SECTION 2.0

Inboard Area Sites

Section 2.0 contains all of the information related to the Inboard Area sites. This section is organized as follows:

2.1: Site Background and Extent of Contamination provides background information and discusses the nature of contamination for each site located in the Inboard Area. It includes a brief summary of the historical investigations and describes, in general terms, the nature of contamination found at the Inboard Area sites. Background information on each Army BRAC site is provided, along with a discussion of additional Army BRAC environmental concerns and other environmental issues to be addressed by the HWRP.

2.2: Overview of Risk Assessment and Action Goals provides an overview of the risk assessment and the process used to establish action goals for Inboard Area sites. It presents details about the processes used to determine contaminants of concern (COCs) and to establish action goals.

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

2.4: Summary and Evaluation of Alternatives summarizes the evaluation and selection of remedial alternatives for each of the Inboard Area sites recommended for further action. These sites are divided into three groups: Army BRAC sites, other Army BRAC Environmental Considerations, and HWRP Issues. This section summarizes the process used to evaluate alternatives for each of these groups.

Information for the Coastal Salt Marsh Area sites is presented in Section 3.0.

SECTION 2.1

Site Background and Nature of Contamination

This section provides background information and discusses the nature of contamination for each site located in the Inboard Area. Section 2.1.1 provides a brief summary of the historical investigations and describes in general terms the nature of contamination found at the Inboard Area sites. Section 2.1.2 identifies the sites within the Inboard Area that are evaluated in this ROD/RAP. Section 2.1.3 provides background on each Army BRAC site and identifies the nature of contamination and chemicals of concern (COCs). Section 2.1.4 discusses additional Army BRAC environmental concerns. Section 2.1.5 covers other environmental issues to be addressed by the HWRP.

2.1.1 Historical Investigations and Nature of Contamination

Numerous activities were conducted in the Inboard Area sites between 1985 and 2002. These activities included remedial investigations, interim removal actions, and a human health and ecological risk assessment. The findings of these activities are found in the following primary documents; a complete listing of the Administrative Record documents can be found in Appendix A:

- *Remedial Design Investigation Final Data Report* (FW, 2000): Two phases of sampling were completed at the paved revetment areas. The first phase of the investigation was conducted in the general revetment area to address data gaps and design issues associated with Inboard Area-Wide distribution of pesticides, PAHs, and metals. Phase 2 of the investigation was conducted to address site-specific issues associated with paved revetments that were formerly characterized using composite samples or had data gaps.

- *Comprehensive Remedial Investigation* (IT, 1999a): Inboard Area sites were investigated during the RI, which reviewed and evaluated previous investigation data; compared the results to newly collected data; and collected and analyzed soil, sediment, and water samples to determine whether the sites were affected by past activities. 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 polynuclear aromatic hydrocarbons in sediment and soil. The Comprehensive Remedial Investigation combines data from activities conducted between 1985 and 1997.

- *1999 Interim Removal Action Data Report* (IT, 1999c): Interim removal actions were conducted at the following Inboard Area sites in 1999: Former Sewage Treatment Plant, Building 35/39 Area, Building 41, Building 82/87/92/94 Area, PDD Spoils Pile B, C, E, H, I, J, and L, and Revetment 9. Soil was excavated and disposed of offsite, and samples were collected following the removal actions.

- *1998 Interim Removal Action Data Report* (IT, 1999c): Interim removal actions were conducted at the following Inboard Area sites in 1998: FSTP, Building 20, Building 35/39 Area, Building 41 Area, Building 82/87/92/94 Area, Building 86, PDD, PDD Spoils Piles

A through E and G through N, East Levee Generator/Pad, Revetment 10, and Revetment 18/Building 15 Area. Soil was excavated and disposed of offsite, and samples were collected following the removal actions.

The types of contaminants detected at various sites within the Inboard Area include:

- TPH-d, TPH-g, JP-4, or TPH-motor
- Metals
- Dioxins and furans
- VOCs
- SVOCs including PAHs
- PCB
- Pesticides/herbicides

During the Focused Feasibility Study (FFS), data were reviewed from groundwater wells located in the vicinity of the Inboard Area sites where potential scour within channels may occur during the development and maturation of the wetland. The review concluded that groundwater does not pose a threat to surface water or aquatic receptors. As discussed in Appendix B, 18 groundwater monitoring wells were sampled in 2001 and 2002 (USACE, 2002a and 2002b). The results of recent groundwater sampling verified that groundwater beneath the Main Airfield Parcel does not adversely affect saltwater aquatic life or human health from past Department of Defense (DoD) activities (USACE, 2002a and 2002b).

2.1.2 Sites Evaluated in This ROD/RAP

Inboard Area sites evaluated in this ROD/RAP are divided into three groups: Army BRAC sites, other Army BRAC Environmental Considerations, and HWRP Issues. The sites included in each group are listed below and are shown in Figure 2.1-1 (following the tables at the end of this text). The text provided below also indicates how sites within each of the three groups are evaluated in the ROD/RAP. Section 2.4 provides details on the alternatives that are evaluated in this ROD/RAP.

2.1.2.1 Army BRAC Sites

Inboard Area Army BRAC sites that are addressed in this ROD/RAP are listed in Table 1-1.

This ROD/RAP determines the need for remedial action and fully develops and evaluates alternatives for each Army BRAC site that requires remedial action. This ROD/RAP evaluates Alternative 1, No Further Action; Alternative 2, Excavation and Offsite Disposal; and Alternative 3, Manage In-Situ, with Monitoring and Maintenance for Army BRAC Sites. Alternative 4 was developed specifically for issues that will be addressed by the HWRP, and is not evaluated for the Army BRAC sites. The Army BRAC program will perform the environmental response actions for the Army BRAC sites that require remedial action.

2.1.2.2 Other Army BRAC Environmental Concerns

In addition to the Army BRAC sites identified above, three other environmental concerns are addressed in this ROD/RAP by the Army BRAC program. These issues include a group of four sites identified by the Archive Search Report, the GSA/BRAC soil stockpiles located on the runway, and radiological cylinders.

The Archive Search Report sites addressed in this ROD/RAP are listed below:

- Testing Range—ASR Site #4
- Alleged Hazardous, Toxic, and Radiological Waste (HTRW) Disposal Site—ASR Site #8
- Skeet Range—ASR Site #18
- Firing-In-Butt—ASR Site #19

Section 4.0 provides a schedule of activities that will be completed by the Army BRAC program to address the Archive Search Report sites. Because information and data available for these sites are still undergoing review, decisions regarding the need for remedial action and the evaluation of alternatives for these sites are not included in this ROD/RAP. However, the Army, DTSC, and the RWQCB have agreed to complete the study/investigation activities listed in Section 4.0 for the Archive Search Report sites in accordance with the schedule indicated. Should remedial action be required at the Archive Search Report sites, the action goals included in this ROD/RAP will apply.

The RWQCB will determine what additional actions (if any) may be required with respect to the GSA/BRAC stockpiled soil currently on the runway (see Section 2.1.5.1). The Army will be responsible for conducting any additional actions required by the RWQCB.

No environmental concerns were identified for the Radiological Cylinders (see Section 2.1.4.3). Therefore no remedial action is proposed for this issue.

2.1.2.3 Hamilton Wetland Restoration Project Issues

The Army Civil Works Program, through the HWRP, will take actions described in this ROD/RAP to address the potential risks posed by the following environmental issues:

- Inboard Area-Wide DDTs
- PAHs in soil adjacent to the runway
- Lead-based paint

For the Inboard Area-Wide DDTs and PAHs in soil adjacent to the runway, this ROD/RAP evaluates two alternatives: Alternative 1, the No Further Action alternative; and Alternative 4, Manage Onsite, with Monitoring and Maintenance for the Army Civil Works Program. Alternative 4 was specifically developed for issues that will be addressed by the Army Civil Works Program through the HWRP. Alternatives 2 and 3 were not considered because they apply only to sites being addressed by the Army BRAC program.

To address possible lead contamination from lead-based paint at current and previously demolished building locations, the ROD/RAP selects the following alternative. The HWRP will provide 3 feet of stable cover over the footprint of the building and to a distance of 6 feet beyond the building footprint. If 3 feet of cover cannot be achieved, the soil area at these current and previously demolished building locations, plus 6 feet beyond the building perimeter, will be scraped to a depth of 6 inches and managed elsewhere on site beneath 3 feet of stable cover. The building foundation and any concrete/asphalt/hard foundation surface adjacent to the building may remain. The age of historical and existing buildings is described in the Environmental Baseline Survey (EBS) (CH2M HILL, 2003). No other alternatives were considered or evaluated.

2.1.3 Background and Nature of Contamination—Army BRAC Sites

The following subsections describe each Army BRAC site located in the Inboard Area, summarize the types of contaminants (metals, pesticides, TPH, etc.) detected at each site, describe any interim removal action work performed, and identify the ROD/RAP COCs detected at the site. As presented in Section 2.2, remedial actions are evaluated in this ROD/RAP for detections of residual COCs that are found above action goals. Action goals and COCs are defined in Section 2.2. Specific information regarding sample locations and individual sample results is available in the primary reports cited for each Inboard Area site. The location of each site is shown on Figure 2.1-1.

2.1.3.1 Former Sewage Treatment Plant

The FSTP was constructed in 1941/1942 and was located at the eastern edge of the Inboard Area, close to Perimeter Road and the PDD, and immediately southwest of the pump station area. Prior to construction of the FSTP, sewage was discharged to the San Pablo Bay through a pipeline extended approximately 600 feet to the Bay near the southeast end of the runway. The FSTP consisted of several buildings, a digester, and four sludge drying beds. The beds were unlined and were contained within earthen berms. Sewage generated at HAAF was processed by treatment at the FSTP. Treated effluent water was discharged into San Pablo Bay via an outfall pipe. Beginning in 1986, sewage from the remaining operating areas of HAAF was directed to the Novato Sanitation District. This site was identified in the Archive Search Report as ASR Site #2.

The FSTP buildings were demolished and the sludge, berms, and bed dikes were removed and disposed of in an offsite landfill in 1987 (IT, 1999).

The RI presented information regarding the former sludge drying beds, digester, and the abandoned sanitary sewer lines. Metals, PCBs (Aroclor 1254), DDT, and DDE were detected in the soil boring samples collected from around the former sludge drying beds at depths ranging from 1 to 6.5 feet below ground surface (bgs). There was one detection of DDE at depth of 11.5 feet bgs. PAHs and unknown extractable hydrocarbons (UHE) were also detected at depths ranging from 3.5 to 4 feet bgs and 2 feet bgs, respectively in a pothole sample. UHE, PAHs, DDT, and DDE were also detected in two soil borings drilled to the south and west of the monitoring well (MW) TP-MW-101 (IT, 1999). TPH-g; UHE; benzene, toluene, ethylbenzene, and xylene (BTEX); VOCs; heptaclor; and 13 metals were detected in one groundwater sample collected from the former monitoring well (IT, 1999). Monitoring well TP-MW-101 was removed during the 1998 interim removal actions. In addition, five water samples were collected from inside sanitary sewer lines SS-1 through SS-6. Metals, VOCs, one pesticide, and TPH, including UHE (IT, 1999) were detected in the water samples. Coliform bacteria were also detected in the SS-1 water sample.

An interim removal action was conducted in 1998 at the former sludge drying beds at the FSTP. Following the 1998 interim removal actions, metals, pesticides, and TPH-d were detected in the confirmation soil samples at depths ranging from 2.5 feet to 7.5 feet (the 7.5 feet bgs samples were collected only in the southeastern corner of the excavation). After the 1998 interim removal action, a black sludge layer was identified in soil located on the eastern side of the area , and was excavated in 1999. After the 1998 interim removal action, a black sludge layer was identified in soil located on the eastern side of the area and was excavated in 1999. Following the 1999 interim removal actions, DDD, DDT, dieldrin, silver,

mercury, and TPH-d were detected in confirmation samples at depths ranging from 3 to 4 feet bgs. Only DDT was detected above action goals at depths ranging from 3 to 10.5 feet bgs.

The evaluation of COCs during the ROD/RAP process did not identify any COCs for the FSTP. However, risk management evaluations determined that remedial action should be conducted to address individual detections of DDTs. To address these individual detections, DDTs are listed in Table 2.1-1.

2.1.3.2 Building 20

Building 20, on the northern Perimeter Road, was used to produce electricity for runway lighting, radar, or other activities. One transformer pad is adjacent to the east wall, and one diesel UST was buried on the southwest side of the building. The transformers have been removed (IT, 1999).

During a 1996 UST/AST investigation conducted by IT, an area of stained soil with a heavy hydrocarbon odor was observed about 10 feet west of the building. The UST and 10 feet of associated piping were removed during the RI. The UST excavation was extended to a depth of 10 feet bgs and the vertical extent of contamination from UHE, unknown purgeable hydrocarbons (UHP), and lead was determined to extend to 5 feet bgs. Lead was also detected in shallow soil samples collected from the northern, southwestern, and southern sides of Building 20 and in a water sample collected from the excavation. PCBs were not detected in soil samples collected from around the transformer pad and UHE and UHP were detected in one soil sample collected from the stained soil area (IT, 1999).

An interim removal action was conducted in the area of the former UST in 1998, and confirmation samples were collected at depths ranging from 5 to 10 feet bgs. Metals were the only constituents detected in confirmation samples; however, they were not detected above action goals.

The FFS evaluations did not identify any COCs at this site that could potentially pose a risk to human health or the environment (see FFS Table 1-7) (USACE, 2001). The FFS determined that no remedial action was required at this site to protect human health or the environment. Therefore, the No Further Action alternative was selected and this site is not evaluated in further detail in the ROD/RAP.

2.1.3.3 Building 26

Building 26 is located along the northern Perimeter Road, approximately 500 feet southeast of Building 20. A transformer pad is located on the west side of the building; the transformers have been removed (IT, 1999). One diesel UST was formerly located on the south side of the transformer pad, and a former AST was located inside the building. The UST excavation was backfilled.

During the RI, UHE was detected above its action goal at a depth of 5 feet bgs in the pothole sample collected from the northeastern side of the former UST, but not at 10 feet bgs in this same sample location. UHE was also detected above its action goal to the west and south of the former UST and Building 26, at depths ranging from 5 to 5.5 feet bgs, but not at 10 feet bgs. The action goal for TPH diesel is also used as the action goal for UHE. The horizontal extent of soil affected by fuel was estimated using the results of "step-out" samples, which showed declining concentrations away from the former UST location.

Table 2.1-1 lists the COCs for Building 26. Concentrations of COCs detected at this site exceed action goals.

2.1.3.4 Building 35/39 Area

The Building 35/39 Area is located near the northeast corner of the Inboard Area. Both buildings contain high-capacity pumps for the removal of water from the Main Airfield Parcel. The water is discharged via outfall pipes into the ODD, as discussed in Section 3.1.3.5, located immediately outside the perimeter levee in the coastal salt marsh, which flows into San Pablo Bay (IT, 1999). Features in this area include Building 35, which contains a large pump, and the former AST 6. AST 6 was formerly located at the northeastern corner of Building 35. AST 5 was located southeast of Building 39. Three active transformers are located midway between the two buildings, and outfall pipes are located at each building to discharge water from the pumps through the levee into the ODD (IT, 1999).

RI activities were conducted to assess potential impacts from PCBs to the soil around the transformer pad. PCBs were not detected in the soil samples at the transformer pad, but metals were detected in a groundwater sample collected from monitoring well PS-MW-101 (located northeast of Building 35). In addition, results of previous investigations detailed in the RI indicated that the surface soil was contaminated from toluene and PAHs near the fill port of former AST 5 at Building 39 and lead, PAHs, and toluene were detected in surface soil samples collected beneath former AST 6.

Following the 1998 interim removals in the Building 35/39 Area, UHE and lead were detected at depths ranging from 2.5 to 5 feet bgs in soil confirmation samples southwest of Building 39. In addition, lead, TPH, DDTs, UHE, and PAHs were detected at depths ranging from 3 to 7.5 feet bgs in soil confirmation samples collected following the 1999 interim removal actions. DDTs were detected above both action goals established for DDTs (0.03 and 1 ppm) at a depth of 4.5 feet bgs adjacent to the outfall pipeline for Building 35.

Table 2.1-1 lists the COCs for the Building 35/39 Area. Concentrations of COCs detected at this site exceed action goals.

2.1.3.5 Building 41 Area

Building 41 was a pump station in the southern portion of the pump station area. Two 1,100-gallon diesel USTs formerly located on the northwestern side of Building 41 supplied fuel for the pumps at the building. Structures in and around Building 41 have been removed. Features at the site included four inoperable diesel-powered pumps inside Building 41 and two former ASTs east of Building 41. Former Building 40 and three former transformers (on a concrete pad) were located northeast of Building 40. One outfall pipe extended 80 feet southeast from Building 41, through the levee, to a discharge point in the ODD in the coastal salt marsh (CH2M HILL, 2001). Discharges from the pipeline are believed to contribute to contamination in the ODD, as discussed in Section 3.1.3.5.

During the RI, soil samples were collected at Building 41 to determine the extent of TPH contamination from the former USTs and contamination of PCBs of the soil at the transformer pad. One groundwater sample was also collected from groundwater monitoring well PSA-MW-3 (located southeast of Building 41).

UHE and lead were detected along the southwestern side of the USTs at a depth of 8 feet bgs (IT, 1999). Lead was the only analyte detected in a step-out pothole sample collected from an area located across the PDD; the sample was collected to determine the westward extent of fuel contamination. PCBs were not detected in the soil samples collected from the transformer pad. Metals and UHE were detected in the groundwater sample collected from monitoring well PSA-MW3. Before the RI**,** lead was detected in several soil samples located near the northern side of Building 41.

During the 1998 interim removal conducted in the Building 41 Area, UHE and lead were detected in the confirmation samples. UHE and PAHs were detected above guidance levels (established for the interim removal action) in a boring collected adjacent to the northern section of Building 41. During the 1999 interim removal at the UST, TPH-d was detected in confirmation samples, which were collected at depths ranging from 4 to 9.5 feet bgs. TPH-d was detected above its action goal.

