vanadium	Zinc
PS-SD-06	PS018SS1	16.1	165	7.21	NA	1.2 †	234	94.7	131	890	4100	NA	265	6.61	66.7	349
PS-SD-07	PS019SS1	13.4	130	4.17	NA	1.2 †	126	89.3	85.4	140	4700	NA	310	0.803 †	107	287
PS-SD-08	PS020SS1	11.9	145	2.32	NA	1.2 †	142	55.9	81.9	43	3000	NA	219	0.803 †	139	215
PS-SD-09	PS021DS1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PS-SD-09	PS021SS1	9.52	154	2.2	NA	1.2 †	132	38.3	78.4	79	1850	NA	161	0.803 †	128	183
PS-SD-09A	PS-SD-09A-1.5	10.2	67.6 J	0.9	22.5	0.5 U	101	16.6	58.7	20 U	747	0.4	75.2	0.5 U	111	68.7
PS-SD-09A	PS-SD-09A-2.5	11.3	55.7 J	0.9	16.4 J	0.5 U	86.1	14.9	53.9	12.8 J	520	0.2	66.1	0.5 U	101	61
PS-SD-101	PS-101-SS-0	NA	102	2.68	71.3	1.749 †	62.9	73.8	51.4	165	3370	0.276	284	1.749 †	51	240
PS-SD-101	PS-101-SS-1	NA	74.4	0.771 †	22.4	0.774	35.3	14.1	21.5	94.8	901	0.096	74.4	0.764 †	31	170
PS-SD-102	PS-102-SS-0	NA	62.5	1.98	104.9	1.441 †	91.1	71.5	60.8	62.2	2710	0.34	264	1.441 †	80.1	230
PS-SD-102	PS-102-SS-1	NA	89.7	1.83	72.4	1.356 †	103	27.4	69.1	59.3	553	0.428	130	1.356 †	101.6	165
PS-SD-103	PS-103-SS-0	NA	79.1	2.7	82.7	4.337	97.1	60.7	152	95.1	1900	0.306	215	1.124 †	86.3	285
PS-SD-103	PS-103-SS-1	NA	74.1	1.51	49.2	0.9804 †	59	21	63.1	123	714	0.231	96.1	0.9804 †	53.1	144
PS-SD-104	PS-104-SS-0	NA	111	6.76	92.1	1.739	74.8	162	78.8	172	7640	0.403	548	1.516 †	63	446
PS-SD-104	PS-104-SS-1	NA	126	4.35	69	1.421 †	46.9	95.5	89.8	557	2820	0.372	225	1.421 †	58.2	253
PS-SD-105	PS-105-SS-0	NA	94.4	4.05	107	2.137 †	78.6	96.2	70.9	263	4920	0.274	395	2.137 †	64.1	343
PS-SD-105	PS-105-SS-1	NA	151	3.35	138	2.5 †	124	23	100	311	550	0.595	180	2.5 †	75.5	224
PS-SD-106	PS-106-SS-0	NA	82.8	4.28	59.8	1.865	98.4	80.1	80.5	426	3610	1.256	269	1.71	53.5	291
PS-SD-106	PS-106-SS-1	NA	155	2.11	58.9	NA	305.4	16.7	86.5	1020	500	0.819	64.3	1.352	41.4	132
PS-SD-107	PS-107-SS-0	NA	103	5.46	107	1.819 †	136	82.9	105	469	3520	0.476	296	1.819 †	66.9	355
PS-SD-107	PS-107-SS-1	NA	295	5.92	134	2.428 †	326	45.4	169	1230	1440	1.53	217	2.428 †	105	388
PS-SD-108	PS-108-SS-0	NA	117	4.94	89.6	2.12	96.9	146	70.7	299	7220	0.595	487	1.931 †	67.2	382
PS-SD-108	PS-108-SS-1	NA	131	2.48	76	1.6	127	28	65.4	343	1050	0.565	132	1.48 †	51.5	160
PS-SD-109	PS-109-SS-0	NA	67.4	4.93	124	1.327 †	77.2	72.4	82.8	219	3160	0.324	254	NA	62.9	263
PS-SD-109	PS-109-SS-1	NA	146	3.01	104	1.475 †	127	16.7	75.2	319	280	0.401	121	NA	75.8	167
PS-SD-109A	PS-SD-109A-2.5	15.8	56.1 J	0.9	21.1	0.5 U	97.3	17.8	66.8	22.4	483	0.5	86.5	0.087 J	97.5	92.4
PS-SD-110	PS-110-SS-0	NA	71.7	3.39	115	1.839 †	83.1	80.9	68.7	172	3290	0.213	287	1.839 †	65.8	240
PS-SD-110	PS-110-SS-1	NA	160	4.13	132	2.025 †	130	25.7	95.5	332	725	0.486	147	2.025 †	70	207
PS-SD-111	PS-111-SS-0	NA	73	3.63	171	2.451 †	100	23.1	75.5	138	593	0.485	226	2.451 †	88.2	231
PS-SD-111	PS-111-SS-1	NA	171	1.34	142	2.84	141	21	90.2	502	697	0.536	132	2.12	61.2	195
PS-SD-112	PS-112-SS-0	NA	114	4.36	134	2.075 †	116	155	75.5	173	7140	0.44	502	2.075 †	106	381
PS-SD-112	PS-112-SS-1	NA	89.5	2.1	84.6	1.352 †	99.2	18.4	61.9	69.7	303	0.497	120	1.352 †	97.3	167
PS-SD-113	PS-113-SS-0	NA	76.4	3.61	136	1.846 †	79.3	104	77.9	78.6	5010	0.229	376	1.846 †	66.4	238
PS-SD-113	PS-113-SS-1	NA	166	2.58	100	1.484 †	137	16.1	75.4	356	427	0.451	116	1.484 †	68	138
PS-SD-114	PS-114-SS-0	NA	78.2	2.39	92.3	1.378 †	115	55.9	68.9	80.7	2270	0.391	243	1.378 †	103	233
PS-SD-114	PS-114-SS-1	NA	92.1	1.99	97.5	1.52	113	16.9	65	118	288	0.404	123	1.413 †	93.8	166
PS-SD-115	PS-115-SS-0	NA	77.4	3.47	68	0.8504 †	88.8	57.1	102	197	2470	0.423	196	0.8504 †	62.4	226
PS-SD-115	PS-115-SS-1	NA	118	2.8	63	1.158 †	137	77.3	161	602	2340	0.394	145	1.158 †	48.8	197
PS-SD-115A	PS-SD-115A-2.5	18	63.4 J	1.1	22.8	0.5 U	110	20.7	80.6	26.5	714	0.5	101	0.1 J	109	105
PS-SD-116	PS-116-SS-0	NA	75.4	3.54	142	1.786 †	101	64.3	85.7	154	2830	0.389	269	1.786 †	79.3	252
PS-SD-116	PS-116-SS-1	NA	138	3.63	143	1.99	122	20.5	78.9	537	302	0.437	186.5	2.99	62.5	211
PS-SD-117	PS-117-SS-0	NA	80.9	2.56	98.7	1.673 †	192	99.3	66.9	7	4920	0.355	361	1.673 †	91	271
PS-SD-117	PS-117-SS-1	NA	106	3.56	122	2.02	103	24.6	83.5	160	431	0.543	159	1.33	98.1	212
PS-SD-118	PS-118-SS-0	NA	119	5.75	161	2.146	102	140	96.1	108	8410	0.313	579	2.146	96.1	406
PS-SD-118	PS-118-SS-1	NA	132	5.74	169	3.29	85.6	35.9	73.9	454	246	0.43	279	1.761	72.2	363
PS-SD-119	PS-119-SS-0	NA	89.5	2.96	134	2.093 †	122	80.3	75.3	112	3050	0.414	255	2.093 †	102	235
PS-SD-119	PS-119-SS-1	NA	88.4	1.55	101	1.382 †	98.3	25.3	59.4	87.6	320	0.37	131	1.382 †	97.2	195
SC-HCSM-007	HB-6426	12.2 A	71.1 A	1.3 U	25.5 A	1.3 U	114 J+	32.1 A	71.6 A	36.4 A	1170 A	0.34 A	148 A	NA	96 A	162 A
SC-HCSM-008	HB-6428	12.4 A	60.5 A	1.3 A	21.5 A	1.1 U	94.1 J+	35.5 A	53.2 A	49.3 A	723 A	0.47 A	145 A	1.1 U	79.6 A	139 A
SC-HCSM-008A	SC-HCSM-008A-1.5	13.3	56.3 J	0.9	21	0.5 U	95.3	14.6	52.2	11.1 J	381	0.2	69.4	0.5 U	101	60
SC-HCSM-009	HB-6591	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SC-HCSM-010	HB-6430	12.1 A	51.1 A	1.1 U	20.4 A	1.1 U	95.6 J+	24.4 A	46.4 A	17.6 A	700 A	0.16 U	111 A	1.1 U	73.4 A	100 A

Table 6-1. Analytical Results for Samples Located in the Northern Section of the Coastal Salt Marsh
Coastal Salt Marsh Focused Feasibility Study
Inorganics

Sample Location	Sample ID	Arsenic	Barium	Beryllium	Boron	Cadmium	Chromium	Cobalt	Copper	Lead	Manganese	Mercury	Nickel	Silver	Vanadium	Zinc
SC-HCSM-011	HB-6434	11.9 A	2.7 A	NA	NA	1.1 U	85.9 J+	62.5 A	NA	NA	NA	NA	199 A	1.1 U	NA	251 A
SC-HCSM-011	HB-6435	NA	75.6 A	NA	23.1 A	NA	NA	NA	96.2 A	71 A	927 A	0.34 A	NA	NA	77.9 A	NA
SC-HCSM-012	HB-6437	10.8 A	73.8 A	2.8 A	34.5 A	1.3 U	79.1 J+	50.7 A	58 A	84.8 A	1230 A	0.41 A	248 A	1.3 U	74.9 A	213 A
SC-HCSM-013	HB-6439	12.2 A	62.8 A	2.4 A	29.6 A	1.2 U	89.1 J+	46.2 A	58.2 A	65.8 A	1220 A	0.31 A	191 A	1.2 U	73.8 A	186 A
SC-HCSM-019	HB-6447	19.3	115	3.9	29.7	15	243	93.5	112	602	1250	0.52	390	6.6	60.2	454
SD-EPVS-002	HB-4684	12.7 J-	81.4 A	NA	NA	2.3 A	108 A	29 A	58 J-	72.2 A	NA	0.75 A	117 J-	1.1 J	87.6 A	141 J-
SD-EPVS-008	HB-4690	13.4 J-	51.8 A	NA	NA	1.4 A	111 A	26.4 A	43.2 J-	42.1 A	NA	0.41 A	102 J-	0.31 J	74.8 A	90.5 J-
SD-PCBI-003	HB-4513	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SD-PCBI-003	HB-4567	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SD-PCBI-004	HB-4514	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SD-PCBI-004	HB-4568	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SW-EPVS-003	HB-4655	NA	NA	NA	NA	NA	NA	18.3 A	NA	NA	NA	NA	NA	NA	NA	90.8 J-
SW-EPVS-003	HB-4656	7.3 J-	56.1 A	NA	NA	1.1 A	83.6 J+	NA	52.1 A	43.7 A	NA	0.45 A	84.1 A	0.3 J	78.7 A	NA
SW-EPVS-004	HB-4658	22.2 J-	55.2 A	NA	NA	1.5 A	93.1 J+	20.5 A	53.1 A	32.8 A	NA	0.48 A	93.8 A	0.33 J	89.1 A	107 J-
SW-EPVS-006	HB-4676	14.4 J-	52.1 A	NA	NA	1.2 U	80.8 A	19.7 A	48.2 J-	26.5 A	NA	0.63 A	81.7 J-	0.69 J	74.5 A	92.7 J-
SW-EPVS-007	HB-4671	11.4 J-	62.2 A	NA	NA	1.7 A	87.2 J+	33.8 A	63.6 A	71 A	NA	0.29 A	128 A	0.63 J	72.9 A	132 J-
TWA-SD16	TWA-SD16	12.5	106	7	80.9	1.7 †	109	17.8	115	66.9	333	0.44	144	3.4 †	57.5	177
TWA-SD16	TWA-SD16-15	10.7	59.2	0.96	38.2	1 †	92.1	18.5	84.9	27.5	249	0.44	112	2 †	93.7	100
TWA-SD17	TWA-SD17	22.3	302	8.6	55.9	2.8	347	83.3	493	1540	3030	1.7	248	6.2	56.6	572
TWA-SD17	TWA-SD17-15	9.5	69.4	1.4	27.6	1.8	90.1	18.4	58.2	307	301	0.44	114	2.1 †	71.2	111
TWA-SD17	TWA-SD17-30	15.7	121	4.8	44.6	1.4	135	81	85.9	323	3370	0.44	298	3.3	54	273
TWA-SD18	TWA-SD118	21.8	NA	NA	NA	1.1	125	NA	NA	640	NA	NA	NA	2 †	NA	NA
TWA-SD18	TWA-SD18	NA	264	3.2	40	NA	NA	20.3	90.3	NA	541	0.77	115	NA	75.2	174
TWA-SD18A	TWA-SD18A-2.5	10.6	100 U	1	27.4	0.2 J	86.8	13.6	65.2	36.4	228	0.4	83.6	0.2 J	84.2	92
TWA-SD19	TWA-SD19	13	61.1	0.76	23.2	1.1 †	93.1	13.3	73.5	38.5	246	0.36	91.5	2.3 †	81.3	114
TWA-SD19	TWA-SD19-15	34.4	83.5	1.3	26.8	4	115	80.5	92.9	65.4	340	0.62	266	2.5 †	101	259
TWA-SD21	TWA-SD121	5.1	NA	2.3	28.3	NA	51.2	NA	81.6	NA	NA	NA	162	NA	NA	168
TWA-SD21	TWA-SD21	NA	74.2	NA	NA	1.1 †	NA	48.2	NA	30.2	1520	0.56	NA	2.3 †	91.6	NA
TWA-SD22	TWA-SD22	16.2	138	7.2	38.1	1.6	178	80.8	133	559	3700	0.41	270	4.5	67.9	334
TWA-SD22	TWA-SD22-15	22.4	152	4	52.8	2.3	139	147	1190	231	9510	0.42	456	2.9 †	78.3	1160
TWA-SD22	TWA-SD22-30	10.8	69	1.4	38.8	1.1 †	102	25.5	67.9	30.2	348	0.35	119	2.3 †	100	130
TWA-SD23	TWA-SD123	9.2	NA	6.6	70.9	3.8	1600	NA	NA	NA	NA	NA	800	NA	NA	NA
TWA-SD23	TWA-SD23	NA	81.3	NA	NA	NA	59.1	85.2	NA	82.3	5200	0.22 †	NA	2.2 †	55.2	215
TWA-SD23	TWA-SD23-15	9.5	63.7	1.1	37.9	3.2	95	28.1	533	30.2	826	0.31	133	2.1 †	88.3	356
TWA-SD23	TWA-SD23-3	14.1	55.1 J	1	19.4 J	0.5 U	101	19.2	72.2	24.1	592	0.6	95.5	0.1 J	94.3	101
TWA-SD24	TWA-SD24-15	8.4	NA	NA	NA	NA	NA	NA	NA	297	420	0.14	46.6	1.3 †	30.2	537
TWA-SD25	TWA-SD25	3.1	88.7	0.61	10.5 †	0.53 †	128	7.3	43.4	594	349	0.11 †	40.2	1.1 †	28.6	77.7
TWA-SD25	TWA-SD25-15	2.7	165	0.82	11.1 †	0.56 †	13.1	8.4	60	17.1	355	0.11 †	18	1.1 †	19.3	57.3

Table 6-1. Analytical Results for Samples Located in the Northern Section of the Coastal Salt Marsh
Coastal Salt Marsh Focused Feasibility Study
Organics

Sample Location	Sample ID	BHCs Total	Chlordanes Total	DDTs Total	Dichlorprop	Endrin Aldehyde	Heptachlor	Heptachlor Epoxide	MCPA	MCPP	Methoxychlor	PAHs Total	PCBs Total	Pentachlorophenol	Phenol	TCDD TEQ Total	TPH-diesel/ TPH-motor Oil	TPH-gasoline/ TPH-JP-4
40	HB-99-SO-40	NA	NA	0.89	0.1 J	NA	NA	NA	71 J	27 J	NA	NA	NA	NA	NA	NA	NA	NA
40	HB-99-SO-40X	0.61	1	ND*	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
41	HB-99-SO-41	ND*	0.0036	0.076	0.0061 U	NA	NA	NA	1.5 U	3 U	NA	NA	NA	NA	NA	NA	NA	NA
42	HB-99-SO-42	ND*	0.0189	0.117	0.0044 U	NA	NA	NA	1.1 U	2.1 U	NA	NA	NA	NA	NA	NA	NA	NA
43	HB-99-SO-43	ND*	0.026	0.135	0.0043 U	NA	NA	NA	1.1 U	2.1 U	NA	NA	NA	NA	NA	NA	NA	NA
44	HB-99-SO-2-3-44	NA	NA	NA	0.0036 U	NA	NA	NA	0.91 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA
44	HB-99-SO-2-3-44RE	ND*	0.043	0.405	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
44	HB-99-SO-44	ND*	0.012	0.315	0.0036 U	NA	NA	NA	0.89 U	1.7 U	NA	NA	NA	NA	NA	NA	NA	NA
45	HB-99-SO-45	ND*	ND*	1.81	0.0037 U	NA	NA	NA	0.92 U	1.8 U	NA	NA	NA	NA	NA	NA	NA	NA
BK-SS-02	BK004SS1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BK-SS-02	BK005SS1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BK-SS-02	BK006SS1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CSM-ANE-SD-325	CSM-ANE-SD-325-5	ND*	ND*	3.46	NA	0.029 U	0.029 U	0.029 U	NA	NA	0.029 U	NA	0.200164	NA	NA	NA	100 U / 2900	NA
CSM-ANE-SD-326	CSM-ANE-SD-326-0	ND*	ND*	0.0069	NA	0.0032 UJ	0.0032 U	0.0032 U	NA	NA	0.0032 U	NA	0.1592495	NA	NA	NA	NA	NA
CSM-ANE-SD-326	CSM-ANE-SD-326-2	ND*	ND*	0.0084	NA	0.0039 UJ	0.0039 U	0.0039 U	NA	NA	0.0039 U	NA	0.6810261	NA	NA	NA	NA	NA
CSM-ANE-SD-327	CSM-ANE-SD-327-0	0.0037	ND*	0.0087	NA	0.004 UJ	0.004 U	0.004 U	NA	NA	0.004 U	NA	0.0003269	NA	NA	NA	NA	NA
CSM-ANE-SD-327	CSM-ANE-SD-327-2	0.003	ND*	ND*	NA	0.004 UJ	0.004 U	0.004 U	NA	NA	0.004 U	NA	0.00007868	NA	NA	NA	NA	NA
CSM-ANE-SD-328	CSM-ANE-SD-328-0	ND*	ND*	0.0204	NA	0.0031 UJ	0.0031 U	0.0031 U	NA	NA	0.0031 U	NA	0.962974	NA	NA	NA	NA	NA
CSM-ANE-SD-328	CSM-ANE-SD-328-2	ND*	0.044	4.51	NA	0.02 JN	0.0029 UJ	0.0029 UJ	NA	NA	0.0029 UJ	NA	0.6039091	NA	NA	NA	NA	NA
CSM-ANE-SS-320	CSM-ANE-SS-320-0	ND*	ND*	ND*	NA	0.0038 U	0.0038 U	0.0038 U	NA	NA	0.0038 U	NA	0.4313431	NA	NA	NA	NA	NA
CSM-ANE-SS-320	CSM-ANE-SS-320-2	ND*	ND*	0.0019	NA	0.0036 U	0.0036 U	0.0036 U	NA	NA	0.0036 U	NA	0.202502	NA	NA	NA	NA	NA
CSM-ANE-SS-321	CSM-ANE-SS-321-0	ND*	0.035	0.3064	NA	0.0038 J-	0.0043 UJ	0.0043 UJ	NA	NA	0.0043 UJ	NA	0.5398406	NA	NA	NA	NA	NA
CSM-ANE-SS-321	CSM-ANE-SS-321-2	ND*	ND*	ND*	NA	0.0035 UJ	0.0035 U	0.0035 U	NA	NA	0.0035 U	NA	0.00252541	NA	NA	NA	NA	NA
CSM-ANE-SS-322	CSM-ANE-SS-322-0	ND*	0.29	6.39	NA	0.025 U	0.025 U	0.025 U	NA	NA	0.025 U	NA	2.188048	NA	NA	NA	NA	NA
CSM-ANE-SS-322	CSM-ANE-SS-322-2	ND*	ND*	0.0543	NA	0.0017 J	0.0037 U	0.0037 U	NA	NA	0.0037 U	NA	0.1968532	NA	NA	NA	NA	NA
CSM-ANE-SS-323	CSM-ANE-SS-323-0	ND*	0.031	1.13	NA	0.0098	0.0035 U	0.0035 U	NA	NA	0.0035 U	NA	0.4635514	NA	NA	NA	NA	NA
CSM-ANE-SS-324	CSM-ANE-SS-324-0	0.0482	0.94	0.8	NA	0.0072 UJ	0.062 J-	0.1 J-	NA	NA	0.02 JN	NA	0.1385073	NA	NA	NA	NA	NA
CSM-ANW-312	CSM-ANW-312-0	ND*	0.0391	1.08	NA	0.0075 J-	0.0034 UJ	0.0034 UJ	NA	NA	0.0034 UJ	NA	NA	NA	NA	NA	NA	NA
CSM-ANW-313	CSM-ANW-SD-313-0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0726284	NA	NA	NA	NA	NA
CSM-ANW-SD-311	CSM-ANW-SD-311-10	ND*	ND*	0.2062	NA	0.0042 U	0.0042 U	0.0042 U	NA	NA	0.0042 U	NA	0.026867	NA	NA	NA	370 N / AE73490 U	NA
CSM-ANW-SS-310	CSM-ANW-SS-310-0	ND*	0.01	0.076	NA	0.0015 J	0.0026 U	0.0026 U	NA	NA	0.0026 U	NA	0.0288088	NA	NA	NA	NA	NA
CSM-ANW-SS-310	CSM-ANW-SS-310-2	ND*	0.0026	0.0298	NA	0.0026 U	0.0026 U	0.0026 U	NA	NA	0.0026 U	NA	0.022322	NA	NA	NA	NA	NA
CSM-ANW-SS-312	CSM-ANW-SS-312-0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.598909	NA	NA	NA	NA	NA
CSM-ANW-SS-312	CSM-ANW-SS-312-2	ND*	0.0143	0.177	NA	0.0032	0.0024 U	0.0024 U	NA	NA	0.005 N	NA	0.37651	NA	NA	NA	NA	NA
CSM-HM-SD-390	CSM-HM-SD-390-0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CSM-HM-SD-390	CSM-HM-SD-390-3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CSM-HM-SD-391	CSM-HM-SD-391-0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CSM-HM-SD-391	CSM-HM-SD-391-3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CSM-HM-SD-392	CSM-HM-SD-392-0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CSM-HM-SD-392	CSM-HM-SD-392-3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CSM-HM-SD-393	CSM-HM-SD-393-0	ND*	0.097	1.51	NA	0.016 N	0.0036 U	0.0036 U	NA	NA	0.0036 U	NA	NA	NA	NA	NA	NA	NA
CSM-HM-SD-393	CSM-HM-SD-393-1.5	ND*	ND*	ND*	NA	0.0034 UJ	0.0034 UJ	0.0034 UJ	NA	NA	0.0034 UJ	NA	NA	NA	NA	NA	NA	NA
CSM-HM-SD-394	CSM-HM-SD-394-0	ND*	ND*	0.0158	NA	0.0033 U	0.0033 U	0.0033 U	NA	NA	0.0033 U	NA	NA	NA	NA	NA	NA	NA
CSM-HM-SD-394	CSM-HM-SD-394-1.5	ND*	ND*	ND*	NA	0.0035 U	0.0035 U	0.0035 U	NA	NA	0.0035 U	NA	NA	NA	NA	NA	NA	NA
CSM-HM-SD-395	CSM-HM-SD-395-0	ND*	ND*	0.0149	NA	0.0034 U	0.0034 U	0.0034 U	NA	NA	0.0034 U	NA	NA	NA	NA	NA	NA	NA
CSM-HM-SD-395	CSM-HM-SD-395-1.5	ND*	ND*	0.0024	NA	0.0032 U	0.0032 U	0.0032 U	NA	NA	0.0032 U	NA	NA	NA	NA	NA	NA	NA
CSM-ODD-SD-330	CSM-ODD-SD-330-0	ND*	0.13	3.2	NA	0.021 J	0.037 U	0.037 U	NA	NA	0.037 U	NA	NA	NA	NA	ND*	220 U / 9500 JN	NA
CSM-ODD-SD-330	CSM-ODD-SD-330-1.5	ND*	ND*	4.79	NA	0.039 U	0.039 U	0.039 U	NA	NA	0.039 U	NA	NA	NA	NA	NA	4600 JN / 460 U	NA
CSM-ODD-SD-331	CSM-ODD-SD-331-0	ND*	ND*	0.0197	NA	0.0035 U	0.0035 U	0.0035 U	NA	NA	0.0035 U	NA	NA	NA	NA	NA	21 U / 76	NA
CSM-ODD-SD-331	CSM-ODD-SD-331-1.5	ND*	ND*	0.0063	NA	0.0037 U	0.0037 U	0.0037 U	0.0037 U	NA	NA	NA	NA	NA	NA	NA	22 U / 74 JN	NA
CSM-ODD-SD-332	CSM-ODD-SD-332-0	ND*	0.25	2.83	NA	0.041 N	0.0047 U	0.0047 U	NA	NA	0.0047 U	NA	NA	NA	NA	NA	27 U / 1400	NA
CSM-ODD-SD-333	CSM-ODD-SD-333-0	ND*	0.061	11.01	NA	0.028 N	0.0058 U	0.0058 U	NA	NA	0.0058 U	NA	NA	NA	NA	NA	1400 U / 15000 N	NA

Table 6-1. Analytical Results for Samples Located in the Northern Section of the Coastal Salt Marsh
Coastal Salt Marsh Focused Feasibility Study
Organics

Sample Location	Sample ID	BHCs Total	Chlordanes Total	DDTs Total	Dichlorprop	Endrin Aldehyde	Heptachlor	Heptachlor Epoxide	MCPA	MCPP	Methoxychlor	PAHs Total	PCBs Total	Pentachlorophenol	Phenol	TCDD TEQ Total	TPH-diesel/ TPH-motor Oil	TPH-gasoline/ TPH-JP-4
HAAF CHM 203	HAAF CHM 203-1.0	ND*	ND*	ND*	1.9 U	0.0084 UJ	0.0084 UJ	0.0084 UJ	37 U	37 U	0.0084 UJ	2.9773	ND*	NA	NA	NA	19 U / 39	9 U
HAAF CHM 204	HAAF CHM 204-1.0	ND*	ND*	0.054	2.3 U	0.01 UJ	0.01 UJ	0.01 UJ	45 U	45 U	0.01 UJ	10.0918	ND*	NA	NA	NA	23 U / 45	11 U
HAAF CHM 204	HAAF CHM 204-2.0	ND*	ND*	ND*	2.5 U	0.011 UJ	0.011 UJ	0.011 UJ	50 U	50 U	0.011 UJ	1.9928	ND*	NA	NA	NA	25 U / 48	13 U
HAAF CHM 204	HAAF CHM 204-4.0	ND*	ND*	ND*	2.1 U	0.0096 UJ	0.0096 UJ	0.0096 UJ	43 U	43 U	0.0096 UJ	7.1039	NA	NA	NA	NA	21 U / 81	11 U
HAAFCHM 201	HAAFCHM 201-1.0	ND*	0.41	9.9	2.6 U	0.097	0.012 U	0.012 U	52 U	52 U	0.012 U	1.3338	ND*	NA	NA	NA	260 U / 1100	13 U
HAAFCHM 201	HAAFCHM 201-2.0	ND*	ND*	0.0065	2.2 U	0.0098 U	0.0098 U	0.0098 U	43 U	43 U	0.0098 U	3.2696	ND*	NA	NA	NA	22 U / 80	11 U
HAAFCHM 201	HAAFCHM 201-4.0	ND*	ND*	0.013	2.4 U	0.0028 J	0.011 U	0.011 U	47 U	47 U	0.011 U	4.8659	ND*	NA	NA	NA	24 U / 82	12 U
HAAFCHM 202	HAAFCHM 202-1.0	ND*	ND*	0.0089	2 U	0.0091 U	0.0091 U	0.0091 U	40 U	40 U	0.0091 U	0.949	ND*	NA	NA	NA	20 U / 36	10 U
HAAFCHM 202	HAAFCHM 202-2.0	ND*	ND*	0.0034	2.1 U	0.0096 U	0.0096 U	0.0096 U	43 U	43 U	0.0096 U	0.5455	ND*	NA	NA	NA	21 U / 21	11 U
HAAFCHM 202	HAAFCHM 202-4.0	ND*	ND*	ND*	2.1 U	0.0094 U	0.0094 U	0.0094 U	42 U	42 U	0.0094 U	0.3904	ND*	NA	NA	NA	21 U / 19 J	10 U
HAAFCHM 203	HAAFCHM 203-2.0	ND*	ND*	ND*	2 U	0.0088 UJ	0.0088 UJ	0.0088 UJ	39 U	39 U	0.0088 UJ	2.1479	ND*	NA	NA	NA	20 U / 25	10 UJ
HAAFCHM 203	HAAFCHM 203-4.0	ND*	ND*	ND*	2.1 U	0.0095 UJ	0.0095 UJ	0.0095 UJ	42 U	42 U	0.0095 UJ	0.8214	ND*	NA	NA	NA	21 U / 32	11 U
HAAFCHM 205	HAAFCHM 205-1.0	0.012	0.32	2.68	2.3 U	0.059	0.021 U	0.021 U	47 U	47 U	0.021 U	1.1506	1.1	NA	NA	NA	120 U / 890	12 U
HAAFCHM 205	HAAFCHM 205-2.0	ND*	ND*	0.015	2.4 U	0.011 UJ	0.011 UJ	0.011 UJ	47 U	47 U	0.011 UJ	1.6749	ND*	NA	NA	NA	24 U / 52	12 U
HAAFCHM 205	HAAFCHM 205-4.0	ND*	ND*	0.0022	2.2 U	0.0098 UJ	0.0098 UJ	0.0098 UJ	43 U	43 U	0.0098 UJ	3.9234	ND*	NA	NA	NA	22 U / 59	11 U
HAAFCHM 206	HAAFCHM 206-1.0	ND*	ND*	ND*	2 U	0.009 UJ	0.009 UJ	0.009 UJ	40 U	40 U	0.009 UJ	1.1222	ND*	NA	NA	NA	20 U / 19 J	10 U
HAAFCHM 206	HAAFCHM 206-2.0	ND*	ND*	ND*	2.1 U	0.0094 UJ	0.0094 UJ	0.0094 UJ	42 U	42 U	0.0094 UJ	0.7515	ND*	NA	NA	NA	21 U / 20 J	10 U
HAAFCHM 206	HAAFCHM 206-4.0	ND*	ND*	ND*	2.2 U	0.0098 U	0.0098 U	0.0098 U	44 U	44 U	0.0098 U	0.6674	ND*	NA	NA	NA	22 U / 24	11 U
HAAFCHM 207	HAAFCHM 207-1.0	ND*	ND*	ND*	1.8 U	0.0082 UJ	0.0082 UJ	0.0082 UJ	37 U	37 U	0.0082 UJ	2.1955	ND*	NA	NA	NA	18 U / 11 J	9 U
HAAFCHM 207	HAAFCHM 207-2.0	ND*	ND*	ND*	2.2 U	0.01 UJ	0.01 UJ	0.01 UJ	44 U	44 U	0.01 UJ	0.3446	ND*	NA	NA	NA	22 U / 20 J	11 U
HAAFCHM 207	HAAFCHM 207-4.0	ND*	ND*	ND*	2.3 U	0.01 U	0.01 U	0.01 U	45 U	45 U	0.01 U	1.5516	ND*	NA	NA	NA	23 U / 29	11 U
HAAFCHM 208	HAAFCHM 208-1.0	ND*	0.0022	0.0062	1.9 U	0.0083 U	0.0083 U	0.0083 U	37 U	37 U	0.0083 U	2.5051	ND*	NA	NA	NA	19 U / 46	9 U
HAAFCHM 208	HAAFCHM 208-2.0	ND*	ND*	ND*	2.1 U	0.0096 U	0.0096 U	0.0096 U	43 U	43 U	0.0096 U	3.0581	ND*	NA	NA	NA	21 U / 38	11 U
HAAFCHM 208	HAAFCHM 208-4.0	ND*	ND*	ND*	2.5 U	0.011 U	0.011 U	0.011 U	49 U	49 U	0.011 U	1.4445	ND*	NA	NA	NA	25 U / 30	12 U
HAAFCHM 209	HAAFCHM 209-1.0	ND*	ND*	0.019	2.1 U	0.0096 UJ	0.0096 UJ	0.0096 UJ	43 U	43 U	0.0096 UJ	1.132	ND*	NA	NA	NA	21 U / 36	11 U
HAAFCHM 209	HAAFCHM 209-2.0	ND*	ND*	0.0088	5.6 U	0.01 U	0.01 U	0.01 U	110 U	110 U	0.01 U	3.6476	ND*	NA	NA	NA	23 U / 50	11 U
HAAFCHM 209	HAAFCHM 209-4.0	ND*	ND*	ND*	2.6 U	0.012 U	0.012 U	0.012 U	52 U	52 U	0.012 U	1.5613	ND*	NA	NA	NA	26 UJ / 76 J-	13 U
HAAFCHM 210	HAAFCHM 210-1.0	ND*	ND*	0.0036	2 U	0.009 UJ	0.009 UJ	0.009 UJ	40 U	40 U	0.009 UJ	2.3802	ND*	NA	NA	NA	20 U / 16 J	10 U
HAAFCHM 210	HAAFCHM 210-2.0	ND*	ND*	0.003	2 U	0.0091 UJ	0.0091 UJ	0.0091 UJ	40 U	40 U	0.0091 UJ	0.4273	ND*	NA	NA	NA	20 U / 15 J	10 U
HAAFCHM 210	HAAFCHM 210-4.0	ND*	0.0028	0.1806	2.1 U	0.0096 UJ	0.0096 UJ	0.0096 UJ	43 U	43 U	0.0096 UJ	0.7879	ND*	NA	NA	NA	21 U / 18 J	11 U
HAAFCHM 211	HAAFCHM 211-1.0	ND*	ND*	ND*	1.9 U	0.0085 UJ	0.0085 UJ	0.0085 UJ	38 U	38 U	0.0085 UJ	2.1137	ND*	NA	NA	NA	19 U / 19	9 U
HAAFCHM 211	HAAFCHM 211-2.0	ND*	ND*	ND*	1.9 U	0.0086 UJ	0.0086 UJ	0.0086 UJ	38 U	38 U	0.0086 UJ	0.7461	ND*	NA	NA	NA	19 U / 21	10 U
HAAFCHM 211	HAAFCHM 211-4.0	ND*	ND*	ND*	2.5 U	0.011 UJ	0.011 UJ	0.011 UJ	49 U	49 U	0.011 UJ	0.6878	ND*	NA	NA	NA	25 U / 24 J	12 U
HAAFCHM 212	HAAFCHM 212-1.0	ND*	ND*	ND*	1.9 U	0.0085 UJ	0.0085 UJ	0.0085 UJ	38 U	38 U	0.0085 UJ	1.5212	ND*	NA	NA	NA	19 U / 14 J	10 U
HAAFCHM 212	HAAFCHM 212-2.0	ND*	ND*	ND*	2.3 U	0.011 U	0.011 U	0.011 U	47 U	47 U	0.011 U	4.3289	ND*	NA	NA	NA	23 U / 47	12 U
HAAFCHM 212	HAAFCHM 212-4.0	ND*	ND*	ND*	2.3 U	0.011 U	0.011 U	0.011 U	47 U	47 U	0.011 U	1.0594	ND*	NA	NA	NA	23 U / 30	12 U
HCSM-016A	HCSM-016A-1.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ODD-SD1	ODD-SD1-05	NA	NA	0.69	NA	NA	NA	NA	NA	NA	NA	ND*	NA	4.8 †	0.99 †	NA	3 † / NA	NA
ODD-SD1	ODD-SD1-15	NA	NA	1.98	NA	NA	NA	NA	NA	NA	NA	ND*	NA	4.6 †	0.96 †	NA	2.9 † / NA	NA
ODD-SD1A	ODD-SD1A-2.5	ND*	0.038	0.878	NA	0.0051	0.0039 U	0.0039 U	NA	NA	0.0039 U	NA	NA	NA	NA	NA	920 U / 10000	NA
ODD-SD2	ODD-SD2-05	NA	NA	0.2	NA	NA	NA	NA	NA	NA	NA	7.1	NA	4.2 †	0.86 †	NA	2.6 † / NA	NA
ODD-SD2	ODD-SD2-15	NA	NA	0.9491	NA	NA	NA	NA	NA	NA	NA	ND*	NA	2.8 †	0.57 †	NA	1.7 † / NA	NA
ODD-SD3	ODD-SD3-05	NA	NA	1.32	NA	NA	NA	NA	NA	NA	NA	1.99	NA	3.6 †	0.75 †	NA	2.3 † / NA	NA
ODD-SD3	ODD-SD3-15	NA	NA	0.38	NA	NA	NA	NA	NA	NA	NA	ND*	NA	4 †	0.83 †	NA	2.5 † / NA	NA
PS-SD-01	PS013SS1	NA	NA	0.25	NA	NA	NA	NA	NA	NA	NA	0.37	NA	0.76 †	0.052 †	NA	NA	NA
PS-SD-01	PS013SS2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PS-SD-02	PS014SS1	NA	NA	ND*	NA	NA	NA	NA	NA	NA	NA	ND*	NA	0.76 †	0.052 †	NA	NA	NA
PS-SD-02	PS014SS2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PS-SD-03	PS015SS1	NA	NA	ND*	NA	NA	NA	NA	NA	NA	NA	ND*	NA	0.76 †	0.052 †	NA	NA	NA
PS-SD-03	PS015SS2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PS-SD-04	PS016SS1	NA	ND*	ND*	NA	NA	NA	NA	NA	NA	NA	ND*	NA	NA	NA	NA	NA	NA
PS-SD-05	PS017SS1	NA	ND*	ND*	NA	NA	NA	NA	NA	NA	NA	0.48	NA	NA	NA	NA	NA	NA

Table 6-1. Analytical Results for Samples Located in the Northern Section of the Coastal Salt Marsh
Coastal Salt Marsh Focused Feasibility Study
Organics

Sample Location	Sample ID	BHCs Total	Chlordanes Total	DDTs Total	Dichlorprop	Endrin Aldehyde	Heptachlor	Heptachlor Epoxide	MCPA	MCPP	Methoxychlor	PAHs Total	PCBs Total	Pentachlorophenol	Phenol	TCDD TEQ Total	TPH-diesel/ TPH-motor Oil	TPH-gasoline/ TPH-JP-4
PS-SD-06	PS018SS1	NA	ND*	3	NA	NA	NA	NA	NA	NA	NA	5.37	NA	NA	NA	NA	NA	NA
PS-SD-07	PS019SS1	NA	ND*	0.94	NA	NA	NA	NA	NA	NA	NA	5.3	NA	NA	NA	NA	NA	NA
PS-SD-08	PS020SS1	NA	NA	ND*	NA	NA	NA	NA	NA	NA	NA	ND*	NA	0.76 †	0.052 †	NA	NA	NA
PS-SD-09	PS021DS1	NA	NA	1.4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PS-SD-09	PS021SS1	NA	NA	ND*	NA	NA	NA	NA	NA	NA	NA	ND*	NA	0.76 †	0.052 †	NA	NA	NA
PS-SD-09A	PS-SD-09A-1.5	ND*	ND*	ND*	NA	0.0037 U	0.0037 U	0.0037 U	NA	NA	0.0037 U	NA	NA	NA	NA	NA	22 U / 22 JN	NA
PS-SD-09A	PS-SD-09A-2.5	ND*	ND*	ND*	NA	0.0036 U	0.0036 U	0.0036 U	NA	NA	0.0036 U	NA	NA	NA	NA	NA	19 JN / 21 U	NA
PS-SD-101	PS-101-SS-0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND*	NA	NA	NA	NA	87.4 † / NA	NA
PS-SD-101	PS-101-SS-1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND*	NA	NA	NA	NA	87.4 † / NA	NA
PS-SD-102	PS-102-SS-0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND*	NA	NA	NA	NA	87.4 † / NA	NA
PS-SD-102	PS-102-SS-1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND*	NA	NA	NA	NA	87.4 † / NA	NA
PS-SD-103	PS-103-SS-0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PS-SD-103	PS-103-SS-1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND*	NA	NA	NA	NA	384 / NA	NA
PS-SD-104	PS-104-SS-0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND*	NA	NA	NA	NA	87.4 † / NA	NA
PS-SD-104	PS-104-SS-1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND*	NA	NA	NA	NA	87.4 † / NA	NA
PS-SD-105	PS-105-SS-0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND*	NA	NA	NA	NA	87.4 † / NA	NA
PS-SD-105	PS-105-SS-1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND*	NA	NA	NA	NA	87.4 † / NA	NA
PS-SD-106	PS-106-SS-0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	3.88	NA	NA	NA	NA	87.4 † / NA	NA
PS-SD-106	PS-106-SS-1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND*	NA	NA	NA	NA	87.4 † / NA	NA
PS-SD-107	PS-107-SS-0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND*	NA	NA	NA	NA	87.4 † / NA	NA
PS-SD-107	PS-107-SS-1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND*	NA	NA	NA	NA	87.4 † / NA	NA
PS-SD-108	PS-108-SS-0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND*	NA	NA	NA	NA	87.4 † / NA	NA
PS-SD-108	PS-108-SS-1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND*	NA	NA	NA	NA	87.4 † / NA	NA
PS-SD-109	PS-109-SS-0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND*	NA	1.7693 †	0.8833 †	NA	87.4 † / NA	NA
PS-SD-109	PS-109-SS-1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND*	NA	3.924 †	1.968 †	NA	796 / NA	NA
PS-SD-109A	PS-SD-109A-2.5	ND*	ND*	0.003	NA	0.0039 UJ	0.0039 UJ	0.0039 UJ	NA	NA	0.0039 UJ	NA	NA	NA	NA	NA	23 U / 71 N	NA
PS-SD-110	PS-110-SS-0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND*	NA	NA	NA	NA	87.4 † / NA	NA
PS-SD-110	PS-110-SS-1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND*	NA	NA	NA	NA	87.4 † / NA	NA
PS-SD-111	PS-111-SS-0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND*	NA	NA	NA	NA	87.4 † / NA	NA
PS-SD-111	PS-111-SS-1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND*	NA	NA	NA	NA	87.4 † / NA	NA
PS-SD-112	PS-112-SS-0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND*	NA	NA	NA	NA	87.4 † / NA	NA
PS-SD-112	PS-112-SS-1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND*	NA	NA	NA	NA	87.4 † / NA	NA
PS-SD-113	PS-113-SS-0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND*	NA	NA	NA	NA	87.4 † / NA	NA
PS-SD-113	PS-113-SS-1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND*	NA	NA	NA	NA	1130 / NA	NA
PS-SD-114	PS-114-SS-0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND*	NA	NA	NA	NA	87.4 † / NA	NA
PS-SD-114	PS-114-SS-1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND*	NA	NA	NA	NA	87.4 † / NA	NA
PS-SD-115	PS-115-SS-0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	22.833	NA	2.76	3.06	NA	87.4 † / NA	NA
PS-SD-115	PS-115-SS-1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	7.86	NA	1.79	2.34	NA	87.4 † / NA	NA
PS-SD-115A	PS-SD-115A-2.5	ND*	ND*	0.0239	NA	0.0045 U	0.0045 U	0.0045 U	NA	NA	0.0045 U	NA	NA	NA	NA	NA	53 / NA	NA
PS-SD-116	PS-116-SS-0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND*	NA	NA	NA	NA	87.4 † / NA	NA
PS-SD-116	PS-116-SS-1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND*	NA	NA	NA	NA	953 / NA	NA
PS-SD-117	PS-117-SS-0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND*	NA	NA	NA	NA	87.4 † / NA	NA
PS-SD-117	PS-117-SS-1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND*	NA	NA	NA	NA	87.4 † / NA	NA
PS-SD-118	PS-118-SS-0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND*	NA	NA	NA	NA	87.4 † / NA	NA
PS-SD-118	PS-118-SS-1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND*	NA	NA	NA	NA	701 / NA	NA
PS-SD-119	PS-119-SS-0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND*	NA	NA	NA	NA	87.4 † / NA	NA
PS-SD-119	PS-119-SS-1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND*	NA	NA	NA	NA	87.4 † / NA	NA
SC-HCSM-007	HB-6426	NA	NA	0.025	NA	NA	NA	NA	NA	NA	NA	0.203	0.02647	NA	NA	NA	NA	NA
SC-HCSM-008	HB-6428	NA	NA	0.1	NA	NA	NA	NA	NA	NA	NA	ND*	0.10027	NA	NA	NA	NA	NA
SC-HCSM-008A	SC-HCSM-008A-1.5	ND*	ND*	ND*	NA	0.0036 U	0.0036 U	0.0036 U	NA	NA	0.0036 U	NA	NA	NA	NA	NA	21 U / 21 JN	NA
SC-HCSM-009	HB-6591	NA	0.003	0.501	NA	NA	NA	0.002 A	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SC-HCSM-010	HB-6430	NA	NA	ND*	NA	NA	NA	NA	NA	NA	NA	ND*	0.02132	NA	NA	NA	NA	NA

Table 6-1. Analytical Results for Samples Located in the Northern Section of the Coastal Salt Marsh
Coastal Salt Marsh Focused Feasibility Study
Organics

Sample Location	Sample ID	BHCs Total	Chlordanes Total	DDTs Total	Dichlorprop	Endrin Aldehyde	Heptachlor	Heptachlor Epoxide	MCPA	MCPP	Methoxychlor	PAHs Total	PCBs Total	Pentachlorophenol	Phenol	TCDD TEQ Total	TPH-diesel/ TPH-motor Oil	TPH-gasoline/ TPH-JP-4
SC-HCSM-011	HB-6434	NA	NA	NA	0.054 UJ	NA	NA	NA	NA	NA	NA	ND*	0.02	NA	NA	NA	NA	NA
SC-HCSM-011	HB-6435	0.0018	0.0042	0.139	NA	NA	NA	NA	NA	NA	NA	0.804	0.057733	NA	NA	NA	NA	NA
SC-HCSM-012	HB-6437	ND*	0.0078	0.227	0.065 UJ	NA	NA	NA	NA	NA	NA	0.178	0.14977	NA	NA	NA	NA	NA
SC-HCSM-013	HB-6439	ND*	0.0087	0.228	0.058 UJ	NA	NA	NA	NA	NA	NA	ND*	0.14076	NA	NA	NA	NA	NA
SC-HCSM-019	HB-6447	ND*	ND*	1.8	0.065 UJ	0.44 U	0.21 U	0.21 U	13 UJ	13 UJ	2.1 U	0.51	1.6941	NA	NA	NA	NA	NA
SD-EPVS-002	HB-4684	NA	NA	ND*	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SD-EPVS-008	HB-4690	NA	NA	0.12	NA	NA	NA	0.0027 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SD-PCBI-003	HB-4513	NA	NA	0.0131	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SD-PCBI-003	HB-4567	NA	NA	0.83	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SD-PCBI-004	HB-4514	NA	NA	ND*	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SD-PCBI-004	HB-4568	NA	NA	0.0073	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SW-EPVS-003	HB-4655	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SW-EPVS-003	HB-4656	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SW-EPVS-004	HB-4658	NA	NA	ND*	NA	NA	NA	0.0026 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SW-EPVS-006	HB-4676	NA	NA	ND*	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SW-EPVS-007	HB-4671	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TWA-SD16	TWA-SD16	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND*	NA	NA	NA	NA	3.4 † / NA	NA
TWA-SD16	TWA-SD16-15	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND*	NA	NA	NA	NA	2 † / NA	NA
TWA-SD17	TWA-SD17	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	47.8	NA	NA	NA	NA	55 † / NA	NA
TWA-SD17	TWA-SD17-15	NA	ND*	5.64	NA	NA	NA	NA	NA	NA	NA	ND*	NA	NA	NA	NA	34 † / NA	NA
TWA-SD17	TWA-SD17-30	NA	ND*	2.72	NA	NA	NA	NA	NA	NA	NA	ND*	NA	NA	NA	NA	46 † / NA	NA
TWA-SD18	TWA-SD118	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND*	NA	NA	NA	NA	2 † / NA	NA
TWA-SD18	TWA-SD18	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TWA-SD18A	TWA-SD18A-2.5	ND*	0.0198	0.162	NA	0.0034 J-	0.0034 UJ	0.0034 UJ	NA	NA	0.0034 UJ	NA	NA	NA	NA	NA	NA	NA
TWA-SD19	TWA-SD19	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND*	NA	NA	NA	NA	2.3 † / NA	NA
TWA-SD19	TWA-SD19-15	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND*	NA	NA	NA	NA	2.5 † / NA	NA
TWA-SD21	TWA-SD121	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TWA-SD21	TWA-SD21	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND*	NA	NA	NA	NA	2.3 † / NA	NA
TWA-SD22	TWA-SD22	1.3	3.32	NA	0.061 †	NA	NA	NA	NA	NA	NA	0.12	NA	NA	NA	NA	3.9 † / NA	NA
TWA-SD22	TWA-SD22-15	NA	ND*	ND*	0.071 †	NA	NA	NA	NA	NA	NA	2.24	NA	NA	NA	NA	2.9 † / NA	NA
TWA-SD22	TWA-SD22-30	NA	ND*	ND*	0.057 †	NA	NA	NA	NA	NA	NA	0.41	NA	NA	NA	NA	2.3 † / NA	NA
TWA-SD23	TWA-SD123	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TWA-SD23	TWA-SD23	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND*	NA	NA	NA	NA	2.2 † / NA	NA
TWA-SD23	TWA-SD23-15	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND*	NA	NA	NA	NA	2.1 † / NA	NA
TWA-SD23	TWA-SD23-3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TWA-SD24	TWA-SD24-15	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.26	NA	NA	NA	NA	NA	NA
TWA-SD25	TWA-SD25	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND*	NA	NA	NA	NA	1.1 † / NA	NA
TWA-SD25	TWA-SD25-15	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND*	NA	NA	NA	NA	1.1 † / NA	NA

Note:
NA - not analyzed ND* - All congeners were non-detect † value listed under "Final Result" is the quantitation limit
"J" qualifier - estimated value, below practical quantitation limit "U" qualifier - compound analyzed for but not detected "A" qualifier - compound analyzed by Flame AA

Table 6-2. Analytical Results for Samples Located in the Central Section of the Coastal Salt Marsh
Coastal Salt Marsh Focused Feasibility Study
Inorganics

Sample Location	Sample ID	Arsenic	Barium	Beryllium	Boron	Cadmium	Chromium	Cobalt	Copper	Lead	Manganese	Mercury	Nickel	Silver	Vanadium	Zinc
BP-2	BP-2-12	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BP-2	BP-2-6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CSM-A14-SD-370	CSM-A14-SD-370-0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CSM-A14-SD-370	CSM-A14-SD-370-2	2.1 J	70.1 J	0.4 J	20.1 J-	0.4 J	28.6	8.9 J	13.7	13.9 J	203	0.1 U	43.1	0.5 U	30.1	39.4
CSM-A14-SD-370	CSM-A14-SD-370-4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CSM-A14-SD-371	CSM-A14-SD-371-2	20.6	55.5 J	0.9	50.3 J-	1.1	97.6	33.8	74.1	24.4	259	0.4	137	0.5 U	96.8	107
CSM-A14-SD-372	CSM-A14-SD-372-2	13.1	57.2 J	0.9	45 J-	0.7	92.1	16.6	55.5	20 U	303	0.4	73.6	0.5 U	101	74
CSM-A14-SD-372	CSM-A14-SD-372-4	19	57.6 J	1	31 J-	0.8	96.5	21.7	60.7	41.5	279	0.4	103	0.5 U	101	107
CSM-A14-SD-373	CSM-A14-SD-373-2	3.9 J	171	0.8	20 UJ	0.4 J	28.2	8.8 J	15.8	20 U	182	0.1 U	29.9	0.5 U	33.4	45.7
CSM-A14-SD-374	CSM-A14-SD-374-0	16.5	293	1.1	42.7 J-	1.3	100	24.1	74	90.9	646	0.2	108	0.5 U	109	155
CSM-A14-SD-374	CSM-A14-SD-374-2	12.5	59.6 J	1	30 J-	0.7	100	20.7	56.2	26	344	0.5	100	0.5 U	101	89.9
CSM-A14-SD-374	CSM-A14-SD-374-4	9.3	53.9 J	0.8	23 J-	0.8	87.4	16.7	52.3	20.6	333	0.4	86.2	0.5 U	88.7	82.1
CSM-A14-SD-375	CSM-A14-SD-375-2	50.4	51.1 J	0.7	23.3 J-	0.9	78.9	93.3	48.1	23.1	252	0.4	203	0.5 U	80.6	69
CSM-A14-SD-376	CSM-A14-SD-376-0	6.5	100 U	0.7	20 UJ	0.9	84.2	13.6	35.4	17 J	462	0.1 U	70.9	0.5 U	64.6	85.8
CSM-A14-SD-376	CSM-A14-SD-376-2	4 J	346	1.5	5.7 J	0.3 J	26.7	6.9 J	13.2	13 J	211	0.4	21.8	0.5 U	51.7	37.5
CSM-A14-SD-376	CSM-A14-SD-376-4	1.7 J	134	0.7	4.4 J	0.5 U	12	3.7 J	6.7 J	20 U	162	0.6	15.5	0.5 U	21.3	18.9
CSM-A14-SD-377	CSM-A14-SD-377-2	2.4 J	123	1.1	20 UJ	0.5 U	16.9	10 U	11.1	20 U	319	0.1 U	22.3	0.5 U	27.7	36.7
CSM-A14-SD-378	CSM-A14-SD-378-2	4 J	228	0.8	22 J-	0.6	58.5	9.3 J	23.8	11.6 J	187	0.1 U	49.5	0.5 U	46.3	63.5
CSM-BP-SD-350	CSM-BP-SD-350-0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CSM-BP-SD-350	CSM-BP-SD-350-3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CSM-BP-SD-351	CSM-BP-SD-351-0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CSM-BP-SD-351	CSM-BP-SD-351-3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CSM-BP-SD-352	CSM-BP-SD-352-0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CSM-BP-SD-352	CSM-BP-SD-352-2.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CSM-CDA-SD-360	CSM-CDA-SD-360-0	8.2	49.4 J	0.6	33.4	0.5 U	90	14	42.5	16.1 J	464	NA	70	0.049 J	73	75.4
CSM-CDA-SD-360	CSM-CDA-SD-360-2	4.5 J	113	0.7	12.3 J	0.5 U	42.1	6.8 J	15.4	20.4	232	NA	30	0.5 U	31.1	44.3
CSM-CDA-SD-361	CSM-CDA-SD-361-0	7.2	140	0.6	13.2 J	0.5 U	72.7	11.7	55.6	1280	532	NA	50.3	0.1 J	48.8	270
CSM-CDA-SD-361	CSM-CDA-SD-361-2	10.8	76.1 J	0.7	26	0.5 U	89	15.7	43.7	49.4	330	NA	75	0.1 J	76.4	114
CSM-CDA-SD-362	CSM-CDA-SD-362-0	4.2 J	145	0.8	5 J	0.5 U	38.1	7.3 J	20.1	81.7	266	NA	34.2	0.3 J	36.8	70.5
CSM-CDA-SD-362	CSM-CDA-SD-362-2	11	81.7 J	0.8	14.9 J	0.5 U	91.2	12.2	49.4	51.4	280	NA	64.5	0.073 J	91.9	88.2
CSM-CDA-SD-363	CSM-CDA-SD-363-0	7.9	64 J	0.8	28.1	0.5 U	105	14.3	63.7	33.8	422	NA	81	0.5 U	96.7	99.3
CSM-CDA-SD-363	CSM-CDA-SD-363-2	4.5 J	111	0.8	12.5 J	0.5 U	36.7	9.3 J	32.8	75.7	296	NA	37.1	0.033 J	39.7	97.1
CSM-HDD-SD-340	CSM-HDD-SD-340-0	3.4 J	59.6 J	0.6	24.1	0.5 U	91.1	11.5	45.3	20 U	567	0.4	75.3	0.2 J	78.3	76.5
CSM-HDD-SD-340	CSM-HDD-SD-340-3	12.8	51.8 J	0.7	24.8 J+	0.5 U	80.8	19.7	46.6	17.5 J	534	0.2	89 J-	0.1 J	70.8	89.2
CSM-HDD-SD-340	CSM-HDD-SD-340-4	15.3	66 J	1.1	34	0.5 U	97.2	21.9	56	19.6 J	611	NA	101	0.2 J	87.7	102
CSM-HDD-SD-341	CSM-HDD-SD-341-0	18.2	67.7 J	0.9	38.8 J+	0.5 U	101	21.2	64.7	21.5 J-	691	0.5	99.5	0.1 J	92.6	109
CSM-HDD-SD-341	CSM-HDD-SD-341-2	16	69.4 J	1.2	33.3	0.5 U	109	22.3	77.7	229 J-	658	0.5	112	0.2 J	102	139
CSM-HDD-SD-341	CSM-HDD-SD-341-3.5	13.5	57.4 J	0.9	27.6 J+	0.5 U	96.1	18.9	62.6	22.6 J-	643	NA	98.5	0.1 J	84.3	113
CSM-HDD-SD-342	CSM-HDD-SD-342-0	11.7	137	1	36.1 J+	0.5 U	101	22.1	72.3	29 J-	723	0.3	105	0.3 J	91.3	141
CSM-HDD-SD-342	CSM-HDD-SD-342-1	17.5	76.1 J	1	40.9 J+	0.5 U	117	20	79.6	25.9 J-	623	0.5	104	0.071 J	117	114
CSM-HDD-SD-342	CSM-HDD-SD-342-2.5	12	62.9 J	1	25.6	0.5 U	106	23.3	76.2	30.5	705	NA	112	0.2 J	95.1	147
CSM-HDD-SD-343	CSM-HDD-SD-343-0	12.1	59.5 J	0.8	26.5	0.5 U	92	17.5	61.3	22.6	842	0.4	88.5	0.2 J	83.7	110
CSM-HDD-SD-343	CSM-HDD-SD-343-1	13.8	56.8 J	0.8	28.7	0.5 U	82.8	18.5	52.8	19.1 J	875	0.4	81.9	0.1 J	76.4	95.1
CSM-HDD-SD-343	CSM-HDD-SD-343-2.5	13.5	61.5 J	0.9	28.5	0.5 U	95.2	18.3	56.1	18.9 J	659	NA	91.5	0.1 J	84.8	95.7
CSM-HDD-SD-344	CSM-HDD-SD-344-0	13.8	56.8 J	0.9	31.6	0.5 U	94.6	21.3	61.9	23.2	735	0.4	96.6	0.2 J	85.4	110
CSM-HDD-SD-344	CSM-HDD-SD-344-1	12.3	60.9 J	0.8	28.2 J+	0.5 U	92.3	18.5	56.5	20.6 J-	655	0.4	91.9	0.099 J	82.5	98.4
CSM-HDD-SD-344	CSM-HDD-SD-344-2.5	15	57.6 J	1	27.8	0.5 U	90.4	20.8	50.4	18 J	666	NA	93.4	0.1 J	81	91
CSM-HM-SD-396	CSM-HM-SD-396-0	16.3	183	1	24.9	1.2	115	19.6	133	54.5	407	1.2	107	23.2	92.8	229
CSM-HM-SD-396	CSM-HM-SD-396-1.5	16	93.1 J	0.9	26	0.5 U	110	15	78.1	44	490	0.6	95.9	3.5	90.5	142