In February 2002, during remediation activities at Building 41, contaminated soil was removed and disposed of offsite. The analytical results of the soil removal activities are provided in *Final Construction Report Building 41 Demolition and Soil Removal, Spoils Pile F Removal, and Revetments 6 and 7 Removal* (IT, 2003). After reviewing the analytical data from that event, it was agreed that some additional samples are needed to determine whether the actions are complete. As a result, for the purposes of this report, this site is being evaluated as though the actions have not yet taken place.

The COCs for Building 41 are listed in Table 2.1-1. Concentrations of COCs detected at this site exceed action goals.

2.1.3.6 Building 82/87/92/94 Area

Building 82

Building 82 is a single-story structure located south of former Building 86 and approximately 50 feet from Perimeter Road. Building 82 was built in the area of former Building 91; an air freight terminal. Building 82 was used, in turn, for flight operations (IT, 1999), aircraft rescue, and first aid (CH2M HILL, 2001). Currently, Building 82 is used by the Marin County Sheriff's Department for storage of training and safety equipment and by the Army for its HAAF BRAC office**.** A transformer previously was located on a concrete pad northeast of the building. Also, one propane tank is located on the northeastern corner of the building. RI activities were conducted at Building 82 to identify PCB contamination in soil at the former transformer pad. PCB (Aroclor-1260) was detected in all soil samples; the highest concentration was found on the southeast side of the transformer pad at a depth of 10 to 17 inches bgs. However, PCBs were not detected in the step-out samples. In addition, UHE was detected in two pothole samples. Step-out samples were collected at depths ranging from 2 to 10 feet bgs.

During the 1998 interim removal actions, soil was removed from the Building 82 transformer pad to a depth of 4 feet bgs. UHE, UHP, and PCB were detected above their guidance levels (established for the interim removal actions) in confirmation soil samples at depths ranging from 2.5 to 4.5 feet bgs. The Army conducted an additional removal action in 1999 to address contamination identified at the Building 82 transformer pad following 1998 interim removal actions. Total petroleum hydrocarbon extractable (TPH-e) was detected in a groundwater

sample collected from one of the pothole wells; the concentration of TPH-e was below established water screening levels (IT, 2000b). TPH-d and lead were detected below guidance levels (established for the interim removal actions) in soil samples collected at depths ranging from 0.5 to 7 feet bgs. PCBs were not detected in soil samples collected from the 1999 excavation, and they were not detected in groundwater samples collected from the potholes.

The Army conducted an additional soil and groundwater investigation at Building 82 in September 2002 (Cerrudo Services, 2002). Soil and groundwater samples were collected inside and outside of Building 82 and were analyzed for TPH constituents and BTEX. No further action for groundwater is necessary at this site (see Appendix B).

Building 87

Building 87, located immediately south of the aircraft parking lot, was used to store products (5 gallons or less) such as paint, oil and grease, antifreeze, and solvents. Numerous 55-gallon drums of solvent and cleaning compounds were stored on horizontal dispensing racks in the area around Building 87. One metal CONEX container, located northwest of Building 87, contained unleaded gasoline in 5-gallon containers. The racks and drums were occasionally moved to various locations surrounding the building (IT, 1999).

During an investigation conducted by the Army in 1993, metals were detected above their background concentrations in the soil samples collected from around Building 87. Metals were also detected in groundwater samples collected from monitoring well AM-MW-104. PAHs, metals, TPH, and VOCs were detected in sediments collected from several catch basins in the storm drain system (ESI, 1993).

Building 92/94 Area

Buildings 92 and 94 are single-story structures located north of Building 82 and to the west of former Building 86. The buildings were used for aircraft maintenance and storage (IT, 1999) and to store supplies for aircraft rescue and offices (CH2M HILL, 2001). They are currently used to store records and sampling equipment. Three transformers were located on a concrete pad between Buildings 92 and 94. The asphalt is deteriorated on the southern, western, and eastern sides of the pad. Storage Area 3 was located on the eastern side of Building 94. The storage area contained five metal containers used to store maintenance related fluids such as fuel, paint, and solvents. Curbing or other surface containment did not surround the area.

In 1993, sampling activities were conducted at locations east of Building 94 (ESI, 1993). Soil samples were collected from two test pits and two soil borings. Metals were detected in the samples.

RI activities were conducted at the Building 92/94 Area to address the potential impacts on soil from PCBs. Aroclor-1260 was detected in soil samples collected from 0 to 2.5 feet bgs; however, it was not detected in the step-out samples. Lead was detected below its background concentration in a green-stained rocky fill that was observed during the step-out sampling; fuel hydrocarbons were not detected in the samples of stained fill (IT, 1999).

During the 1998 interim removal actions conducted at the Building 92/94 Area, PCBs were detected below the guidance level (established for the interim removal action) at a depth of 4.5 feet bgs in one confirmation sample. The sample was located along the southeast corner of the transformer pad.

The COCs for the Building 82/87/92/94 Area are listed in Table 2.1-1. Concentrations of COCs detected at this site exceed action goals.

2.1.3.7 Building 84/90 Area

The Building 84/90 Area is at the southeastern end of the former AMSF area, northwest of Perimeter Road and south of the taxiways. Building 84 was used for repair of aircraft electronics equipment (IT, 1999). A fenced enclosure just northeast of Building 84 formerly contained a concrete slab and three transformers. The transformers were removed in 1995 (IT, 1999). Three electrical units of unknown use are located on the northern exterior wall beneath an awning. There were no documented releases of hazardous materials at this site. This site was identified in the Archive Search Report as ASR Site #7.

Building 90 was an aircraft avionics shop (USACE, 2003). Based on the recent historic research conducted by the Army, the area was used for aircraft avionics maintenance activities, including radar systems testing and calibration (USACE, 2003). The southern end of the building is a small utility/electrical room, and two wash racks adjoin the west side of the building. A small sump is on the southern side of the building. This sump was used as a receiving structure for a floor drain inside the southern shed of Building 90. A fence-enclosed transformer pad adjoined the southern side of the building. The transformers were removed in 1991 (IT, 1999).

RI activities were conducted at Buildings 84 and 90 to assess potential impacts to the site from operations and potential PCB contamination from the transformers (IT, 1999). Metals and PAHs were detected in a surface soil sample collected from surface to 0.5 foot bgs near the awning on the north side of Building 84. PCB was not detected at the former transformer pad at Building 84 in surface samples (0 to 0.5 foot bgs). Metals, PAHs, and UHE were detected in soil near Building 90. The depth of the soil samples ranged from surface to 12 feet bgs. A groundwater sample was also collected from one soil boring drilled west of Building 90, adjacent to the edge of the wash racks. Lead was detected in the groundwater sample. No PCB was detected at the former transformer pad at Building 90.

The FFS evaluations did not identify any COCs at this site that could potentially pose a risk to human health or the environment (see FFS Table 1-7) (USACE, 2001). The FFS determined that no remedial action was required at this site to protect human health or the environment. Therefore, the No Further Action alternative was selected and this site is not evaluated in further detail in the ROD/RAP.

2.1.3.8 Building 86

Building 86 was an aircraft maintenance hangar located about 50 feet southeast of the New Hamilton Partners (NHP) levee. A flammable materials locker and at least one recirculating solvent parts cleaner were located in Building 86. Substances used and waste generated at the hangar included stripping and degreasing solvents, oils, and paints. Storage Area 1, near the northeastern corner of Building 86, was used for drum storage. Drums were placed horizontally on metal storage and dispensing racks. Waste material from activities at Building 86 were taken by U.S. Army personnel to a storage area located in the southwestern corner of the building (Storage Area 2). Storage Area 2 consisted of 55-gallon drums and smaller containers, which stored waste oils, waste fuel, and other maintenance-related fluids. The materials were stored within a metal container that rested on a gravel surface.

Building 86 was removed in 1998 (IT, 1999). The remaining building pad is adjoined by concrete aircraft aprons on the north, east, and south, and by a concrete slab on the west.

Before the RI, metal and PAH contaminants were detected in sediment samples collected from five storm drains located east and northeast of Building 86 (IT, 1999). The Army also removed soil affected by TPH from a small area located within 30 feet of Building 86 in 1995 (IT, 1996b).

RI activities were conducted at Building 86 to address the contamination of TPH and other chemicals to the soil, PCB contamination at the transformer pad, and the potential to contaminate groundwater at monitoring well AM-MW-101 (IT, 1999). UHE, UHP, lead, and one PAH were detected in samples along the interior and exterior drains at Building 86. UHE, UHP, and lead were also detected in soil samples collected from the western corner of Building 86. PCBs were not detected at the transformer pad. Metals and UHE were detected in a groundwater sample collected from monitoring well AM-MW-101.

During the 1998 interim removal, a storm drain investigation was conducted at Building 86 (IT, 2000a). Metals were detected in the soil along the portion of SD-1 located southeast of Building 86 at depths ranging from 5.5 to 11.5 feet bgs. Several PAHs were also detected above their guidance levels (established for the interim removal action) at a depth of 10 feet bgs in the soil sample collected along the portion of SD-1 north of Building 87.

The COCs for Building 86 are listed in Table 2.1-1. Concentrations of COCs detected at this site exceed action goals.

2.1.3.9 Perimeter Drainage Ditch

The PDD is a drainage channel constructed to convey surface water runoff to pump stations for lifting and discharge into the ODD and San Pablo Bay. The PDD also conveys water from portions of the GSA properties, from privately owned agricultural lands adjoining the airfield, and overflow from Ignacio Reservoir. Additionally, there is an open drainage ditch at the base of Reservoir Hill in the GSA Phase I Sale Area that connects to the north end of the PDD by an underground storm-drain pipe (IT, 1999). Historically, drainage from the adjacent Hamilton North Antenna Field also entered the PDD. Rainfall in the North Antenna Field currently ponds onsite, and no longer drains to the PDD. The PDD encompasses all of the Main Airfield Parcel, except for the western margin. For the purposes of this ROD/RAP, the PDD is divided into three sections: (1) the unlined PDD, (2) the lined PDD outside of the proposed HWRP channel cut, and (3) the lined PDD within the proposed HWRP channel cut. These areas are described below and are shown on Figure 2.1-1.

When HAAF was constructed in 1932, the PDD began at what is currently the discharge point of the 54-inch-diameter storm drain and ran around the perimeter of the Main Airfield Parcel, exiting the Main Airfield Parcel near the southwestern boundary. The Army lined this portion of the PDD with concrete in 1940 to expedite runoff and reduce maintenance costs associated with removing vegetation that impeded flow in the ditch (US Army, 1940). The concrete lining extends approximately 5 feet up the side of the ditch, with 3 to 4 feet of bare soil from the top of the liner to the top of the ditch. The concrete lining is cracked, and pieces of the concrete liner have broken away over the years. However, a vast majority of the lining is still intact. A portion of the lined PDD is located in the proposed HWRP channel cut (see Figure 2.1-1).

During the remedial design investigation, two surface soil samples were collected from partings or cracks located in the lined PDD. One of these locations was within the proposed HWRP channel cut area. Pesticides, herbicides, metals, and PAHs were detected in the samples (FW, 2000). The banks of the PDD above the concrete lining within the proposed HWRP channel cut were excavated in December 2001/January 2002, during the Building 41 demolition and soil-removal activities (IT, 2003).

In the 1950s, the drainage ditch was realigned to accommodate the extension of the runway. The new ditch began at the base of POL Hill, flowed north to a subsurface storm drain at the north end of the runway, and turned south to meet up with the original lined PDD, as shown on Figure 2.1-1. This portion of the PDD is not lined. The RI investigated the unlined portion of the PDD for PCBs, metals, PAHs, and pesticides. Metals, PAHs, and pesticides were detected in the unlined PDD sediments.

The unlined PDD was dewatered and sediment was removed during the 1998 interim removal actions. Following removal actions, the highest level of residual contamination in the unlined portion of the PDD was located in the northernmost section. UHE, metals, and pesticides were detected in the confirmation samples in the northern section of the unlined PDD. Dioxins, furans, DDTs, nickel, UHE, and benzo(b)fluoranthene were detected in the southern section of the unlined PDD. DDTs were detected above both action goals established for DDTs (0.03 and 1 ppm) within portions of the unlined PDD.

The COCs for the unlined PDD, lined PDD outside the proposed HWRP channel cut, and the lined PDD within the proposed HWRP channel cut are listed in Table 2.1-1. Concentrations of COCs detected at these sites exceed action goals.

2.1.3.10 PDD Spoils Piles

Since the 1930s, the PDD was periodically dredged to remove vegetative matter and sediment. During the 1990s, dredged material was placed in 14 separate locations, later designated Spoils Piles A through N. The spoils piles were identified based on review of aerial photographs and field reconnaissance (ETC, 1994).

Sampling activities were conducted at the PDD spoils piles in 1995 (WC, 1996). Metals, PAHs, oil and grease, chlordane, pesticides, methylene chloride, and SVOCs were detected in the spoils piles. Removal actions were conducted in 1998 at Spoils Piles A through E and G through N. Removal actions were conducted in 1999 at Spoils Piles B, C, E, H, I, J, and L. Following the 1998 and 1999 removal actions, the following residual contaminants were present at the former spoils piles locations:

- Spoils Pile A—Metals, UHE, and DDTs were detected in the confirmation sample at a depth of 1 foot bgs.
- Spoils Pile B—Metals, DDTs, endrin aldehyde, and endrin ketone were detected in confirmation samples at a depth of 0.5 foot bgs.
- Spoils Pile C—DDTs were detected in the confirmation sample, at a depth of 0.5 foot bgs.
- Spoils Pile D—Metals and DDTs were detected in the confirmation sample at a depth of 1 foot bgs.

- Spoils Pile E—DDTs were detected in confirmation samples collected from excavations at a depth of 0.5 foot bgs.
- Spoils Pile G—Metals and DDTs were detected in the confirmation sample at a depth of 0.5 foot bgs.
- Spoils Pile H—TPH-d and DDTs were detected in confirmation samples at a depth of 0.5 foot bgs.
- Spoils Pile I—During the 1999 removal action, no chemicals were detected in the confirmation sample collected at a depth of 0.5 foot bgs, which was analyzed for pesticides and TPH-e. Sample SS-PDSP-I01 (collected in 1998) was not removed during the 1999 removal action; beryllium and DDTs were detected in this sample at a depth of 1 foot bgs.
- Spoils Pile J—DDTs, benzo(a)pyrene, benzo(g,h,I)pyrene, indeno(1,2,3-cd)pyrene, and pyrene were detected in confirmation samples at a depth of 0.5 foot bgs.
- Spoils Pile K—Metals and DDTs were detected in a confirmation sample at a depth of 1 foot bgs.
- Spoils Pile L—Metals and DDT were detected in the 1998 interim removal action sample; these results were used in the risk assessment. However, the 1999 removal action removed the 1998 sample point, and nickel was the only contaminant detected in the confirmation sample at a depth of 0.5 foot bgs.
- Spoils Pile M—Metals and DDTs were detected in confirmation samples at a depth of 1 foot bgs.
- Spoils Pile N—Metals, UHE, benzo(a)pyrene, and DDTs were detected in confirmation samples at a depth of 1 foot bgs.

Interim removal actions were conducted for Spoils Pile F in 2002. Samples collected at Spoils Pile F in 1995 indicated metals, PAH, and DDT contamination. In February 2002, during remediation activities at Spoils Pile F, contaminated soil was removed and disposed of offsite. The analytical results of the soil removal activities are provided in *Final Construction Report Building 41 Demolition and Soil Removal, Spoils Pile F Removal, and Revetments 6 and 7 Removal* (IT, 2003). After reviewing the analytical data from that event, it was agreed that some additional samples are needed to determine whether the actions are complete. As a result, for the purposes of this report, this site is being evaluated as though the actions have not yet taken place.

The COCs for PDD Spoils Piles (except Spoils Piles E and H) are listed in Table 2.1-1. Concentrations of COCs detected at the Spoils Piles (except Spoils Piles E and H) exceed action goals.

The FFS evaluations did not identify residual COCs at Spoils Piles E or H that could potentially pose a risk to human health or the environment. The FFS determined that no remedial action was required at Spoils Piles E or H to protect human health or the environment. Therefore, the No Further Action alternative was selected and Spoils Piles E and H are not evaluated in further detail in the ROD/RAP.

2.1.3.11 East Levee Generator Pad

The East Levee Generator Pad is located midway between the FSTP and the southern end of the runway. One transformer pad and one generator pad were formerly adjacent to each other at a former AST site.

RI activities were conducted at this site to investigate contamination from PCBs at the former transformer location and contamination from fuel constituents at the former generator and AST locations (IT, 1999). Pesticides and metals were also investigated in the general vicinity of the site. PCBs were not detected in surface soil samples collected at the generator pad. However, lead, seven PAHs, and UHE were detected in the northern sample and lead and UHE were also detected in the southern sample.

Excavation activities were conducted beneath the generator pad during the 1998 interim removal actions (IT, 2000a). Although metals were detected in confirmation samples, no metals were detected above action goals.

The FFS evaluations did not identify any COCs at this site that could potentially pose a risk to human health or the environment (see FFS Table 1-7) (USACE, 2001). The FFS determined that no remedial action was required at this site to protect human health or the environment. Therefore, the No Further Action alternative was selected and this site is not evaluated in further detail in the ROD/RAP.

2.1.3.12 Onshore Fuel Line Sites

From circa 1945 until 1975, the onshore fuel line (ONSFL) was used to transport aviation gasoline and, later, JP-4 liquid fuels from the Offshore Fuel System to several locations around the airfield. Before the installation of the fuel line, fuel was delivered by rail or tanker truck.

The fuel line included an offshore portion, between the unloading terminal in the Bay and the booster pump station just inside the east levee, and an onshore portion, which extended from the booster pump station to the airfield hangars. This offshore portion was previously closed, as documented in letters from RWQCB and DTSC, dated July 30, 1999, and September 9, 1999 (RWQCB, 1999 and DTSC, 1999). For the purposes of evaluation during the RI and risk assessment, the ONSFL was divided into three sections:

- 54-inch Drain Line Segment (former 6-inch-diameter fuel pipeline that ran under the northwestern end of the runway via a 54-inch-diameter storm drainage culvert)
- Hangar Segment (southeast trending parallel fuel pipelines formerly located in the grassy area between the runway and the hangars)
- Northern Segment (former 6-inch-diameter fuel line along the northern perimeter of the Inboard Sites parcel)

The fuel lines were removed in 1995 except for the portion from the PDD to the levee, which was removed in 1998. Total purgeable petroleum hydrocarbon (TPH-p), ethylbenzene, xylenes, PAHs, and lead were detected in the soil samples collected after removal of the fuel lines. The soil located along the hangar fuel lines has been contaminated by petroleum hydrocarbons, PAHs, VOCs, and lead. Most of the contamination was located at depths ranging from 5 to 10 feet bgs (IT, 1999). However, during actions to remove the pipelines,

contaminated soils were returned to the excavation. Therefore, there may be contamination at or near the surface. The soil beneath the board-mounted transformer, located at the booster pump station in the northeastern corner of the Main Airfield Parcel, was investigated for PCBs during the RI. PCBs were not detected. Additional sampling also was conducted along previous sample areas of the fuel line to determine the extent of fuel contamination for locations with high concentrations of fuel contamination. Results of the soil sampling indicated that most of the contamination is within 20 feet of the trench; however, one location required step-outs to 50 feet beyond the trench.

The COCs for the ONSFL are listed in Table 2.1-1. Concentrations of COCs detected at this site exceed action goals.

2.1.3.13 Northwest Runway Area

The Northwest Runway Area was investigated initially as part of the GSA Phase II Sale Area (IT, 1998). The site is located at the extreme northern end of the Main Airfield Parcel, along the southeastern slope of the northern perimeter levee, between Ignacio Reservoir Marsh and an alkali marsh. This site was originally identified as an area of potential concern through an aerial photograph review, which showed possible surface disturbances. A geophysical survey conducted in this area identified anomalies that suggested that buried objects might be present at suspected Landfill 23 located primarily in the GSA Phase II Sale Area (IT, 1998). Soil and groundwater investigations did not encounter debris that was indicative of landfill activity. This site is also known as ASR Site #17.

Investigations of soil and groundwater began at this site in 1985. Metals, DDD, TPH, and bis(2-ethylhexyl)phthalate (a common laboratory contaminant) were detected in the soil samples collected along the northwestern runway area. No evidence of landfill activity was identified. Four groundwater monitoring wells (MW-PVC-1, -2, -3, and -4) were installed in August 1985, and were sampled between October 1985 and September 1986. Groundwater results are discussed in Appendix B.

In 1997, four direct-push soil samples were collected and temporary monitoring wells (TW-001 through -004) were installed in the boreholes (IT, 1998). The soil samples were collected at depths of 5, 10, and 15 feet bgs. Metals were detected in the soil; their concentrations were within the range of background concentrations (IT, 1998). Groundwater results are discussed in Appendix B.

This ROD/RAP did not identify any COCs at this site, so it was determined that no remedial action is required to protect human health and the environment. As a result, the No Further Action alternative has been selected and this site is not evaluated in further detail in this ROD/RAP.

2.1.3.14 Tarmac East of Outparcel A-5

The tarmac east of Outparcel A-5 is a taxiway connecting the former AMSF with the northwestern portion of the runway. The tarmac is located northwest of former Building 86 and adjoins and includes a portion of the NHP levee constructed at the boundary between the GSA and BRAC properties.

The tarmac was identified for further investigation when a petroleum hydrocarbon and PAH plume located at Outparcel A-5 was found to extend northeast onto the Main Airfield

Parcel. During the RI, PAH, lead, and UHP were detected in pothole samples collected at the tarmac east of Outparcel A-5. The maximum horizontal extent of the plume from Outparcel A-5 is approximately 20 feet east of the levee beneath the tarmac and within the levee easement (IT, 1999). The majority of the TPH-contaminated soil is beneath the concrete at about 3 feet bgs; however, contaminated soil may extend to 10 feet bgs (IT, 1999).

The FFS evaluations did not identify any COCs at this site that could potentially pose a risk to human health or the environment (see FFS Table 1-7) (USACE, 2001). The FFS determined that no remedial action was required at this site to protect human health and the environment. Therefore, the No Further Action alternative was selected, and this site is not evaluated in further detail in the ROD/RAP.

2.1.3.15 Revetment Area

The revetment area, located east of the runway, is transected by asphalt-paved taxiways that connect 28 circular-shaped parking areas (revetment turnouts) and extensive undeveloped areas. The revetments were used for aircraft staging and refueling before 1974, except for Revetments 6 and 10, which were used as an engine test pad and firefighter training area, respectively (IT, 1999). Fuels, solvents, and vehicles were periodically ignited and doused at Revetment 10 from 1975 to 1987. Aircraft fueling via fuel trucks was also reported to have occurred in the revetment area. Revetments 6 and 10 were also identified in the Archive Search Report; they were referred to as the Engine Test Area and the Burn Pit, respectively.

In addition to the 28 revetments discussed above, the Archive Search Report identified 8 historic revetments in the Main Airfield Parcel. Two of these were paved over during the construction of the aircraft maintenance area, two became dirt roads, and one has been revegetated by the surrounding grass. These 8 historic revetments have not been investigated.

Of the 28 revetment turnouts, 24 are paved with concrete, and 4 are unpaved (9, 11, 12, and 23). Each turnout is nearly encircled by an earthen berm approximately 1 foot high. A thin layer of sediment, grass, and weeds is now present at many of the turnouts. Revetment 18 includes the Building 15 Area because they are geographically close.

A series of storm drains and drop inlets were located throughout the revetment area (see Figure 2.1-1).

The revetments are grouped in this ROD/RAP to provide a clearer summary of the investigations conducted at each revetment and the results of these investigations. The following is the breakout of these groups:

- Revetments 1 through 4, 7, 8, 13 through 17, 19 through 22, and 24 through 28
- Revetment 5
- Revetment 6
- Revetments 9, 11, 12, and 23
- Revetment 10
- Revetment 18/Building 15

The following subsections discuss each group of revetments and their respective investigations.

Revetments 1 through 4, 7, 8, 13 through 17, 19 through 22, and 24 through 28

During the 1993 Army investigation, soil samples were collected from beneath the revetment pads (ESI, 1993). TPH and lead were detected at Revetments 1, 2, 3, 4, 7, 8, 13 through 17, 19, 20, 21, 22, 24, and 28. Bis(2-ethylhexyl)phthalate (a common laboratory contaminant) was detected at Revetments 3 and 8. SVOCs were detected in the composite soil samples at Revetments 7, 15, 19 (only in the duplicate sample), 20, and 27. Additional samples were collected from around the pads located at Revetments 17, 20, 26, and 27 (ESI, 1993). Four soil borings were drilled around each pad and soil samples were collected at 4 to 5 feet bgs. The soil samples were analyzed for TPH, BTEX, and lead. TPH was detected at Revetments 17, 26, and 27. Lead and one PAH were detected above baseline concentrations; however, BTEX was not detected.

In 1993, the Army installed two additional wells, RV-MW-103 at Revetment 20 and RV-MW-102 at Revetment 26 (ESI, 1993). No constituents were detected in groundwater samples collected from monitoring well RV-MW-103. Groundwater was not sampled at RV-MW-102 because recharge was insufficient (ESI, 1993).

RI activities were conducted at Revetments 17 and 27. Soil samples were collected from the revetment to obtain more accurate TPH results than previously reported. Lead was detected below its background concentration at Revetments 17 and 27.

In 1999, UHE and UHP were detected in the surface soil samples collected from Revetments 1, 7, 13, 19, 21, 22, and 26 (FW, 2000). UHE also was detected in the surface soil samples at Revetments 2, 14, 24, 25, and 28 and UHP was detected at Revetments 3 and 4. TPH-D also was detected at Revetment 19. Metals were detected in the surface soil samples collected from all of the revetments. PAHs were detected in the surface soil samples collected from Revetments 1, 2, 4, 7, 13, 19, 21, 22, 24, and 25. Analyses of Revetments 15 and 19 resulted in estimated detections of VOCs in surface soil samples and analyses at Revetment 27 resulted in confirmed detections of VOCs in surface samples (FW, 2000).

In February 2002, during remediation activities at Revetments 6 and 7, contaminated soil was removed and disposed of offsite. The analytical results of the soil removal activities are provided in *Final Construction Report Building 41 Demolition and Soil Removal, Spoils Pile F Removal, and Revetments 6 and 7 Removal* (IT, 2003). After reviewing the analytical data from that event, it was agreed that some additional samples are needed to determine whether the actions are complete. As a result, for the purposes of this report, this site is being evaluated as though the actions have not yet taken place.

Table 2.1-1 lists the COCs for Revetment 7. Concentrations of COCs detected at Revetment 7 exceed action goals.

The FFS evaluations did not identify any COCs at Revetments 8, 17, 24, or 27 that could potentially pose a risk to human health or the environment (see FFS Table 1-7) (USACE, 2001). The FFS determined that no remedial action was required at these sites. The evaluation of COCs during the ROD/RAP process identified cadmium and lead as COCs at Revetment 15 and cadmium as a COC at Revetment 20. However, for each revetment, the COCs were detected in only one sample and the concentrations detected were only slightly above the action goal. Risk management evaluations during the FFS determined that no

remedial action was necessary at Revetments 15 and 20. Therefore, Revetments 15 and 20 are not evaluated in further detail in this ROD/RAP.

The baseline risk assessment and FFS evaluations did not identify any contaminants at Revetment 28 that could potentially pose a risk to human health or the environment (see FFS Table 1-1) (USACE, 2001). The FFS determined that no remedial action was required at this site. Therefore, the No Further Action alternative was selected and this site is not evaluated in further detail in the ROD/RAP. COCs were identified at the remaining revetments covered in this subsection.

Revetment 5

In 1993, TPH and lead were detected in samples collected from Revetment 5 (ESI, 1993).

In 1996, monitoring wells RVT-MW-1 through RVT-MW-3 were installed around a catch basin located next to Revetment 5 (IT, 1999). There were 10 metals detected in the groundwater samples collected from these wells, but organics were not detected (IT, 1999).

In 1999, analyses of Revetment 5 resulted in estimated detections of VOCs in a surface soil sample collected beneath the pavement (FW, 2000). UHP was also detected in the surface soil sample.

The baseline risk assessment and FFS evaluations did not identify any contaminants at Revetment 5 that could potentially pose a risk to human health or the environment (see FFS Table 1-1) (USACE, 2001). The FFS determined that no remedial action was required at this site. Therefore, the No Further Action alternative was selected and this site is not evaluated in further detail in the ROD/RAP.

Revetment 6

In 1990, one monitoring well (RV-MW-101) was installed adjacent to Revetment 6 (IT, 1999). Groundwater results are discussed in Appendix B.

Also, in 1990, surface and subsurface soil samples were collected from the edge of Revetment 6. Lead, toluene, and bis(2-ethylhexyl)phthalate (a common laboratory contaminant) were detected in the soil. Lead was detected below its background concentration (IT, 1999). In addition, in 1995, Woodward-Clyde (WC) also collected two soil samples at depths ranging from 2.5 to 3 feet bgs. No analytes were detected in the soil samples (IT, 1999).

One soil sample was collected from Revetment 6 in 1998, during the RI, and was analyzed for TPH. Toluene and lead were detected in the soil sample.

In 1999, dioxins were detected in three surface soil samples collected from the revetment (FW, 2000). Metals, PAHs, UHE, and UHP also were detected in the surface soil samples.

In February 2002, during remediation activities at Revetment 6, contaminated soil was removed and disposed of offsite. The analytical results of the soil removal activities are provided in *Final Construction Report Building 41 Demolition and Soil Removal, Spoils Pile F Removal, and Revetments 6 and 7 Removal* (IT, 2003). After reviewing the analytical data from that event, it was agreed that some additional samples are needed to determine whether the

actions are complete. As a result, for the purposes of this report, this site is being evaluated as though the actions have not yet taken place.

Table 2.1-1 lists the COCs for Revetment 6. Concentrations of COCs detected at this site exceed action goals.

Revetments 9, 11, 12, and 23 (unpaved revetments)

In 1996, WC investigated Revetments 9, 11, 12, and 23. Soil samples were collected from depths ranging from surface to 6 inches bgs and 1 to 1.5 feet bgs; soil borings were also installed at two additional locations (IT, 1999). The soil samples were analyzed for TPH-d, TPH-g, TPH-JP-4, TPH-motor oil, BTEX, PAHs, VOCs, metals, and oil and grease. Ten metals were detected above baseline concentrations and TPH, BTEX, and VOCs were not detected. Acenaphthene was detected above its baseline concentration at Revetment 9 at a depth of 6 inches bgs; it was not detected at 1.5 feet bgs. In addition, eight temporary monitoring wells, RVT-TW1 through RVT-TW8, were installed in soil borings at these unpaved revetments. Groundwater samples were collected and analyzed for TPH-d, TPH-g, TPH-JP-4, BTEX, and PAHs. Xylene was detected in the groundwater at Revetment 9 and ethylbenzene was detected in the groundwater at Revetment 12.

Before the RI, 10 metals were detected in the soil samples collected from the unpaved revetments at depths ranging from surface to 1.5 feet bgs. Xylene was detected in groundwater samples collected from temporary monitoring wells at Revetment 9, and ethylbenzene was detected at Revetment 12. RI activities were conducted at Revetments 11 and 23. During the RI, gasoline and UHE were detected in the soil at Revetment 11 and five metals were detected at Revetment 23.

Following the 1999 interim removal actions at Revetment 9, lead was detected in confirmation samples at levels below action goals.

The FFS evaluations did not identify any COCs at Revetment 9 that could potentially pose a risk to human health or the environment (see Table FFS 1-1) (USACE, 2001). The FFS determined that no remedial action was required at Revetment 9. Therefore, the No Further Action alternative was selected and this site is not evaluated in further detail in the ROD/RAP. Table 2.1-1 lists the COCs for Revetments 11, 12, and 23. Concentrations of COCs are detected above action goals at Revetments 11, 12, and 23.

Revetment 10

In 1987, soil samples were collected from three soil borings at Revetment 10 (the firefighter training area) at depths ranging from 1 to 9 feet bgs. The concentrations of seven metals were detected above their background concentrations. The highest detection of TPH was detected at a depth of 1 foot bgs (IT, 1999). PAHs were not detected.

In 1993, surface and subsurface soil samples and groundwater samples were collected at the Revetment (ESI, 1993). Toluene, anthracene, chrysene, bis(2-ethylhexyl)phthalate (a common laboratory contaminant), and lead were detected in the soil samples. Lead and four PAHs were detected above their background concentrations. Ethylbenzene, toluene, xylene, and 1,3-dimethylbenzene were detected in subsurface soil samples. Methyl ethyl ketone (MEK) and TPH were detected in the groundwater samples.

During the RI, a PCB investigation was conducted at Revetment 10. PCBs were not detected in the soil samples collected from the area.

During the 1998 interim removal, three dioxins and one furan were detected in soil samples at a depth of 1 foot bgs on the eastern side of the excavation; however, the detected concentrations were below action goals.

The FFS evaluations did not identify any COCs at Revetment 10 that could potentially pose a risk to human health or the environment (see FFS Table 1-7) (USACE, 2001). The FFS determined that no remedial action was required at this site. Therefore, the No Further Action alternative was selected and this site is not evaluated in further detail in the ROD/RAP.

Revetment 18/Building 15 Area

Building 15 is south of Revetment 18, along the northern perimeter of the Main Airfield Parcel. Building 15 formerly contained a generator that provided electrical power for airfield activities, such as runway lighting (IT, 1999). One concrete transformer pad is adjacent to the western side of the building. One former 120-gallon AST was located northwest of Building 15. The AST stored diesel fuel for the generator inside the building. Three transformers were also formerly located on soil adjacent to the concrete pad located west of Building 15; they were removed in 1995 (IT, 1999).

Building 15 was investigated to determine environmental impacts from fuel storage and PCB contamination at the transformer location during the RI (IT, 1999). The AST and associated piping were removed. UHE and lead were detected in soil samples collected southeast of the former AST at a depth of 1.5 feet bgs. The excavation was extended to 10 feet bgs and additional samples were collected. UHE was detected above step-out criteria at 7 feet bgs, but TPH was not detected at 8.5 feet bgs. Step-out potholes were also excavated to a depth of 10 feet bgs, about 20 feet from each side of the excavation, and one groundwater sample was collected from the step-out pothole east of the concrete pad. UHE was not detected in the step-out pothole soil samples; however, it was detected in the groundwater sample. PCBs were not detected in the surface soil samples collected from around the concrete transformer pad northwest of Building 15.

During the 1998 interim removal, lead and UHE were detected in confirmation samples collected from the AST and transformer area at Building 15. The constituents were detected at depths ranging from 5.5 to 9.5 feet bgs, but were below action goals.

During the remedial design investigation, pesticides, UHP, and PAHs were detected in the surface soil sample collected in the Revetment 18 area, and VOCs were detected in the surface soil sample collected beneath the pavement at the revetment (FW, 2000).

The baseline risk assessment and FFS evaluations did not identify any contaminants at Revetment 18/Building 15 that could potentially pose a risk to human health or the environment (see FFS Table 1-1) (USACE, 2001). The FFS determined that no remedial action was required at this site. Therefore, the No Further Action alternative was selected and this site is not evaluated in further detail in the ROD/RAP.

2.1.4 Background and Nature of Contamination—Other Army BRAC Environmental Concerns

This section provides background information on other Army BRAC environmental concerns that are addressed in this ROD/RAP. Where information on the nature of contamination is available it is provided. COCs have not been identified for these areas of environmental concern.

2.1.4.1 Archive Search Report Sites

The St. Louis District of the U.S. Army Corps of Engineers was contracted by U.S. Army Forces Command in 2000 to conduct an archival search on behalf of the Army BRAC office at HAAF. The purpose was to identify locations where contamination from base operations may have occurred. The results of their investigation were published in the Archive Search Report (USACE, 2001). The Archive Search Report includes some sites previously identified by initial investigations conducted by the Army, as described in the preceding text. Portions of the Archive Search Report required further elaboration, clarification, or supportive documentation. The Army BRAC office conducted additional archives research and the results are presented in a Memorandum of Record dated February 2003 (USACE, 2003). For reference, the following descriptions correlate to the numbers delegated to them in the Archive Search Report, Plate 3 and both documents will be referenced jointly as USACE, 2001 and USACE, 2003.