Table 6-2. Analytical Results for Samples Located in the Central Section of the Coastal Salt Marsh
Coastal Salt Marsh Focused Feasibility Study
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Sample Location	Sample ID	Arsenic	Barium	Beryllium	Boron	Cadmium	Chromium	Cobalt	Copper	Lead	Manganese	Mercury	Nickel	Silver	Vanadium	Zinc
CSM-HM-SD-397	CSM-HM-SD-397-0	21.4	64.9 J	1.1	27.1	0.5 U	97.3	26.8	80.5	32.6	633	0.5	118	0.8	102	146
CSM-HM-SD-397	CSM-HM-SD-397-1.5	9.5	90.3 J	1	30	0.2 J	110	25.4	83.7	44.2	390	0.4	128	5	89.7	163
CSM-HM-SD-398	CSM-HM-SD-398-0	23.2	66.2 J	0.6	26.4	0.5 U	86	17.5	84.1	27.4	869	1	82.5	1.3	86.9	137
CSM-HM-SD-398	CSM-HM-SD-398-1.5	24.2	60.5 J	0.8	23.7	0.5 U	99.2	16.9	73.7	26.3	503	0.3	89.5	0.2 J	101	106
CSM-HM-SD-399	CSM-HM-SD-399-0	84.7	184	1	32.2	0.5 U	93.2	16.1	50.9	26.6	614	0.4	95.1	0.5 U	106	99.8
CSM-HM-SD-399	CSM-HM-SD-399-1.5	10.3	52.3 J	1	27.3	2.2	96.2	15.2	70.1	25.5	261	0.4	86.9	0.4 J	94.1	159
CSM-HM-SD-400	CSM-HM-SD-400-0	19.1	77.3 J	1	31.9	0.5 U	111	25.1	64.1	21.7	255	0.4	111	0.5 U	109	86.5
CSM-HM-SD-400	CSM-HM-SD-400-1.5	16.5	56.7 J	0.8	29.4	0.5 U	94.9	23.3	82.2	27.1	302	0.4	112	0.2 J	91.3	95.1
CSM-HM-SD-401	CSM-HM-SD-401-0	12.3	69 J	0.9	27.5	0.5 U	102	17.4	63.6	23.2	241	0.4	89.5	0.094 J	98.9	79.9
CSM-HM-SD-401	CSM-HM-SD-401-1.5	22.4	55 J	1	27.2	0.5 U	94.8	17.6	61.9	24.1	513	0.4	90.8	0.082 J	95.8	89.7
CSM-HM-SD-402	CSM-HM-SD-402-0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CSM-HM-SD-403	CSM-HM-SD-403-0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CSM-HM-SD-404	CSM-HM-SD-404-0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ELL-SB5	ELL-WC-45-SB5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ELL-SB5	ELL-WC-95-SB5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ELL-SB6	ELL-WC-45-SB6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ELL-SB6	ELL-WC-95-SB6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
EL-MW-101	EL001SS1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
EL-MW-101	EL001SS2	13.1	91	2.09	NA	1.2 †	127	15.1	65.4	52	250	NA	87.3	0.803	130	97.8
EL-MW-102	EL004SS1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
EL-MW-102	EL004SS2	8.2	78.5	1.69	NA	1.2 †	98.3	16.5	43	18.5	456	NA	72.6	0.803	88	101
EL-MW-103	EL002SS1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
EL-MW-103	EL002SS2	12.5	68.3	1.64	NA	1.2 †	72.7	19.4	51.2	43	274	NA	63	0.803	74	92.7
EL-MW-104	EL003SS1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
EL-MW-104	EL003SS2	5.3	171	1.61	NA	4.96	101	15.8	78	96	505	NA	64.5	2.06	57.9	327
EL-SB-01	EL-1-SS-11.5	NA	80.8	0.6097 †	172	0.741	48.5	3.21	14.9	77.1	139	0.0616 †	30.7	0.6158 †	13.9	104
EL-SB-01	EL-1-SS-4	NA	116	0.6305 †	12.61 †	0.6243 †	21.5	7.92	11.6	24.6	283	0.067	28.8	0.6243 †	24.5	40.9
EL-SB-01	EL-1-SS-7.5	NA	123	0.583	73.2	0.5748 †	39	8.75	16.7	22.2	276	0.129	45.9	0.5748 †	32.6	56.3
EL-SB-02	EL-2-SS-11	NA	54.3	0.982 †	161	1.003 †	98.2	17.9	36.1	10.6	479	0.136	98	1.003 †	81.4	90
EL-SB-02	EL-2-SS-6.5	NA	157	0.6519 †	21.6	0.6519 †	168	19	22.2	27.8	512	0.083	189	0.6519 †	57.5	83.6
EL-SB-03	EL-3-SS-11	NA	88.8	0.6606	30.1	2.07	71.1	11.4	36.3	119	325	0.083	56.5	0.6606 †	52.6	114
EL-SB-03	EL-3-SS-2.5	NA	236	0.965	12.68 †	0.6212 †	22.2	6.5	9.8	59.8	188	0.114	18.6	0.6212 †	28.8	52.5
EL-SB-03	EL-3-SS-9	NA	71.2	0.6243 †	51.5	0.6181 †	15.2	17.7	15.8	10.9	211	0.0619 †	23.5	0.6181 †	47.5	18.8
EL-SB-04	EL-4-SS-3	NA	229	0.776	12.71	0.818	38.9	12.4	28.6	60.1	365	0.0629 †	44.4	0.629 †	46.5	86.8
EL-SB-04	EL-4-SS-9.5	NA	111	0.6013	38	0.614 †	46.5	13.1	22.7	22.6	443	0.098	58.9	0.6135	48.2	61.7
HT-01	HT-01-1	10	61.5	1 †	7	1 †	74	5 †	33.5	5 †	NA	NA	53	NA	NA	NA
HT-01	HT-01-1A	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	82.8	71.5
HT-01	HT-01-2	15.5	61	1 †	8	1 †	56	5 †	NA	5 †	NA	NA	48.5	NA	82.5	72.5
HT-01	HT-01-2A	NA	NA	NA	NA	NA	NA	NA	31	NA	NA	NA	NA	NA	NA	NA
HT-02	HT-02-1	12.5	121.5	1 †	13.5	1 †	75.5	9	50	38.8	NA	NA	69	NA	56.8	219
HT-02	HT-02-2	8.5	40.5	1 †	18.5	1 †	46	9	34.5	5	NA	NA	71.5	NA	52.8	69.5
HT-03	HT-03-1	6.8	67.5	1 †	18	1 †	68.5	5 †	33	10.3	NA	NA	68.5	NA	34.8	70
HT-03	HT-03-2	5	267	1 †	10	1 †	30	5 †	21.5	51.3	NA	NA	29.5	NA	12	175.5
HT-04	HT-04-1	5	66.5	1 †	9	1 †	69	5 †	28	14.8	NA	NA	67	NA	15.3	95
HT-04	HT-04-2	5.3	159	1 †	8	1 †	36	5 †	25.5	76.9	NA	NA	34.5	NA	31.5	194
HT-05	HT-05-1	9.5	80	1 †	8	1 †	56.5	5 †	43.5	30	NA	NA	55.5	NA	45.5	125
HT-05	HT-05-2	10	244.5	1 †	11	1.6	55	5 †	45	58.8	NA	NA	81	NA	42.5	242
HT-06	HT-06-1	15.5	48.5	1 †	17.5	1 †	71	5 †	25	5 †	NA	NA	63.5	NA	65.5	64
HT-06	HT-06-2	22.5	43	1 †	15	1 †	63	5.1	41	5 †	NA	NA	75	NA	67.8	100

Table 6-2. Analytical Results for Samples Located in the Central Section of the Coastal Salt Marsh
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Sample Location	Sample ID	Arsenic	Barium	Beryllium	Boron	Cadmium	Chromium	Cobalt	Copper	Lead	Manganese	Mercury	Nickel	Silver	Vanadium	Zinc
HT-07	HT-07-1	NA	NA	1 †	5 †	1 †	NA	5 †	15.5	5.5	NA	NA	NA	NA	NA	NA
HT-07	HT-07-1A	NA	246	NA	NA	NA	56	NA	NA	8.3	NA	NA	38	NA	37.3	72
HT-07	HT-07-2	15	106	1 †	14.5	1 †	80.5	5 †	31	5 †	NA	NA	82.5	NA	68.5	94
HT-08	HT-08-1	9	242	1 †	5 †	1 †	43	5 †	25	71	NA	NA	49	NA	49.5	528.5
HT-08	HT-08-2	11.5	234	1 †	5 †	1 †	42	5 †	24	70.5	NA	NA	46.5	NA	47.5	286.5
HT-09	HT-09-1	7.5	85.5	1 †	7	1 †	62.5	5 †	31	47.5	NA	NA	51	NA	47	200
HT-09	HT-09-2	5	184.5	1 †	8.5	1 †	29	5 †	18	5 †	NA	NA	29	NA	21	408.5
HT-10	HT-10-1	8.8	243	1 †	6	1 †	46	9.4	63	375	NA	NA	42.5	NA	41.5	855
HT-10	HT-10-2	7.5	52	1 †	16	1 †	39	8.1	22	33.8	NA	NA	39.5	NA	33	84
HT-11	HT-11-1	17	NA	1 †	7	1 †	75	5.1	36	11.8	NA	NA	91	NA	67.8	NA
HT-11	HT-11-1A	NA	61	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	64.5
HT-11	HT-11-2	NA	88.5	1 †	21.5	NA	NA	6.6	NA	5 †	NA	NA	98.5	NA	NA	200
HT-11	HT-11-2A	14	NA	NA	NA	2.6	58	NA	64	NA	NA	NA	NA	NA	63	NA
HT-12	HT-12-1	10	13.8	1 †	13.5	1 †	43.5	5 †	17	5 †	NA	NA	50.5	NA	95	74.5
HT-12	HT-12-2	8	88	1 †	8	1 †	48	5 †	21	9	NA	NA	52.5	NA	51.8	137.5
HT-13	HT-13-1	6.2	151.5	1 †	5 †	1 †	19	8.1	8	13.8	NA	NA	31.5	NA	27	48
HT-13	HT-13-2	6	112.5	1 †	7.5	1 †	42.5	6.3	18	10	NA	NA	38	NA	31	43
HT-14	HT-14-1	8.5	192	1 †	8	6.1	65	5 †	42.5	46.3	NA	NA	74	NA	41	223.5
HT-14	HT-14-2	5	86.5	1 †	5 †	1 †	39	5 †	18	15.8	NA	NA	51.5	NA	23.3	51
HT-15	HT-15-1	5	150	1 †	5 †	1.6	36.5	5 †	32.5	343.8	NA	NA	37.5	NA	33.3	670
HT-15	HT-15-2	13.8	94.5	1 †	19	1 †	62	5 †	48.5	50	NA	NA	73.5	NA	48.3	299
ODD-SD4	ODD-SD4-05	17.1	NA	1.6	30.8	1.2 †	94	30.4	64.8	38	547	0.35	130	NA	77.2	158
ODD-SD4	ODD-SD4-15	22.7	NA	1.4	40.2	1.1 †	101	22.5	69.9	32.7	1120	0.41	109	NA	97.4	144
ODD-SD5	ODD-SD5-05	12.8	NA	0.92	27.4	1.1 †	89.9	22.8	55.2	29.1	591	0.23	114	NA	67.9	116
ODD-SD5	ODD-SD5-15	9.1	NA	0.53	27.9	0.98 †	78.5	13.8	27.6	9.7	418	0.2 †	74.5	NA	60	68.9
SB-ELBP-001	HB-4569	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SB-ELBP-001	HB-4593	NA	NA	NA	NA	NA	NA	NA	NA	160 A	NA	NA	NA	NA	NA	NA
SB-ELBP-002	HB-4574	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SB-ELBP-002	HB-4594	NA	NA	NA	NA	NA	NA	NA	NA	9.6 A	NA	NA	NA	NA	NA	NA
SB-ELBP-003	HB-4573	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SB-ELBP-003	HB-4596	NA	NA	NA	NA	NA	NA	NA	NA	12.9 A	NA	NA	NA	NA	NA	NA
SB-ELBP-004	HB-4570	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SB-ELBP-004	HB-4597	NA	NA	NA	NA	NA	NA	NA	NA	9.1 A	NA	NA	NA	NA	NA	NA
SB-ELBP-004	HB-4598	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SB-ELBP-005	HB-4572	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SB-ELBP-005	HB-4599	NA	NA	NA	NA	NA	NA	NA	NA	40.6 A	NA	NA	NA	NA	NA	NA
SB-ELBP-006	HB-4961	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SB-ELBP-007	HB-4966	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SB-ELBP-008	HB-4959	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SB-ELBP-04A	SB-ELBP-04A-0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SB-ELBP-04A	SB-ELBP-04A-3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SC-HCSM-002	HB-6418	13.7 A	68 A	1.2 U	26.5 A	1.2 U	114 J+	26.9 A	72.1 A	36.9 A	856 A	0.43 A	143 A	1.2 U	96.9 A	159 A
SC-HCSM-003	HB-6420	15.3 A	66 A	1.1 U	24.6 A	1.1 U	108 J+	28.1 A	72.7 A	35.1 A	1410 A	0.38 A	135 A	1.1 U	88.2 A	148 A
SC-HCSM-004	HB-6422	14.2 A	72.4 A	1.4 A	24.8 A	1.2 U	96.1 J+	37.5 A	75 A	50.5 A	714 A	0.42 A	165 A	1.2 U	88.8 A	171 A
SC-HCSM-005	HB-6592	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SC-HCSM-006	HB-6424	14.2 A	65.4 A	1.6 A	22.6 A	1.2 U	114 J+	26.3 A	78.2 A	44.6 A	783 A	0.48 A	140 A	1.2 U	102 A	176 A
SC-HCSM-007	HB-6426	12.2 A	71.1 A	1.3 U	25.5 A	1.3 U	114 J+	32.1 A	71.6 A	36.4 A	1170 A	0.34 A	148 A	NA	96 A	162 A
SC-HCSM-014	HB-6441	8.2 A	66.4 A	1.2 U	27.8 A	1.2 U	91.1 J+	23.3 A	61.4 A	26.3 A	922 A	0.36 A	126 A	1.2 U	87.6 A	144 A
SC-HCSM-015	HB-6443	26.8 A	71.6 A	1.5 U	49.7 A	1.5 U	101 J+	36.8 A	56.4 A	36.6 A	1030 A	0.37 A	137 A	1.5 U	80.7 A	136 A

Table 6-2. Analytical Results for Samples Located in the Central Section of the Coastal Salt Marsh
Coastal Salt Marsh Focused Feasibility Study
Inorganics

Sample Location	Sample ID	Arsenic	Barium	Beryllium	Boron	Cadmium	Chromium	Cobalt	Copper	Lead	Manganese	Mercury	Nickel	Silver	Vanadium	Zinc
SC-HCSM-016	HB-6444	12.7 A	120 A	1.4 U	38 A	1.4 U	104 J+	60.9 A	56.6 A	30.7 A	12200 A	0.35 A	171 A	1.4 U	86.6 A	153 A
SC-HCSM-017	HB-6445	15 A	52.2 A	2.4 U	41.3 A	4.3 A	86.5 J+	53.2 A	154 A	190 A	392 A	0.49 A	242 A	2.4 U	79.4 A	250 A
SC-HCSM-018	HB-6446	21.7 A	81.3 A	2.3 U	40.3 A	5.8 A	69.4 J+	93.4 A	149 A	254 A	793 A	0.58 A	338 A	2.3 U	83.1 A	375 A
TP-SD-03	TP301SS1	16.2	110	0.427 †	NA	1.2 †	103	20.6	80.4	45.8	583	8.4	95.9	0.803 †	106	145
TP-SD03A	TP-SD03A-0	16.8	94.8 J	0.8	19.8 J	0.5	73.4	19.5	159	171	420	6	81.9	20.1	65.1	255
TP-SD03A	TP-SD03A-1.5	18.7	56.5 J	0.7	22.6	0.5 U	91.4	17.4	72.2	40.5	425	0.5	86.5	0.2 J	94.3	114
TWA-SD01	TWA-SD1	33.9	96.4	0.63	26.4	0.89 †	55.9	17.4	49.2	16.2	1020	0.29	68.7	1.8 †	59.4	87.3
TWA-SD06	TWA-SD06-15	19	67.8	0.67	30.5	1.1 †	88.4	15.9	68.6	34	380	0.41	97.5	2.2 †	80.3	116
TWA-SD06	TWA-SD6	5.4	28.2	0.37	22.3	0.9 †	47	5.3	81.2	12.9	152	0.55	47	1.8 †	45.1	78.7
TWA-SD07	TWA-SD07-15	72.9 †	173	2.1	89.6	11.5	73	136	87.3	121	18200	0.8	546	NA	62.9	647
TWA-SD07	TWA-SD07-30	44.8 †	119	1.9	59.7	6.9	87.4	91.2	70.9	59	5870	0.45 †	283	4.5 †	81.7	296
TWA-SD07	TWA-SD7	8	78.8	1.1 †	65.5	3.3	107	41.2	97.3	88.7	3360	0.56 †	187	5.6 †	81.5	306
TWA-SD08	TWA-SD08-15	7.4	76.4	0.9	44.1	1.1 †	113	15.3	61.2	30.5	248	0.38	95.6	2.2 †	101	95
TWA-SD08	TWA-SD8	35.1	122	1.7	101	2.1 †	200	33.1	120	62	519	0.64	202	4.2 †	195	196
TWA-SD09	TWA-SD9	NA	53	NA	NA	NA	77.5	NA	NA	NA	479	0.73	89.4	2.4 †	64.3	NA
TWA-SD09	TWA-SD90	84.1	NA	1.6	65.2	1.9	NA	74.4	73.9	71	NA	NA	NA	NA	NA	227
TWA-SD11	TWA-SD11	12.1	60.7	0.63	31.8	1 †	83.7	17	61.6	33.4	315	0.43	80.8	2 †	74.8	106
TWA-SD12	TWA-SD12	26.2	120	1.3	72.9	1.6 †	155	23.1	76	48	410	0.57	148	3.2 †	160	144
TWA-SD12	TWA-SD12-15	24.5	67.5	0.83	40	1 †	101	17.2	66.4	19.7	255	0.33	103	2.1 †	97.2	84.5
TWA-SD12	TWA-SD12-30	18.8	79.6	0.92	48	1.2	110	16.6	69.4	36.2	340	0.41	106	2.3 †	106	101
TWA-SD13	TWA-SD113	14.3	NA	1.5	24.1	NA	NA	NA	69	37.8	555	NA	NA	NA	84.7	NA
TWA-SD13	TWA-SD13	NA	65.6	NA	NA	0.98 †	95.5	23.8	NA	NA	NA	0.43	119	2 †	NA	173
TWA-SD15	TWA-SD15	13	77.3	0.68	28.8 †	1.4 †	81.8	20.1	61.5	30.9	564	0.46	103	2.9†	74	129
TWA-SD15	TWA-SD15-15	20.8	72.2	0.84	22.9 †	1.1 †	88.6	18.2	60.6	26.3	644	0.59	93.3	2.3 †	93.9	109
TWA-SD15	TWA-SD15-30	12.1	51.4	0.63	21.3 †	1.1 †	80.1	13.9	41.2	10.4	406	0.25	69.3	2.1 †	84.3	61.7

Table 6-2. Analytical Results for Samples Located in the Central Section of the Coastal Salt Marsh
Coastal Salt Marsh Focused Feasibility Study
Organics

Sample Location	Sample ID	BHCs Total	Chlordanes Total	DDTs Total	Dichlorprop	Endrin Aldehyde	Heptachlor	Heptachlor Epoxide	MCPA	MCPP	Methoxychlor	PAHs Total	PCBs Total	Pentachlorophenol	Phenol	TCDD TEQ Total	TPH-diesel/ TPH-motor Oil	TPH-gasoline/ TPH-JP-4
BP-2	BP-2-12	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.00000721693	NA	NA
BP-2	BP-2-6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0000029093	NA	NA
CSM-A14-SD-370	CSM-A14-SD-370-0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	19 UJ / 110 N	NA
CSM-A14-SD-370	CSM-A14-SD-370-2	ND*	ND*	0.1012	NA	0.0022 U	0.0022 U	0.0022 U	NA	NA	0.014	0.7049	0.0046019	NA	NA	NA	130 U / 660	NA
CSM-A14-SD-370	CSM-A14-SD-370-4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	25 U / 310 N	NA
CSM-A14-SD-371	CSM-A14-SD-371-2	ND*	ND*	ND*	NA	0.0036 U	0.0036 U	0.0036 U	0.0036 U	NA	NA	0.2849	0.0023107	NA	NA	NA	21 U/ 21 U	NA
CSM-A14-SD-372	CSM-A14-SD-372-2	ND*	ND*	ND*	NA	0.0037 U	0.0037 U	0.0037 U	NA	NA	0.0037 U	0.2248	0.0039881	NA	NA	NA	22 U / 28	NA
CSM-A14-SD-372	CSM-A14-SD-372-4	ND*	ND*	ND*	NA	0.0035 U	0.0035 U	0.0035 U	NA	NA	0.0035 U	0.5935	ND*	NA	NA	NA	21 U / 35	NA
CSM-A14-SD-373	CSM-A14-SD-373-2	ND*	ND*	0.1816	NA	0.0031	0.0023 U	0.0023 U	NA	NA	0.0043	0.2898	0.0024574	NA	NA	NA	13 U / 95	NA
CSM-A14-SD-374	CSM-A14-SD-374-0	ND*	ND*	0.0135	NA	0.0037 U	0.0037 U	0.0037 U	NA	NA	0.0037 U	2.4685	ND*	NA	NA	NA	22 U / 56	NA
CSM-A14-SD-374	CSM-A14-SD-374-2	ND*	ND*	ND*	NA	0.0041 U	0.0041 U	0.0041 U	NA	NA	0.0041 U	0.7425	0.0003135	NA	NA	NA	24 U / 70	NA
CSM-A14-SD-374	CSM-A14-SD-374-4	ND*	ND*	ND*	NA	0.0035 U	0.0035 U	0.0035 U	NA	NA	0.0035 U	0.2904	0.032365	NA	NA	NA	21 U / 29	NA
CSM-A14-SD-375	CSM-A14-SD-375-2	ND*	ND*	ND*	NA	0.0032 U	0.0032 U	0.0032 U	NA	NA	0.0032 U	0.472	0.0000472	NA	NA	NA	19 U / 19 U	NA
CSM-A14-SD-376	CSM-A14-SD-376-0	ND*	ND*	0.35	NA	0.0025 U	0.0025 U	0.0025 U	NA	NA	0.0025 U	35.207	0.0054721	NA	NA	NA	15 U / 53	NA
CSM-A14-SD-376	CSM-A14-SD-376-2	ND*	ND*	0.0049	NA	0.0023 UJ	0.0023 U	0.0023 U	NA	NA	0.0023 U	ND*	0.00019738	NA	NA	NA	13 U / 13 U	NA
CSM-A14-SD-376	CSM-A14-SD-376-4	ND*	ND*	0.0056	NA	0.0024 UJ	0.0024 U	0.0024 U	NA	NA	0.0024 U	0.004	0.0005014	NA	NA	NA	14 U / 14 U	NA
CSM-A14-SD-377	CSM-A14-SD-377-2	ND*	ND*	0.0124	NA	0.0022 U	0.0022 U	0.0022 U	NA	NA	0.0022 U	0.0279	0.000536	NA	NA	NA	13 U / 13 U	NA
CSM-A14-SD-378	CSM-A14-SD-378-2	ND*	ND*	ND*	NA	0.0024 U	0.0024 U	0.0024 U	NA	NA	0.0024 U	0.0581	0.0006242	NA	NA	NA	14 U / 26	NA
CSM-BP-SD-350	CSM-BP-SD-350-0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND*	NA	NA	NA	NA	NA
CSM-BP-SD-350	CSM-BP-SD-350-3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND*	NA	NA	NA	NA	NA
CSM-BP-SD-351	CSM-BP-SD-351-0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND*	NA	NA	NA	NA	NA
CSM-BP-SD-351	CSM-BP-SD-351-3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND*	NA	NA	NA	NA	NA
CSM-BP-SD-352	CSM-BP-SD-352-0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND*	NA	NA	NA	NA	NA
CSM-BP-SD-352	CSM-BP-SD-352-2.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND*	NA	NA	NA	NA	NA
CSM-CDA-SD-360	CSM-CDA-SD-360-0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CSM-CDA-SD-360	CSM-CDA-SD-360-2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CSM-CDA-SD-361	CSM-CDA-SD-361-0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CSM-CDA-SD-361	CSM-CDA-SD-361-2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CSM-CDA-SD-362	CSM-CDA-SD-362-0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CSM-CDA-SD-362	CSM-CDA-SD-362-2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CSM-CDA-SD-363	CSM-CDA-SD-363-0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CSM-CDA-SD-363	CSM-CDA-SD-363-2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.1676426	NA	NA	NA	NA	NA
CSM-HDD-SD-340	CSM-HDD-SD-340-0	ND*	ND*	0.0058	NA	0.0034 U	0.0034 U	0.0034 U	NA	NA	0.0034 U	NA	NA	NA	NA	NA	NA	NA
CSM-HDD-SD-340	CSM-HDD-SD-340-3	ND*	ND*	ND*	NA	0.0032 U	0.0032 U	0.0032 U	NA	NA	0.0032 U	NA	0.0003201	NA	NA	NA	NA	NA
CSM-HDD-SD-340	CSM-HDD-SD-340-4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CSM-HDD-SD-341	CSM-HDD-SD-341-0	ND*	ND*	0.0078	NA	0.0039 U	0.0039 U	0.0039 U	NA	NA	0.0039 U	NA	NA	NA	NA	NA	NA	NA
CSM-HDD-SD-341	CSM-HDD-SD-341-2	ND*	ND*	0.008	NA	0.0041 U	0.0041 U	0.0041 U	NA	NA	0.0041 U	NA	NA	NA	NA	NA	NA	NA
CSM-HDD-SD-341	CSM-HDD-SD-341-3.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CSM-HDD-SD-342	CSM-HDD-SD-342-0	ND*	ND*	0.047	NA	0.0043 U	0.0043 U	0.0043 U	NA	NA	0.0043 U	NA	NA	NA	NA	NA	NA	NA
CSM-HDD-SD-342	CSM-HDD-SD-342-1	ND*	ND*	ND*	NA	0.0042 U	0.0042 U	0.0042 U	NA	NA	0.0042 U	NA	0.0001543	NA	NA	NA	NA	NA
CSM-HDD-SD-342	CSM-HDD-SD-342-2.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CSM-HDD-SD-343	CSM-HDD-SD-343-0	ND*	ND*	ND*	NA	0.0035 U	0.0035 U	0.0035 U	NA	NA	0.0035 U	NA	NA	NA	NA	NA	NA	NA
CSM-HDD-SD-343	CSM-HDD-SD-343-1	ND*	ND*	0.0047	NA	0.0032 U	0.0032 U	0.0032 U	NA	NA	0.0032 U	NA	NA	NA	NA	NA	NA	NA
CSM-HDD-SD-343	CSM-HDD-SD-343-2.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CSM-HDD-SD-344	CSM-HDD-SD-344-0	ND*	ND*	0.0244	NA	0.0037 U	0.0037 U	0.0037 U	NA	NA	0.0037 U	NA	NA	NA	NA	NA	NA	NA
CSM-HDD-SD-344	CSM-HDD-SD-344-1	ND*	ND*	ND*	NA	0.0034 U	0.0034 U	0.0034 U	NA	NA	0.0034 U	NA	NA	NA	NA	NA	NA	NA
CSM-HDD-SD-344	CSM-HDD-SD-344-2.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CSM-HM-SD-396	CSM-HM-SD-396-0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CSM-HM-SD-396	CSM-HM-SD-396-1.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table 6-2. Analytical Results for Samples Located in the Central Section of the Coastal Salt Marsh
Coastal Salt Marsh Focused Feasibility Study
Organics