Four Archive Search Report sites are evaluated in this ROD/RAP. Background information for each of these sites is provided below. The Army is in the process of evaluating and investigating these sites. Limited analytical data are currently available for the Alleged HTRW Disposal site (ASR Site #8). The Archive Search Report sites described below will follow a process of site investigation, then site contamination levels will be compared to action goals presented in Table 1-2, and if, based on this comparison, remediation is warranted, then the RWQCB SCRs will identify the procedure for completion.

Testing Range (ASR Site #4)

The Archive Search Report identified an area labeled as the "Testing Area" based on an aerial photograph dated August 1946. The area is described as a "rectangle approximately 1,000 feet by 100 feet between the sewage treatment plant and the black powder magazine." The Archive Search Report did not explain the basis for labeling the area as a "testing area;" however, the Army BRAC office has historical maps dated 16 May 1945 and 4 December 1952 that outline an area approximately 940 feet by 100 feet labeled "testing range." Neither the BRAC office nor the Archive Search Report team was able to locate accounts on how the site was used. Because Hamilton was not a research and development base, it is not likely that testing of weapons occurred here. Based on the survey of additional maps dated 25 February 1959, 15 December 1963, and 22 November 1963 that depict a portion of the testing range called a "firing range," the Army BRAC office concludes that the "testing range" may have been a small arms target practice area.

Alleged Hazardous, Toxic, and Radiological Waste Disposal Site (ASR Site #8)

In December of 2000, a local resident and former military facility inspector stated that during a routine inspection of Hamilton, in the mid-1980s, he was told various chemicals were improperly disposed of in an area near the north end of the runway (the alleged HTRW Disposal site). Previous sampling in the area included the collection and analysis of three samples within the area in question. Additionally, one boring conducted by URS Group for USACE San Francisco District in 2001-2002 was located within the boundaries of the alleged disposal area. No contamination or debris was reported from this work. The Army will conduct sampling in the area, and a Sampling and Analysis Plan is currently in review. For the purposes of future investigations, this area is being referred to as the Northwest Alleged Disposal Area.

Skeet Range (ASR Site #18)

A skeet range was identified in the Archive Search Report as ASR Site #18. The range was situated inboard, at the corner where South Boundary Road meets East Boundary Road and west of what is now the south runway extension. It is visible on aerial photography dating up to 26 April 1943, but is not observable in photographs beginning in 1946. COCs at a skeet range are lead and other metals from shot and PAHs associated with clay targets.

Firing-In-Butt (ASR Site #19)

A firing-in-butt was identified in the Archive Search Report as ASR Site #19. The Archive Search Report accurately located the historic Firing-In-Butt in the vicinity of the runway and Revetment 25. However, the Archive Search Report incorrectly shows the Butt as being closer to the firing line than photos indicate and incorrectly states the date of its removal. There were three hardstands and a "butt," which is a target surrounded by barricade material. Aircraft machine guns, on both sides of the aircraft, were fired into the earthen mound called a "butt" to check firing alignment. The hardstands with connecting road still exist and are visible in 1960s aerial imagery. The Butt was removed in its entirety in 1947, the disposition of the soil not known.

According to the *Closed, Transferring, and Transferred Range and Site Inventory Report, Hamilton Army Airfield* (URS, 2002), the site is considered to be a negligible explosives safety risk and no explosive-related action is necessary. The report goes on to say that because the aircraft were firmly fixed, there is low probability that rounds strayed from the intended target.

2.1.4.2 General Services Administration and BRAC Soil Stockpiles

Approximately 97 soil stockpiles are currently staged in rows on the runway. In 1995 and 1996, the soil was generated by the environmental remediation of GSA and BRAC properties adjacent to the Main Airfield Parcel. Minor amounts of additional soil were generated in 1997 and 1998. The soil was stockpiled on the runway located on the Main Airfield Parcel. Soil with concentrations above hazardous waste thresholds (lead, PCB, VOCs, pesticides or herbicides) were not stockpiled on the runway and were shipped offsite for disposal. TPH- and PAH-contaminated soils from petroleum sites are not regulated by CERCLA.

The stockpiles on the runway were evaluated for reuse in levees, as excavation backfill, or as capping soil. A plan of randomly generated sampling locations and a statistical approach to the evaluation of the sample results was employed to characterize the stockpiles and determine which stockpiles were ready for reuse and which had unacceptable levels of TPH or PAHs, so were not ready for immediate reuse. Based on the analysis of the sample results, some stockpiles were used in the NHP Levee, and other stockpiles were consolidated into piles of like chemical concentrations. Other piles were left in their original configuration. Additional samples were collected from a number of the consolidated stockpiles to characterize them after consolidation.

The stockpiles have been managed to prevent erosion and sediment transport by rainwater runoff. Each pile has been coated with a soil cement mixture to prevent erosion. Soil and rock berms and straw bales were placed around the stockpiles or at the perimeter of the airfield, taxiways, and former aircraft parking areas to manage and mitigate sediment in runoff from the airfield to the lower-lying grassland areas at the runway edges. The stockpiles were left in an "as-is" condition. The stormwater erosion berms have been maintained and stormwater sampling has been conducted since 1996.

The RWQCB will determine what additional actions (if any) may be required with respect to the management and reuse of the stockpiled soil. The Army will be responsible for conducting any additional actions required by the RWQCB.

2.1.4.3 Radiological Waste Disposal Cylinders

According to the *Base Realignment and Closure (BRAC) Historical Record Search to Identify any Residual Radioactive Material at Hamilton Army Airfield* by the Medical Physics Center 1994, two concrete-capped galvanized cylinders were buried, in accordance with Atomic Energy Commission policy, at Hamilton near an earthen levee in 1963. With the assistance of the U.S. Air Force, the cylinders, confirmed to contain electron tubes and wave-guides, were located northeast of the runway overrun levee. The cylinders were taken offsite on 14 September 1988 and disposed of at a low-level radiological disposal facility in Barnwell, South Carolina. Soil and water samples were taken internally, externally, and adjacent to each culvert, and were tested for radioactivity. All soil samples confirmed no migration of radioactivity to the nearby environment. After excavation of the cylinders, soil samples were collected from the former disposal site and analyzed for gamma spectrometry and tritium. No contamination was detected. After backfilling the excavation to grade, Geiger measurements showed no activity (Weston, 1990).

The California Department of Health Services (DHS) reviewed documentation of the radiological history of HAAF. DHS concluded that the cylinders had been removed from the base and that no contamination had occurred. The DHS findings were documented in a memorandum to the Army dated March 17, 2003 (DHS, 2003).

2.1.5 Background and Nature of Contamination—Environmental Issues Hamilton Wetland Restoration Program

Several issues related to residual contamination have been identified within the Inboard Area. These issues include residual Inboard Area-Wide DDTs, and PAHs in soil near the

runway, and lead-based paint. These issues will be addressed as part of the HWRP. Background information on these issues is provided in the sections below.

2.1.5.1 Residual Inboard Area-Wide DDTs and Polynuclear Aromatic Hydrocarbons Near the Runway

In 1999, the Army conducted a study to evaluate the potential for the presence of pesticides throughout the unpaved areas of the Main Airfield Parcel and the potential for PAHs to be located adjacent to the runway. This study and the results of the study are documented in the Remedial Design Investigation Final Data Report (FW, 2000). During the study, the Army collected 23 samples throughout the Main Airfield Parcel and near the runway to evaluate the presence or absence of pesticides and DDTs.

The study showed that approximately 270 acres of grassland have residual concentrations of DDTs. The concentrations of total DDTs detected ranged from 0.0181 to 0.935 ppm. The study also showed soil along the margins (within 50 feet) of the southern end of the runway contain residual PAHs. The PAH detections are greater along the southern end of the runway, which was the normal landing area. The concentrations of PAHS detected ranged from 0.036 to 54.9 ppm. The residual DDTs and PAHs may pose a potential risk to future wetland receptors if the receptors, or their prey items, are exposed to existing site soil during the development and maturation of the wetland.

The State and Army acknowledge that they have different views regarding the scope of the Army's legal responsibility for the residual concentrations of Inboard Area-Wide DDTs and PAHs in soil adjacent to the runway. Nevertheless, both parties are in full agreement as to the measures necessary to address the remaining contamination, including these residuals, on the HAAF site. Two Alternatives (Alternative 1 and Alternative 4) are developed and evaluated in this ROD/RAP for these issues.

2.1.5.2 Lead-Based Paint

Given the age of existing and previously demolished buildings in the Inboard Area, lead-based paint may have been used on the buildings. The age of historical and existing buildings is described in the EBS (CH2M HILL, 2003). Multiple alternatives are not evaluated in the ROD/RAP for lead-based paint issues. Instead, the ROD/RAP presents the following selected alternative.

To address possible lead contamination from paint used on the buildings, the HWRP will provide 3 feet of stable cover over the footprint of the building and to a distance of 6 feet beyond the building footprint. If 3 feet of cover cannot be achieved, the soil area at the current and previously demolished building locations plus 6 feet beyond the building perimeter will be scraped to a depth of 6 inches and managed elsewhere onsite beneath 3 feet of stable cover. The building foundation and any concrete/asphalt/hard foundation surface adjacent to the building may remain.

TABLE 2.1-1

Inboard Area Site-Specific COCs

Contaminants	Action Goals (ppm)	Former Sewage Treament Plant	Building 26	Building 35/39 Area	Building 41 Area	Building 82/87/92/94 Area	Building 86	PDD Unlined	PDD Lined (In proposed channel)	PDD Lined (Outside proposed channel)	PDD Spoils Pile A	PDD Spoils Pile B	PDD Spoils Pile C	PDD Spoils Pile D	PDD Spoils Pile F	PDD Spoils Pile G	PDD Spoils Pile I
Metals																	
Arsenic	16.7														X		
Barium	190					X											
Beryllium	1.03					X	X	X	X	X	X				X		X
Boron	36.9																
Cadmium	1.2						X					X					
Chromium	112						X										
Cobalt	27.6														X		
Copper	68.1											X					
Lead	46.7														X		
Manganese	943														X		
Mercury	0.43											X					
Nickel	114														X		
Silver	1											X					
Vanadium	118																
Zinc	158										X	X			X		
Semivolatile Organic Compounds (including PAHs)																	
PAHs, total	4.022				X		X								X		
Petroleum Hydrocarbons																	
TPH-diesel	144		X		X												
TPH-motor Oil	144																
TPH-gasoline	12																
TPH-JP-4	12																
Pesticides/PCBs/Dioxins																	
DDTs, total (onsite disposal)	0.03	X[a]		X				X	X	X	X		X	X	X	X	X
DDTs, total (offsite disposal)	1			X				X									

TABLE 2.1-1

Inboard Area Site-Specific COCs

Contaminants	Action Goals (ppm)	PDD Spoils Pile J	PDD Spoils Pile K	PDD Spoils Pile L	PDD Spoils Pile M	PDD Spoils Pile N	ONSFL-54-inch Line	ONSFL-Hanger Segment	ONSFL-Northern Segment	Revetment 1	Revetment 2	Revetment 3	Revetment 4	Revetment 6	Revetment 7	Revetment 11	Revetment 12	Revetment 13
Metals																		
Arsenic	16.7																	
Barium	190			X						X		X						
Beryllium	1.03																	
Boron	36.9																	
Cadmium	1.2									X	X		X					X
Chromium	112																	
Cobalt	27.6			X														
Copper	68.1											X				X	X	
Lead	46.7			X		X				X	X		X		X			X
Manganese	943											X						
Mercury	0.43																	
Nickel	114																	
Silver	1																	
Vanadium	118																	
Zinc	158			X														
Semivolatile Organic Compounds (including PAHs)																		
PAHs, total	4.022							X		X					X			X
Petroleum Hydrocarbons																		
TPH-diesel	144																	
TPH-motor Oil	144								X									
TPH-gasoline	12						X	X	X					X				
TPH-JP-4	12							X	X									
Pesticides/PCBs/Dioxins																		
DDTs, total (onsite disposal)	0.03	X	X		X	X												
DDTs, total (offsite disposal)	1																	

TABLE 2.1-1

Inboard Area Site-Specific COCs

Contaminants	Action Goals (ppm)	Revetment 14	Revetment 16	Revetment 19	Revetment 21	Revetment 22	Revetment 23	Revetment 25	Revetment 26
Metals									
Arsenic	16.7								
Barium	190		X	X				X	X
Beryllium	1.03								
Boron	36.9								X
Cadmium	1.2			X					
Chromium	112								
Cobalt	27.6								
Copper	68.1			X	X		X		
Lead	46.7			X					
Manganese	943								X
Mercury	0.43								
Nickel	114								
Silver	1								
Vanadium	118				X				
Zinc	158								
Semivolatile Organic Compounds (including PAHs)									
PAHs, total	4.022			X					
Petroleum Hydrocarbons									
TPH-diesel	144	X		X	X	X		X	X
TPH-motor Oil	144								
TPH-gasoline	12			X	X	X			X
TPH-JP-4	12								
Pesticides/PCBs/Dioxins									
DDTs, total (onsite disposal)	0.03								
DDTs, total (offsite disposal)	1								

x = Contaminant identified as a COC at site.

[a] Not a COC but risk management evaluation determined that remedial action is required for individual detection of DDT.

There are no COCs at the following sites:
Revetment 18/Building 15, Building 20, Building 84/90 Area, Tarmac East of Outparcel A-5, PDD Spoils Pile E, PDD Spoils Pile H, East Levee Generator Pad, Northwest Runway Area, and Revetments 5, 8, 9, 10, 15, 17, 20, 24, 27, and 28.

GRAPHIC SCALE

500 0 500 1000

(IN FEET)
1 inch = 500 ft.

NORTHWEST RUNWAY AREA

RADIOLOGICAL WASTE DISPOSAL CYLINDERS

PDD SPOILS PILE A

NORTHWEST ALLEGED DISPOSAL AREA (ASR SITE #8)

PDD–UNLINED PORTION

NORTH LEVEE

PERIMETER ROAD

ONSFL–54" DRAIN LINE SEGMENT

PDD SPOILS PILE B

BUILDING 20

BUILDING 26

PDD–LINED PORTION OUTSIDE HWRP CHANNEL CUT

ONSFL–NORTHERN SEGMENT

PDD SPOILS PILE C

REVETMENT 16

REVETMENT 15

REVETMENT 14

REVETMENT 12

REVETMENT 28

REVETMENT 11

REVETMENT 10

REVETMENT 26

PDD SPOILS PILE D

REVETMENT 9

REVETMENT 8

REVETMENT 7

REVETMENT 18/BUILDING 15

ONSFL–HANGAR SEGMENT

REVETMENT 19

REVETMENT 17

REVETMENT 20

REVETMENT 21

REVETMENT 22

REVETMENT 23

REVETMENT 24

REVETMENT 13

REVETMENT 27

REVETMENT 25

REVETMENT 3

FIRING–IN BUTT, (ASR SITE #19)

PDD SPOILS PILE E

BUILDINGS 35/39

REVETMENT 6

PDD LINED PORTION WITHIN PROPOSED HWRP CHANNEL CUT

PDD SPOILS PILE F

BUILDING 41 AREA

FORMER SEWAGE TREATMENT PLANT

REVETMENT 5

REVETMENT 4

TESTING RANGE, (ASR SITE #4)

REVETMENT 2

PDD SPOILS PILE G

REVETMENT 1

EAST LEVEE GENERATOR PAD

HISTORIC REVETMENTS

PDD SPOILS PILE I

PDD SPOILS PILE H

PDD SPOILS PILE J

PDD SPOILS PILE K

SKEET RANGE (ASR SITE #18)

PDD SPOILS PILE L

HISTORIC REVETMENTS

PDD SPOILS PILE M

PDD SOILS PILE N

BUILDINGS 84/90

BUILDINGS 82/87/92/94

BUILDING 86

TARMAC EAST OF OUTPARCEL A–5

LANDFILL 26

GSA PHASE II SALE PARCEL

LEGEND

- MAIN AIRFIELD PARCEL BOUNDARY
- AREAS ENLARGED IN FIGURE 2.4-2 THROUGH FIGURE 2.4-5
- LINED PERIMETER DRAINAGE DITCH OUTSIDE PROPOSED HWRP CHANNEL CUT
- LINED PERIMETER DRAINAGE DITCH WITHIN PROPOSED HWRP CHANNEL CUT
- UNLINED PERIMETER DRAINAGE DITCH
- STORMWATER DRAINAGE SYSTEM
- SEWER SYSTEM LINES

FIGURE 2.1-1
INBOARD AREA SITE LOCATIONS
HAMILTON ARMY AIRFIELD

ROD/RAP

CH2MHILL

E042003005SAC_HAAF Fig2.1-1.ai 8/7/03 esm

SECTION 2.2

Overview of Risk Assessment and Action Goals

This section provides an overview of the risk assessment and the process used to establish action goals for Inboard Area sites. Contamination at most of the sites was first evaluated in the risk assessment to make an initial determination of the contaminants of potential concern (COPCs), and the levels that pose a risk. The sites were further evaluated in the FFS based on preliminary action goals, and it was determined that 18 sites did not require further action. Further analysis of the data occurred during preparation of this ROD/RAP, resulting in changes to the action goals and further evaluation of the data. Through that process, two sites that had been identified in the FFS as not requiring further action were determined to require further action. Furthermore, several sites that had not been evaluated in the risk assessment or FFS were determined to require action based on the analytical data collected for those areas and the action goals in this ROD/RAP. The following subsections describe the process used to arrive at these decisions.

2.2.1 Risk Assessment Overview

The baseline risk assessment for HAAF was prepared by the Army for 63 BRAC property sites. The sites were divided into five coastal salt marsh sites and 58 Inboard Area sites. The risk assessment evaluated the Seasonal Wetland as an Inboard Area site; however, it was determined not to be a part of the HAAF Main Airfield Parcel, and is not addressed in this ROD/RAP. This section summarizes the baseline risk assessment for the 57 remaining Inboard Area sites located within the HAAF Main Airfield Parcel. These sites are listed in Table 1-1.

The baseline risk assessment estimated the potential risk that the residual contamination at sites within the Inboard Area may pose to human health and the environment at present, and during the development, maturation, and life of the wetland. The risk assessment assumed that exposure pathways are complete at all sites. For example, the baseline risk assessment assumed that human and ecological receptors were in direct contact with contaminants at a site even where existing contamination is currently covered or is planned to be covered in the future Wetland Restoration Project. Exposure to human or ecological receptors would not occur in this case, provided the contaminants remained covered. As a result, the baseline risk assessment presents a worst-case estimate of where and when remedial actions would be needed to protect human health and the environment for those Inboard Area sites evaluated. Key baseline risk assessment assumptions are as follows:

- Exposures may occur now and in the future because of the chemicals present in the soil or sediment.
- Human and ecological receptors will be present in the future.
- The receptors were assumed to be directly exposed to existing soil or sediment (i.e., the risk assessment did not consider the fact that some sites are covered with concrete or clean fill, or will be covered in the future with imported cover material).

- For the future redevelopment scenario, existing soils will become sediments that support estuarine and freshwater biota.
- The site will not be used for residential or industrial purposes, so these scenarios were not considered in the Human Health Ecological Risk Assessment (HHERA).

2.2.1.1 Baseline Ecological Risk Assessment

The Inboard Area sites are currently grassland habitats or seasonal wetlands, with the PDD supporting a small freshwater community. Construction of a wetland habitat is proposed for the site. The ecological risk assessment considered both current and future land use scenarios for the 57 sites by evaluating the risks to representative plants and animals under estuarine, freshwater, and grassland habitat scenarios for each site. Exposure pathways associated with direct uptake and ingestion were used to assess the risks to the following current and/or future ecological receptors and their associated habitats at the Inboard Area sites:

- **Estuarine Habitat –** algae, pickleweed, amphipods, bay shrimp, northern anchovies, juvenile salmonids, California clapper rail, California black rail, double-crested cormorant, and salt marsh harvest mouse
- **Freshwater Habitat –** algae, amphipods, mosquitofish, great blue heron, and snipe
- **Grassland Habitat –** terrestrial plants, black-tailed deer, California vole, raccoon, burrowing owl, and northern harrier

These receptors were primarily selected to represent specific trophic levels, but some species were selected to represent a trophic level and are also special-status protected species.

The 95 percent upper confidence limit (95th UCL) of the mean was used for the exposure concentrations in the ecological risk assessment (USACE, 2001). The UCL is the 95th percent upper confidence limit of the arithmetic mean concentration for the contaminant. If the 95th UCL exceeded the maximum detected concentration, the maximum concentration was used for the exposure point concentration. The maximum concentration was also used when the number of samples collected for a site was insufficient to calculate a 95th UCL.

The HHERA identified COCs for each Inboard Area site in Table 1-6 of the FFS (USACE, 2001). These COCs included contaminants related to DoD activities at the site that could adversely impact human health or the environment at present, or during the development, maturation, and life of the wetland.

2.2.1.2 Baseline Human Health Ecological Risk Assessment

Current and future land use scenarios were assessed during the HHERA for the Inboard Area sites. Recreational uses of the grassland and freshwater marsh environments were considered potentially complete exposure pathways under current land use conditions. Future land use conditions considered recreational uses of the grassland, freshwater marsh, and future estuarine environments as potentially complete exposure pathways. Based on the proposed land use, current and future land use exposure scenarios for humans were expected to be similar for terrestrial grassland and freshwater marsh environments; the Inboard Area sites are currently undeveloped. Residential and industrial scenarios were not

considered. Deed restrictions will specify that the property shall not be used for residences, schools, daycare facilities, hospitals, hospices, or other similar sensitive uses.

The following receptors and exposure pathways were considered for the Inboard Area sites for the HHERA (USACE, 2001):

- **Marsh Recreational User –** the exposure pathways considered for this receptor included incidental ingestion of affected soil, direct skin contact with contaminated soil, skin contact with surface water, and incidental ingestion of surface water.
- **Recreational Angler –** the exposure pathways considered for this receptor included ingestion of fish living in surface water, and ingestion of shellfish living in the water at the sediment/surface-water interface.
- **Grassland Recreational User –** the exposure pathways considered for this receptor included incidental ingestion of affected soil, direct skin contact with affected soil, and inhalation of windborne soil.

Groundwater and secondary pathways were not considered complete pathways.

The HHERA identified human health COCs for each Inboard Area site. Section 3 and Tables 3-6 through 3-24 of the HHERA identify and discuss the COCs. These COCs included contaminants that were related to DoD activities at the site that were judged to have the potential to adversely impact human health during the development and maturation of the wetland.

2.2.2 Action Goals

The objective of this ROD/RAP is to remove and/or cover contamination at the Inboard Area, rendering it suitable for open-space wetland restoration. To achieve these objectives, this document establishes action goals protective of wetland receptors (including sensitive species). The action goals for the Inboard Area sites are provided in Table 2.2-1. Numerical values for each action goal are set for the various contaminants found at the Inboard Area sites. However, action goals apply only to specific contaminants at each site, because the COCs differ at each site. Table 2.1-1 shows the specific contaminants of concern at each site and the corresponding action goal. The following paragraphs describe the process for selecting specific COCs at the Inboard Area sites and the sources for the action goals.

COCs for the Inboard Area sites were established by evaluating the results of the risk assessment during the FFS process and were further evaluated during the ROD/RAP. Two sites, Spoils Pile C and Spoils Pile L, screened out in the FFS were included for further action in the ROD/RAP. One site, the Northwest Runway Area, was included in the FFS for further evaluation, but was screened out during the ROD/RAP re-evaluation.

The results of the baseline risk assessment were further evaluated in the FFS to determine how the potential risk should be addressed by proposed remedial actions. The FFS refined the conceptual model used in the baseline risk assessment. Similar to the baseline risk assessment, the FFS conceptual model was based on potential exposure pathways and human and ecological receptors for a wetland end-use. However, the baseline risk assessment evaluated every receptor at each site, while the FFS conceptual model identified

and evaluated receptors based on the general habitat types (upland, estuarine, freshwater, or recreational) that are expected to be developed at each site. These general habitat types were established by the preferred wetland configuration (Jones & Stokes, 1998).

Although the wetland design has not been finalized, the general habitat types and receptors at a specific location are not expected to change significantly because of the physical constraints of the site. For example, a planned upland area is not likely to become a subtidal channel, and vice versa. The FFS conceptual model assumed estuarine and human recreational receptors at each Inboard Area site and additional freshwater receptors at the Building 82/87/92/94 Area; PDD Spoils Piles A, B and N; and the PDD Unlined Portion.

The FFS used hazard indices (HIs) developed in the baseline risk assessment to determine whether a site required remedial action. To require remedial action and evaluation in the FFS, a site had to have at least one receptor with an HI greater than 1. The receptors evaluated included those identified in the FFS conceptual model (as described above).

For each remaining site that required further evaluation, the FFS established site-specific FFS COPCs based on the receptors that were expected to be present during the development, maturation, and life of the wetland and the potential risk posed by residual contaminants. The site-specific FFS COPCs were determined as follows: the FFS reviewed the risk assessment COPCs at each site for the receptors identified by the FFS conceptual model. If the ecological hazard quotient (HQ) was greater than 1.0, or the human health HQ was greater than 1.0, or the incremental lifetime cancer risk (ILCR) was greater than $1x10^{-6}$, then the contaminant was considered a site-specific FFS COPC. The FFS COPCs determined in the FFS on a site-specific basis are listed in Table 1-2 of the FFS (USACE, 2001). The FFS then determined COCs by comparing FFS COPC concentrations to preliminary action goals (called comparator values in the FFS). The COCs determined in the FFS on a site-specific basis are listed in Table 1-5 of the FFS (USACE, 2001).

The process for determining the action goals and how those action goals would be compared to the sites was refined during development of the ROD/RAP. For each site, the ROD/RAP re-evaluated the COCs presented in the FFS by comparing each site-specific FFS COPC to the action goals established for the ROD/RAP (see below). The ROD/RAP compared the 95th UCL (or maximum if fewer than 5 samples were collected) concentrations for each FFS COPC to the action goals. If the 95th UCL (or maximum, if fewer than 5 samples were collected) concentration for a COPC was greater than the action goal, the contaminant was considered a COC. A site had to have at least one COC to be evaluated in the ROD/RAP.

For each site, the ROD/RAP identifies COCs as the contaminants that should be compared to the action goals. Detections of these COCs above the action goals are evaluated for remedial actions in this ROD/RAP. The action goals selected in this ROD/RAP for the Inboard Area are based on a number of sources (see Table 2.2-1). For metals, the primary sources are Inboard Area ambient concentrations or San Francisco Bay ambient concentrations, whichever is higher. For total PAHs, the reference is the ER-L. Petroleum hydrocarbon action goals are based on the Presidio of San Francisco Saltwater Ecological Protective Zone. DDT action goals are derived from RWQCB calculations. The DDT values were developed in the Coastal Salt Marsh Focused Feasibility Study (CH2M HILL, 2003).

TABLE 2.2-1
Action Goals—Inboard Area
Hamilton Main Airfield Parcel ROD/RAP

Contaminant	Action Goals (ppm)	Source[a]
Metals		
Arsenic	16.7	BRAC Soils Ambient
Barium	190	BRAC Soils Ambient
Beryllium	1.03	BRAC Soils Ambient
Boron	36.9	BRAC Soils Ambient
Cadmium	1.2	ER-L
Chromium	112	SF Bay Ambient
Cobalt	27.6	BRAC Soils Ambient
Copper	68.1	SF Bay Ambient
Lead	46.7	ER-L
Manganese	943	BRAC Soils Ambient
Mercury	0.43	SF Bay Ambient
Nickel	114	BRAC Soils Ambient
Silver	1	ER-L
Vanadium	118	BRAC Soils Ambient
Zinc	158	SF Bay Ambient
Semivolatile Organic Compounds (including PAHs)		
PAHs, total	4.022	ER-L
Petroleum Hydrocarbons		
TPH-dl/TPH-motor oil[b]	144	Presidio—Saltwater Ecological Protective Zone
TPH-g/JP-4	12	Presidio—Saltwater Ecological Protective Zone
Pesticides		
DDTs, total[c]	0.03	RART—California clapper rail

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

[a] The sources of the action goals are:

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

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

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

SECTION 2.3

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 COCs above their action goals and/or eliminating exposures to human and ecological receptors. RAOs can differ with each specific site, depending on site conditions, exposure scenarios, and receptors. The FFS and ROD/RAP developed specific RAOs that were used to guide the development of alternatives for each Inboard Area site (discussed in Section 2.4).

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

2.3.1 Definition of Remedial Action Objectives

RAOs were developed in this ROD/RAP to evaluate the ability of the remedial alternatives to comply with Applicable or Relevant, and Appropriate Requirements (ARARs), and to protect human health and the environment. RAOs are quantitative and qualitative expressions of goals for protecting human health and the environment. They are expressed in terms of contaminants and media of interest, possible receptors, and associated exposure pathways (CH2M HILL, 2001). Contaminants considered in establishing RAOs for the Inboard Area sites were based on COCs.

2.3.2 Identification of Remedial Action Objectives

Protection of human health and the environment in the future wetland can be accomplished by reducing the concentrations of residual COCs that are greater than their action goals or by controlling or eliminating the exposure of receptors to residual COCs that are greater than their action goals. The RAOs for the Army BRAC sites, Other Army BRAC Environmental Considerations, and HWRP issues are summarized in the following sections.

2.3.2.1 Army BRAC Sites

The RAOs for the Army BRAC sites are to prevent or mitigate the exposure of ecological and human receptors to soil and/or sediment containing concentrations of site specific COCs that are greater than their respective action goals at a given site. This can be accomplished by reducing the concentrations of residual COCs that are greater than their action goals or by controlling or eliminating the exposure of receptors to residual COCs that are greater than their action goals. Table 2.1-2 provides the action goals for the COCs at each of these sites.

2.3.2.2 Other Army BRAC Environmental Considerations

The RAOs for the other Army BRAC Environmental Consideration sites are to prevent or mitigate the exposure of ecological and human receptors to soil and/or sediment containing

concentrations of chemicals that are greater than the established action goals. This can be accomplished by reducing the concentrations of residual COCs that are greater than their action goals or by controlling or eliminating the exposure of receptors to residual COCs that are greater than their action goals.

2.3.2.3 Hamilton Wetland Restoration Project Issues

The RAOs for the issues that will be addressed by the HWRP (Inboard Area-Wide DDTs and PAHs near the runway) are to prevent or mitigate the exposure of ecological and human receptors to soil containing concentrations of COCs that are greater than their respective action goals for these issues. Table 2.1-2 provides the action goals for the COCs for these issues.

2.3.3 Remedy Selection Requirements and Process

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

2.3.3.1 State Remedy Selection Requirements and Process

The selection of the remedy by DTSC and the RWQCB is based on their authority to approve RAPs as set forth in Section 25356.1 of the California Health and Safety Code. The statutory requirements governing selection of the remedy are also contained in Health and Safety Code Section 25356.1.5. In summary, any remedy selected in a RAP must be based on, and be no less stringent than, requirements of the NCP (40 Code of Federal Regulations (CFR) Part 300), 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 constitutes 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
- The effect of contamination or pollution levels upon present, future, and probable beneficial uses of contaminated, polluted, or threatened resources
- The 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 preexisting background contamination levels
- Cost-effectiveness of alternative remedial action measures
- Potential environmental impacts of alternative remedial action measures

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

2.3.3.2. Army Remedy Selection Requirements and Process

Pursuant to Section 121(d)(1) of CERCLA, remedial actions must attain a degree of cleanup, which is protective of 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 ARARs. Although HAAF is not on the NPL of CERCLA sites, the remedial investigations and remedial actions conducted at the site are required to be consistent with the NCP. As such, this ARARs analysis was developed in a manner consistent with guidance and policy of CERCLA, as amended by SARA. The intent of this ARARs analysis is to identify those federal and more-stringent state regulations that will be considered during the implementation of remedial actions.

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 the 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 so 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, 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), technology-based requirements for actions (e.g., action-specific ARARs), and restrictions on activities in certain locations (e.g., location-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 that, 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 are 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 waste.

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 materials 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 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 being protective of human health and the environment, cannot be waived. Currently, it is not envisioned that any waivers will be requested for the Main Airfield Parcel sites; however, the circumstances under which potential ARARs could be waived are summarized below for 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 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, using another method or approach [Section 121 (d)(4)(D)].
- Inconsistent Application of State Requirements: With respect to a state standard, requirement, criterion, or limitation, the state has not consistently applied the standard, requirement, criterion, or limitation in similar circumstances at other remedial actions [Section 121 (d)(4)(E)].
- Fund Balancing: The Hazardous Substance Response Fund (Fund) waiver may apply when the selection of a remedial action that attains such level or standard of control will not provide a balance between the need for protection of public health and welfare and the environment at the facility under consideration and the availability of amounts from the Fund to respond to other sites that present or may present a threat to public health or welfare or the environment, considering the relative immediacy of such threats [Section 121 (d)(4)(F)]. The Fund Balancing waiver does not apply because funding for Hamilton is provided by the BRAC Environmental Restoration Account.

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

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

2.3.3.3 Chemical-Specific ARARs and TBCs

Chemical-specific ARARs include those requirements that regulate the release to, or presence in, the environment of materials possessing certain chemical or physical characteristics or containing specified chemical compounds. These requirements generally set health- or risk-based concentration limits or discharge limitations for specific chemicals. When a specific chemical is subject to more than one discharge or exposure limit, the more stringent of the requirements is used. Potential chemical-specific ARARs were evaluated on the basis of contaminants and the media 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.

The chemical-specific ARARs and TBCs for the Inboard Area sites can be divided into two categories: (1) those that affect action goals, and (2) those that affect soil and sediment characterization and disposal. Table 2.3-1 lists the TBC criteria. Chemical-specific ARARs that affect soil and sediment characterization and disposal are described below, in the section on 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 sources for chemical-specific TBCs for the Inboard Area sites 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.
- San Francisco Bay ambient levels from *San Francisco Bay RWQCB Staff Report: Ambient Concentrations of Toxic Chemicals in San Francisco Bay Sediments*. May 1998.
- *Report of Petroleum Hydrocarbon Bioassay and Point-of-Compliance Concentration Determinations; Saltwater Ecological Protection Zone; Presidio of San Francisco, California,* Dated December 1997.

2.3.3.4 Location-Specific ARARs

Location-specific ARARs are those requirements that relate to the geographical position or physical condition of the site. These requirements may limit the type of remedial action that can be implemented or may impose additional constraints on some remedial alternatives. The potential location-specific ARARs for the Inboard Area sites are summarized in Table 2.3-2.

Clean Water Act (Section 404)

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

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

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

2.3.3.5 Action-Specific ARARs

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 California Code of Regulations (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.

Table 2.3-3 summarizes the action-specific ARARs for the Inboard Area sites.

TABLE 2.3-1
Chemical-Specific To-Be-Considered Criteria for Developing Action Goals

Contaminants	Chemical-Specific TBCs Inboard Sites (ppm)
Metals	
Cadmium	1.2[a]
Chromium	112[b]
Copper	68.1[b]
Lead	46.7[a]
Total Mercury	0.43[b]
Silver	1[a]
Zinc	158[b]
Pesticides	
Total DDTs	0.03[c]
Petroleum Hydrocarbons	
TPH-d/TPH-motor	144[d]
TPH-g/JP-4	12[d]
Polynuclear Aromatic Hydrocarbons	
Total PAHs	4.022[a]

[a] 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.

[b] *San Francisco Bay RWQCB Staff Report: Ambient Concentrations of Toxic Chemicals in San Francisco Bay Sediments*. May 1998.

[c] The DDT values were developed in the *Coastal Salt Marsh Focused Feasibility Study* (CH2M HILL, 2003).

[d] *Report of Petroleum Hydrocarbon Bioassay of Point-of-Compliance Concentration Determinations; Saltwater Ecological Protection Zone; Presidio of San Francisco, California.* Dated December 1997.