Sample Location	Sample ID	BHCs Total	Chlordanes Total	DDTs Total	Dichlorprop	Endrin Aldehyde	Heptachlor	Heptachlor Epoxide	MCPA	MCPP	Methoxychlor	PAHs Total	PCBs Total	Pentachlorophenol	Phenol	TCDD TEQ Total	TPH-diesel/ TPH-motor Oil	TPH-gasoline/ TPH-JP-4
CSM-HM-SD-397	CSM-HM-SD-397-0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CSM-HM-SD-397	CSM-HM-SD-397-1.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CSM-HM-SD-398	CSM-HM-SD-398-0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CSM-HM-SD-398	CSM-HM-SD-398-1.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CSM-HM-SD-399	CSM-HM-SD-399-0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CSM-HM-SD-399	CSM-HM-SD-399-1.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CSM-HM-SD-400	CSM-HM-SD-400-0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CSM-HM-SD-400	CSM-HM-SD-400-1.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CSM-HM-SD-401	CSM-HM-SD-401-0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CSM-HM-SD-401	CSM-HM-SD-401-1.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CSM-HM-SD-402	CSM-HM-SD-402-0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0189997	NA	NA	NA	NA	NA
CSM-HM-SD-403	CSM-HM-SD-403-0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0166201	NA	NA	NA	NA	NA
CSM-HM-SD-404	CSM-HM-SD-404-0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0213997	NA	NA	NA	NA	NA
ELL-SB5	ELL-WC-45-SB5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND*	NA	NA	NA	NA	12 † / NA	NA
ELL-SB5	ELL-WC-95-SB5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.664	NA	NA	NA	NA	2.4 † / NA	NA
ELL-SB6	ELL-WC-45-SB6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND*	NA	NA	NA	NA	1.2 † / NA	NA
ELL-SB6	ELL-WC-95-SB6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.39	NA	NA	NA	NA	2.4 † / NA	NA
EL-MW-101	EL001SS1	NA	NA	ND*	NA	NA	NA	NA	NA	NA	NA	ND*	NA	NA	NA	NA	NA	NA
EL-MW-101	EL001SS2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
EL-MW-102	EL004SS1	NA	NA	ND*	NA	NA	NA	NA	NA	NA	NA	ND*	NA	NA	NA	NA	NA	NA
EL-MW-102	EL004SS2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
EL-MW-103	EL002SS1	NA	NA	ND*	NA	NA	NA	NA	NA	NA	NA	ND*	NA	NA	NA	NA	NA	NA
EL-MW-103	EL002SS2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
EL-MW-104	EL003SS1	NA	NA	ND*	NA	NA	NA	NA	NA	NA	NA	ND*	NA	NA	NA	NA	NA	NA
EL-MW-104	EL003SS2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
EL-SB-01	EL-1-SS-11.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	218 / NA	NA
EL-SB-01	EL-1-SS-4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	65.5 / NA	NA
EL-SB-01	EL-1-SS-7.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	402 / NA	NA
EL-SB-02	EL-2-SS-11	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	65.5 / NA	NA
EL-SB-02	EL-2-SS-6.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	65.5 / NA	NA
EL-SB-03	EL-3-SS-11	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	723 / NA	NA
EL-SB-03	EL-3-SS-2.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	149 / NA	NA
EL-SB-03	EL-3-SS-9	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	65.5 / NA	NA
EL-SB-04	EL-4-SS-3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	65.5 / NA	NA
EL-SB-04	EL-4-SS-9.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	456 / NA	NA
HT-01	HT-01-1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
HT-01	HT-01-1A	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
HT-01	HT-01-2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
HT-01	HT-01-2A	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
HT-02	HT-02-1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
HT-02	HT-02-2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
HT-03	HT-03-1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
HT-03	HT-03-2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
HT-04	HT-04-1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
HT-04	HT-04-2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
HT-05	HT-05-1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
HT-05	HT-05-2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
HT-06	HT-06-1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
HT-06	HT-06-2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table 6-2. Analytical Results for Samples Located in the Central Section of the Coastal Salt Marsh
Coastal Salt Marsh Focused Feasibility Study
Organics

Sample Location	Sample ID	BHCs Total	Chlordanes Total	DDTs Total	Dichlorprop	Endrin Aldehyde	Heptachlor	Heptachlor Epoxide	MCPA	MCPP	Methoxychlor	PAHs Total	PCBs Total	Pentachlorophenol	Phenol	TCDD TEQ Total	TPH-diesel/ TPH-motor Oil	TPH-gasoline/ TPH-JP-4
HT-07	HT-07-1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
HT-07	HT-07-1A	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
HT-07	HT-07-2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
HT-08	HT-08-1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
HT-08	HT-08-2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
HT-09	HT-09-1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
HT-09	HT-09-2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
HT-10	HT-10-1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
HT-10	HT-10-2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
HT-11	HT-11-1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
HT-11	HT-11-1A	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
HT-11	HT-11-2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
HT-11	HT-11-2A	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
HT-12	HT-12-1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
HT-12	HT-12-2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
HT-13	HT-13-1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
HT-13	HT-13-2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
HT-14	HT-14-1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
HT-14	HT-14-2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
HT-15	HT-15-1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
HT-15	HT-15-2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ODD-SD4	ODD-SD4-05	NA	NA	0.034	NA	NA	NA	NA	NA	NA	NA	ND*	NA	3.7	0.77 †	NA	2.3 † / NA	NA
ODD-SD4	ODD-SD4-15	NA	NA	ND*	NA	NA	NA	NA	NA	NA	NA	ND*	NA	3.6	0.75 †	NA	2.3 † / NA	NA
ODD-SD5	ODD-SD5-05	NA	NA	ND*	NA	NA	NA	NA	NA	NA	NA	ND*	NA	3.5	0.73 †	NA	2.2 † / NA	NA
ODD-SD5	ODD-SD5-15	NA	NA	ND*	NA	NA	NA	NA	NA	NA	NA	ND*	NA	3.2	0.65 †	NA	2 † / NA	NA
SB-ELBP-001	HB-4569	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.12	NA	NA	NA	NA	NA
SB-ELBP-001	HB-4593	NA	NA	0.008	NA	NA	NA	NA	NA	NA	NA	0.085	ND*	NA	NA	NA	57 † / NA	NA
SB-ELBP-002	HB-4574	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND*	NA	NA	NA	NA	NA
SB-ELBP-002	HB-4594	NA	NA	ND*	NA	NA	NA	NA	NA	NA	NA	ND*	ND*	NA	NA	NA	12 † / NA	NA
SB-ELBP-003	HB-4573	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.075	NA	NA	NA	NA	NA
SB-ELBP-003	HB-4596	NA	NA	0.0057	NA	NA	NA	NA	NA	NA	NA	ND*	0.055	NA	NA	NA	11 † / NA	NA
SB-ELBP-004	HB-4570	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.35	NA	NA	NA	NA	NA
SB-ELBP-004	HB-4597	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND*	0.28	NA	NA	NA	11 † / NA	NA
SB-ELBP-004	HB-4598	NA	NA	0.094	NA	NA	NA	NA	NA	NA	NA	0.15	NA	NA	NA	NA	NA	NA
SB-ELBP-005	HB-4572	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.048	NA	NA	NA	NA	NA
SB-ELBP-005	HB-4599	NA	NA	ND*	NA	NA	NA	NA	NA	NA	NA	0.537	NA	NA	NA	NA	300 † / NA	NA
SB-ELBP-006	HB-4961	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND*	NA	NA	NA	NA	NA
SB-ELBP-007	HB-4966	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND*	NA	NA	NA	NA	NA
SB-ELBP-008	HB-4959	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.17	NA	NA	NA	NA	NA
SB-ELBP-04A	SB-ELBP-04A-0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.000928301	NA	NA
SB-ELBP-04A	SB-ELBP-04A-3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.023475983	NA	NA
SC-HCSM-002	HB-6418	NA	NA	ND*	NA	NA	NA	NA	NA	NA	NA	0.296	0.02761	NA	NA	NA	NA	NA
SC-HCSM-003	HB-6420	NA	NA	ND*	NA	NA	NA	NA	NA	NA	NA	0.34	0.01585	NA	NA	NA	NA	NA
SC-HCSM-004	HB-6422	NA	NA	0.4	NA	NA	NA	NA	NA	NA	NA	0.679	0.04072	NA	NA	NA	NA	NA
SC-HCSM-005	HB-6592	NA	0.003	0.34	NA	NA	NA	0.001 A	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SC-HCSM-006	HB-6424	NA	NA	ND*	NA	NA	NA	NA	NA	NA	NA	0.398	0.03534	NA	NA	NA	NA	NA
SC-HCSM-007	HB-6426	NA	NA	0.025	NA	NA	NA	NA	NA	NA	NA	0.203	0.02647	NA	NA	NA	NA	NA
SC-HCSM-014	HB-6441	ND*	ND*	ND*	0.059 UJ	NA	NA	NA	NA	NA	NA	ND*	0.010641	NA	NA	NA	NA	NA
SC-HCSM-015	HB-6443	NA	NA	ND*	0.075 UJ	NA	NA	NA	NA	NA	NA	ND*	0.01329	NA	NA	NA	NA	NA

Table 6-2. Analytical Results for Samples Located in the Central Section of the Coastal Salt Marsh
Coastal Salt Marsh Focused Feasibility Study
Organics

Sample Location	Sample ID	BHCs Total	Chlordanes Total	DDTs Total	Dichlorprop	Endrin Aldehyde	Heptachlor	Heptachlor Epoxide	MCPA	MCPP	Methoxychlor	PAHs Total	PCBs Total	Pentachlorophenol	Phenol	TCDD TEQ Total	TPH-diesel/ TPH-motor Oil	TPH-gasoline/ TPH-JP-4
SC-HCSM-016	HB-6444	NA	NA	ND*	0.069 UJ	NA	NA	NA	NA	NA	NA	ND*	0.008768	NA	NA	NA	NA	NA
SC-HCSM-017	HB-6445	NA	NA	ND*	0.12 UJ	NA	NA	NA	NA	NA	NA	ND*	0.0258	NA	NA	NA	NA	NA
SC-HCSM-018	HB-6446	NA	NA	ND*	0.11 UJ	NA	NA	NA	NA	NA	NA	ND*	0.05058	NA	NA	NA	NA	NA
TP-SD-03	TP301SS1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.507021	NA	NA	NA	NA	NA
TP-SD03A	TP-SD03A-0	ND*	0.0055	0.063	NA	0.0047 U	0.0047 U	0.0047 U	NA	NA	0.0047 U	NA	NA	NA	NA	NA	NA	NA
TP-SD03A	TP-SD03A-1.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TWA-SD01	TWA-SD1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND*	NA	NA	NA	NA	1.8 † / NA	NA
TWA-SD06	TWA-SD06-15	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND*	NA	NA	NA	NA	2.2 † / NA	NA
TWA-SD06	TWA-SD6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND*	NA	NA	NA	NA	1.8 † / NA	NA
TWA-SD07	TWA-SD07-15	NA	NA	ND*	1.5 †	NA	NA	NA	NA	NA	NA	ND*	NA	NA	NA	NA	7.3 † / NA	NA
TWA-SD07	TWA-SD07-30	NA	NA	ND*	0.9 †	NA	NA	NA	NA	NA	NA	ND*	NA	NA	NA	NA	4.5 † / NA	NA
TWA-SD07	TWA-SD7	NA	NA	ND*	1.7	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5.6 † / NA	NA
TWA-SD08	TWA-SD08-15	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND*	NA	NA	NA	NA	2.2 † / NA	NA
TWA-SD08	TWA-SD8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND*	NA	NA	NA	NA	4.2 † / NA	NA
TWA-SD09	TWA-SD9	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND*	NA	NA	NA	NA	2.4 / NA	NA
TWA-SD09	TWA-SD90	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TWA-SD11	TWA-SD11	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND*	NA	NA	NA	NA	2 / NA	NA
TWA-SD12	TWA-SD12	NA	NA	ND*	0.081 †	NA	NA	NA	NA	NA	NA	ND*	NA	NA	NA	NA	3.2 / NA	NA
TWA-SD12	TWA-SD12-15	NA	ND*	ND*	0.052 †	NA	NA	NA	NA	NA	NA	ND*	NA	NA	NA	NA	2.1 / NA	NA
TWA-SD12	TWA-SD12-30	NA	ND*	ND*	0.058 †	NA	NA	NA	NA	NA	NA	ND*	NA	NA	NA	NA	NA	2.3
TWA-SD13	TWA-SD113	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TWA-SD13	TWA-SD13	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND*	NA	NA	NA	NA	2 / NA	NA
TWA-SD15	TWA-SD15	NA	ND*	ND*	0.072 †	NA	NA	NA	NA	NA	NA	ND*	NA	NA	NA	NA	2.9 / NA	NA
TWA-SD15	TWA-SD15-15	NA	ND*	ND*	0.057 †	NA	NA	NA	NA	NA	NA	ND*	NA	NA	NA	NA	2.3 / NA	NA
TWA-SD15	TWA-SD15-30	NA	ND*	ND*	0.053 †	NA	NA	NA	NA	NA	NA	ND*	NA	NA	NA	NA	2.1 / NA	NA

Note:
NA - not analyzed ND* - All congeners were non-detect † value listed under "Final Result" is the quantitation limit
"J" qualifier - estimated value, below practical quantitation limit "U" qualifier - compound analyzed for but not detected "A" qualifier - compound analyzed by Flame AA

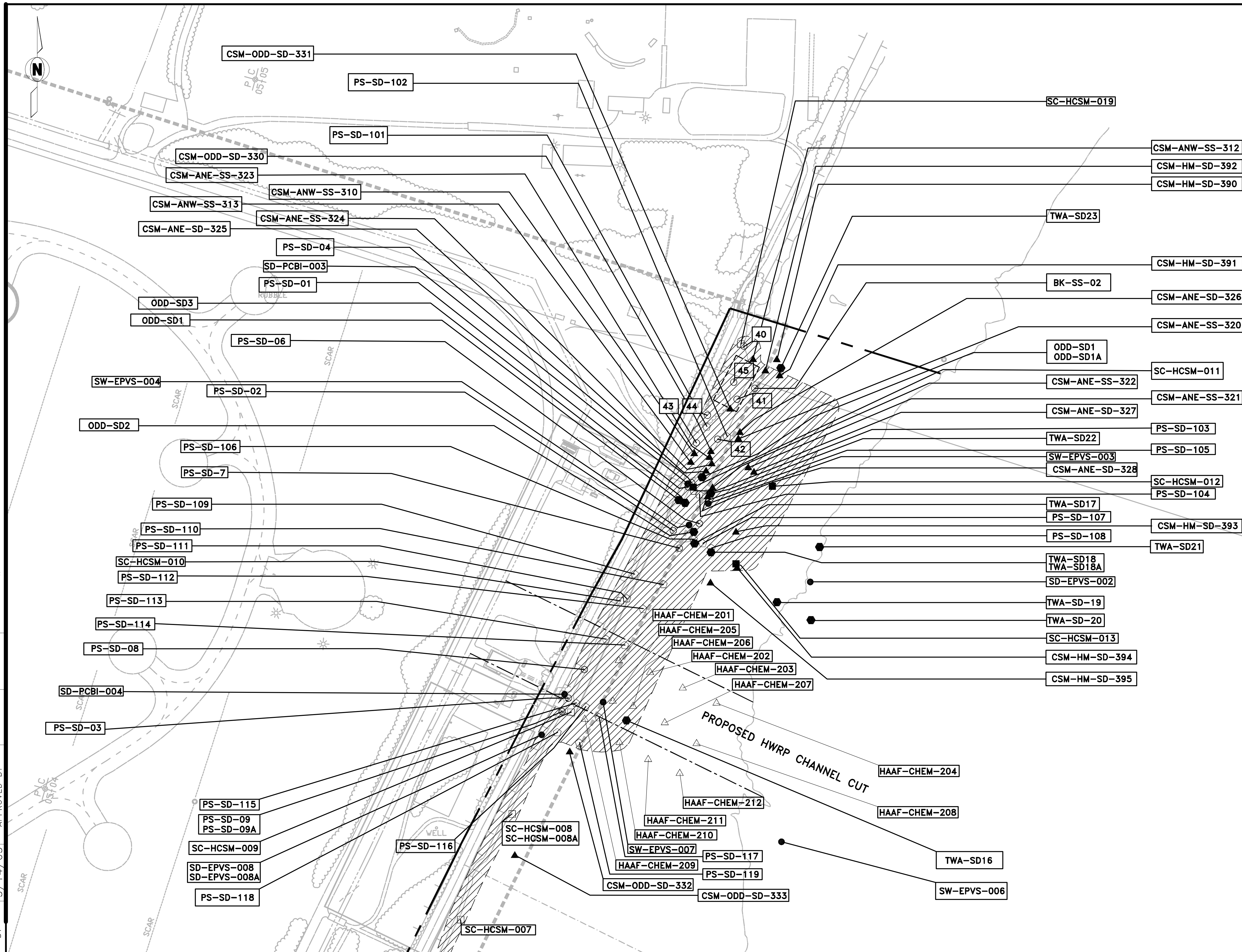
Table 6-3. Analytical Results for Samples Located in the Southern Section of the Coastal Salt Marsh
Coastal Salt Marsh Focused Feasibility Study
Inorganics

Sample Location	Sample ID	Arsenic	Barium	Beryllium	Boron	Cadmium	Chromium	Cobalt	Copper	Lead	Manganese	Mercury	Nickel	Silver	Vanadium	Zinc
30	HB-99-SD-30	8.9 A	66.7 A	0.83 A	32.7 J-	0.76 A	102 J-	19.9 A	58.6 A	30.4 A	551 A	0.34 J	113 J-	0.34 A	86.9 A	138 J
31	HB-99-SD-31	10.2 A	76.5 A	0.91 A	30.8 J-	0.59 A	99.7 J-	23.4 A	64 A	27.4 A	1220 A	0.37 J	122 J-	0.3 A	102 A	159 J
32	HB-99-SD-32	10.4 A	72.8 A	0.89 A	27 J-	1.1 A	94.3 J-	21 A	90.1 A	103 A	523 A	0.43 J	120 J-	0.61 A	96.2 A	872 J
32	HB-99-SD-32RE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
33	HB-99-SD-33	10.8 J	1060 A	0.82 A	20.9 A	5.1 J+	81.4 J	16.6 J	348 J+	1980 J+	680 A	0.32 A	71.2 A	0.95 A	70.4 J+	1740 J+
33	HB-99-SD-33RE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
34	HB-99-SD-34	9.2 A	72 A	0.86 A	27.3 J-	0.67 A	91.4 J-	22 A	71.6 A	50 A	959 A	0.34 J	116 J-	0.34 A	86.9 A	160 J
34	HB-99-SD-34DL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
35	HB-99-SD-35	11.9 A	71.8 A	0.87 A	32.2 J-	0.75 A	100 J-	22.1 A	78 A	158 A	1060 A	0.42 J	117 J-	0.5 A	90.8 A	200 J
36	HB-99-SD-36	9.6 A	220 A	0.64 A	35.7 J-	0.81 A	99.8 J-	25.6 A	86.3 A	59.9 A	651 A	0.38 J	93.1 J-	0.48 A	64.2 A	319 J
36	HB-99-SD-36DL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
36	HB-99-SD-36RX	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
37	HB-99-SD-37	3.1 A	198 A	0.73 A	8.6 J-	0.54 A	64.7 J-	9.3 A	24.3 A	349 A	293 A	0.12 J	28.2 J-	0.1 A	32.7 A	249 J
38	HB-99-SD-38	NA	141 A	0.72 A	7.4 J-	NA	70.6 J-	14.5 A	21.2 A	NA	431 A	NA	91.8 J-	NA	51.7 A	53.9 J
38	HB-99-SD-38X	3.9 A	NA	NA	NA	0.5 A	NA	NA	NA	22.8 A	NA	0.22 J	NA	1.3 A	NA	NA
39	HB-99-SD-39	8.3 A	78.5 A	1 A	33.1 A	0.75 A	88.2 A	23.6 A	68.9 A	34 A	491 A	NA	127 A	0.32 J-	107 A	159 J
39	HB-99-SD-39DL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BK-SS-03	BK203SS1	9.22	55.6	0.427 †	34.4	1.2 †	114	17.2	66.7	28.1	627	0.348	104	0.803 †	81.2	139
BK-SS-03	BK203SS2	7.77	98.4	0.427 †	52.3	1.2 †	147	20.4	75	41.2	370	0.384	118	0.803 †	112	149
BK-SS-10	BK210SS1	10	172	1.19	69.6	1.2 †	157	22.3	80.8	38	437	0.443	125	0.803 †	135	160
CSM-BD-SD-300	CSM-BD-SD-300-0	9.6	65.2 J	1	35.5	0.5 UJ	115	21.1	80.7	28.4	497	0.3	116	0.2 J	98	139
CSM-BD-SD-300	CSM-BD-SD-300-3	9.5	65.4 J	1	32.2	0.5 UJ	115	21.5	79.5	28.3	590	0.5	117	0.2 J	95.6	138
CSM-BD-SD-303	CSM-BD-SD-303-0	9.7	69.2 J	1	32.3	0.5 UJ	118	22.1	81.6	29.9	627	0.5	120	0.2 J	98.3	141
CSM-BD-SD-303	CSM-BD-SD-303-3	11.3	70 J	0.9	24.8	0.5 UJ	113	21.4	74.3	26	637	0.2	116	0.2 J	96.6	129
CSM-BD-SS-301	CSM-BD-SS-301-0	10	66.4 J	1	26.6	0.5 UJ	114	21.1	79.9	28.6	600	0.2	115	0.2 J	97.3	136
CSM-BD-SS-301	CSM-BD-SS-301-3	10	65.6 J	0.9	24.2	0.5 UJ	114	21	78.3	27.8	572	0.5	115	0.2 J	95.9	136
CSM-BD-SS-302	CSM-BD-SS-302-0	9.5	60.3 J	1	28.6	0.5 UJ	108	21.1	77.9	28.4	462	0.5	113	0.2 J	91.5	136
CSM-BD-SS-302	CSM-BD-SS-302-3	9.5	66.7 J	1	30.1	0.5 UJ	112	20.5	77.5	27.6	457	0.5	112	0.2 J	94.9	135
HB-99-BD-33A	HB-99-BD-33A-1	11.5	81.5 J	1.2	24.9	0.5 UJ	140	25.1	95.1	33.1	711	0.2	139	0.2 J	114	160
HB-99-BD-33A	HB-99-BD-33A-3	9.5	67.9 J	1	41.9	0.5 UJ	118	21.3	79.4	28.8	501	0.5	116	0.2 J	100	139
TWA-SD02	TWA-SD02-15	20.8	64.6	0.87	40.2	1 †	78.2	18.1	98.5	31	425	0.3	86.5	2 †	80.2	142
TWA-SD02	TWA-SD2	15.4	81.2	1.5	54.9	1.6 †	151	43	388	49.6	1380	0.55	154	3.2 †	153	505
TWA-SD03	TWA-SD03-15	15.3	79.6	0.98	36.2	1.2 †	120	20	65.2	42	378	0.54	139	2.3 †	92	143
TWA-SD03	TWA-SD3	11.9	61.3	0.99	30.4	1.1 †	116	12.9	77	47.3	297	0.39	102	2.1 †	97.8	127

Table 6-3. Analytical Results for Samples Located in the Southern Section of the Coastal Salt Marsh
Coastal Salt Marsh Focused Feasibility Study
Organics

Sample Location	Sample ID	BHCs Total	Chlordanes Total	DDTs Total	Dichlorprop	Endrin Aldehyde	Heptachlor	Heptachlor Epoxide	MCPA	MCPP	Methoxychlor	PAHs Total	PCBs Total	Pentachlorophenol	Phenol	TCDD TEQ Total	TPH-diesel/ TPH-motor Oil	TPH-gasoline/ TPH-JP-4
30	HB-99-SD-30	ND*	0.0018	ND*	NA	NA	NA	0.0016 U	NA	2.5 U	0.016 U	0.166	NA	NA	NA	NA	48 † / NA	12 † / NA
31	HB-99-SD-31	ND*	ND*	ND*	NA	NA	NA	0.0018 U	NA	2.7 U	0.018 U	0.381	NA	NA	NA	NA	52 † / NA	15 † / NA
32	HB-99-SD-32	ND*	0.0195	0.0527	NA	NA	NA	0.0018 U	NA	2.7 U	0.018 U	3.035	NA	0.0073 A	NA	NA	52 † / NA	NA
32	HB-99-SD-32RE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	7.3 / NA
33	HB-99-SD-33	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	17 † / NA
33	HB-99-SD-33RE	ND*	ND*	ND*	NA	NA	NA	0.0021 U	NA	NA	0.021 U	0.575	NA	NA	NA	NA	NA	NA
34	HB-99-SD-34	NA	NA	NA	NA	NA	NA	NA	NA	2.5 U	NA	4.246	NA	NA	NA	NA	24	22 † / NA
34	HB-99-SD-34DL	ND*	NA	ND*	NA	NA	NA	NA	NA	NA	0.33 U	NA	NA	NA	NA	NA	NA	NA
35	HB-99-SD-35	ND*	ND*	0.0337	NA	NA	NA	0.0017 U	NA	2.6 U	0.023 A	14.72	NA	NA	NA	NA	84	12 † / NA
36	HB-99-SD-36	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	17.908	NA	NA	NA	NA	88	19 † / NA
36	HB-99-SD-36DL	ND*	ND*	0.074	NA	NA	NA	0.0097 U	NA	NA	0.097 U	NA	NA	NA	NA	NA	NA	NA
36	HB-99-SD-36RX	NA	NA	NA	NA	NA	NA	NA	NA	3 UJ	NA	NA	NA	0.0014 J-	NA	NA	NA	NA
37	HB-99-SD-37	ND*	0.0077	0.46	NA	NA	NA	0.011 J+	NA	1.5 U	0.098 U	2.7	NA	NA	NA	NA	92	5.6 † / NA
38	HB-99-SD-38	NA	NA	0.14	NA	NA	NA	NA	NA	1.3 U	NA	0.191	NA	0.0059 A	NA	NA	26 † / NA	18 / NA
38	HB-99-SD-38X	ND*	0.005	0.24	NA	NA	NA	0.017 A	NA	NA	0.087 U	0.115	NA	NA	NA	NA	NA	NA
39	HB-99-SD-39	NA	NA	NA	NA	NA	NA	NA	NA	2.4 J-	NA	23.092	NA	0.00048 J	NA	NA	NA	22 † / NA
39	HB-99-SD-39DL	0.34	NA	0.074	NA	NA	NA	NA	NA	NA	0.62 J+	NA	NA	NA	NA	NA	NA	NA
BK-SS-03	BK203SS1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BK-SS-03	BK203SS2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BK-SS-10	BK210SS1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CSM-BD-SD-300	CSM-BD-SD-300-0	ND*	ND*	ND*	NA	0.0043 U	0.0043 U	0.0043 U	NA	NA	0.0043 U	NA	NA	NA	NA	NA	NA	NA
CSM-BD-SD-300	CSM-BD-SD-300-3	ND*	ND*	ND*	NA	0.0041 U	0.0041 U	0.0041 U	NA	NA	0.0041 U	NA	NA	NA	NA	NA	NA	NA
CSM-BD-SD-303	CSM-BD-SD-303-0	ND*	ND*	ND*	NA	0.0042 U	0.0042 U	0.0042 U	NA	NA	0.0042 U	NA	NA	NA	NA	NA	NA	NA
CSM-BD-SD-303	CSM-BD-SD-303-3	ND*	ND*	ND*	NA	0.0038 UJ	0.0038 U	0.0038 U	NA	NA	0.0038 U	NA	NA	NA	NA	NA	NA	NA
CSM-BD-SS-301	CSM-BD-SS-301-0	ND*	ND*	ND*	NA	0.0042 U	0.0042 U	0.0042 U	NA	NA	0.0042 U	NA	NA	NA	NA	NA	NA	NA
CSM-BD-SS-301	CSM-BD-SS-301-3	ND*	ND*	ND*	NA	0.0038 UJ	0.0038 UJ	0.0038 UJ	NA	NA	0.0038 UJ	NA	NA	NA	NA	NA	NA	NA
CSM-BD-SS-302	CSM-BD-SS-302-0	ND*	ND*	ND*	NA	0.0043 U	0.0043 U	0.0043 U	NA	NA	0.0043 U	NA	NA	NA	NA	NA	NA	NA
CSM-BD-SS-302	CSM-BD-SS-302-3	ND*	ND*	ND*	NA	0.0042 UJ	0.0042 U	0.0042 UJ	NA	NA	0.0042 UJ	NA	NA	NA	NA	NA	NA	NA
HB-99-BD-33A	HB-99-BD-33A-1	ND*	ND*	ND*	NA	0.004 U	0.004 U	0.004 U	NA	NA	0.004 U	NA	NA	NA	NA	NA	NA	NA
HB-99-BD-33A	HB-99-BD-33A-3	ND*	ND*	ND*	NA	0.0043 U	0.0043 U	0.0043 U	NA	NA	0.0043 U	NA	NA	NA	NA	NA	NA	NA
TWA-SD02	TWA-SD02-15	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.41	NA	NA	NA	NA	2 † / NA	NA
TWA-SD02	TWA-SD2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND*	NA	NA	NA	NA	3.2 † / NA	NA
TWA-SD03	TWA-SD03-15	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND*	NA	NA	NA	NA	2.3 † / NA	NA
TWA-SD03	TWA-SD3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND*	NA	NA	NA	NA	2.1 † / NA	NA