TABLE 2.3-2
Location-Specific ARARs for Inboard Area 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 those waters subject to objectives in San Francisco RWQCB's 1986 Basin Plan.
California Endangered Species Act	Title 14, CCR 670.1, 670.2, and 670.5	Applicable[a]	Contains standards for the identification and protection of listed or proposed threatened or endangered plants or animals.
California Fish and Game Code	Section 1900—California Native Plant Protection Act	Applicable[a]	Contains standards for the identification and protection of plants by the Act.
	Sections 3503.5, 3511, 4700, and 5050		Identifies and protects certain birds, mammals, reptiles, and amphibians.
Federal Endangered Species Act	50 CFR 402	Applicable[a]	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 USFWS 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.
	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 – wetlands 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 Bay Conservation and Development Commission (BCDC) to regulate construction and other activities within 100 feet inland from highest tidal action.

TABLE 2.3-2
Location-Specific ARARs for Inboard Area Sites

Source	Citation	ARAR Status	Description of ARARs
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.
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.
Procedures for Implementing the Requirements of the Council on Environmental Quality on NEPA – Wetlands Protection	40 CFR 6.302(a)	Applicable	Executive Order 11990, Protection of Wetlands, requires federal agencies to avoid adverse impacts on wetlands. A floodplains/ wetlands assessment is also required.

[a] Applicable only if threatened or endangered species are identified on site.
USC = United States Code
NEPA = National Environmental Policy Act

TABLE 2.3-3
Action-Specific ARARs for Inboard Area 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 that stormwater 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 that 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. Before transportation, containers must 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 before 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 2.3-3
Action-Specific ARARs for Inboard Area 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. 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.

TABLE 2.3-3
Action-Specific ARARs for Inboard Area 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 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.
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.
	BAAQMD, Regulation 8, Rule 40 (Aeration of Contaminated Soil and Removal of Underground Storage Tanks)	Applicable	This rule limits the emissions of organic compounds with organic chemicals or petroleum and provides procedures for controlling emissions during underground storage tank removal and soil stockpiling. Exemptions are provided for soil that contains nonvolatile hydrocarbons and for soil, which is in-situ.
	BAAQMD, Regulation 11 (Hazardous Pollutants, Rule 1 (Lead)	Relevant and Appropriate	This regulation limits the emission of lead to the atmosphere based on ground-level concentrations of lead in air.

TABLE 2.3-3
Action-Specific ARARs for Inboard Area Sites

Source	Standard, Requirement, Criterion, or Limitation	ARAR Status	Description of ARARs
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 stormwater discharges and implement practices to reduce these discharges. Stormwater 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 before anticipated storm events and after actual storm events need to be conducted to identify areas contributing to stormwater discharge and evaluated for the effectiveness of BMPs and other control practices. Applies to construction sites 5 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 2.3-3
Action-Specific ARARs for Inboard Area 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 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, 13240, 13260, 13263, 13267, 13300, 13304, 13307)	SWRCB Resolution 92-49 (as amended April 12, 1994 and October 2, 1996) Subparagraph IIIG	Applicable	Section IIIG directs the water boards to ensure that dischargers clean up and abate the effects of discharges in a manner promoting attainment of either background water quality or the best reasonable water quality if background quality is not feasible. (Feasibility is determined by the factors listed in Section IIIG and 23 CCR, Chapter 15, Section 2550.4.) Minimum water standards must be protective of the beneficial use(s). Section IIIG directs the water boards to apply 23 CCR, Chapter 15, Section 2550.4 in approving any alternative cleanup levels less stringent than background quality. The requirement to obtain the water board's approval is not a substantive requirement (ARAR); however, the Army will consult with the water board in applying the State's criteria to establish alternative cleanup level(s).
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.

TABLE 2.3-3
Action-Specific ARARs for Inboard Area Sites

Source	Standard, Requirement, Criterion, or Limitation	ARAR Status	Description of ARARs
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.
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 previously. These guidelines fall into the category of TBC.

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

BAAQMD = Bay Area Air Quality Management District
BMP = best management practice
CAMU = corrective action management unit
CCR = California Code of Regulations
cm/sec = centimeter per second
DWQ = Department of Water Quality
LDR = land disposal restriction
RCRA = Resource Conservation and Recovery Act

SECTION 2.4

Summary and Evaluation of Alternatives

This section summarizes the evaluation of remedial alternatives for each of the Inboard Area sites recommended for further action. As described in Section 2.1.2, the Inboard Area sites are divided into three groups: Army BRAC sites, other Army BRAC Environmental Considerations, and HWRP Issues. The process used in this ROD/RAP to evaluate alternatives for each of these groups is summarized below.

Alternatives for the Inboard Army BRAC sites were first developed and evaluated in the Inboard Area Sites FFS (USACE, 2001). The alternatives for Inboard Area sites are redefined and re-evaluated in this ROD/RAP. The three alternatives evaluated in this ROD/RAP for the Army BRAC Inboard Area sites are listed below:

- Alternative 1, No Further Action
- Alternative 2, Excavation and Offsite Disposal
- Alternative 3, Manage In-Situ, with Monitoring and Maintenance, for Army BRAC sites

The Army BRAC sites evaluated for remedial action are listed in Table 1-1.

Section 2.1 presents alternatives for the Army BRAC Environmental Considerations (Archive Search Report Sties and GSA/BRAC Stockpiled Soil). Further evaluation of the selected alternatives is not required in this ROD/RAP.

Alternatives for the HWRP issues of Inboard Area-Wide DDTs and PAHs near the runway were first developed and discussed in the Inboard Area Sites (USACE, 2001). The alternatives are redefined and re-evaluated in this ROD/RAP. The two alternatives evaluated in this ROD/RAP for the Inboard Area-Wide DDTs and PAHs near the runway are listed below:

- Alternative 1, No Further Action
- Alternative 4, Manage Onsite, with Monitoring and Maintenance, for Army Civil Works Issues

A single alternative for addressing lead-based paint through the HWRP was presented in Section 2.1. Further evaluation of the selected alternative for lead-based paint is not required in this ROD/RAP.

All of the remedial alternatives were developed by assembling remedial technologies, compatible with a wetland end-use scenario, into treatment options that met RAOs. In some cases, specific aspects of the HWRP were also considered in identifying, evaluating, and selecting remedial alternatives.

Remedial alternatives were not developed or evaluated for Army BRAC sites that do not require remedial action. Army BRAC sites that do not require remedial action include sites for which the FFS determined no action is required or those where no COCs are identified in the ROD/RAP process. The Army BRAC sites that do not require further action are listed below:

- **Building 20:** FFS determined no remedial action required
- **Building 84/90:** FFS determined no remedial action required
- **PDD Spoil Pile E:** no COCs identified in ROD/RAP process
- **PDD Spoil Pile H:** FFS determined no remedial action required
- **East Levee Generator Pad:** FFS determined no remedial action required
- **Northwest Runway Area:** risk management evaluation determined no remedial action required
- **Tarmac East of Outparcel A-5:** FFS determined no remedial action required
- **Revetments, 5, 8, 9, 10, 15, 17, 20, 24, 27, and 28:** FFS determined no remedial action required
- **Revetment 18/Building 15:** FFS determined no remedial action required

The sections below provide a description of Alternatives 1 through 4, and select the remedial alternative for the Army BRAC Program sites that require remedial action and the HWRP Inboard Area-Wide DDTs and PAHs near the runway. A summary of the rationale for adopting the selected alternatives is also provided.

2.4.1 Remedial Alternatives

The four remedial alternatives developed for use and evaluation in this ROD/RAP are described in the following text.

2.4.1.1 Alternative 1, No Further Action

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

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

2.4.1.2 Alternative 2, Excavation and Offsite Disposal

Under this alternative, contaminated soils above action goals will be excavated and disposed of at an appropriate offsite landfill facility. Table 2.1-2 lists the action goals for sites that have been determined to require excavation. For the Inboard Area sites, excavation will continue until the action goals have been achieved. Excavated sites that are shown to meet the action goals shall be considered fully remediated and there would be no institutional controls placed on the use of the site. Excavation activities within the Inboard Area will need to be completed before levee breach.

Remedial Goals

Alternative 2 serves three purposes:

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

Primary Action

Implementation of this alternative would consist of excavation and offsite disposal of site soils, as well as sampling to confirm removal of contaminated soils from the affected site. The following sections 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, as necessary, soil transfer from off-road trucks to highway transport trucks, as necessary.
- **Preconstruction biological surveying.** No sensitive species are known or suspected to be present at the Inboard Area sites so preconstruction biological surveying is not required.
- **Excavation of site material.** Contaminated material would be excavated using standard construction equipment. Excavation would continue until RAOs are achieved to ensure protection of human health and the environment. Confirmation samples would be collected to verify that RAOs are met (see below).
- **Disposal of site material.** Excavated materials would need to be classified and disposed of in a suitable offsite location. Waste profiling would be required to determine classification of the waste. 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 from the bottom and sidewalls of the excavation. Confirmation sampling will be conducted as necessary on a site-by-site basis. Once the confirmation sampling shows that all remaining contaminant concentrations have been reduced to below action goals, the site may be backfilled.
- **Backfill Operations.** Sites will be backfilled only as necessary to eliminate unsafe conditions using clean onsite soil or re-handled dredged material.

2.4.1.3 Alternative 3, Manage In-Situ, with Monitoring and Maintenance, for Army BRAC Sites

Under this alternative, a performance criteria of 3 feet of stable cover is established for a site where residual concentrations exceed the action goals identified in Table 2.1-2. The purpose

of the performance criteria for this alternative is to eliminate or significantly reduce any potential risk associated with residual concentrations of contaminants by preventing exposure of future wetland receptors to contaminated site soils. Alternative 3 is the final remedy for sites where residual concentrations of contaminants are greater than the action goals listed in Table 2.1-2 and the performance criteria can be met.

Alternative 3 is only considered for sites being addressed by the Army BRAC program. This alternative was not considered for Inboard Area-Wide DDTs or PAHs near the runway. For sites where this alternative is selected, the remedy will be implemented by ensuring that 3 feet of stable cover, or equivalent, are provided. This performance criteria of 3 feet of stable cover, or its equivalent, shall be achieved as of the date of the breach of the outboard levee and restoration of tidal action to the site. The HWRP design and geomorphic and scour analyses will be used to determine whether performance criteria can be achieved. If affected soils remain in areas of the wetland restoration project that are subject to tidal scour so that the performance criteria cannot be achieved, then such affected soils shall be excavated and disposed of offsite in accordance with Alternative 2.

The Army shall ensure that the HWRP, including implementation of its plan for monitoring and adaptive management, will achieve and maintain the 3 feet of stable cover, or equivalent, at each site where Alternative 3 is selected. The duration of the HWRP obligation shall extend to a date 13 years following the date of levee breach and reintroduction of tidal influence to the Inboard Area. This duration is the limit of the authorized implementation period of the HWRP and after, in accordance with federal law. Throughout the period of implementation of the HWRP and after, the Army and the property owner shall ensure that the remedy for these sites is maintained to the extent necessary to protect human health and the environment.

For sites where this alternative is selected, institutional controls in the form of land use restrictions, and monitoring, will be required where contamination remains at levels above the action goals.

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

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

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

2.4.1.4 Alternative 4, Manage Onsite, with Monitoring and Maintenance, for Army Civil Works Issues

Under this alternative, a performance criteria of 3 feet of stable cover, or equivalent measures, as agreed to by the Army and the State, is established for the areas specified below. The primary purpose of the performance criteria for this alternative is to eliminate or significantly reduce any potential risks associated with residual concentrations of Inboard Area-Wide DDTs and PAHs in soils adjacent to the runway by preventing exposure of future wetland receptors to site soils contaminated with these compounds. This alternative applies only to sites being addressed by the Army Civil Works Program; it was not considered for BRAC sites listed in Table 1-1.

Sampling indicates that all surface soils in the Inboard Area are affected by DDTs and that soils adjacent to the southern end of the runway are affected by PAHs. The HWRP design and geomorphic and scour analyses will be used to determine whether the performance criteria can be achieved for those portions of the Inboard Area where residual DDTs and PAHs in site soils adjacent to the runway exceed the action goals for DDTs and/or PAHs identified in Table 2.1-2. Where residual contamination of site soils exceed the action goals for DDTs and/or PAHs, and the performance criteria cannot be met, the HWRP will, with the concurrence of the State, excavate some or all of the impacted soils and manage them onsite. Following any such excavation, the HWRP shall address the residual contamination of site soils exceeding the action goals for DDTs and/or PAHs (Table 2.1-2), including both those soils that have been excavated for onsite management and those soils left in place, by implementing 3 feet of stable cover or equivalent measures. The performance criteria shall consist of placement of 3 feet of stable cover of dredged material, or an appropriate alternative action providing a level of protection equivalent to 3 feet of stable cover, as agreed to between the Army and the RWQCB. This performance criteria of 3 feet of stable cover, or its equivalent, shall be achieved as of the date of the breach of the outboard levee and restoration of tidal action to the site, and shall be maintained throughout the life of the wetland.

The Army Civil Works Program shall ensure, through both construction and implementation of its plan for monitoring and adaptive management, that the HWRP will achieve and maintain the performance criteria of 3 feet of stable cover or its equivalent. The duration of this HWRP obligation shall extend to a date 13 years following the date of levee breach and reintroduction of tidal influence to the Inboard Area. This duration is the limit of the authorized implementation period of the HWRP, in accordance with federal law. Thereafter, the property owner shall ensure that the performance criteria for the Inboard Area-Wide DDTs and PAHs in soils adjacent to the runway are maintained to the extent necessary to protect human health and the environment. The Army and the State have determined that the HWRP is likely to be an appropriate and effective mechanism for implementing this alternative.

Institutional controls in the form of land-use restrictions and monitoring will be required where contaminant concentrations of Inboard Area-Wide DDTs and/or PAHs in soils adjacent to the runway remain at levels above the action goals in Table 2.1-2. The institutional controls include:

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

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

2.4.2 Evaluation of Alternatives

The remedial alternatives were evaluated based on the nine criteria set forth in the NCP. These evaluation criteria served as the basis for conducting the detailed analysis during the FFS, revising the analysis during the ROD/RAP and, subsequently, selecting remedial actions appropriate for the future wetland-use scenario.

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

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

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

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

1. Overall Protection of Human Health and the Environment

Army BRAC Sites (Alternatives 1, 2, and 3)

Where remedial actions are necessary, Alternative 1 does not meet this criterion because it has no remedial activity to protect human health or the environment from levels of contamination above action goals. Alternatives 2 and 3 protect human health and the environment by removing the contamination above action goals at each site, or by preventing exposure of human and ecological receptors to contamination above action goals.

HWRP Issues (Alternatives 1 and 4)

Where remedial actions are necessary, Alternative 1 does not meet this criterion because it has no remedial activity to protect human health or the environment from levels of contamination above action goals. Alternative 4 protects human health and the environment by preventing exposure of human and ecological receptors to contamination above action goals.

2. Compliance with Applicable Requirements

Army BRAC Sites (Alternatives 1, 2, and 3)

Alternatives 2 and 3 are expected to satisfy this criterion because they will meet their location- and action-specific ARARs. While there are no chemical-specific ARARs for residual contamination at HAAF, chemical-specific TBC criteria are proposed for the site. Alternative 2 will meet the criteria by removing contamination above action goals. The performance criteria specified for Alternative 3 will meet chemical-specific TBC criteria when 3 feet of stable cover material are provided. Where remedial actions are necessary, Alternative 1 does not meet this criterion.

HWRP Issues (Alternatives 1 and 4)

Alternative 4 is expected to satisfy this criterion because it will meet the location- and action-specific ARARs. While there are no chemical-specific ARARs for residual contamination at HAAF, chemical-specific TBC criteria are proposed for the site. The performance criteria specified for Alternative 4 will meet chemical-specific TBC criteria when 3 feet of stable cover material are provided. Where remedial actions are necessary, Alternative 1 does not meet this criterion.

3. Long-Term Effectiveness and Permanence

Army BRAC Sites (Alternatives 1, 2 and 3)

Alternatives 2 and 3 are effective in the long-term. Alternative 2 provides a high degree of permanence because the residual contamination will be removed. Contaminated materials will remain at HAAF if Alternative 3 is used, but the monitoring and management of Alternative 3 will verify that restrictions and recommendations implemented during the design and construction protect the wetland as it develops and matures. Where remedial actions are necessary, Alternative 1 is not effective in the long term.

HWRP Issues (Alternatives 1 and 4)

Alternative 4 is effective in the long term and will provide permanence. Although contaminated materials will remain at HAAF if Alternative 4 is implemented, the monitoring and management of Alternative 4 will verify that restrictions and recommendations implemented during the design and construction protect the wetland as it develops and matures. Where remedial actions are necessary, Alternative 1 is not effective in the long term.

4. Reduction of Toxicity, Mobility, and Volume Through Treatment

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

5. Short-Term Effectiveness

Army BRAC Sites (Alternatives 1, 2 and 3)

No short-term impacts are expected from Alternative 1. Alternative 2 potentially may have short-term impacts on the community, workers, and environment because it involves excavation, stockpiling, and transporting soil to an offsite disposal facility. Fugitive dusts can be created during this process, but will be controlled using water, as necessary. Risk of worker exposure can be mitigated by following safety protocols during excavation activities. Alternative 3 does not have any short-term impacts because the action proposed in this alternative is the establishment of performance criteria, not the actual placement of cover.

HWRP Issues (Alternatives 1 and 4)

No short-term impacts are expected from Alternative 1. Alternative 4 may have the potential for short-term impacts on the community, workers, and environment because it may involve excavation, grading, stockpiling, and transporting soil elsewhere onsite. Fugitive dusts can be created during this process, but will be controlled using water, as necessary. Risk of worker exposure can be mitigated by following safety protocols during construction activities.

6. Implementability

Army BRAC Sites (Alternatives 1, 2, and 3)

There are no obstacles associated with implementing Alternative 1. Alternative 2 includes a few obstacles because this alternative uses excavation to reduce contamination. Excavation is a well-established remedial action and activities can be completed safely. Both Alternatives 2 and 3 will need to be coordinated with the HWRP.

HWRP Issues (Alternatives 1 and 4)

There are no obstacles associated with implementing Alternative 1. Alternative 4 will require coordination with the Army BRAC program.