Note:
NA - not analyzed   ND* - All congeners were non-detect   † value listed under "Final Result" is the quantitation limit
"J" qualifier - estimated value, below practical quantitation limit   "U" qualifier - compound analyzed for but not detected   "A" qualifier - compound analyzed by Flame AA



LEGEND:

- SOIL SAMPLE LOCATION (ESI, 1993)
- SOIL SAMPLE LOCATION (FW, 2000)
- SOIL SAMPLE LOCATION (IT, 1999a)
- SOIL SAMPLE LOCATION (IT, 1999b)
- SOIL SAMPLE LOCATION (IT, 1999c)
- SOIL SAMPLE LOCATION (USACE, 2001)
- SOIL SAMPLE LOCATION (USACE, 2001/2002)
- SOIL SAMPLE LOCATION (USACE, 1994)
- SOIL SAMPLE LOCATION (WCC, 1994)
- SOIL SAMPLE LOCATION (WCC, 1987)
- SOIL SAMPLE LOCATION (WCFS, 19996)
- MONITORING WELLS
- PROPOSED REMEDIAL ACTION AREA
- BOUNDARY OF COASTAL SALT MARSH

NOTE:
PROPOSED REMEDIAL ACTION AREAS ARE ESTIMATED. THE ACTUAL AREAS WILL BE DETERMINED BY CONFIRMATION SAMPLING

APPROXIMATE SCALE
0 100 200 FEET

FIGURE 6-1
COASTAL SALT MARSH
PROPOSED REMEDIAL ACTION AREAS
NORTHERN SECTION
HAMILTON ARMY AIRFIELD

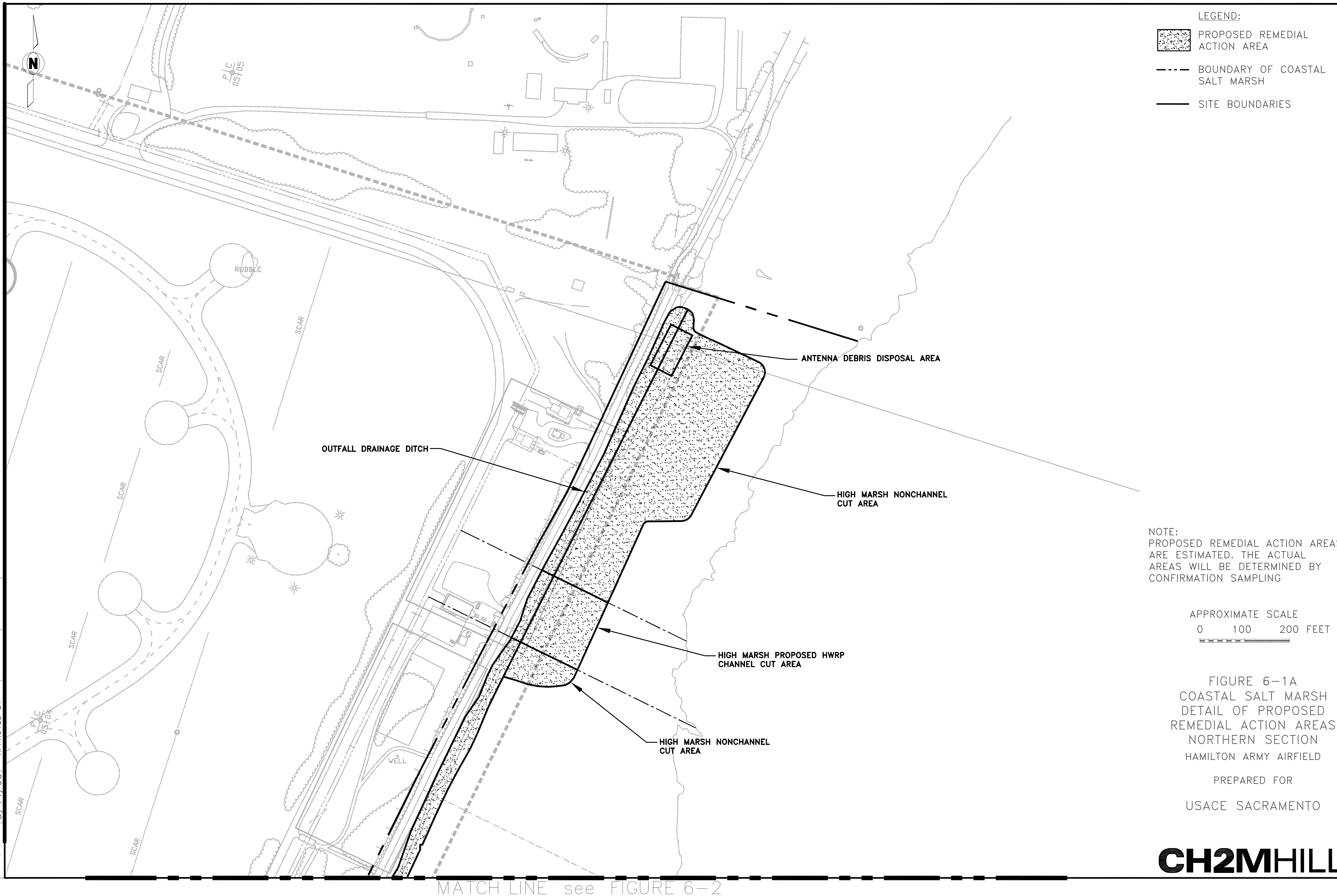
PREPARED FOR

USACE SACRAMENTO

CH2MHILL

MATCH LINE see FIGURE 6-2

DRAWN BY | RED | CHECKED BY | APPROVED BY | 5/14/03 | DRAWING NUMBER #



NOTE:
PROPOSED REMEDIAL ACTION AREAS ARE ESTIMATED. THE ACTUAL AREAS WILL BE DETERMINED BY CONFIRMATION SAMPLING

FIGURE 6-1A
COASTAL SALT MARSH
DETAIL OF PROPOSED
REMEDIAL ACTION AREAS
NORTHERN SECTION
HAMILTON ARMY AIRFIELD

PREPARED FOR

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CH2MHILL

DRAWN BY RED 5/14/03 | CHECKED BY | APPROVED BY | DRAWING NUMBER #

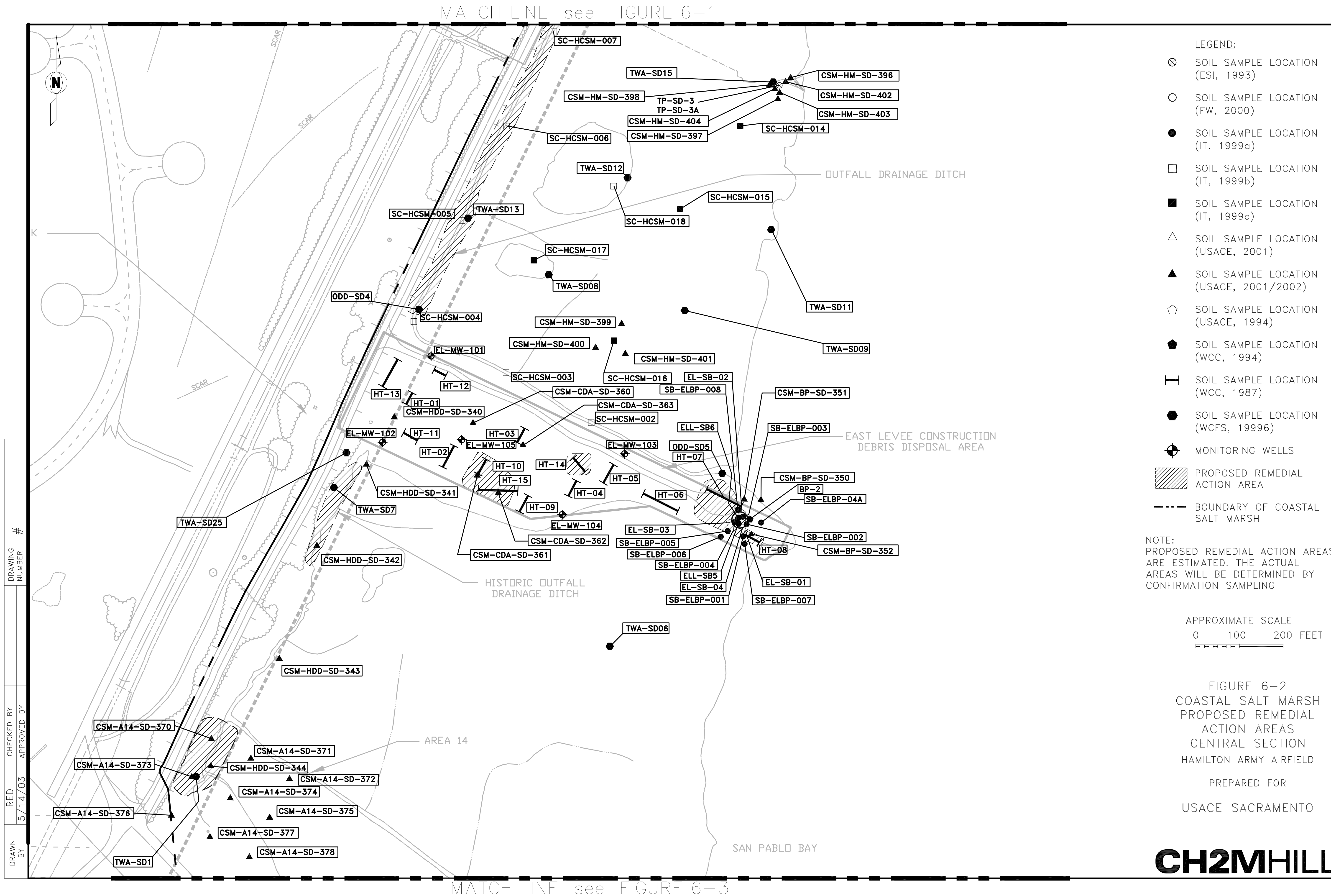
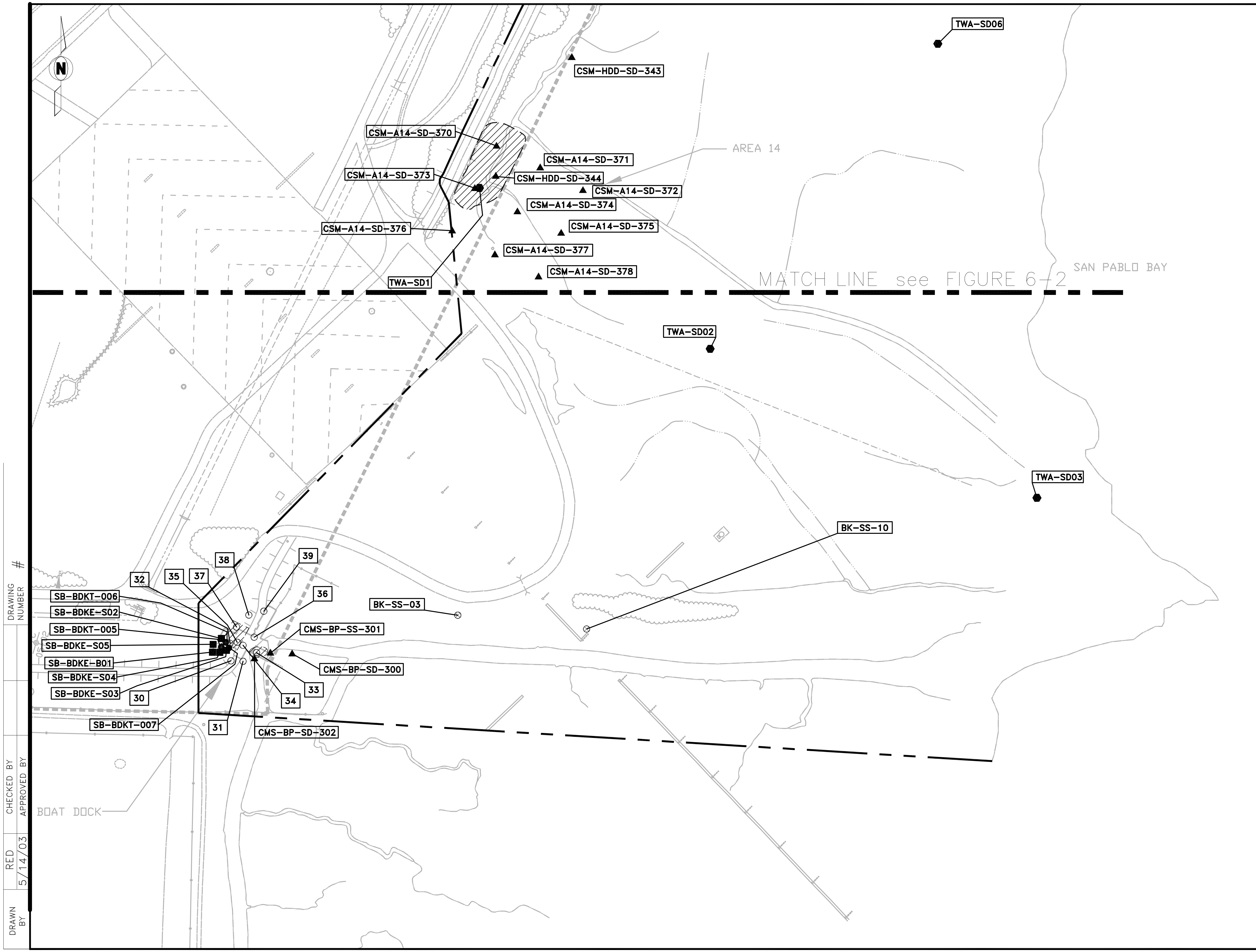


FIGURE 6-2
COASTAL SALT MARSH
PROPOSED REMEDIAL
ACTION AREAS
CENTRAL SECTION
HAMILTON ARMY AIRFIELD

PREPARED FOR

USACE SACRAMENTO

CH2MHILL



LEGEND:

- SOIL SAMPLE LOCATION (ESI, 1993)
- SOIL SAMPLE LOCATION (FW, 2000)
- SOIL SAMPLE LOCATION (IT, 1999a)
- SOIL SAMPLE LOCATION (IT, 1999b)
- SOIL SAMPLE LOCATION (IT, 1999c)
- SOIL SAMPLE LOCATION (USACE, 2001)
- SOIL SAMPLE LOCATION (USACE, 2001/2002)
- SOIL SAMPLE LOCATION (USACE, 1994)
- SOIL SAMPLE LOCATION (WCC, 1994)
- SOIL SAMPLE LOCATION (WCC, 1987)
- SOIL SAMPLE LOCATION (WCFS, 19996)
- PROPOSED REMEDIAL ACTION AREA
- BOUNDARY OF COASTAL SALT MARSH

NOTE:
PROPOSED REMEDIAL ACTION AREAS ARE ESTIMATED. THE ACTUAL AREAS WILL BE DETERMINED BY CONFIRMATION SAMPLING

APPROXIMATE SCALE
0 100 200 FEET

FIGURE 6-3
COASTAL SALT MARSH
PROPOSED REMEDIAL ACTION AREAS
SOUTHERN SECTION
HAMILTON ARMY AIRFIELD

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SECTION 7

Conclusions

The FFS evaluated the results of historical investigations and assessments to determine how residual contamination should be addressed by the proposed remedial actions. The conceptual model used in the FFS is based on potential exposure pathways and human and ecological receptors in the CSM. The model assumes that human (recreational) and ecological (estuarine) receptors could be present at each site.

The need for development and evaluation of remedial actions was determined by evaluating whether FFS COPCs at a site are greater than their respective action goals. Action goals were established in the FFS based on a number of sources. The FFS process indicated all of the CSM sites required full evaluation in the FFS (i.e., required the development and evaluation of remedial actions). The remedial alternatives listed below were evaluated against the nine criteria set forth by the NCP and other considerations, based on state regulations and guidelines, to determine the appropriate remedial alternative for each site:

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

7.1 Preferred Remedial Alternative

Table 7-1 presents a summary of the preferred alternative selected for each site. The rationale used to recommend the preferred remedial alternative for the CSM sites is provided below.

Alternative 2 - Excavation and Offsite Disposal is the preferred alternative for all of the CSM sites. The Excavation and Offsite Disposal alternative would remove soil containing FFS COPCs at concentrations above action goals. Under this alternative, potential exposure of marsh receptors to FFS COPCs would be eliminated because soil containing concentrations of FFS COPCs above action goals would be completely removed. The areas recommended for excavation within the CSM are shown on Figure 6-1, 6-1a, 6-2, and 6-3. Table 7-2 provides the area of pickleweed habitat that would be disturbed in the short term to complete the excavation activities. Alternative 1 – No Further Action was not selected for any of the CSM sites because it would not meet RAOs.

7.2 Estimated Impact on Pickleweed Habitat

Alternative 2, Excavation and Offsite Disposal, is recommended for all of the CSM 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 (see Table 7-2). Significant short-term impacts, including damage and destruction of habitat, will occur as a result of remediation activities at each CSM 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 acre.

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 affected at a specific site may vary when field activities are conducted. The final footprint of excavation activities will be determined by confirmation sampling conducted during remedial activities.

TABLE 7-1
Preferred Remedial Alternative Summary for CSM Sites

Site	Alternative 1— No Further Action	Alternative 2— Excavation and Offsite Disposal
Antenna Debris Disposal Area		X
East Levee Construction Debris Disposal Area		X
High Marsh Area		
Proposed HWRP Channel Cut		X
Nonchannel Cut		X
Historic Outfall Drainage Ditch		X
Outfall Drainage Ditch		X
Boat Dock		
Nonchannel Area		X
Channel Area		X
Area 14		X
Former Sewage Treatment Plant Outfall		X

TABLE 7-2
Estimated Impacts to Pickleweed Habitat

Site	Short-Term Impact [a] (acres)		LongTerm Impact [b] (acres)
	Access	Excavation	
Antenna Debris Disposal Area	--	0.25	0
East Levee Construction Debris Disposal Area	0.05	0.34	0
High Marsh Area – Nonchannel Cut Area	0.05	2.66	0
High Marsh Area – Proposed HWRP Channel Cut Area	0.04	0.78	0
Historic Outfall Drainage Ditch	--	0.21	0.21
Outfall Drainage Ditch	0.06	0.78	0.05
Boat Dock – Nonchannel Area	0.01	0.026	0
Boat Dock – Channel Area	0.02	0.014	0
Area 14	0.03	0.26	0
Former Sewage Treatment Plant Outfall Pipe	0.15	0.07	0
Subtotal	0.41 acres	5.4 acres	0.26 acres
Total short-term and long term impact = 6.07 acres			

-- Temporary access road is not necessary for excavation.

[a] Temporary habitat impacts due to equipment access and excavation of contaminated material; habitat is expected to fully recover within 2 years.

[b] Permanent habitat destruction due to excavation activities (margin along each side of the ODD and Historic ODD).

SECTION 8

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APPENDIX A

CSM Groundwater

APPENDIX A

Groundwater

Introduction

This appendix provides a summary of the hydrogeology of the Inboard Area and Coastal Salt Marsh (CSM) at the former Hamilton Army Airfield (HAAF) and discusses specific groundwater investigations conducted within the CSM. An assessment of the condition of groundwater is provided. Additional specific details regarding the hydrogeologic and groundwater investigations can be obtained from the reports listed at the end of this appendix.

Seven environmental investigations of groundwater at HAAF, dating back to 1985 (WCFS, 1985) through groundwater sampling in 2002 (Cerrudo Services, 2002), were conducted at the Inboard Area and CSM. The referenced reports present the groundwater data, associated soil data, and the geologic and hydrogeologic conditions at the property.

Summary of Hydrogeology

The Inboard Area and the CSM have similar compositions of Bay Mud but somewhat different hydrogeology, primarily as the result of differences in elevation and levels of saturation. Most of the Inboard Area lies below sea level and is inundated only seasonally with rainfall and stormwater surface runoff. During drier weather, this water either evaporates from the property or slowly percolates to the perimeter ditch and eventually is pumped to San Pablo Bay. In contrast, the CSM is inundated regularly with saltwater from the higher tides of San Pablo Bay as well as receiving normal stormwater and stormwater discharges from the Inboard Area runoff via the pump stations.

Groundwater at HAAF is uniformly distributed throughout the saturated clay formation in the Inboard Area and CSM. Groundwater levels at the Inboard Area vary according to seasonal rainfall (and the associated stormwater pumping) and evapotranspiration rates. The levels are influenced, to a lesser degree, by irrigation water discharged onto the property from upland areas. Groundwater levels and saturation of the CSM vary with the diurnal fluctuations of tide elevations and inundation during storm events.

Where the Inboard Area is composed of Bay Mud (saturated or desiccated) and from zero to approximately two meters of overlying fill, groundwater moves slowly along the path of least resistance to the lowest area of the property percolating through the consolidated fill and over the saturated clay, tens of meters thick. The clay retards the vertical movement of contaminants, and the consolidated fill retards horizontal movement. The sediment composition of the CSM is predominantly soft Bay Mud, made up of very dense, relatively homogeneous clay. Groundwater does not move through this type of solid, highly porous, but weakly permeable formation without a significant applied hydraulic pressure difference. The continuous saturated clay and the lack of movement of groundwater within the clay limit movement of contaminants within the marsh.

Coastal Salt Marsh Groundwater Investigations

In 1986, the Army investigated the ELCDDA within the CSM as an area of potential concern because of reported former dumping of construction debris and open incineration of wood (WCFS, 1987). Pairs of soil samples were collected from a series of 15 trenches within the ELCDDA and analyzed for metals, total recoverable petroleum hydrocarbons (TRPH), VOCs, SVOCs, pesticides, and PCB arochlors. The results of the trench investigation indicated no releases had occurred within the disposal area. No organic chemicals were detected, and metals were reported within background concentrations (WCFS, 1987). Groundwater was not sampled at the ELCDDA during the investigation.

In 1991, ESI conducted an investigation of soil and groundwater at the CSM to evaluate the potential of contaminants from the ELCDDA. The investigation included installation of five wells (EL-MW-101, EL-MW-102, EL-MW-103, EL-MW-104, and EL-MW-105) placed at four perimeter locations and at the center of the ELCDDA; sample collection; and sample analyses. Groundwater samples at four consecutive quarterly sampling events—January, April, July, and October 1991—were analyzed for a comprehensive suite of organic compounds, including VOCs, SVOCs, PCBs, PAHs, pesticides, and herbicides; inorganic compounds (metals); and general chemistry parameters.

There was only one trace detection of a VOC—MEK, at 27.6 μg/L—in one well and no other organic detections (ESI, 1993). MEK, a common laboratory contaminant, was interpreted to be an investigation-related contaminant rather than related to the in-situ groundwater condition. Varied detections of metals (unfiltered samples) were reported. Hydrocarbons were not suspected on the basis of previous soil sample results. As a consequence, groundwater samples were not analyzed for TPH at that time. All other VOCs and SVOCs, PAHs, pesticides, and PCBs were not detected in any groundwater samples analyzed.

Values for metals detected in the CSM groundwater samples collected during the 1991 quarterly sampling events are listed in Table 4.23 of the ESI report. In general, the detections of metals are at low concentrations, sporadic, and not indicative of any contaminant release.

In 2001 and 2002, at the request of a representative of the Regional Water Quality Control Board, the Army (through the USACE, Sacramento District) conducted a final groundwater survey of 18 of the 42 monitoring wells at the Inboard Area, including three background wells and two wells at the CSM. The goal of the sampling was to add to the limited data on filtered metals in groundwater; and the focus was wells located in the vicinity of the planned channels for the Hamilton Wetland Restoration Project. Water samples were collected and analyzed for specific chemicals of interest.

The Army sampled two of the ELCDDA wells: EL-MW-103, and EL-MW-104. The samples were analyzed for metals, including mercury, TPHs in the extractable range, pesticides, and PCBs. Metals (filtered samples) were detected in both wells, diesel-range hydrocarbons (TPH-d) were detected in well EL-MW-104 at 200 μg/L, and endrin initially was estimated at a trace concentration of 0.008 μg/L. The TPH-d detection was below the Presidio, Saltwater Ecological Protection Zone numbers for TPH. Upon more rigorous evaluation, the reported trace concentration of endrin was determined to be a false positive result; thus, the chemical was not detected. With the exception of the TPH-d result, essentially no organics and only varied detections of metals were reported in the groundwater.

All groundwater analytical data from the 2001/2002 sampling of the 18 wells are presented in the table Groundwater Analytical Data for Select Wells at Hamilton Army Airfield in the *Groundwater Data Report, Final Well Sampling*, *Hamilton Army Airfield, Novato, California,* June 2002 and addendum, September 2002 (USACE, 2002).

Results indicated that groundwater does not appear to have been affected by former site activities. The one previous MEK result was just above the detection limit in one sample in only the first of four events from one well. The TPH-d result was at trace concentrations. It was determined that no further action would be required for groundwater at the CSM.

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APPENDIX B

Samples Used to Characterize CSM Sites

Table B-1
Antenna Debris Disposal Area
Samples Used to Characterize Site

Sample Number	Sample Location	Analyses Conducted	Reference	Date of Sample
TWA-SD24-15	TWA-SD24	Metals (including Methyl Mercury), TPH, PNAs	WCFS, 1996	09-May-95
TWA-SD24	TWA-SD24			
HB-99-SO-40	40	Pesticides/Herbicide, metals	FW, 2000	02-Aug-99
HB-99-SO-40x	40			
HB-99-SO-41	41			
HB-99-SO-42	42			
HB-99-SO-43	43			
HB-99-SO-44	44			
HB-99-SO-45	45			
CSM-ANE-SS-320	CSM-ANE-SS-320	Metals, Mercury, Pesticides, PCBs	USACE, 2001/2002	14-Dec-01
CSM-ANE-SS-321	CSM-ANE-SS-321			13-Dec-01
CSM-ANE-SS-322	CSM-ANE-SS-322			13-Dec-01
CSM-ANE-SS-323	CSM-ANE-SS-323			14-Dec-01
CSM-ANE-SS-324	CSM-ANE-SS-324			13-Dec-01
CSM-ANE-SD-325	CSM-ANE-SD-325	Metals, Mercury, Pesticides, PCBs, TPH-E		18-Dec-01
CSM-ANE-SD-326	CSM-ANE-SD-326	Metals, Pesticides, PCBs		16-Jan-02
CSM-ANE-SD-327	CSM-ANE-SD-327			16-Jan-02
CSM-ANE-SD-328	CSM-ANE-SD-328			16-Jan-02
CSM-ANW-SS-310	CSM-ANW-SS-310	Metals, Mercury, Pesticides, PCBs		13-Dec-01
CSM-ANW-SD-311	CSM-ANW-SD-311	Metals, Mercury, Pesticides, PCBs, TPH-E		18-Dec-01
CSM-ANW-SS-312	CSM-ANW-SS-312	Metals, Mercury, Pesticides, PCBs		13-Dec-01
CSM-ANW-313	CSM-ANW-313	Metals, PCBs		31-Jan-02

Table B-2
East Levee Construction Debris Disposal Area
Samples Used to Characterize Site

Sample Number	Sample Location	Analyses Conducted	Reference	Date of Sample
EL-1-SS-11.5	EL-SB-01	Metals, SVOCs, TPH	USACE, 1994	14-Feb-94
EL-1-SS-4	EL-SB-01			14-Feb-94
EL-1-SS-7.5	EL-SB-01			14-Feb-94
EL-2-SS-11	EL-SB-02	Metals, SVOCs		14-Feb-94
EL-2-SS-6.5	EL-SB-02			14-Feb-94
EL-3-SS-11	EL-SB-03	Metals, SVOCs, TPH		14-Feb-94
EL-3-SS-2.5	EL-SB-03	Metals, SVOCs		14-Feb-94
EL-3-SS-9	EL-SB-03	Metals, SVOCs, TPH		14-Feb-94
EL-4-SS-3	EL-SB-04			14-Feb-94
EL-4-SS-9.5	EL-SB-04			14-Feb-94
EL001SS1	EL-MW-101	Metals, Herbicides, Pesticides, SVOCs, VOCs	ESI, 1993	11-Dec-90
EL001SS2	EL-MW-101			11-Dec-90
EL002SS1	EL-MW-103			13-Dec-90
EL002SS2	EL-MW-103			13-Dec-90
EL003SS1	EL-MW-104	Metals, Herbicides, Pesticides		13-Dec-90
EL003SS2	EL-MW-104			13-Dec-90
EL004SS1	EL-MW-102	Metals, Herbicides, Pesticides, SVOCs, VOCs		17-Dec-90
EL004SS2	EL-MW-102			17-Dec-90
ELL-WC-45-SB5	ELL-SB5	Polynuclear Aromatic Hydrocarbons (PAHs), TPH	WCFS, 1996	09-May-95
ELL-WC-45-SB6	ELL-SB6			09-May-95
ELL-WC-95-SB5	ELL-SB5			09-May-95
ELL-WC-95-SB6	ELL-SB6			09-May-95
HB-4569	SB-ELBP-001	BTEX, Lead, Pesticides, PCBs, TPH	IT, 1999a	18-Apr-97
HB-4570	SB-ELBP-004			23-Apr-97
HB-4571	SB-ELBP-005			23-Apr-97
HB-4572	SB-ELBP-005			23-Apr-97
HB-4573	SB-ELBP-003			23-Apr-97
HB-4574	SB-ELBP-002			23-Apr-97
HB-4593	SB-ELBP-001			29-Apr-97
HB-4594	SB-ELBP-002			29-Apr-97
HB-4596	SB-ELBP-003			29-Apr-97
HB-4597	SB-ELBP-004			29-Apr-97
HB-4598	SB-ELBP-004			29-Apr-97
HB-4599	SB-ELBP-005	BTEX, Lead, PCBs, TPH		29-Apr-97
HB-4959	SB-ELBP-008	PCBs		24-Jul-97
HB-4961	SB-ELBP-006			24-Jul-97
HB-4966	SB-ELBP-007			24-Jul-97

Table B-2
East Levee Construction Debris Disposal Area
Samples Used to Characterize Site

Sample Number	Sample Location	Analyses Conducted	Reference	Date of Sample
HT-03-1	HT-03	Metals, SVOCs, VOCs	WCC, 1987	02-Jul-86
HT-03-2	HT-03			02-Jul-86
HT-04-1	HT-04			02-Jul-86
HT-04-2	HT-04			02-Jul-86
HT-05-1	HT-05			03-Jul-86
HT-05-2	HT-05			03-Jul-86
HT-06-1	HT-06			01-Jul-86
HT-06-2	HT-06			01-Jul-86
HT-07-1	HT-07			30-Jun-86
HT-07-1A	HT-07			30-Jun-86
HT-07-2	HT-07			30-Jun-86
HT-07-2A	HT-07			30-Jun-86
HT-08-1	HT-08			30-Jun-86
HT-08-2	HT-08			30-Jun-86
HT-09-1	HT-09	Metals, SVOCs, VOCs		02-Jul-86
HT-09-2	HT-09			02-Jul-86
HT-10-1	HT-10			01-Jul-86
HT-10-2	HT-10			01-Jul-86
HT-12-1	HT-12			01-Jul-86
HT-12-2	HT-12			01-Jul-86
HT-13-1	HT-13			01-Jul-86
HT-13-2	HT-13			01-Jul-86
HT-14-1	HT-14			03-Jul-86
HT-14-2	HT-14			03-Jul-86
HT-15-1	HT-15			03-Jul-86
HT-15-2	HT-15			03-Jul-86
T-01-1	T-01			30-Jun-86
T-01-1A	T-01			30-Jun-86
T-01-2	T-01			30-Jun-86
T-01-2A	T-01			30-Jun-86
T-02-1	T-02			30-Jun-86
T-02-2	T-02			30-Jun-86
T-11-1	T-11			30-Jun-86
T-11-1A	T-11			30-Jun-86
T-11-2	T-11			30-Jun-86
T-11-2A	T-11			30-Jun-86
BP-2-6	BP-2	Dioxins	WC, 1994	18-Oct-94
BP-2-12	BP-2			18-Oct-94
CSM-BP-SD-350	CSM-BP-SD-350	PCBs	USACE, 2001/2002	08-Jan-02
CSM-BP-SD-351	CSM-BP-SD-351			19-Dec-01
CSM-BP-SD-352	CSM-BP-SD-352			19-Dec-01
SB-ELBP-04A	SB-ELBP-04A	Dioxin/Furan		19-Dec-01
CSM-CDA-SD-360	CSM-CDA-SD-360	Metals		08-Jan-02
CSM-CDA-SD-361	CSM-CDA-SD-361			08-Jan-02
CSM-CDA-SD-362	CSM-CDA-SD-362			08-Jan-02
CSM-CDA-SD-363	CSM-CDA-SD-363	Metals, PCBs		08-Jan-02

Table B-3
Coastal Salt Marsh - High Marsh Nonchannel Cut
Samples Used to Characterize Site

Sample Number	Sample Location	Analyses Conducted	Reference	Date of Sample
Nonchannel Cut				
BK004DS1	BK-SS-02	Metals	ESI, 1993	13-Feb-91
BK004SS1	BK-SS-02			13-Feb-91
BK005SS1	BK-SS-02			13-Feb-91
BK006SS1	BK-SS-02			13-Feb-91
BK203SS1	BK-SS-03			05-Aug-92
BK203SS2	BK-SS-03			05-Aug-92
BK210SS1	BK-SS-10			07-Aug-92
HB-4676	SW-EPVS-006	Metals, Pesticides	IT, 1999a	19-Jun-97
HB-4684	SD-EPVS-002			19-Jun-97
HB-6434	SC-HCSM-011	Metals (including Methyl Mercury), Herbicides, Pesticides, PCBs, PNAs	IT, 1999c	05-Nov-98
HB-6435	SC-HCSM-011			05-Nov-98
HB-6437	SC-HCSM-012			05-Nov-98
HB-6439	SC-HCSM-013			05-Nov-98
HB-6441	SC-HCSM-014			05-Nov-98
HB-6443	SC-HCSM-015			06-Nov-98
HB-6444	SC-HCSM-016			05-Nov-98
HB-6446	SC-HCSM-018			06-Nov-98
HB-6445	SC-HCSM-017	Metals, PCBs, PNAs		05-Nov-98
PS-101-SS-0	PS-SD-101	Metals, SVOCs	USACE, 1994	10-Feb-94
PS-101-SS-1	PS-SD-101			10-Feb-94
PS-102-SS-0	PS-SD-102			10-Feb-94
PS-102-SS-1	PS-SD-102			10-Feb-94
PS-103-SS-0	PS-SD-103			10-Feb-94
PS-104-SS-0	PS-SD-104			10-Feb-94
PS-104-SS-1	PS-SD-104			10-Feb-94
PS-105-SS-0	PS-SD-105			10-Feb-94
PS-105-SS-1	PS-SD-105			10-Feb-94
PS-106-SS-0	PS-SD-106			10-Feb-94
PS-106-SS-1	PS-SD-106			10-Feb-94
PS-107-SS-0	PS-SD-107			10-Feb-94
PS-107-SS-1	PS-SD-107			10-Feb-94
PS-108-SS-0	PS-SD-108			10-Feb-94
PS-108-SS-1	PS-SD-108			10-Feb-94
PS-110-SS-0	PS-SD-110			10-Feb-94
PS-110-SS-1	PS-SD-110			10-Feb-94
PS-111-SS-0	PS-SD-111			10-Feb-94
PS-111-SS-1	PS-SD-111			10-Feb-94
PS-112-SS-0	PS-SD-112			10-Feb-94
PS-112-SS-1	PS-SD-112			10-Feb-94
PS-118-SS-0	PS-SD-118			10-Feb-94
PS-119-SS-0	PS-SD-119			10-Feb-94
PS-119-SS-1	PS-SD-119			10-Feb-94
PS-103-SS-1	PS-SD-103	Metals, TPH, SVOCs		10-Feb-94
PS-118-SS-1	PS-SD-118			10-Feb-94

Table B-3
Coastal Salt Marsh - High Marsh Nonchannel Cut
Samples Used to Characterize Site

Sample Number	Sample Location	Analyses Conducted	Reference	Date of Sample
PS016SS1	PS-SD-04	Metals, Herbicides, Pesticides, SVOCS, VOCs	ESI, 1993	11-Feb-91
PS017SS1	PS-SD-05			11-Feb-91
PS018SS1	PS-SD-06			11-Feb-91
PS019SS1	PS-SD-07			11-Feb-91
TWA-SD03-15	TWA-SD03	Metals (including Methyl Mercury), PNAs, TPH	WCFS, 1996	12-May-95
TWA-SD11	TWA-SD11			11-May-95
TWA-SD121	TWA-SD21			09-May-95
TWA-SD02-15	TWA-SD02	Metals, TPH, PNAs		14-Apr-95
TWA-SD06-15	TWA-SD06			18-Apr-95
TWA-SD08-15	TWA-SD08			19-Apr-95
TWA-SD113	TWA-SD13			19-Apr-95
TWA-SD118	TWA-SD18			03-May-95
TWA-SD12	TWA-SD12	Metals, Pesticides, PNAs, TPH, VOCs		19-Apr-95
TWA-SD12-15	TWA-SD12			19-Apr-95
TWA-SD12-30	TWA-SD12			19-Apr-95
TWA-SD123	TWA-SD23	Metals, TPH, PNAs		04-May-95
TWA-SD13	TWA-SD13			19-Apr-95
TWA-SD17	TWA-SD17	Metals, PNAs, TPH, VOCs		03-May-95
TWA-SD17-15	TWA-SD17	Metals, Pesticides, PNAs, VOCs		03-May-95
TWA-SD17-30	TWA-SD17			03-May-95
TWA-SD19	TWA-SD19	Metals (including Methyl Mercury), PNAs, TPH		09-May-95
TWA-SD19-15	TWA-SD19			09-May-95
TWA-SD18	TWA-SD18	Metals, PNAs, TPH		03-May-95
TWA-SD2	TWA-SD02			14-Apr-95
TWA-SD21	TWA-SD21			09-May-95
TWA-SD22	TWA-SD22	Metals, Herbicides, Pesticides, PNAs, TPH, VOCs		04-May-95
TWA-SD22-15	TWA-SD22			04-May-95
TWA-SD22-30	TWA-SD22			04-May-95
TWA-SD23	TWA-SD23	Metals, PNAs, TPH		04-May-95
TWA-SD23-15	TWA-SD23			04-May-95
TWA-SD25-15	TWA-SD25			09-May-95
TWA-SD6	TWA-SD06			18-Apr-95
TWA-SD8	TWA-SD08			19-Apr-95
TWA-SD9	TWA-SD09			20-Apr-95
TWA-SD90	TWA-SD09			20-Apr-95
TWA-SD3	TWA-SD03	Metals (including Methyl Mercury), PNAs, TPH		12-May-95
TWA-SD25	TWA-SD25			09-May-95
CSM-HM-SD-390	CSM-HM-SD-390	Metals, Mercury	USACE, 2001/2002	17-Dec-01
CSM-HM-SD-391	CSM-HM-SD-391			17-Dec-01
CSM-HM-SD-392	CSM-HM-SD-392			17-Dec-01
CSM-HM-SD-393	CSM-HM-SD-393	Metals, Mercury, Pesticides		07-Jan-02
CSM-HM-SD-394	CSM-HM-SD-394			07-Jan-02
CSM-HM-SD-395	CSM-HM-SD-395			07-Jan-02
CSM-HM-SD-399	CSM-HM-SD-399	Metals, Mercury		17-Dec-01
CSM-HM-SD-400	CSM-HM-SD-400			17-Dec-01
CSM-HM-SD-401	CSM-HM-SD-401			17-Dec-01
TWA-SD23	TWA-SD23	Metals, Mercury		17-Dec-01
HCSM-016A	HCSM-016A			17-Dec-01
TWA-SD18A	TWA-SD18A	Metals, Mercury, Pesticides		07-Jan-02

Table B-4
High Marsh Proposed HWRP Channel
Samples Used to Characterize Site

Sample Number	Sample Location	Analyses Conducted	Reference	Date of Sample
Proposed Channel Cut				
PS-113-SS-0	PS-SD-113	Metals, SVOCs	USACE, 1994	10-Feb-94
PS-113-SS-1	PS-SD-113	Metals, TPH, SVOCs		10-Feb-94
PS-114-SS-0	PS-SD-114	Metals, SVOCs		10-Feb-94
PS-114-SS-1	PS-SD-114			10-Feb-94
PS-116-SS-0	PS-SD-116			10-Feb-94
PS-116-SS-1	PS-SD-116	Metals, TPH, SVOCs		10-Feb-94
PS-117-SS-0	PS-SD-117	Metals, SVOCs		10-Feb-94
PS-117-SS-1	PS-SD-117			10-Feb-94
TWA-SD16	TWA-SD16	Metals, PNAs, TPH	WCFS, 1996	03-May-95
TWA-SD16-15	TWA-SD16			03-May-95
HAAF-CHM-201	HAAF-CHM-201	PAHs, Herbicides, Pesticides, Metals, TPH-D, TPH-G, Mercury, PCBs, VOCs	USACE, Sept. 2001	06-Sep-01
HAAF-CHM-202	HAAF-CHM-202			06-Sep-01
HAAF-CHM-203	HAAF-CHM-203			06-Sep-01
HAAF-CHM-204	HAAF-CHM-204			06-Sep-01
HAAF-CHM-205	HAAF-CHM-205			05-Sep-01
HAAF-CHM-206	HAAF-CHM-206			05-Sep-01
HAAF-CHM-207	HAAF-CHM-207			05-Sep-01
HAAF-CHM-208	HAAF-CHM-208			05-Sep-01
HAAF-CHM-209	HAAF-CHM-209			05-Sep-01
HAAF-CHM-210	HAAF-CHM-210			05-Sep-01
HAAF-CHM-211	HAAF-CHM-211			05-Sep-01
HAAF-CHM-212	HAAF-CHM-212			05-Sep-01

Table B-5
Historic ODD
Samples Used to Characterize Site

Sample Number	Sample Location	Analyses Conducted	Reference	Date of Sample
TWA-SD1	TWA-SD01	Metals, TPH, PNAs	WCFS, 1996	14-Apr-95
TWA-SD07-15	TWA-SD07	Metals, Herbicides, Pesticides, TPH, VOCs		18-Apr-95
TWA-SD7	TWA-SD07			18-Apr-95
TWA-SD07-30	TWA-SD07	Metals, Herbicides, Pesticides, PNAs, TPH, VOCs		18-Apr-95
CSM-HDD-SD-340	CSM-HDD-SD-340	Metals, Mercury, Pesticides, PCBs	USACE 2001/2002	13-Dec-01
CSM-HDD-SD-341	CSM-HDD-SD-341	Metals, Mercury, Pesticides		13-Dec-01
CSM-HDD-SD-342	CSM-HDD-SD-342	Metals, Mercury, Pesticides, PCBs		13-Dec-01
CSM-HDD-SD-343	CSM-HDD-SD-343	Metals, Mercury, Pesticides		13-Dec-01
CSM-HDD-SD-344	CSM-HDD-SD-344			13-Dec-01

Table B-6
Coastal Salt Marsh - Outfall Drainage Ditch Samples Used to Characterize Site

Sample Number	Sample Location	Analyses Conducted	Reference	Date of Sample
HB-4655	SW-EPVS-003	Metals, Pesticides	IT, 1999a	18-Jun-97
HB-4656	SW-EPVS-003			18-Jun-97
HB-4513	SD-PCBI-003	Pesticides, PCBs		16-Apr-97
HB-4515	SD-PCBI-004			16-Apr-97
HB-4568	SD-PCBI-004			23-Apr-97
HB-4514	SD-PCBI-004	Pesticides		16-Apr-97
HB-4567	SD-PCBI-003			23-Apr-97
HB-4658	SW-EPVS-004	Metals, Pesticides		18-Jun-97
HB-4671	SW-EPVS-007			18-Jun-97
HB-4690	SD-EPVS-008			20-Jun-97
HB-6418	SC-HCSM-002	Metals, Herbicides, Pesticides, PCBs, PNAs	IT, 1999b	04-Nov-98
HB-6420	SC-HCSM-003			04-Nov-98
HB-6422	SC-HCSM-004			04-Nov-98
HB-6424	SC-HCSM-006			05-Nov-98
HB-6426	SC-HCSM-007			06-Nov-98
HB-6428	SC-HCSM-008			06-Nov-98
HB-6430	SC-HCSM-010			06-Nov-98
ODD-SD1-05	ODD-SD1	Metals, Herbicides, Pesticides, SVOCs, TPH, VOCs	WCFS, 1996	11-Apr-95
ODD-SD1-15	ODD-SD1			11-Apr-95
ODD-SD2-05	ODD-SD2			11-Apr-95
ODD-SD2-15	ODD-SD2			11-Apr-95
ODD-SD3-05	ODD-SD3			11-Apr-95
ODD-SD3-15	ODD-SD3			11-Apr-95
ODD-SD4-05	ODD-SD4			10-Apr-95
ODD-SD4-15	ODD-SD4			10-Apr-95
ODD-SD5-05	ODD-SD5			10-Apr-95
ODD-SD5-15	ODD-SD5			10-Apr-95
PS-109-SS-0	PS-SD-109	Metals, SVOCs	USACE, 1994	10-Feb-94
PS-109-SS-1	PS-SD-109	Metals, TPH, SVOCs		10-Feb-94
PS-115-SS-1	PS-SD-115	Metals, SVOCs		10-Feb-94
PS-115-SS-0	PS-SD-115			10-Feb-94
PS013SS1	PS-SD-01	Pesticides, Herbicides, SVOCs, VOCs	ESI, 1993	14-Dec-90
PS014SS1	PS-SD-02			14-Dec-90
PS015SS1	PS-SD-03			14-Dec-90
PS013SS2	PS-SD-01	Metals		14-Dec-90
PS014SS2	PS-SD-02			14-Dec-90
PS015SS2	PS-SD-03			14-Dec-90
PS020SS1	PS-SD-08	Metals, Herbicides, Pesticides, SVOCs, VOCs		11-Feb-91
PS021DS1	PS-SD-09			11-Feb-91
PS021SS1	PS-SD-09			11-Feb-91
HB-6591	SC-HCSM-009	Pesticides	IT, 1999b	16-Apr-99
HB-6592	SC-HCSM-005			16-Apr-99
HB-6447	SC-HCSM-019	Metals (including Methyl Mercury), Herbicides, Pesticides, PCBs, PNAs		11-Nov-98
CSM-ODD-SD-330	CSM-ODD-SD-330	Metals, Mercury, Pesticides, TPH-E	USACE, 2001/2002	07-Jan-02
CSM-ODD-SD-331	CSM-ODD-SD-331			07-Jan-02
CSM-ODD-SD-332	CSM-ODD-SD-332			07-Jan-02
CSM-ODD-SD-333	CSM-ODD-SD-333			07-Jan-02
ODD-SD1A	ODD-SD1A			07-Jan-02
PS-SD-109A	PS-SD-109A			07-Jan-02
PS-SD-115A	PS-SD-115A			07-Jan-02
PS-SD-09A	PS-SD-09A			07-Jan-02
SC-HCSM-008A	SC-HCSM-008A			07-Jan-02

Table B-7
Boat Dock
Samples Used to Characterize Site

Sample Number	Sample Location	Analyses Conducted	Sampling Conducted By	Date of Sample
Boat Dock Nonchannel Area				
HB-4963	SB-BDKT-005	PCBs	IT, 1999a	24-Jul-97
HB-4964	SB-BDKT-007			24-Jul-97
HB-4965	SB-BDKT-006			24-Jul-97
HB-4972	SB-BDKT-007			24-Jul-97
HB-6199	CS-BDKE-B01		IT, 1999c	23-Oct-98
HB-6229	CS-BDKE-S02			23-Oct-98
HB-6230	CS-BDKE-S02			23-Oct-98
HB-6231	CS-BDKE-S03			23-Oct-98
HB-6233	CS-BDKE-S04			23-Oct-98
HB-6234	CS-BDKE-S05			23-Oct-98
HB-99-SD-30	30	Pesticides/Herbicides, PNAs, TPH, VOCs, Metals	FW, 2000	06-Aug-99
HB-99-SD-31	31			05-Aug-99
HB-99-SD-34	34			06-Aug-99
HB-99-SD-35	35			06-Aug-99
HB-99-SD-37	37			05-Aug-99
HB-99-SD-38	38			05-Aug-99
HB-99-SD-38x	38			05-Aug-99
HB-99-SD-32	32	Pesticides/Herbicides, PNAs, TPH, VOC, Metals, Cresols, Carbazole		06-Aug-99
HB-99-SD-36	36			06-Aug-99
HB-99-SD-39	39			06-Aug-09
Boat Dock Channel Area				
HB-99-SD-33	33	Pesticides/Herbicides, PNAs, TPH, VOCs, Metals	FW, 2000	12-Aug-99
CSM-BD-SD-300	CSM-BD-SD-300	Metals, Mercury, Pesticides	USACE, 2001/2002	18-Dec-01
CSM-BD-SS-301	CSM-BD-SS-301			18-Dec-01
CSM-BD-SS-302	CSM-BD-SS-302			18-Dec-01
CSM-BD-SD-303	CSM-BD-SD-303			19-Dec-01
HB-99-BD-33A	HB-99-BD-33A			19-Dec-01

Table B-8
Area 14
Samples Used to Characterize Site

Sample Number	Sample Location	Analyses Conducted	Reference	Date of Sample
CSM-A14-SD-370	CSM-A14-SD-370	Metals, Mercury, Pesticides, TPH-E, PAHs, PCBs	USACE 2001/2002	17-Jan-02 and 12-Dec-01
CSM-A14-SD-371	CSM-A14-SD-371			12-Dec-01
CSM-A14-SD-372	CSM-A14-SD-372			12-Dec-01
CSM-A14-SD-373	CSM-A14-SD-373			12-Dec-01
CSM-A14-SD-374	CSM-A14-SD-374			12-Dec-01
CSM-A14-SD-375	CSM-A14-SD-375			12-Dec-01
CSM-A14-SD-376	CSM-A14-SD-376			17-Jan-02 and 12-Dec-01
CSM-A14-SD-377	CSM-A14-SD-377			12-Dec-01
CSM-A14-SD-378	CSM-A14-SD-378			12-Dec-01

Table B-9
Former Sewage Treatment Plant Outfall
Samples Used to Characterize Site

Sample Number	Sample Location	Analyses Conducted	Reference	Date of Sample
TP301SS1	TP-SD-03	Metals	ESI, 1993	14-Mar-91
TWA-SD15	TWA-SD15	metals (including methyl mercury), herbicides, pesticides, SVOCs, TPH	WCFS, 1996	11-May-95
TWA-SD15-15	TWA-SD15			11-May-95
TWA-SD15-30	TWA-SD15			11-May-95
CSM-HM-SD-396	CSM-HM-SD-396	metals, mercury	USACE 2001/2002	17-Dec-01
CSM-HM-SD-397	CSM-HM-SD-397			17-Dec-01
CSM-HM-SD-398	CSM-HM-SD-398			17-Dec-01
CSM-HM-SD-402	CSM-HM-SD-402	PCBs		31-Jan-02
CSM-HM-SD-403	CSM-HM-SD-403			31-Jan-02
CSM-HM-SD-404	CSM-HM-SD-404			31-Jan-02
TP-SD03A	TP-SD03A	metals, mercury, pesticides, PCBs		17-Dec-01 and 7-Jan-02

APPENDIX C

Risk Assessment Contaminants of Concern for CSM Sites

TABLE C-1
Coastal Salt Marsh Sites Chemicals of Concern Determined from the Human Health and Ecological Risk Assessment

Receptor	Chemicals of Concerr				
	East Levee Const. Debris Disposal Area	High Marsh	Outfall Drainage Ditch	Boat Dock	Antenna Debris Area
Human Health					
Grassland Recreation	NA	NA	NA	NA	NA
Marsh Recreation	None	Arsenic and benzo(a)pyrene	Arsenic and benzo(a)pyrene	Benzo(a)pyrene	Arsenic and total PCBs
Recreational fishing	NA	NA	Arsenic, dieldrin, gamma-chlordane, and total PCBs	NA	NA
Ecological					
Salt Marsh Harvest Mouse	Barium, boron, molybdenum, and nickel	Arsenic, barium, boron, cobalt, manganese, nickel, and vanadium	NA	Barium, copper, thallium, and zinc	Antimony, arsenic, barium, cobalt, copper, manganese, nickel, thallium, vanadium, zinc, and total PCBs
Pickleweed	Boron, chromium, lead, molybdenum, nickel, zinc, and benzo(a)pyrene	Arsenic, boron, chromium, cobalt, copper, lead, lithium, manganese, mercury, nickel, vanadium, zinc, and benzo(a)pyrene	NA	Copper, lead, thallium, zinc, and benzo(a)pyrene	Antimony, arsenic, barium, cadmium, chromium, cobalt, copper, lead, manganese, mercury, nickel, silver, thallium, vanadium, zinc, and benzo(a)pyrene
California Clapper Rail	Lead, 4,4-DDE, and di-n-butylpthalate	Chromium, cobalt, copper, vanadium, zinc, chlordane, 4,4-'DDD, 4,4-DDT, 4,4-DDE, dichlorprop, and di-n-butylphthalate	Lead, 4,4-DDE, 4,4-DDD, and di-n-butylpthalate	Lead and 4,4-DDT	Copper, lead, 4,4-'DDD, 4,4-DDT, 4,4-DDE, and total PCBs
Black Rail	Chromium, lead, zinc, aroclor 1254, 4,4-DDE, and di-n-butylpthalate	Boron, chromium, copper, lead, lithium, mercury, nickel, selenium, vanadium, zinc, chlordane, 4,4-'DDD, 4,4-DDT, 4,4-DDE, dichlorprop, d n-butylphthalate, total PCBs	Chromium, copper, lead, 4,4-DDD, 4,4-DDT, 4,4-DDE, and di-n-butylphthalate	Copper, lead, and 4,4-DDE	Chromium, copper, lead, zinc, 4,4-DDD, 4,4-DDT, 4,4-DDE, and total PCBs
Amphipod	NA	NA	Arsenic, beryllium, cadmium, chromium, cobalt, copper, lead, manganese, mercury, nickel, vanadium, zinc, alpha chlordane, gamma chlordane, 4,4-DDT, 4,4-DDE, 4,4-DDD, dieldrin, TPH-diesel, total PCBs, acenapthene, anthracene, benzo(a)anthracene, benzo(a)pyrene, bis(2-ethylhexyl)phthtalate, chrysene, fluoranthene, pentachlorophenol, phenanthrene, phenol, and pyrene	NA	NA
Bay Shrimp	NA	NA	Silver, boron, and phenol	NA	NA
Salmonid	NA	NA	None	NA	NA
Northern Anchovy	NA	NA	None	NA	NA
Cormorant	NA	NA	None	NA	NA
Algae	NA	NA	Manganese, silver, and phenol	NA	NA

NA Not Applicable

APPENDIX D

DDT Action Goal Documentation

APPENDIX D

DDT Action Goal Documentation

Documentation for DDT Action Goal of 0.03 ppm

The agreed to DDT action goal of 0.03 ppm presented in this FFS is derived below.

Calculation of Toxicity Reference Value (TRV) for DDT

The current avian toxicity reference value (TRV) is based on regional data collected on pelicans (sensitive receptor) from the 1970s in the Southern California Bight. Based on this study an acceptable dose for the pelican was determined to be 0.027 mg/kg-day on a wet-weight basis based on observed average wet weight fish tissue concentrations of 0.15 mg/kg (see below). The fish tissue concentration was based on anchovies and a water-column based exposure. The TRV value derived for pelican is chemical-specific and can be applied to similar avian species.

TRV_{DDT} = Tissue concentration in prey * IR / BW

where

Tissue concentration = 0.150 mg/kg wet weight in pelican diet (LOAEL)
LOAEL – Lowest Observable Adverse Effect Level
Ingestion Rate (IR) = 0.62 kg wet weight/day for pelican
Body Weight (BW) = 3.5 kg for pelican

(0.150 * 0.62)/3.5 = 0.027 mg/kg-day

The 0.027 mg/kg-day dose still represented a 30% decrease in fledging rates so an uncertainty factor of 3 was applied to make it a No Observable Adverse Effect Level (NOAEL):

Dose / Uncertainty Factor = TRV_{low}

TRV_{DDT} = 0.027 / 3 = 0.009 mg/kg-day

The value of 0.009 mg/kg-day corresponds to the low TRV value developed by the BTAG.

Calculation of concentration protective of clapper rail, using pelican TRV

To calculate a sediment concentration protective of the clapper rail, a regression from the pelican-based TRV was used. The ingestion rate and body weight for clapper rail are based on USFWS recommendations. The IR (0.036 kg/day dry weight) calculated by USFWS is based on Nagy's (1987) allometric equation for a bird consuming equal amounts of worms, crabs and mussels. The result is an average tissue concentration in the prey diet of 0.098 mg/kg dry weight. Body weight is based on a thesis by Joy Albertson for average Clapper Rail female body weight.

(TRV * BW) / IR = Calculated concentration protective of Clapper Rail

BW = 0.346 kg
IR = 0.036 kg /day dry weight

Prey tissue concentration protective of clapper rail = (0.009 * 0.346) / 0.036 = 0.098 mg/kg dry weight

To calculate an associated sediment number from tissue, a bioaccumulation factor related to sediment (BSAF):

To arrive at an associated sediment number from tissue, you need to use some kind of accumulation factor. USFWS suggested a range of BAF factors from 2.74 to around 75. A median BSAF of 2.70 for DDT has been documented (Tracey and Hansen 1996).