7. Cost

Army BRAC Sites (Alternatives 1, 2, and 3)

There are no costs for Alternative 1. Estimated project costs for Alternatives 2 and 3 are listed in Table 2.4-1 (which follows the text of this section). The cost analysis includes estimated expenditures required to complete the remediation in terms of both capital costs and annual operations and maintenance. Cost estimates are based on estimated excavation volumes in the ROD/RAP and are expressed in terms of 2003 dollars. The costs associated with Alternative 3 are estimated for anticipated long-term monitoring requirements.

HWRP Issues (Alternatives 1 and 4)

There are no costs for Alternative 1. Estimated project costs for Alternative 4 will accrue to the HWRP.

8. Regulatory Acceptance

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

9. Community Acceptance

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

2.4.3 Comparative Analysis for Selected Alternatives

This section summarizes the basis for the selected alternative for each Inboard Area site requiring remedial action. A comparative analysis summary of the alternatives is provided in Table 2.4-1.

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

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

Alternatives selected below for the Inboard Area sites include Alternative 2, Excavation and Offsite Disposal; and Alternative 3, Manage In-Situ, with Monitoring and Maintenance, for Army BRAC sites. Section 2.4.4 presents the total volume of soil to be excavated or covered under Alternatives 2 and 3.

2.4.3.1 Former Sewage Treatment Plant

Alternative 3, Manage In-Situ, with Monitoring and Maintenance, for Army BRAC Sites, is the preferred alternative for the FSTP. This alternative is effective and implementable. It establishes performance criteria requiring 3 feet of cover. This alternative would meet RAOs by preventing exposure of future wetland receptors to existing site soils. Implementation of

monitoring and adaptive management plans will achieve and maintain the 3 feet of stable cover. The FSTP is located in an area where it is currently expected that cover can be achieved and there is no expected scour or channel cut in the future wetland. The preferred alternative may change to Alternative 2 in the future if the final HWRP design and geomorphic and scour analysis determine that the performance criteria cannot be achieved and maintained.

The area recommended for this alternative is shown in Figure 2.4-1. The area over which the performance criteria would be achieved and maintained was established to address the estimated extent of soil containing DDTs at concentrations above action goals. A summary of the minimum, maximum, and average values for DDTs remaining at the FSTP are shown below. This information was considered in the process of selecting Alternative 3 and establishing cover boundaries for the FSTP.

Minimum, Maximum, and Average Values for DDTs — Former Sewage Treatment Plant

Contaminant	Number of Samples	Minimum Value	Maximum Value	Average Value	Action Goal
DDTs, total	65	0.00390	0.500	0.0113	0.03

Units are in ppm.

Alternative 1 was not selected because it would not meet RAOs and would not protect human health and the environment. Alternative 2 would be an effective and implementable alternative. Alternative 3 was selected over Alternative 2 because this site is in an area where no scour or channel cuts are currently expected in the future wetland and Alternative 3 is more cost-effective.

2.4.3.2 Building 26

Alternative 3, Manage In-Situ, with Monitoring and Maintenance, for Army BRAC Sites, is the preferred alternative for Building 26. This alternative is effective and implementable. This alternative establishes performance criteria requiring 3 feet of cover. This alternative would meet RAOs by preventing exposure of future wetland receptors to existing site soils. Implementation of monitoring and adaptive management plans will achieve and maintain the 3 feet of stable cover. Building 26 is located in an area where it is currently expected that cover can be achieved and there is no expected scour or channel cut in the future wetland. The preferred alternative may change in the future to Alternative 2 should the final HWRP design and geomorphic and scour analysis determine that the performance criteria cannot be achieved and maintained.

The area recommended for this alternative is shown in Figure 2.4-1. The area over which the performance criteria would be achieved and maintained was established to address the estimated extent of soil containing COCs at concentrations above action goals. A summary of the minimum, maximum, and average values for COCs remaining at Building 26 are shown below. This information was considered in the process of selecting Alternative 3 and establishing cover boundaries for Building 26.

Minimum, Maximum, and Average Values for COCs — Building 26

COC	Number of Samples	Minimum Value	Maximum Value	Average Value	Action Goal
TPH-diesel	11	25	770	122	144

Units are in ppm

Alternative 1 was not selected because it would not meet RAOs and would not protect human health and the environment. Alternative 2 would be an effective and implementable alternative. Alternative 3 was selected over Alternative 2 because this site is in an area where no scour or channel cuts are currently expected in the future wetland and Alternative 3 is more cost-effective.

2.4.3.3 Building 35/39

Alternative 2, Excavation and Offsite Disposal, is the preferred alternative for the area at Building 35/39 where DDT was detected above 1 ppm near the outfall pipeline. This alternative is preferred because of the level of DDT detected. The Excavation and Offsite Disposal alternative would remove soil containing DDTs at concentrations above the 1 ppm action goal. After excavation, Alternative 3 would be implemented for any soils containing DDTs greater than the 0.03 ppm action goal. The excavated area would be backfilled as necessary for safety.

Alternative 3, Manage In-Situ, with Monitoring and Maintenance, for Army BRAC Sites, is the preferred alternative for Building 35/39 for the area where DDT concentrations are below 1 ppm, but are above the action goal of 0.03 ppm. This alternative is effective and implementable. This alternative establishes performance criteria requiring 3 feet of cover.

This alternative selection would meet RAOs by removing contamination or preventing exposure of future wetland receptors to existing site soils. Implementation of monitoring and adaptive management plans will achieve and maintain the 3 feet of stable cover. Building 35/39 is located in an area where it is expected that cover can be achieved and there is currently no expected scour or channel cut in the future wetland. The preferred alternative may change in the future to Alternative 2 should the final HWRP design and geomorphic and scour analysis determine that the performance criteria cannot be achieved and maintained.

The area recommended for this alternative is shown in Figure 2.4-1. Excavation and cover boundaries were established to address soil containing COCs at concentrations above action goals. A summary of the minimum, maximum, and average values for COCs remaining at Building 35/39 are shown below. This information was considered in the process of selecting Alternative 2 and 3, and establishing excavation and cover boundaries for Building 35/39.

Minimum, Maximum, and Average Values for COCs — Building 35/39 Area

COC	Number of Samples	Minimum Value	Maximum Value	Average Value	Action Goal
DDTs, total	21	0.0017	3.93	0.188	0.03/1.0

Units are in ppm

Alternative 1 was not selected because it would not meet RAOs and would not protect human health and the environment.

2.4.3.4 Building 41

Alternative 2, Excavation and Offsite Disposal, is the preferred alternative for Building 41. Alternative 2 is effective and implementable. This alternative is preferred because Building 41 is located in an area where there is expected scour or channel cut in the future wetland. The Excavation and Offsite Disposal alternative would remove soil containing COCs at concentrations above action goals. The excavated area would be backfilled with clean onsite soil as necessary for safety. The alternative would meet RAOs by removing COCs above action goals.

The area recommended for this alternative is shown in Figure 2.4-2. Excavation boundaries were established to address soil containing COCs at concentrations above action goals. A summary of the minimum, maximum, and average values for COCs remaining at Building 41 are shown below. This information was considered in the process of selecting Alternative 2 and establishing excavation boundaries for Building 41.

Minimum, Maximum, and Average Values for COCs — Building 41 Area

COC	Number of Samples	Minimum Value	Maximum Value	Average Value	Action Goal
PAHs, total	29	0.0600	101	3.63	4.022
TPH-diesel	38	20.0	3,100	242	144

Units are in ppm.

In February 2002, during remediation activities at Building 41, contaminated soil was removed and disposed of offsite. The analytical results of the soil-removal activities are provided in the *Final Construction Report Building 41 Demolition and Soil Removal, Spoils Pile F Removal, and Revetments 6 and 7 Removal* (IT, 2003). After reviewing the analytical data from that event, it was agreed that some additional samples are needed to determine whether the actions are complete. For this reason, Alternative 2 is chosen in this document as though the remediation activities have not yet taken place.

Alternative 1 was not selected because it would not meet RAOs and would not protect human health and the environment. Alternative 2 was selected over Alternative 3 because this site is in an area where scour or channel cuts are currently expected in the future wetland. The effectiveness of cover and monitoring in Alternative 3 is a potential concern in scour or channel cut areas.

2.4.3.5 Building 82/87/92/94 Area and Building 86 (Including Storm Drains)

Alternative 3, Manage In-Situ, with Monitoring and Maintenance, for Army BRAC Sites, is the preferred alternative for Building 82/87/92/94 and Building 86 (including storm drains). This alternative is effective and implementable. This alternative establishes performance criteria requiring 3 feet of cover. This alternative would meet RAOs by preventing exposure of future wetland receptors to existing site soils. Implementation of monitoring and adaptive management plans will achieve and maintain the 3 feet of stable cover. These buildings and associated storm drains are located in an area where it is

currently expected that cover can be achieved and there is no expected scour or channel cut in the future wetland. The preferred alternative may change in the future to Alternative 2 if the final HWRP design and geomorphic and scour analysis determine that the performance criteria cannot be achieved and maintained.

The area recommended for this alternative is shown in Figure 2.1-1. The area over which the performance criteria would be achieved and maintained was established to address the estimated extent of soil containing COCs at concentrations above action goals. The minimum, maximum, and average values for COCs remaining at Building 82/87/92/94 and Building 86 are summarized below. This information was considered in the process of selecting Alternative 3 and establishing cover boundaries for Building 82/87/92/94 and Building 86 and associated storm drains.

Minimum, Maximum, and Average Values for COCs — Building 82/87/92/94

COC	Number of Samples	Minimum Value	Maximum Value	Average Value	Action Goal
Barium	24	45.5	814	188	190
Beryllium	24	0.652	3.02	1.13	1.03

Units are in ppm.

Minimum, Maximum, and Average Values for COCs — Building 86

COC	Number of Samples	Minimum Value	Maximum Value	Average Value	Action Goal
Beryllium	48	0.74	6.44	0.837	1.03
Cadmium	48	0.99	68.0	23.5	1.2
Chromium	45	11.2	710	88.6	112
PAHs, total	79	0.058	414	5.26	4.022

Units are in ppm.

Alternative 1 was not selected because it would not meet RAOs and would not protect human health and the environment. Alternative 2 would also be an effective and implementable alternative. Alternative 3 was selected over Alternative 2 because this site is in an area where no scour or channel cuts are currently expected in the future wetland and Alternative 3 is more cost-effective.

2.4.3.6 Perimeter Drainage Ditch

Alternative 2, Excavation and Offsite Disposal, is the preferred alternative for the northern portion of the PDD (the unlined PDD) where DDT has been detected above 1 ppm. This alternative is preferred because of the level of DDT detected in this area. The Excavation and Offsite Disposal alternative would remove soil containing DDTs at concentrations above the 1 ppm action goal. After excavation, Alternative 3 would be implemented for any soils containing DDTs greater than the 0.03 action goal. The excavated area would be backfilled as necessary for safety.

Alternative 3, Manage In-Situ, with Monitoring and Maintenance, for Army BRAC Sites, is the preferred alternative for the southern portion of the PDD (the lined PDD). This alternative is effective and implementable. This alternative establishes performance criteria requiring 3 feet of cover. This alternative would meet RAOs by preventing exposure of future wetland receptors to existing site soils. Implementation of monitoring and adaptive management plans will achieve and maintain the 3 feet of stable cover. This portion of the PDD is located in an area where it is currently expected that cover can be achieved and there is no expected scour or channel cut in the future wetland. The preferred alternative may change in the future to Alternative 2 should the final HWRP design and geomorphic and scour analysis determine that the performance criteria cannot be achieved and maintained.

The areas recommended for this alternative are shown in Figure 2.1-1. The area over which the performance criteria would be achieved and maintained was established to address the estimated extent of soil containing COCs at concentrations above action goals. A summary of the minimum, maximum, and average values for COCs remaining at the PDD are shown below. This information was considered in the process of selecting Alternative 3 and establishing cover and excavation boundaries for the PDD.

Minimum, Maximum, and Average Values for COCs — Perimeter Drainage Ditch

COC	Number of Samples	Minimum Value	Maximum Value	Average Value	Action Goal
Beryllium	43	0.68	3.50	1.41	1.03
DDTs, total	49	0.0038	9.5	0.47	0.03

Units are in ppm.

Alternative 1 was not selected because it would not meet RAOs and would not protect human health and the environment.

2.4.3.7 PDD Spoils Piles

PDD Spoils Piles A, B, C, D, G, I, J, K, L, M, and N (Alternative 3)

Alternative 3, Manage In-Situ, with Monitoring and Maintenance, for Army BRAC Sites, is the preferred alternative for the former locations of PDD Spoils Piles A, B, C, D, G, I, J, K, L, M, and N. This alternative is effective and implementable. This alternative establishes performance criteria requiring 3 feet of cover. This alternative would meet RAOs by preventing exposure of future wetland receptors to existing site soils. Implementation of monitoring and adaptive management plans will achieve and maintain the 3 feet of stable cover. These piles are located in areas where it is currently expected that cover can be achieved and there is no expected scour or channel cut in the future wetland. The preferred alternative may change in the future to Alternative 2 if the final HWRP design and geomorphic and scour analysis determine that the performance criteria cannot be achieved and maintained.

The area recommended for this alternative is shown in Figure 2.4-1. The area over which the performance criteria would be achieved and maintained was established to address soil containing COCs at concentrations above action goals. A summary of the minimum, maximum, and average values for COCs remaining at PDD Spoils Piles A, B, C, D, G, I, J, K, L, M, and N are shown below. This information was considered in the process of selecting Alternative 3 and establishing cover boundaries for Spoils Piles A, B, C, D, G, I, J, K, L, M, and N.

Minimum, Maximum, and Average Values for COCs — Perimeter Drainage Ditch Spoils Pile A

COC	Number of Samples	Minimum Value	Maximum Value	Average Value	Action Goal
Beryllium	1	1.90	1.90	1.90	1.03
Zinc	1	164	164	164	158
DDTs, total	1	0.283	0.283	0.283	0.03

Units are in ppm.

Minimum, Maximum, and Average Values for COCs — Perimeter Drainage Ditch Spoils Pile B

COC	Number of Samples	Minimum Value	Maximum Value	Average Value	Action Goal
Cadmium	5	1.30	5.20	2.18	1.2
Copper	5	26.7	185	71.9	68.1
Mercury	5	0.100	1.70	0.446	0.43
Silver	5	1.03	1.07	0.650	1.0
Zinc	5	103	368	251	158

Units are in ppm.

Minimum, Maximum, and Average Values for COCs — Perimeter Drainage Ditch Spoils Pile C

COC	Number of Samples	Minimum Value	Maximum Value	Average Value	Action Goal
DDTs, total	1	0.0390	0.0390	0.0390	0.03

Units are in ppm.

Minimum, Maximum, and Average Values for COCs — Preliminary Drainage Ditch Spoils Pile D

COC	Number of Samples	Minimum Value	Maximum Value	Average Value	Action Goal
DDTs, total	1	0.129	0.129	0.129	0.03

Units are in ppm.

Minimum, Maximum, and Average Values for COCs — Preliminary Drainage Ditch Spoils Pile G

COC	Number of Samples	Minimum Value	Maximum Value	Average Value	Action Goal
DDTs, total	1	0.211	0.211	0.211	0.03

Units are in ppm.

Minimum, Maximum, and Average Values for COCs — Perimeter Drainage Ditch Spoils Pile I

COC	Number of Samples	Minimum Value	Maximum Value	Average Value	Action Goal
Beryllium	2	0.710	1.10	0.910	1.03
DDTs, total	1	0.053	0.053	0.053	0.03

Units are in ppm.

Minimum, Maximum, and Average Values for COCs — Perimeter Drainage Ditch Soils Pile J

COC	Number of Samples	Minimum Value	Maximum Value	Average Value	Action Goal
DDTs, total	1	0.117	0.117	0.117	0.03

Units are in ppm.

Minimum, Maximum, and Average Values for COCs — Perimeter Drainage Ditch Soils Pile K

COC	Number of Samples	Minimum Value	Maximum Value	Average Value	Action Goal
DDTs, total	1	0.178	0.178	0.178	0.03

Units are in ppm.

Minimum, Maximum, and Average Values for COCs — Perimeter Drainage Ditch Soils Pile L

COC	Number of Samples	Minimum Value	Maximum Value	Average Value	Action Goal
Barium	1	222	222	222	190
Cobalt	1	56.6	56.6	56.6	27.6
Lead	1	77.4	77.4	77.4	46.7
Zinc	1	164	164	164	158

Units are in ppm.

Minimum, Maximum, and Average Values for COCs — Perimeter Drainage Ditch Spoils Pile M

COC	Number of Samples	Minimum Value	Maximum Value	Average Value	Action Goal
DDTs, total	2	0.0219	0.0380	0.03	0.03

Units are in ppm.

Minimum, Maximum, and Average Values for COCs — Perimeter Drainage Ditch Spoils Pile N

COC	Number of Samples	Minimum Value	Maximum Value	Average Value	Action Goal
Lead	3	16.5	57.5	34.1	46.7
DDTs, total	3	0.0357	0.0880	0.0702	0.03

Units are in ppm.

Alternative 1 was not selected because it would not meet RAOs and would not protect human health and the environment. Alternative 2 would also be an effective and implementable alternative. Alternative 3 was selected over Alternative 2 because these sites are located in areas where no scour or channel cuts are currently expected in the future wetland and Alternative 3 is more cost-effective.

PDD Spoils Pile F (Alternative 2)

Alternative 2, Excavation and Offsite Disposal, is the preferred alternative for the former location of PDD Spoils Pile F. This alternative is preferred because PDD Spoils Pile F is located in an area where there is expected scour or channel cut in the future wetland. The Excavation and Offsite Disposal alternative would remove soil containing COCs at concentrations above action goals. The excavated area would be backfilled as necessary for safety. The alternative would meet RAOs by removing COCs above action goals.

The area recommended for this alternative is shown in Figure 2.4-1. Excavation boundaries were established to address soil containing COCs at concentrations above action goals. A summary of the minimum, maximum, and average values for COCs remaining at PDD Spoils Pile F are shown below. This information was considered in the process of selecting Alternative 2 and establishing excavation boundaries.