Sediment concentration protective of clapper rail = prey tissue concentration protective of clapper rail / BSAF

BSAF = 2.70
Prey tissue concentration protective of clapper rail = 0.098 mg/kg dry weight

Sediment concentration protective of clapper rail = 0.098 / 2.70 = 0.036 mg/kg

However, because prey ingestion only accounts for 82% of the exposure (USFWS suggests 18% of exposure is from direct incidental sediment ingestion based on sandpipers), it is necessary to take sediment ingestion into account. Therefore, the sediment concentration with no effects can be calculated through the following equation:

Sediment concentration with no effects = percent prey ingestion * sediment concentration protective of clapper rail

Percent prey ingestion = 82% of diet
Sediment concentration protective of clapper rail = 0.036

0.82 * 0.036 = 0.02952, which rounds to **0.030 mg/kg**

APPENDIX E

Cost Estimates

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Cost Tables

APPENDIX E

Cost Estimates

Cost estimates were developed for each remedial alternative to compare costs within plus 50 percent to minus 30 percent accuracy. Cost estimates are based on generic cost units, vendor information, conventional cost-estimating guides, and prior similar estimates as modified by site specific information. No allowances for inflation have been included. Estimated costs for each site-specific remedial alternative are presented in Table E-1.

Site-specific information was utilized in developing the costs for the remedial alternatives. Areas and volumes of the impacted media were used for calculations involving treatment volumes, remediation system sizing, confirmation sampling, etc. Excavated volumes and areas for the Coastal Salt Marsh sites are presented in Table E-2.

TABLE E-1
Coastal Salt Marsh Remedial Alternative Costs

Site	Alternative	Cost
Antenna Debris Disposal Area	No Further Action	$0
	Excavation and Offsite Disposal	$248,500
East Levee Construction Debris Disposal Area	No Further Action	$0
	Excavation and Offsite Disposal	$942,000
High Marsh Area—Nonchannel Cut	No Further Action	$0
	Excavation and Offsite Disposal	$1,333,000
High Marsh Area—Proposed HWRP Channel Cut	No Further Action	$0
	Excavation and Offsite Disposal	$520,600
Historical Outfall Drainage Ditch	No Further Action	$0
	Excavation and Offsite Disposal	$138,000
Outfall Drainage Ditch	No Further Action	$0
	Excavation and Offsite Disposal	$266,000
Boat Dock Nonchannel Area	No Further Action	$0
	Excavation and Offsite Disposal	$46,300
Boat Dock Channel Area	No Further Action	$0
	Excavation and Offsite Disposal	$62,100
Area 14	No Further Action	$0
	Excavation and Offsite Disposal	$224,800
Former Sewage Treatment Plant Outfall	No Further Action	$0
	Excavation and Offsite Disposal	$217,300

TABLE D-2
Coastal Salt Marsh Excavation Areas and Volumes

Site	Area (square feet)	Area (acre)	Volume (cubic yard)
Antenna Debris Disposal Area	11,000	0.25	2,040
East Levee Construction Debris Disposal Area	14,800	0.340	3,180
High Marsh Area—Nonchannel Cut	116,000	2.66	12,889
High Marsh Area- Proposed HWRP Channel Cut	34,200	0.785	5.000
Historical Outfall Drainage Ditch	9,000	0.207	1,330
Outfall Drainage Ditch	34,200	0.785	1,900
Boat Dock Non-Channel Area	1,150	0.0264	128
Boat Dock Channel Area	600	0.0138	67
Area 14	11,250	0.258	1,670
Former Sewage Treatment Plant Outfall	3,250	0.0746	241

Generic Cost Estimates

1. CONFIRMATION SAMPLING (Pre or Post Construction)

A. Analytical costs per sample

Method	Method No.	Cost
VOCs	8260	$235
Pesticides	8080	$210
PCBs	8080	$130
TPH as Gasoline	8015M	$105
TPH as Diesel	8015M	$115
PAHs/SVOCs	8270	$210
Dioxins/Furans	8290	$1,400
Total Metals	6010/7000	$240

B. Sampling costs per sample

			$$/Sample	
1) Labor for sampling (per sample location)				
Assume chargeout rate for 1-Sampling Technician @	$52	per hour		
Assume 1 hour/sample location for sampling, shipping				
1 hour/sample location x 1 Technician x $52/hour =			$52	
2) Rental equipment for sampling (per sample location)				
Assume rental of sampling equipment, shipping, etc. @	$75	per day		
Assume 1 hour per sample location for sampling, etc.				
(1 hour/sample location) / (8 hours/day) x $75/day =			$10	
3) Drill rig for pre-construction sampling (per day)				
Assume cost for drill rig	$2,750	per day		
Assume 0.25 hours per sample location for sampling, etc.				
(0.25 hour/sample location) / (8 hours/day) x $2,750/day =			$95	
3) Labor for data validation (per sample)				
Assume 1 hour/sample				
Assume chargeout rate for 1-Validation Chemist @	$55	per hour		
1 hour/sample x $55/hour =			$55	
TOTAL HAND SAMPLING. COSTS PER SAMPLE (Not incl analytical)			**$117**	**Per Sample**
TOTAL DRILL RIG SAMPLING. COSTS PER SAMPLE (Not incl analytical)			**$202**	**Per Sample**

2. EXCAVATION

A. Mechanical

EQUIPMENT (including operator):	$$/HOUR	
1 - CATERPILLAR 315 EXCAVATOR	$181	
1 - CATERPILLAR 966D LOADER	$130	
TOTAL EQUIPMENT COSTS (Per hour)	$311	
EXCAVATION RATE IN CUBIC YARDS PER HOUR =	40	
LOADER RATE IN CUBIC YARDS PER HOUR (EACH) =	100	
TOTAL COST PER CUBIC YARD	**$5.18**	**Per CY**
MOBILIZATION/DEMOBILIZATION	**$1,500**	**Per Job**

B. Manual

Assume chargeout rate for 2-laborer @ $52/hour each (per hour)	$104	
Assume can excavate 1 cubic yard per hour	$1	
TOTAL COST PER CUBIC YARD	**$104**	**Per CY**

3. ONSITE TRANSPORTATION

A.	Assume: 2 mile haul distance (one way) swell factor = 25% use 10 cubic yard truck 50 minutes/hour			
	1. Loose measure = 2 loaders @ 100 cy/hour * 1.25 = 250 cy/hour / 60 minutes =		4.17	cy/min
	2. Time to load a 40 cy truck			
	10 cy / 4.17 cy/min =		2.4	minutes
	3. Truck unload =	2 minutes		
	4. Spot truck =	1 minutes		
	5. Travel cycle (RT) =	15 minutes		
	6. Fixed cycle = 1.0 min + 2.0 min + 2.4 min		5.4	minutes
	50 min/hour / (5.4 min + 15 min)		2.45	loads per hr
	2.45 loads/hour * 10 cy/truck		24.51	cy output
	Equipment (including operator):			
	1 - 10 CY TRUCK		$100	
	TOTAL COST PER CUBIC YARD		**$4.08**	**Per CY**
B.	Assume: 1 mile haul distance (one way) swell factor = 25% use 10 cubic yard truck 50 minutes/hour			
	1. Loose measure = 2 loaders @ 100 cy/hour * 1.25 = 250 cy/hour / 60 minutes =		4.17	cy/min
	2. Time to load a 10 cy truck			
	10 cy / 4.17 cy/min =		2.4	minutes
	3. Truck unload =	2 minutes		
	4. Spot truck =	1 minutes		
	5. Travel cycle (RT) =	7.5 minutes		
	6. Fixed cycle = 1.0 min + 2.0 min + 2.4 min =		5.4	minutes
	50 min/hour / (5.4 min + 7.5 min) =		3.88	loads/hour
	3.88 loads/hour * 10 cy/truck =		38.76	cy output
	Equipment (including operator):			
	1 - 10 cubic yard truck		$100	
	TOTAL COST PER CUBIC YARD		**$2.58**	**Per CY**

4. OFFSITE TRANSPORTATION AND DISPOSAL

A. Disposal

	$$/CY Class I	$$/CY Class II	$$/CY Class III
Disposal Costs (assume 1.3 tons/cy) =	$50	$23	$16
County tax at 10%	$5	$2	$2
Transportation Costs =	$50	$19	$10
TOTAL COST PER CUBIC YARD	**$105**	**$44**	**$27**

B. Waste Profile

TOTAL WASTE PROFILE FEE (One time cost)	**$300**	**$300**	**$300**

5. EXCAVATION BACKFILL

Import of backfill material (includes material and delivery) =	**$10**	**Per CY**
Equipment (including operator):	$$/Hour	
1 - Front-End Loader	$130	
2- Dump Trucks (@ $65/hr)	$130	
1 - Roller Dozer	$165	
Total Equipment cost (per hour)	$425	
Rate in cubic yards per hour =	150	
TOTAL COST PER CUBIC YARD	**$2.83**	**Per CY**
Mobilization/Demobilization	**$1,300**	**Per Job**

6. DEWATERING

		$$/Week	
Equipment			
	1 pump @ 200 gpm @ $1,000 per month	$300	
	1,000' hose @ $1,000 per month	$300	
	1 2,400-gallon tank @ $500 per month	$200	
Labor			
	Assume chargeout rate for 1-laborer @ $52/hour	$2,080	
TOTAL DEWATERING COST		**$2,880**	**Per Week**

7. SURVEYING

	$$/Day	
Equipment		
1 truck @ $100 per day	$100	
Survey equipment @ $1,500 per day	$1,500	
Labor		
Assume chargeout rate for 2-surveyors @ $90/hour each	$1,440	
TOTAL SURVEYING COST	**$3,040**	**Per Day**

8. TEMPORARY ROADS (Mobe and Demobe)

Materials				
Crane Mat (4 ft x 12 ft)	$550 Ea			
Equipment				
			$$/HOUR	
1 - CATERPILLAR 315 EXCAVATOR			$181	
1 - CATERPILLAR 966D LOADERS			$130	
TOTAL EQUIPMENT COSTS (Per hour)			$311	
Hours to install Crane Mat (per 12-ft pieces)		1		
Hours to remove Crane Mat (per 12-ft pieces)		1		
Labor				
Assume chargeout rate for 2-laborer @ $52/hour each (per hour)			$104	
Installation/Removal Summary				
Installation (Per 4-ft Length - Does not include purchase of mat)			$415	
Installation (Per 4-ft Length - Includes purchase of mat)			$965	
Removal (Per 4-ft Length)			$415	
TOTAL TEMPORARY ROADS COST (Incl. Purchase of Mat)			**$1,380**	**Per 4-ft Length**
TOTAL TEMPORARY ROADS COST (Not Incl. Purchase of Mat)			**$830**	**Per 4-ft Length**

9. REMOVE SLURRY PIPING - 380-FT LENGTHS

Equipment			
			$$/HOUR
	1 - CATERPILLAR 320 EXCAVATOR		$210
Materials			
	Sling	$1,000	$31.25
Labor			
	Assume chargeout rate for 2-laborer @ $52/hour each (per hour)		$104
Duration			
	Assume 16 hours to remove & 16 hours to replace	32 Hours	
Cost for replacing concrete support			$10,000
Cost for pressure testing of pipeline			$10,000
TOTAL SLURRY PIPE REMOVAL & REPLACE			**$31,048**

10. SITE CONTROLS & BIOLOGIST

Materials			
Silt/Mouse Fence:	Material cost per foot	$1	Per Foot
Labor			
Assume chargeout rate for 2-laborer @ $52/hour each (per hour)		$104	Per Hour
Assume can erect 25 ft per hour		25	Ft/Hour
TOTAL COST PER FOOT - SILT/MOUSE FENCE		**$5**	**Per Lin. Ft.**
Biologist			
Assume chargeout Rate for Sr. Biologist @ $100/Hour		100	
TOTAL COST PER BIOLOGIST PER DAY		**$800**	**Per Day**

11. DEMOLISH RAMP PORTION OF DOCK

Equipment		
		$$/HOUR
1 - CATERPILLAR 320 EXCAVATOR		$210
1 - CHAIN SAW		$10
Labor		
Assume chargeout rate for 2-laborer @ $52/hour each (per hour)		$104
Duration		
Assume 16 hours to remove & load for disposal	16	
TOTAL DEMOLISH RAMP PORTION OF DOCK		**$5,184**

12. Demolish Former Sewage Treatment Plant Piping

Equipment				
				$$/HOUR
	1 - CATERPILLAR 315 EXCAVATOR			$210
Labor				
	Subcontract specialty labor (per hour)	$57 Per hour		
	Assume four laborers @ $57 per hour			$228
Duration				
	Assume 3 days (24 hours) to remove & load for disposal		24	
Transportation & Disposal			$1,500	
TOTAL DEMOLISH FORMER SEWAGE TREATMENT PLANT PIPING				**$13,213.20**

Site-Specific Cost Estimates

Antenna Debris Disposal Area - Excavation and Offsite Disposal

1. Pre-Removal Confirmation Sampling **$0**

Total # of Samples			0
If **hand** sampling - Use this row			0
If sampling with **drill rig** - Use this row			
		Put # of Smpls here	
# of VOC samples		0	0
# of Pesticides samples		0	0
# of PCBs samples		0	0
# TPH-G samples		0	0
# TPH-D samples		0	0
# PAHs/SVOCs samples		0	0
# Dioxins/Furans samples		0	0
# Metals samples		0	0
	#	Unit $	
Individual metals:	0	$18	0

2. Post-Removal Confirmation Sampling **$9,889**

Total # of Samples			26
If **hand** sampling - Use this row			3,050
If sampling with **drill rig** - Use this row			
		Put # of Smpls here	
# of VOC samples		0	0
# of Pesticides samples		21	4,851
# of PCBs samples		10	1,430
# TPH-G samples		0	0
# TPH-D samples		0	0
# PAHs/SVOCs samples		0	0
# Dioxins/Furans samples		0	0
# Metals samples		0	0
	#	Unit $	
Individual metals:	31	$18	558

3. Excavation of Sediments **$11,850**

Total # of cubic Yards	2,000
Cost for Excavation	$10,350
Mobilization/Demobilization of Equipment	$1,500

4. Onsite Transportation & Staging **$6,450**

Haul distance (1 or 2 miles one-way)?				1
Total # of cubic yards + 25% swell factor	2000	x	1.25	2500
Cost for 1-mile haul distance				$6,450

Cost for 2-mile haul distance

5. Offsite Transportation and Disposal				**$109,695**
Total # of cubic yards-- + 25% swell factor	2000	x	1.25	2,500
Cost for Disposal (assume Class II)				$109,395
Waste Profile Fee (One time cost)				$300
6. Excavation Backfill				**$6,967**
Total # of bank cubic yards				2,000
Cost for backfill (including fill material)				$5,667
Cost for mobe/demobe				$1,300
7. Dewatering				**$15,840**
Total # weeks of job				5
Cost for Dewatering				$15,840
8. Surveying				**$6,688**
Total # days to survey site				2
Cost for Surveying				$6,688
9. Temporary Access Roads				**$0**
Purchase Crane Mats?				no
Total length of roadway (in feet)				$0
Installation (if "**yes**" to above)				$0
Installation (if "**no**" to above)				$0
10. Site Controls & Biologist				**$16,665**
Total # linear feet of fencing				1,500
Cost for fencing				$7,065
Total # days for biologist				12
Cost for biologist				$9,600

SUBTOTAL CAPITAL COSTS	**$184,044**
15% BID CONTINGENCY	**$27,607**
15% SCOPE CONTINGENCY	**$27,607**
5% PERMITTING COSTS	**$9,202**
TOTAL CAPITAL COSTS	**$248,500**

East Levee Construction Debris Disposal Area - Excavation and Offsite Disposal

1. Pre-Removal Confirmation Sampling **$0**

Total # of Samples				0
If **hand** sampling - Use this row				0
If sampling with **drill rig** - Use this row				0
			Put # of Smpls here	
# of VOC samples			0	0
# of Pesticides samples			0	0
# of PCBs samples			0	0
# TPH-G samples			0	0
# TPH-D samples			0	0
# PAHs/SVOCs samples			0	0
# Dioxins/Furans samples			0	0
# Metals samples			0	0
	#	Unit $		
Individual metals:	0	$18		0

2. Post-Removal Confirmation Sampling **$15,844**

Total # of Samples				32
If **hand** sampling - Use this row				$3,754
If sampling with **drill rig** - Use this row				
			Put # of Smpls here	
# of VOC samples			0	$0
# of Pesticides samples			8	$1,848
# of PCBs samples			12	$1,716
# TPH-G samples			0	$0
# TPH-D samples			4	$506
# PAHs/SVOCs samples			4	$924
# Dioxins/Furans samples			4	$6,160
# Metals samples			0	$0
	#	Unit $		
Individual metals:	52	$18		$936

3. Excavation of Sediments **$18,060**

Total # of cubic Yards	3,200
Cost for Excavation	$16,560
Mobilization/Demobilization of Equipment	$1,500

4. Onsite Transportation & Staging **$16,320**

Haul distance (1 or 2 miles one-way)?				2
Total # of cubic yards + 25% swell factor	3200	x	1.25	4000
Cost for 1-mile haul distance				
Cost for 2-mile haul distance				$16,320

5. Offsite Transportation and Disposal **$175,332**

Total # of cubic yards-- + 25% swell factor	3200	x	1.25	4,000
Cost for Disposal (assume Class II)				$175,032
Waste Profile Fee (One time cost)				$300

6. Excavation Backfill **$5,833.33**

Total # of bank cubic yards	1,600
Cost for backfill (including fill material)	$4,533
Cost for mobe/demobe	$1,300

7. Dewatering **$9,504**

Total # weeks of job	3
Cost for Dewatering	$9,504

8. Surveying **$13,376**

Total # days to survey site	4
Cost for Surveying	$13,376

9. Temporary Access Roads **$397,343**

Purchase Crane Mats?	yes
Total length of roadway (in feet)	1,020
Installation (if "**yes**" to above)	$351,900
Installation (if "**no**" to above)	$45,443
Total length of roadway (in feet) for non-purchase	219

10. Site Controls & Biologist **$12,069**

Total # linear feet of fencing	864
Cost for fencing	$4,069
Total # days for biologist	10
Cost for biologist	$8,000

11. Remove and Replace Slurry Pipe (240 feet) **$34,152.80**

Cost to remove & replace pipe and one pipe support	$31,048

SUBTOTAL CAPITAL COSTS	**$697,834**
15% BID CONTINGENCY	**$104,675**
15% SCOPE CONTINGENCY	**$104,675**
5% PERMITTING COSTS	**$34,892**
TOTAL CAPITAL COSTS	**$942,000**

High Marsh Area, Nonchannel Cut - Excavation and Offsite Disposal

1. Pre-Removal Confirmation Sampling **$0**

Total # of Samples				0
If **hand** sampling - Use this row				0
If sampling with **drill rig** - Use this row				0
			Put # of Smpls here	
# of VOC samples			0	0
# of Pesticides samples			0	0
# of PCBs samples			0	0
# TPH-G samples			0	0
# TPH-D samples			0	0
# PAHs/SVOCs samples			0	0
# Dioxins/Furans samples			0	0
# Metals samples			0	0
	#	Unit $		
Individual metals:	0	$18		0

2. Post-Removal Confirmation Sampling **$30,212**

Total # of Samples				88
If **hand** sampling - Use this row				$10,324
If sampling with **drill rig** - Use this row				
			Put # of Smpls here	
# of VOC samples			0	$0
# of Pesticides samples			24	$5,544
# of PCBs samples			8	$1,144
# TPH-G samples			0	$0
# TPH-D samples			0	$0
# PAHs/SVOCs samples			16	$3,696
# Dioxins/Furans samples			0	$0
# Metals samples			33	$8,712
	#	Unit $		
Individual metals:	44	$18		$792

3. Excavation of Sediments **$68,258**

Total # of cubic Yards	12,900
Cost for Excavation	$66,758
Mobilization/Demobilization of Equipment	$1,500

4. Onsite Transportation & Staging **$65,790**

Haul distance (1 or 2 miles one-way)?				2
Total # of cubic yards + 25% swell factor	12900	x	1.25	16125
Cost for 1-mile haul distance				
Cost for 2-mile haul distance				$65,790

5. Offsite Transportation and Disposal **$705,898**

Total # of cubic yards-- + 25% swell factor	12900	x	1.25	16,125
Cost for Disposal (assume Class II)				$705,598
Waste Profile Fee (One time cost)				$300

6. Excavation Backfill **$37,850.00**

Total # of bank cubic yards	12,900
Cost for backfill (including fill material)	$36,550
Cost for mobe/demobe	$1,300

7. Dewatering **$9,504**

Total # weeks of job	3
Cost for Dewatering	$9,504.00

8. Surveying **$13,376**

Total # days to survey site	4
Cost for Surveying	$13,376

9. Temporary Access Roads **$41,500**

Purchase Crane Mats?	no
Total length of roadway (in feet)	200
Installation (if "**yes**" to above)	
Installation (if "**no**" to above)	$41,500

10. Site Controls & Biologist **$15,346**

Total # linear feet of fencing	1,220
Cost for fencing	$5,746
Total # days for biologist	12
Cost for biologist	$9,600

SUBTOTAL CAPITAL COSTS	**$987,733**
15% BID CONTINGENCY	**$148,160**
15% SCOPE CONTINGENCY	**$148,160**
5% PERMITTING COSTS	**$49,387**
TOTAL CAPITAL COSTS	**$1,333,000**

High Marsh Area, Porposed HWRP Channel Cut - Excavation and Offsite Disposal

Capital Costs

1. Pre-Removal Confirmation Sampling **$0**

Total # of Samples			0
If **hand** sampling - Use this row			0
If sampling with **drill rig** - Use this row			0
		Put # of Smpls here	
# of VOC samples		0	0
# of Pesticides samples		0	0
# of PCBs samples		0	0
# TPH-G samples		0	0
# TPH-D samples		0	0
# PAHs/SVOCs samples		0	0
# Dioxins/Furans samples		0	0
# Metals samples		0	0
	#	Unit $	
Individual metals:	0	$18	0

2. Post-Removal Confirmation Sampling **$10,076**

Total # of Samples			9
If **hand** sampling - Use this row			1,056
If sampling with **drill rig** - Use this row			
		Put # of Smpls here	
# of VOC samples		0	0
# of Pesticides samples		11	2,541
# of PCBs samples		0	0
# TPH-G samples		0	0
# TPH-D samples		10	1,265
# PAHs/SVOCs samples		10	2,310
# Dioxins/Furans samples		0	0
# Metals samples		11	2,904
	#	Unit $	
Individual metals:	0	$18	0

3. Excavation of Sediments **$27,375**

Total # of cubic Yards	5,000
Cost for Excavation	$25,875
Mobilization/Demobilization of Equipment	$1,500

4. Onsite Transportation & Staging **$16,125**

Haul distance (1 or 2 miles one-way)?				1
Total # of cubic yards + 25% swell factor	5000	x	1.25	6250
Cost for 1-mile haul distance				$16,125
Cost for 2-mile haul distance				

5. Offsite Transportation and Disposal **$273,788**

Total # of cubic yards-- + 25% swell factor	5000	x	1.25	6,250
Cost for Disposal (assume Class II)				$273,488
Waste Profile Fee (One time cost)				$300

6. Excavation Backfill **$14,166.67**

Total # of bank cubic yards	5,000
Cost for backfill (including fill material)	$14,167
Cost for mobe/demobe	

7. Dewatering **$3,168**

Total # weeks of job	1
Cost for Dewatering	$3,168.00

8. Surveying **$6,688**

Total # days to survey site	2
Cost for Surveying	$6,688

9. Temporary Access Roads **$29,050**

Purchase Crane Mats?	no
Total length of roadway (in feet)	140
Installation (if "**yes**" to above)	
Installation (if "**no**" to above)	$29,050

10. Site Controls & Biologist **$5,226**

Total # linear feet of fencing	600
Cost for fencing	$2,826
Total # days for biologist	3
Cost for biologist	$2,400

SUBTOTAL CAPITAL COSTS	**$385,662**
15% BID CONTINGENCY	**$57,849**
15% SCOPE CONTINGENCY	**$57,849**
5% PERMITTING COSTS	**$19,283**
TOTAL CAPITAL COSTS	**$520,600**

Historic Outfall Drainage Ditch - Excavation and Offsite Disposal

Capital Costs

1. Pre-Removal Confirmation Sampling **$0**

Total # of Samples			0
If **hand** sampling - Use this row			0
If sampling with **drill rig** - Use this row			
		Put # of Smpls here	
# of VOC samples		0	0
# of Pesticides samples		0	0
# of PCBs samples		0	0
# TPH-G samples		0	0
# TPH-D samples		0	0
# PAHs/SVOCs samples		0	0
# Dioxins/Furans samples		0	0
# Metals samples		0	0
	#	Unit $	
Individual metals:	0	$18	0

2. Post-Removal Confirmation Sampling **$381**

Total # of Samples			1
If **hand** sampling - Use this row			117
If sampling with **drill rig** - Use this row			
		Put # of Smpls here	
# of VOC samples		0	0
# of Pesticides samples		0	0
# of PCBs samples		0	0
# TPH-G samples		0	0
# TPH-D samples		0	0
# PAHs/SVOCs samples		0	0
# Dioxins/Furans samples		0	0
# Metals samples		1	264
	#	Unit $	
Individual metals:	0	$18	0

3. Excavation of Sediments **$8,383**

Total # of cubic Yards	1,330
Cost for Excavation	$6,883
Mobilization/Demobilization of Equipment	$1,500

4. Onsite Transportation & Staging **$6,783**

Haul distance (1 or 2 miles one-way)?				2
Total # of cubic yards + 25% swell factor	1330	x	1.25	1663
Cost for 1-mile haul distance				
Cost for 2-mile haul distance				$6,783

5. Offsite Transportation and Disposal **$73,048**

Total # of cubic yards-- + 25% swell factor	1330	x	1.25	1,663
Cost for Disposal (assume Class II)				$72,748
Waste Profile Fee (One time cost)				$300

6. Excavation Backfill **$0.00**

Total # of bank cubic yards	0
Cost for backfill (including fill material)	$0
Cost for mobe/demobe	

7. Dewatering **$3,168**

Total # weeks of job	1
Cost for Dewatering	$3,168.00

8. Surveying **$6,688**

Total # days to survey site	2
Cost for Surveying	$6,688

9. Temporary Access Roads **$0**

Purchase Crane Mats?	no
Total length of roadway (in feet)	$0
Installation (if "**yes**" to above)	$0
Installation (if "**no**" to above)	$0

10. Site Controls & Biologist **$3,862**

Total # linear feet of fencing	650
Cost for fencing	$3,062
Total # days for biologist	1
Cost for biologist	$800

SUBTOTAL CAPITAL COSTS	**$102,312**
15% BID CONTINGENCY	**$15,347**
15% SCOPE CONTINGENCY	**$15,347**
5% PERMITTING COSTS	**$5,116**
TOTAL CAPITAL COSTS	**$138,000**

Outfall Drainage Ditch - Excavation and Offsite Disposal

Capital Costs

1. Pre-Removal Confirmation Sampling — **$0**

Total # of Samples				0
If **hand** sampling - Use this row				0
If sampling with **drill rig** - Use this row				0
			Put # of Smpls here	
# of VOC samples			0	0
# of Pesticides samples			0	0
# of PCBs samples			0	0
# TPH-G samples			0	0
# TPH-D samples			0	0
# PAHs/SVOCs samples			0	0
# Dioxins/Furans samples			0	0
# Metals samples			0	0
	#	Unit $		
Individual metals:	0	$18		0

2. Post-Removal Confirmation Sampling — **$11,321**

Total # of Samples				19
If **hand** sampling - Use this row				2,229
If sampling with **drill rig** - Use this row				
			Put # of Smpls here	
# of VOC samples			0	0
# of Pesticides samples			16	3,696
# of PCBs samples			4	572
# TPH-G samples			0	0
# TPH-D samples			0	0
# PAHs/SVOCs samples			6	1,386
# Dioxins/Furans samples			0	0
# Metals samples			12	3,168
	#	Unit $		
Individual metals:	15	$18		270

3. Excavation of Sediments — **$11,333**

Total # of cubic Yards	1,900
Cost for Excavation	$9,833
Mobilization/Demobilization of Equipment	$1,500

4. Onsite Transportation & Staging — **$6,128**

Haul distance (1 or 2 miles one-way)?				1
Total # of cubic yards + 25% swell factor	1900	x	1.25	2375
Cost for 1-mile haul distance				$6,128

Cost for 2-mile haul distance				
5. Offsite Transportation and Disposal				**$104,225**
Total # of cubic yards-- + 25% swell factor	1900	x	1.25	2,375
Cost for Disposal (assume Class II)				$103,925
Waste Profile Fee (One time cost)				$300
6. Excavation Backfill				**$0.00**
Total # of bank cubic yards				0
Cost for backfill (including fill material)				$0
Cost for mobe/demobe				
7. Dewatering				**$3,168**
Total # weeks of job				1
Cost for Dewatering				$3,168.00
8. Surveying				**$6,688**
Total # days to survey site				2
Cost for Surveying				$6,688
9. Temporary Access Roads				**$33,200**
Purchase Crane Mats?				no
Total length of roadway (in feet)				160
Installation (if "**yes**" to above)				
Installation (if "**no**" to above)				$33,200
10. Site Controls & Biologist				**$20,956**
Total # linear feet of fencing				3,600
Cost for fencing				$16,956
Total # days for biologist				5
Cost for biologist				$4,000

SUBTOTAL CAPITAL COSTS	**$197,018**
15% BID CONTINGENCY	**$29,553**
15% SCOPE CONTINGENCY	**$29,553**
5% PERMITTING COSTS	**$9,851**
TOTAL CAPITAL COSTS	**$266,000**

Boat Dock Nonchannel Area - Excavation and Offsite Disposal

Capital Costs

1. Pre-Removal Confirmation Sampling **$0**

Total # of Samples				0
If **hand** sampling - Use this row				0
If sampling with **drill rig** - Use this row				
			Put # of Smpls here	
# of VOC samples			0	0
# of Pesticides samples			0	0
# of PCBs samples			0	0
# TPH-G samples			0	0
# TPH-D samples			0	0
# PAHs/SVOCs samples			0	0
# Dioxins/Furans samples			0	0
# Metals samples			0	0
	#	Unit $		
Individual metals:	0	$18		0

2. Post-Removal Confirmation Sampling **$2,508**

Total # of Samples				10
If **hand** sampling - Use this row				$1,173
If sampling with **drill rig** - Use this row				
			Put # of Smpls here	
# of VOC samples			0	$0
# of Pesticides samples			5	$1,155
# of PCBs samples			0	$0
# TPH-G samples			0	$0
# TPH-D samples			0	$0
# PAHs/SVOCs samples			0	$0
# Dioxins/Furans samples			0	$0
# Metals samples			0	$0
	#	Unit $		
Individual metals:	10	$18		$180

3. Excavation of Sediments **$2,173**

Total # of cubic yards		130
Cost for Excavation		$673
Mobilization/Demobilization of Equipment		$1,500
Manual excavation # cubic yards	0	
Cost for Excavation		$0

4. Onsite Transportation & Staging **$419**

Haul distance (1 or 2 miles one-way)?				1
Total # of cubic yards + 25% swell factor	130	x	1.25	163
Cost for 1-mile haul distance				$419
Cost for 2-mile haul distance				

5. Offsite Transportation and Disposal **$7,411**

Total # of cubic yards-- + 25% swell factor	130	x	1.25	163
Cost for Disposal (assume Class II)				$7,111
Waste Profile Fee (One time cost)				$300

6. Excavation Backfill **$1,668.33**

Total # of bank cubic yards	130
Cost for backfill (including fill material)	$368
Cost for mobe/demobe	$1,300

7. Dewatering **$3,168**

Total # weeks of job	1
Cost for Dewatering	$3,168.00

8. Surveying **$6,688**

Total # days to survey site	2
Cost for Surveying	$6,688

9. Temporary Access Roads **$8,300**

Purchase Crane Mats?	no
Total length of roadway (in feet)	40
Installation (if "**yes**" to above)	
Installation (if "**no**" to above)	$8,300

10. Site Controls & Biologist **$1,978**

Total # linear feet of fencing	250
Cost for fencing	$1,178
Total # days for biologist	1
Cost for biologist	$800

SUBTOTAL CAPITAL COSTS	**$34,313**
15% BID CONTINGENCY	**$5,147**
15% SCOPE CONTINGENCY	**$5,147**
5% PERMITTING COSTS	**$1,716**
TOTAL CAPITAL COSTS	**$46,300**

Boat Dock Channel Area - Excavation and Offsite Disposal

Capital Costs

1. Pre-Removal Confirmation Sampling **$0**

Total # of Samples				0
If **hand** sampling - Use this row				0
If sampling with **drill rig** - Use this row				
			Put # of Smpls here	
# of VOC samples			0	0
# of Pesticides samples			0	0
# of PCBs samples			0	0
# TPH-G samples			0	0
# TPH-D samples			0	0
# PAHs/SVOCs samples			0	0
# Dioxins/Furans samples			0	0
# Metals samples			0	0
	#	Unit $		
Individual metals:	0	$18		0

2. Post-Removal Confirmation Sampling **$829**

Total # of Samples				4
If **hand** sampling - Use this row				469
If sampling with **drill rig** - Use this row				
			Put # of Smpls here	
# of VOC samples			0	0
# of Pesticides samples			0	0
# of PCBs samples			0	0
# TPH-G samples			0	0
# TPH-D samples			0	0
# PAHs/SVOCs samples			0	0
# Dioxins/Furans samples			0	0
# Metals samples			0	0
	#	Unit $		
Individual metals:	20	$18		360

3. Excavation of Sediments **$1,862**

Total # of cubic Yards	70
Cost for Excavation	$362
Mobilization/Demobilization of Equipment	$1,500

4. Onsite Transportation & Staging **$226**

Haul distance (1 or 2 miles one-way)?				1
Total # of cubic yards + 25% swell factor	70	x	1.25	88
Cost for 1-mile haul distance				$226
Cost for 2-mile haul distance				

5. Offsite Transportation and Disposal **$4,129**

Total # of cubic yards-- + 25% swell factor	70	x	1.25	88
Cost for Disposal (assume Class II)				$3,829
Waste Profile Fee (One time cost)				$300

6. Excavation Backfill **$0.00**

Total # of bank cubic yards	0
Cost for backfill (including fill material)	$0
Cost for mobe/demobe	

7. Dewatering **$3,168**

Total # weeks of job	1
Cost for Dewatering	$3,168.00

8. Surveying **$6,688**

Total # days to survey site	2
Cost for Surveying	$6,688

9. Temporary Access Roads **$20,750**

Purchase Crane Mats?	no
Total length of roadway (in feet)	100
Installation (if "**yes**" to above)	
Installation (if "**no**" to above)	$20,750

10. Site Controls & Biologist **$1,507**

Total # linear feet of fencing	150
Cost for fencing	$707
Total # days for biologist	1
Cost for biologist	$800

11. Demolish and Dispose of Ramp Portion of Boat Dock **$6,834**

Total weight of demolished material (tons)	20
Cost for transportation & disposal ($40/t disp & $35/t trans)	$1,650
Cost for demolition	$5,184

SUBTOTAL CAPITAL COSTS	**$45,993**
15% BID CONTINGENCY	**$6,899**
15% SCOPE CONTINGENCY	**$6,899**
5% PERMITTING COSTS	**$2,300**
TOTAL CAPITAL COSTS	**$62,100**

Area 14 - Excavation and Offsite Disposal

Capital Costs

1. Pre-Removal Confirmation Sampling — **$5,425**

Total # of Samples				31
If **hand** sampling - Use this row				3,637
If sampling with **drill rig** - Use this row				
			Put # of Smpls here	
# of VOC samples			0	0
# of Pesticides samples			0	0
# of PCBs samples			0	0
# TPH-G samples			0	0
# TPH-D samples			12	1,518
# PAHs/SVOCs samples			0	0
# Dioxins/Furans samples			0	0
# Metals samples			0	0
	#	Unit $		
Individual metals:	15	$18		270

2. Post-Removal Confirmation Sampling — **$3,538**

Total # of Samples				24
If **hand** sampling - Use this row				2,816
If sampling with **drill rig** - Use this row				
			Put # of Smpls here	
# of VOC samples			0	0
# of Pesticides samples			0	0
# of PCBs samples			0	0
# TPH-G samples			0	0
# TPH-D samples			5	633
# PAHs/SVOCs samples			0	0
# Dioxins/Furans samples			0	0
# Metals samples			0	0
	#	Unit $		
Individual metals:	5	$18		90

3. Excavation of Sediments — **$10,298**

Total # of cubic Yards	1,700
Cost for Excavation	$8,798
Mobilization/Demobilization of Equipment	$1,500

4. Onsite Transportation & Staging — **$5,483**

Haul distance (1 or 2 miles one-way)?				1
Total # of cubic yards + 25% swell factor	1700	x	1.25	2125
Cost for 1-mile haul distance				$5,483
Cost for 2-mile haul distance				

5. Offsite Transportation and Disposal **$93,286**

Total # of cubic yards-- + 25% swell factor	1700	x	1.25	2,125
Cost for Disposal (assume Class II)				$92,986
Waste Profile Fee (One time cost)				$300

6. Excavation Backfill **$6,116.67**

Total # of bank cubic yards	1,700
Cost for backfill (including fill material)	$4,817
Cost for mobe/demobe	$1,300

7. Dewatering **$6,336**

Total # weeks of job	2
Cost for Dewatering	$6,336.00

8. Surveying **$6,688**

Total # days to survey site	2
Cost for Surveying	$6,688

9. Temporary Access Roads **$20,750**

Purchase Crane Mats?	no
Total length of roadway (in feet)	100
Installation (if "**yes**" to above)	
Installation (if "**no**" to above)	$20,750

10. Site Controls & Biologist **$8,568**

Total # linear feet of fencing	800
Cost for fencing	$3,768
Total # days for biologist	6
Cost for biologist	$4,800

SUBTOTAL CAPITAL COSTS	**$166,487**
15% BID CONTINGENCY	**$24,973**
15% SCOPE CONTINGENCY	**$24,973**
5% PERMITTING COSTS	**$8,324**
TOTAL CAPITAL COSTS	**$224,800**

Former Sewage Treatment Plant Outfall - Excavation and Offsite Disposal

Capital Costs

1. Pre-Removal Confirmation Sampling				**$0**
Total # of Samples				0
If **hand** sampling - Use this row				0
If sampling with **drill rig** - Use this row				0
			Put # of Smpls here	
# of VOC samples			0	0
# of Pesticides samples			0	0
# of PCBs samples			0	0
# TPH-G samples			0	0
# TPH-D samples			0	0
# PAHs/SVOCs samples			0	0
# Dioxins/Furans samples			0	0
# Metals samples			0	0
	#	Unit $		
Individual metals:	0	$18		0
2. Post-Removal Confirmation Sampling				**$1,107**
Total # of Samples				1
If **hand** sampling - Use this row				117
If sampling with **drill rig** - Use this row				
			Put # of Smpls here	
# of VOC samples			0	0
# of Pesticides samples			2	462
# of PCBs samples			0	0
# TPH-G samples			0	0
# TPH-D samples			0	0
# PAHs/SVOCs samples			0	0
# Dioxins/Furans samples			0	0
# Metals samples			2	528
	#	Unit $		
Individual metals:	0	$18		0
3. Excavation of Sediments				**$2,742**
Total # of cubic Yards				240
Cost for Excavation				$1,242
Mobilization/Demobilization of Equipment				$1,500
4. Onsite Transportation & Staging				**$1,224**
Haul distance (1 or 2 miles one-way)?				2
Total # of cubic yards + 25% swell factor			240 x 1.25	300
Cost for 1-mile haul distance				
Cost for 2-mile haul distance				$1,224

5. Offsite Transportation and Disposal **$13,427**

Total # of cubic yards-- + 25% swell factor	240	x	1.25	300
Cost for Disposal (assume Class II)				$13,127
Waste Profile Fee (One time cost)				$300

6. Excavation Backfill **$680.00**

Total # of bank cubic yards	240
Cost for backfill (including fill material)	$680
Cost for mobe/demobe	

7. Dewatering **$3,168**

Total # weeks of job	1
Cost for Dewatering	$3,168.00

8. Surveying **$6,688**

Total # days to survey site	2
Cost for Surveying	$6,688

9. Temporary Access Roads **$116,200**

Purchase Crane Mats?	no
Total length of roadway (in feet)	560
Installation (if "**yes**" to above)	
Installation (if "**no**" to above)	$116,200

10. Site Controls & Biologist **$2,542**

Total # linear feet of fencing	200
Cost for fencing	$942
Total # days for biologist	2
Cost for biologist	$1,600

11. Remove Former Sewage Treatment Plant Pipeline **$13,213**

Cost for removal, transportation, & Disposal	$13,213

SUBTOTAL CAPITAL COSTS	**$160,992**
15% BID CONTINGENCY	**$24,149**
15% SCOPE CONTINGENCY	**$24,149**
5% PERMITTING COSTS	**$8,050**
TOTAL CAPITAL COSTS	**$217,300**

Site Name - Excavation with Offsite Disposal - or - Limited Excavation with Offsite Disposal

Capital Costs

1. Pre-Removal Confirmation Sampling **$0**

Total # of Samples				0	
If **hand** sampling - Use this row				0	**! Delete this cell if not using**
If sampling with **drill rig** - Use this row				0	**! Delete this cell if not using**
			Put # of Smpls here		
# of VOC samples			0	0	
# of Pesticides samples			0	0	
# of PCBs samples			0	0	
# TPH-G samples			0	0	
# TPH-D samples			0	0	
# PAHs/SVOCs samples			0	0	
# Dioxins/Furans samples			0	0	
# Metals samples			0	0	
	#	Unit $			
Individual metals:	0	$18		0	

2. Post-Removal Confirmation Sampling **$0**

Total # of Samples				0	
If **hand** sampling - Use this row				0	**! Delete this cell if not using**
If sampling with **drill rig** - Use this row				0	**! Delete this cell if not using**
			Put # of Smpls here		
# of VOC samples			0	0	
# of Pesticides samples			0	0	
# of PCBs samples			0	0	
# TPH-G samples			0	0	
# TPH-D samples			0	0	
# PAHs/SVOCs samples			0	0	
# Dioxins/Furans samples			0	0	
# Metals samples			0	0	
	#	Unit $			
Individual metals:	0	$18		0	

3. Excavation of Sediments **$1,500**

Total # of cubic Yards	0	
Cost for Excavation	$0	
Mobilization/Demobilization of Equipment	$1,500	**! Delete this cell if not using**

4. Onsite Transportation & Staging **$0**

Haul distance (1 or 2 miles one-way)?				1	
Total # of cubic yards + 25% swell factor	0	x	1.25	0	
Cost for 1-mile haul distance				$0	**! Delete this cell if not using**
Cost for 2-mile haul distance				$0	**! Delete this cell if not using**

5. Offsite Transportation and Disposal **$300**

Total # of cubic yards-- + 25% swell factor	0	x	1.25	0	
Cost for Disposal (assume Class II)				$0	
Waste Profile Fee (One time cost)				$300	**! Delete this cell if not using**

6. Excavation Backfill **$1,300.00**

Total # of bank cubic yards	0	
Cost for backfill (including fill material)	$0	
Cost for mobe/demobe	$1,300	**! Delete this cell if not using**

7. Dewatering **$0**

Total # weeks of job	0
Cost for Dewatering	$0.00

8. Surveying **$0**

Total # days to survey site	0
Cost for Surveying	$0

9. Temporary Access Roads **$0**

Purchase Crane Mats?	no	
Total length of roadway (in feet)	0	
Installation (if "**yes**" to above)	$0	**! Delete this cell if not using**
Installation (if "**no**" to above)	$0	**! Delete this cell if not using**

10. Site Controls & Biologist **$0**

Total # linear feet of fencing	0
Cost for fencing	$0
Total # days for biologist	0
Cost for biologist	$0

SUBTOTAL CAPITAL COSTS	**$3,100**
15% BID CONTINGENCY	**$465**
15% SCOPE CONTINGENCY	**$465**
5% PERMITTING COSTS	**$155**
TOTAL CAPITAL COSTS	**$4,185**

Excavation Costs

Site	No Further Action	Excavation with Offsite Disposal
Antenna Debris Disposal Area	$0	$248,500
East Levee Construction Debris Disposal Area	$0	$942,000
High Marsh		
Non-Channel Cut	$0	$1,333,000
Proposed Channel Cut Area	$0	$520,600
Outfall Drainage Ditch	$0	$266,000
Historic Outfall Drainage Ditch	$0	$138,000
Boat Dock		
Non-Channel Area	$0	$46,300
Channel Area	$0	$62,100
Area 14	$0	$224,800
Former Sewage Treatment Plant Outfall	$0	$217,300

Excavation Volumes (Cubic Yards)

Site	No Further Action	Excavation with Offsite Disposal
Antenna Debris Disposal Area	0	2000
East Levee Construction Debris Disposal Area	0	3200
High Marsh		
Non-Channel Cut	0	12900
Proposed Channel Cut Area	0	5000
Outfall Drainage Ditch	0	1900
Historic Outfall Drainage Ditch	0	1330
Boat Dock		
Non-Channel Area	0	130
Channel Area	0	70
Area 14	0	1700
Former Sewage Treatment Plant Outfall	0	240

APPENDIX F

Response to Comments

Responses to Comments on the Draft Coastal Salt Marsh Focused Feasibility Study for Hamilton Army Air Field April 23, 2002

No.	Comments	Responses
San Francisco Bay Regional Water Quality Control Board (SFB RWQCB) Comments dated June 20, 2002		
General Comments:		
1.	The Focused Feasibility Study evaluates remedial alternatives to address contamination identified in the Coastal Salt Marsh (CSM) east of the HAAF Main Airfield BRAC property. The U.S. Army presented three remedial alternatives: 1. No Further Action; 2. Excavation with Offsite Disposal; 3. Limited Excavation with offsite disposal. In general, Regional Board Staff Supports excavation within the CSM to remove contaminants, subject to the degree of habitat destruction required. The degree of habitat destruction presented in the FFS will be subject to the United States Fish and Wildlife Services evaluation under their Section 7 consultation and resulting Biological Opinion. The Army submitted its Biological Assessment in May, 2002. Board Staff recommends that the Army set up a meeting with the Resource Trustees and Regulators regarding the proposed areas of excavation and the rationale for their delineation.	The Army is currently working with the U.S. Fish and Wildlife Service to determine all potential impacts to endangered species and their habitat. The USFWS responded to the May 2002 submission of the Biological Assessment and request for initiation of formal consultation in June 2002, requesting additional information. The additional information was forwarded in December 2002 and a meeting took place at Hamilton in February 2003. We are now entering into formal consultation and will work closely with the Resource Trustees and Regulators regarding the areas of excavation and the rational for their delineation. Note: Alternative 3 was dropped from consideration in the final FFS.
Specific Comments:		
1.	**Re COCs:** Please review the results of the Ecological Risk Assessment and evaluate whether all COCs have been included in the FFS. For example, chromium and benzo(a)pyrene were identified as COCs in the Antenna Debris Area, however, the FFS does include any discussion of these COCs.	The FFS has been revised. Data used in the FFS includes all of the data used in the risk assessment and additional data that was collected after the risk assessment had been prepared. Because the risk assessment results do not represent all of the available data, the FFS developed a conservative approach to determine FFS chemicals of potential concern (COPCs). Specifically the FFS now compares all of the chemicals detected to action goals, without first considering whether the contaminant may pose a risk to human health or the environment. FFS COPCs are those chemicals for which a contaminant at a site is found above action goals.
2.	**Antenna Debris Disposal Area:** The FFS states that limited excavation is recommended due to physical constraints of the site and expected wet conditions during construction. Board Staff	The proposed alternative for the Antenna Debris Disposal Area has been changed to Alternative 2, Excavation and Offsite Disposal. For the coastal salt marsh sites, excavation will continue until the action goals have been achieved, it is determined by joint agreement of the

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No.	Comments	Responses
	prefers to have the Army propose complete excavation and document conditions in the field as they arise to support limited excavation. The southern extent of the East Antenna Debris Area and the northern extent of the West Antenna Debris Area still require further delineation.	State and Army that further excavation is impractical, or the State and Army agree that the remaining contamination will not pose an unacceptable risk to human health and the environment. Preconstruction sampling is anticipated.
3.	**East Levee Construction Debris Disposal Area**: Board Staff supports the recommendation for excavation and offsite-disposal for the ELCDDA. However, limited excavation is proposed for the burn pit area. This site is located in close proximity to the San Pablo Bay. Board Staff prefers to have the Army propose complete excavation and document conditions in the field as they arise to support limited excavation.	The proposed alternative for the East Levee Construction Debris Disposal Area has been changed to Alternative 2, Excavation and Offsite Disposal. For the coastal salt marsh sites, excavation will continue until the action goals have been achieved, it is determined by joint agreement of the State and Army that further excavation is impractical, or the State and Army agree that the remaining contamination will not pose an unacceptable risk to human health and the environment.
4.	**Figure footnotes:** The figures have dashed lines on the data tables with no associated footnotes. Please revise the figures to reflect whether the sample was not analyzed or the COC was not detected. If a COC wasn't detected, then the detection limit should be provided. Please provide a footnote explaining the shaded boxes on the data tables. This should include an explanation of the screening levels applied at the site.	In the final FFS the data tables have been removed from the figures and are presented separately. Footnotes have been provided to clarify the information presented. Only detections of FFS COPCs are provided.
5.	**Figure C-10:** Some sampled depths are identified as "X" feet. Please explain what this means.	The data tables have been revised to indicate the sample depth.
6.	**Composite Figure:** It would be helpful if the report included one figure of the entire impacted area, identifying the proposed areas of excavation. Often the end of one site proposed for excavation becomes the beginning of another.	The figures have been updated to provide 3 figures which cover the northern CSM, middle CSM, and southern CSM. Together these figures provide a more comprehensive view of the proximity of excavation areas.
7.	**Delineation of Areas of Excavation:** Site figures identify the proposed area of excavation. It would be helpful to distinguish those areas requiring excavation separately from the area of possible impact due to excavation.	The areas of impact due to excavation activities and equipment access will be added to the final figures for this document.

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No.	Comments	Responses
8.	**Table 4-5, Remediation Goals:** Board Staff recommends making these remediation goals a topic of discussion with the RART. The Army's risk assessment was relied on for the development of remediation goals for the high marsh, where no ambient data are available. A more detailed discussion on these numbers needs to be provided in the document. Goals for individual PAHs as well as total PAHs are presented. It appears that the higher of the two was used to screen PAHs. Please explain how these numbers were applied in the feasibility study.	The Army, DTSC and RWQCB have agreed on the action goals presented in the final FFS. The other RART agencies were consulted in the development of these action goals. It was also agreed to evaluate total PAHs and not individual PAHs. The final FFS has been revised to reflect these agreements. The FFS text has been revised to provide references for each of the action goals.
Department of Toxic Substances Control (DTSC) Comments dated May 10, 2002		
1	It was also agreed all data (including data collected prior to the most recent field effort) would be clearly posted on figures of the CSM with isoconcentration lines to allow decisions to be made regarding future characterization sampling. The Army was going to include the data and proposed sampling activities in a draft Technical Memorandum for submission to DTSC on April 12, 2002. Instead, the Army submitted a draft Focused Feasibility Study (FFS) for the CSM on April 23, 2002, bypassing the quality assurance/quality control (QA/QC) process, and implying the sites had been adequately characterized.	The Army did not agree to post isoconcentration lines on figures for the CSM. The Army, DTSC and RWQCB have agreed on the format for presenting all of the data in the final FFS. Data tables with corresponding figures are provided in the final FFS. All of the data for the CSM was presented in the FFS. The issuance of the FFS did not bypass the QA/QC process. All of the data used in the FFS is validated. Prior to the most recent sampling events, the Army and RART agencies agreed that all of the CSM sites evaluated in the risk assessment (including the Antenna Debris Disposal Area, East Levee Construction Debris Disposal Area, Outfall Drainage Ditch [ODD], and Boat Dock) were adequately characterized for risk assessment and risk management decisions. Area 14 and the Historic ODD are the only new sites that are addressed in the CSM FFS.
2	Sufficient analytical data have not been collected to determine the extent of contamination or make decisions regarding remediation. Figures in the FFS identifying proposed removal action locations suggests significant contamination exist beyond the proposed excavation locations.	The Army, DTSC and RWQCB have agreed that the CSM sites have been adequately characterized for determining the appropriate proposed remedial alternatives. The excavation boundaries were estimated using the FFS COPC data. It is anticipated that pre or post excavation confirmation sampling will determine the exact excavation boundaries. The Army believes that the excavation boundaries are adequate to meet the remedial action objectives presented in the FFS.

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No.	Comments	Responses
3	Furthermore, data from 16 duplicate samples were not included in the FFS.[1] [1]Analytical data from the recent field sampling, including duplicate samples, is contained in a data table provided informally by Army staff on March 13, 2002.	Duplicate samples are collected during sampling events to assess the accuracy of sample results. The results of the duplicate samples were compared during the QA/QC process; however, they were not evaluated during the FFS screening process because it is outside of the scope of the FFS. The results for the duplicate samples can be found in the sampling reports that have been provided under separate cover.
4	Data usability can not be confirmed until information on the duplicate samples has been provided, including whether the samples were Field Duplicates or Matrix Spike Duplicates, and the locations where they were collected. For example, duplicate sample CSM-ODD-10-0 contained dichlorodiphenyltrichloroethane (DDT) and its breakdown products ("total DDTs") at a concentration of 46.38 mg/kg, while the highest concentration of total DDTs reported in the FFS is 9.9 mg/kg[2]. [2] The FFS did not include the units for all samples and are presumed to be in mg/kg.	The results for the duplicate samples can be found in the sampling reports that have been provided under separate cover. The duplicate samples were collected to verify the accuracy of the primary samples. Theses results will not be provided in the FFS because the information is outside of the scope of this document. Footnote 2: The units for all sample concentrations are provided in the figures.
5	Decisions regarding the scope of further investigation can not be made until all data have undergone a QA/QC analysis and are presented in a manner which can be easily understood (e.g., posted on maps with isoconcentration lines). The FFS is premature.	As mentioned in the response for Comment #1, all of the data utilized in the FFS was validated. The Army, DTSC and RWQCB have agreed on the format for presenting all of the data in the final FFS. Data tables with corresponding figures are provided in the final FFS. The Army, DTSC and RWQCB have agreed that the CSM sites have been adequately characterized for determining the appropriate proposed remedial alternatives.

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No.	Comments	Responses
6	The Department requests the Army include the following information in the draft Hamilton Army Airfield Remedial Investigation/Feasibility Study Work Plan for the Coastal Salt Marsh (CSM), to supplement information required by US EPA guidance. This information was omitted from or not clearly presented in the FFS. 1) A separate plan view base map (or set of maps) is needed showing all site features within 700 feet of the CSM (The CSM is defined as the area west of the inboard toe of the flood control levee). These features include: a) Map scale, with eastings and northings; b) Topographic features, current and historic; c) Buildings, pipelines, and other structures, current and historic; d) Habitat types and quality; e) Locations of cross-sections; f) Match lines and/or identification of inset maps, where supplemental maps are needed for clarity.	The Army is not currently working on a Remedial Investigation/Feasibility Study Work Plan for the CSM and does not plan on preparing this Work Plan for the CSM sites. The Army, DTSC and RWQCB have agreed that the CSM sites have been adequately characterized for determining the appropriate proposed remedial alternatives. Additional data collection is anticipated as part of the remedial design phase of the project. This comment will be taken into consideration during the development of remedial design documentation. The figures that are provided in the CSM FFS focus on the CSM sites. Approximate scales are provided on the figures. Topographic features and buildings, pipelines, and other structures (current or historic) that are known and are pertinent to the site are presented in the FFS figures. Figure 2-1 has been added to illustrate habitat types in the CSM. There are no cross sections shown through the CSM area and match lines are provided where needed.
7	2) Analytical data from all CSM sampling needs to be presented as follows: a) laboratory data sheets; b) tabulated; c) Quality Assurance/Quality Control analysis; d) the range of analytical results; and e) plotted on maps, as described in item 3 below.	The sampling reports forwarded under separate cover provide the details for the data collected. It has been agreed that the FFS will present the data in a tabular format with corresponding figures.

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No.	Comments	Responses
8	3) The following information needs to be overlain on copies of the base map(s): a) Surface analytical data for individual pollutants of concern, including data east and north of the CSM to provide perspective; b) Subsurface analytical data for individual pollutants of concern; c) Analytical results for duplicate samples; d) Non-detect data with the actual detection limit indicated (e.g., "<2.0"); e) Sample points for which the sample was not analyzed for the particular pollutant should be identified as "NA" for "not analyzed." f) Isoconcentration lines for both surface and subsurface data. The data needs to be contoured irrespective of the assigned "site boundaries" and include, at a minimum, the following: i) Contours of the detection limit; ii) Contours of the following potential remediation goals, most of which are shown in draft FFS Table 3-2, Selected Remediation Goals: (1) Bay Sediment; (2) HHERA Ambient Inorganics; (3) Effects Range, Low (ERL); (4) Effects Range, Medium (ERM); (5) RWQWB Wetland Surface Sediment Guidelines; (6) RART Values; and iii) Additional contours to provide clarity, based on the analytical results, g) Units of the analytical results (i.e., mg/kg, dry weight; mg/L) ,	It has been agreed that the FFS will present the data in a tabular format with corresponding figures. The tables will post the detection limits for non detect data and will indicated if an analyte was not analyzed. The units for all data will be included on the tables. The anticipated channel cut is shown on several figures and will be better defined in the future by the Hamilton Wetland Restoration Project team. The Army, DTSC and RWQCB have agreed that the CSM sites have been adequately characterized for determining the appropriate proposed remedial alternatives. Any additional sampling will be completed during the remedial design phase.

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No.	Comments	Responses
	h) Sample percent moisture; i) Impacts associated with the anticipated implementation of the Hamilton Wetland Restoration Project, including: i) The area anticipated to be excavated, including the possible minimum and maximum areas that may be excavated, and cross-section maps showing the depth of excavation; ii) The potential area(s) of erosion due to the anticipated opening of the flood control levee, based on at least the minimum and maximum anticipated excavation areas, with cross-section maps showing the potential depth of erosion. j) Those locations where additional sampling is not needed to further characterize the extent of contamination.	