Minimum, Maximum, and Average Values for COCs — PDD Spoils Pile F

COC	Number of Samples	Minimum Value	Maximum Value	Average Value	Action Goal
Arsenic	3	3.70	29.6	15.8	16.7
Beryllium	3	0.590	4.80	2.20	1.03
Cobalt	3	6.50	61.1	27.8	27.6
Lead	3	16.5	109	75.8	46.7
Manganese	3	564	1,870	1,070	943
Nickel	3	23.9	198	102	114
Zinc	3	43.9	224	122	158
PAHs, total	2	7.32	41.15	24.2	4.022
DDTs, total	3	0.0211	0.641	0.349	0.03

Units are in ppm.

In February 2002, during remediation activities at Spoils Pile F, contaminated soil was removed and disposed of offsite. The analytical results of the soil removal activities are provided in the *Final Construction Report Building 41 Demolition and Soil Removal, Spoils Pile F*

Removal, and Revetments 6 and 7 Removal (IT, 2003). After reviewing the analytical data from that event, it was agreed that some additional samples are needed to determine if the actions are complete. For this reason, Alternative 2 is chosen in this document as though the remediation activities have not yet taken place.

Alternative 1 was not selected because it would not meet RAOs and would not protect human health and the environment. Alternative 2 was selected over Alternative 3 because this site is in an area where scour or channel cuts are expected in the future wetland. The effectiveness of cover and monitoring in Alternative 3 is a potential concern in scour or channel-cut areas.

2.4.3.8 Onshore Fuel Line

Alternative 3, Manage In-Situ, with Monitoring and Maintenance, for Army BRAC Sites, is the preferred alternative for the ONSFL. This alternative is effective and implementable. This alternative establishes performance criteria requiring 3 feet of cover. This alternative would meet RAOs by preventing exposure of future wetland receptors to existing site soils. Implementation of monitoring and adaptive management plans will achieve and maintain the 3 feet of stable cover. The ONSFL is located in an area where it is currently expected that cover can be achieved and there is no expected scour or channel cut in the future wetland. The preferred alternative may change in the future to Alternative 2 if the final HWRP design and geomorphic and scour analysis determine that the performance criteria cannot be achieved and maintained.

The areas recommended for this alternative are shown in Figures 2.4-3 through 2.4-5. The area over which the performance criteria would be achieved and maintained was established to address the estimated extent of soil containing COCs at concentrations above action goals. A summary of the minimum, maximum, and average values for COCs remaining at the ONSFL segments are shown below. This information was considered in the process of selecting Alternative 3 and establishing cover boundaries for the ONSFL.

Onshore Fuel Line, 54-Inch

Minimum, Maximum, and Average Values for COCs — ONSFL, 54-inch

COC	Number of Samples	Minimum Value	Maximum Value	Average Value	Action Goal
TPH-gasoline	39	43.0	220	29.5	12

Units are in ppm.

Onshore Fuel Line, Hangar Segment

Minimum, Maximum, and Average Values for COCs — ONSFL, Hangar Segment

COC	Number of Samples	Minimum Value	Maximum Value	Average Value	Action Goal
TPH-gasoline	286	1.80	3,700	56.7	12
TPH-JP-4	301	25.0	1,100	19.9	12
PAHs, total	444	0.037	742	2.16	4.022

Units are in ppm.

Onshore Fuel Line, Northern Segment

Minimum, Maximum, and Average Values for COCs — ONSFL, Northern Segment

COC	Number of Samples	Minimum Value	Maximum Value	Average Value	Action Goal
TPH-diesel	159	7.10	870	15.0	144
TPH-motor oil	74	94.0	910	66.8	144
TPH-gasoline	159	0.52	470	12.1	12

Units are in ppm.

Alternative 1 was not selected because it would not meet RAOs and would not protect human health and the environment. Alternative 2 would also be an effective and implementable alternative. Alternative 3 was selected over Alternative 2 because this site is in an area where no scour or channel cuts are currently expected in the future wetland and Alternative 3 is more cost-effective.

2.4.3.9 Revetment Areas

Revetment Areas 6 and 7 (Alternative 2)

Alternative 2, Excavation and Offsite Disposal, is the preferred alternative for Revetment Areas 6 and 7. This alternative is preferred because the revetments are located in an area where there is expected scour or channel cut in the future wetland. The Excavation and Offsite Disposal alternative would remove soil containing COCs at concentrations above action goals. The excavated area would be backfilled as necessary for safety. The alternative would meet RAOs by removing COCs above action goals.

The area recommended for excavation is shown on Figure 2.4-1. Excavation boundaries were established to address soil containing COCs at concentrations above action goals. A summary of the minimum, maximum, and average values for COCs remaining at Revetments 6 and 7 are shown below. This information was considered in the process of selecting Alternative 2 and establishing excavation boundaries for Revetments 6 and 7.

Minimum, Maximum, and Average Values for COCs — Revetment 6

COC	Number of Samples	Minimum Value	Maximum Value	Average Value	Action Goal
TPH-gasoline	7	920	920	920	12

Units are in ppm.

Minimum, Maximum, and Average Values for COCs — Revetment 7

COC	Number of Samples	Minimum Value	Maximum Value	Average Value	Action Goal
Lead	4	12.5	55.6	38.8	46.7
PAHs, total	3	3.061	7.87	5.41	4.022

Units are in ppm.

In February 2002, during remediation activities at Revetment 6, concrete and contaminated soil were removed and disposed of offsite. The analytical results of the Revetment 6 concrete pad and soil removal activities are provided in the *Final Construction Report Building 41 Demolition and Soil Removal, Spoils Pile F Removal, and Revetments 6 and 7 Removal* (IT, 2003). After reviewing the analytical data from that event, it was agreed that some additional samples are needed to determine if the actions are complete. For this reason, Alternative 2 is chosen in this document as though the remediation activities have not yet taken place.

Alternative 1 was not selected because it would not meet RAOs and would not protect human health and the environment. Alternative 2 was selected over Alternative 3 because this site is in an area where scour or channel cuts are expected in the future wetland. The effectiveness of cover and monitoring in Alternative 3 is a potential concern in scour or channel-cut areas.

Revetment Areas 1, 2, 3, 4, 11, 12, 13, 14, 16, 19, 21, 22, 23, 25, and 26, Historic Revetments, and Storm Drains (Alternative 3)

Alternative 3, Manage In-Situ, with Monitoring and Maintenance, for Army BRAC Sites, is the preferred alternative for revetments 1, 2, 3, 4, 11, 12, 13, 14, 16, 19, 21, 22, 23, 25, and 26, historic revetments, and the storm drains in this area. This alternative is effective and implementable. This alternative establishes performance criteria requiring 3 feet of cover. This alternative would meet RAOs by preventing exposure of future wetland receptors to existing site soils. Implementation of monitoring and adaptive management plans will achieve and maintain the 3 feet of stable cover. These revetments are located in an area where it is currently expected that cover can be achieved and there is no expected scour or channel cut in the future wetland. The preferred alternative may change in the future to Alternative 2 should the final HWRP design and geomorphic and scour analysis determine that the performance criteria cannot be achieved and maintained.

The area recommended for this alternative is shown in Figure 2.4-1. The area over which the performance criteria would be achieved and maintained was established to address the estimated extent of soil containing COCs at concentrations above action goals. A summary of the minimum, maximum, and average values for COCs remaining at these revetments are shown below. This information was considered in the process of selecting Alternative 3 and establishing cover boundaries for these revetments.

Minimum, Maximum, and Average Values for COCs — Revetment 1

COC	Number of Samples	Minimum Value	Maximum Value	Average Value	Action Goal
Barium	4	94.7	233	139	190
Cadmium	4	0.0400	1.80	1.00	1.2
Lead	4	9.7	70.2	45.6	46.7
PAHs, total	3	0.483	5.86	1.79	4.022

Units are in ppm.

Minimum, Maximum, and Average Values for COCs — Revetment 2

COC	Number of Samples	Minimum Value	Maximum Value	Average Value	Action Goal
Cadmium	4	0.430	3.10	1.66	1.2
Lead	4	16.6	176	81.6	46.7

Units are in ppm.

Minimum, Maximum, and Average Values for COCs — Revetment 3

COC	Number of Samples	Minimum Value	Maximum Value	Average Value	Action Goal
Barium	1	479	479	479	190
Copper	1	88.4	88.4	88.4	68.1
Manganese	1	1,850	1,850	1,850	943

Units are in ppm.

Minimum, Maximum, and Average Values for COCs — Revetment 4

COC	Number of Samples	Minimum Value	Maximum Value	Average Value	Action Goal
Cadmium	4	0.350	2.90	1.34	1.2
Lead	4	12.8	79.7	32.8	46.7

Units are in ppm.

Minimum, Maximum, and Average Values for COCs — Revetment 11

COC	Number of Samples	Minimum Value	Maximum Value	Average Value	Action Goal
Copper	17	28.6	126	60.5	68.1

Units are in ppm.

Minimum, Maximum, and Average Values for COCs — Revetment 12

COC	Number of Samples	Minimum Value	Maximum Value	Average Value	Action Goal
Copper	16	21.5	218	65.9	68.1

Units are in ppm.

Minimum, Maximum, and Average Values for COCs — Revetment 13

COC	Number of Samples	Minimum Value	Maximum Value	Average Value	Action Goal
Cadmium	4	0.110	4.20	1.57	1.2
Lead	4	15.3	109	45.8	46.7
PAHs, total	3	0.178	6.74	3.26	4.022

Units are in ppm.

Minimum, Maximum, and Average Values for COCs — Revetment 14

COC	Number of Samples	Minimum Value	Maximum Value	Average Value	Action Goal
TPH-diesel	1	160	160	160	144

Units are in ppm.

Minimum, Maximum, and Average Values for COCs — Revetment 16

COC	Number of Samples	Minimum Value	Maximum Value	Average Value	Action Goal
Barium	1	406	406	406	190

Units are in ppm.

Minimum, Maximum, and Average Values for COCs — Revetment 19

COC	Number of Samples	Minimum Value	Maximum Value	Average Value	Action Goal
Barium	4	53.6	403	143	190
Cadmium	4	0.440	1.70	1.15	1.2
Copper	4	33.9	82.4	46.7	68.1
Lead	4	10.0	84.5	41.8	46.7
PAHs, total	4	0.110	12.5	2.77	4.022
TPH-diesel	4	270	270	270	144
TPH-gasoline	4	580	580	580	12

Units are in ppm.

Minimum, Maximum, and Average Values for COCs — Revetment 21

COC	Number of Samples	Minimum Value	Maximum Value	Average Value	Action Goal
Copper	1	70.3	70.3	70.3	68.1
Vanadium	1	131	131	131	118
TPH-diesel	1	310	310	310	144
TPH-gasoline	1	230	230	230	12

Units are in ppm.

Minimum, Maximum, and Average Values for COCs — Revetment 22

COC	Number of Samples	Minimum Value	Maximum Value	Average Value	Action Goal
TPH-diesel	1	880	880	880	144
TPH-gasoline	1	200	200	200	12

Units are in ppm.

Minimum, Maximum, and Average Values for COCs — Revetment 23

COC	Number of Samples	Minimum Value	Maximum Value	Average Value	Action Goal
Copper	15	20.0	141	57.2	68.1

Units are in ppm.

Minimum, Maximum, and Average Values for COCs — Revetment 25

COC	Number of Samples	Minimum Value	Maximum Value	Average Value	Action Goal
Barium	1	238	238	238	190
TPH-diesel	1	330	330	330	144

Units are in ppm.

Minimum, Maximum, and Average Values for COCs — Revetment 26

COC	Number of Samples	Minimum Value	Maximum Value	Average Value	Action Goal
Barium	1	379	379	379	190
Boron	1	58.3	58.3	58.3	36.9
Manganese	1	1,130	1,130	1,130	943
TPH-diesel	1	290	290	290	144
TPH-gasoline	1	60.0	60.0	60.0	12

Units are in ppm.

No analytical data are available for the historic revetments.

Alternative 1 was not selected because it would not meet RAOs and would not protect human health and the environment. Alternative 2 would be an effective and implementable alternative. Alternative 3 was selected over Alternative 2 because these sites are located in areas where no scour or channel cuts are currently expected in the future wetland and Alternative 3 is more cost-effective.

2.4.3.10 Inboard Area-Wide DDTs and PAHs Near the Runway

Alternative 4, Manage Onsite, with Monitoring and Maintenance, for Army Civil Works Issues, is the preferred alternative for Inboard Area-Wide DDTs and PAHs near the runway. This alternative establishes performance criteria requiring 3 feet of cover over all site soils containing residual DDTs and/or PAHs in excess of the action goals. The Army Civil Works Program shall ensure, through both construction and implementation of its plan for monitoring and adaptive management, that the HWRP will achieve and maintain the performance criteria of 3 feet of stable cover or its equivalent. This alternative would meet RAOs by preventing exposure of future wetland receptors to existing site soils. Implementation of monitoring and adaptive management plans will achieve and maintain the 3 feet of stable cover.

The area recommended for cover is shown on Figure 2.4-6. Cover boundaries were established to address soil containing COCs at concentrations above action goals. A summary of the minimum, maximum, and average values for COCs remaining at these areas are shown below. This information was considered in the process of selecting Alternative 4 and establishing cover boundaries for these areas.

Minimum, Maximum, and Average Values for Inboard Area-Wide DDTs and PAHs Near the Runway

COC	Number of Samples	Minimum Value	Maximum Value	Average Value	Action Goal
Total DDTs	23	0.0181	0.935	0.163	0.03
Total PAHs	15	0.036	54.9	7.59	4.02

Units are in ppm.

Alternative 1 was not selected because it would not meet RAOs and would not protect human health and the environment. No other alternatives were considered.

2.4.4 Estimated Total Excavation Volume

As previously discussed, actions to be taken under Alternatives 2 and 4 include excavating soil. This section summarizes the estimated total volume of soil that will be excavated for sites where Alternatives 2 and 4 were selected.

Alternative 2, Excavation and Offsite Disposal, was selected for a number of Inboard Area sites as shown in Table 2.4-1. The total estimated volume of soil that will be excavated under this alternative is 13,800 cubic yards. The final footprint of excavation activities will be determined as part of the remedial design and/or by confirmation sampling conducted during remedial activities.

Alternative 4, Manage Onsite, with Monitoring and Maintenance, for Army Civil Works Issues, was selected for the Inboard Area-Wide DDTs and PAHs near the runway. The estimated maximum volume of soil to be excavated, moved, or managed elsewhere onsite under Alternative 4 is 871,000 cubic yards.

TABLE 2.4-1
Comparative Analysis Summary

		Evaluation Criteria Rankings								
Site	**Alternative**	**Overall Protection of Human Health and the Environment**	**Compliance with State and Federal Requirements**	**Long-Term Effectiveness and Permanence**	**Reduction of TMV Through Treatment**	**Cost**	**Short-Term Effectiveness**	**Implementability**	**Regulatory Agency Acceptance**	**Community Acceptance**
FSTP	**1**	NA	NA	NA	NA	NA	High	High	Low	TBD
	2	High	High	High	NA	$61,217	Medium	Medium	Medium	TBD
	3	High	Low	Medium	NA	$10,000	High	High	High	TBD
Building 26	**1**	NA	NA	NA	NA	NA	High	High	Low	TBD
	2	High	High	High	NA	$23,610	Medium	Medium	Medium	TBD
	3	High	Low	Medium	NA	$10,000	High	High	High	TBD
Building 35/39 Area	**1**	NA	NA	NA	NA	NA	High	High	Low	TBD
	2[a]	High	High	High	NA	$17,384	Medium	Medium	High	TBD
	3[b]	High	Low	Medium	NA	$10,000	High	High	High	TBD
Building 41 Area	**1**	NA	NA	NA	NA	NA	High	High	Low	TBD
	2	High	High	High	NA	$297,018	Medium	Medium	High	TBD
	3	High	Low	Medium	NA	$10,000	High	High	Medium	TBD
Building 82/87/92/94 Area and Building 86	**1**	NA	NA	NA	NA	NA	High	High	Low	TBD
	2	High	High	High	NA	$1,298,674	Medium	Medium	Medium	TBD
	3	High	Low	Medium	NA	$10,000	High	High	High	TBD
Perimeter Drainage Ditch	**1**	NA	NA	NA	NA	NA	High	High	Low	TBD
	2[c]	High	High	High	NA	$4,502,006	Medium	Medium	High	TBD
	3[d]	High	Low	Medium	NA	$10,000	High	High	High	TBD
Perimeter Drainage Ditch Spoils Piles	**1**	NA	NA	NA	NA	NA	High	High	Low	TBD
	2[e]	High	High	High	NA	Spoils Pile A—$ 55,892 Spoils Pile B—$123,374 Spoils Pile C—$97,974 Spoils Pile D—$60,244 Spoils Pile F—$182,305 Spoils Pile G—$68,213 Spoils Pile I—$41,202 Spoils Pile J—$16,915 Spoils Pile K—$32,852 Spoils Pile L—$9,811 Spoils Pile M—$126,722 Spoils Pile N—$72,078	Medium	Medium	High	TBD
	3[f]	High	Low	Medium	NA	$10,000 (per site)	High	High	High	TBD
Onshore Fuel Line	**1**	NA	NA	NA	NA	NA	High	High	Low	TBD
	2	High	High	High	NA	54-inch Line–$625,306 Hangar Segment–$701,748 Northern Segment–$571,294	Medium	Medium	Medium	TBD
	3	High	Low	Medium	NA	$10,000	High	High	High	TBD
Northwest Runway Area	**1**	NA	NA	NA	NA	NA	High	High	High	TBD
	2	High	High	High	NA	$76,566	Medium	High	Medium	TBD

TABLE 2.4-1
Comparative Analysis Summary

Site	Alternative	Evaluation Criteria Rankings: Overall Protection of Human Health and the Environment	Compliance with State and Federal Requirements	Long-Term Effectiveness and Permanence	Reduction of TMV Through Treatment	Cost	Short-Term Effectiveness	Implementability	Regulatory Agency Acceptance	Community Acceptance
	3	High	Low	Medium	NA	$10,000	High	High	Medium	TBD
Revetment Areas	**1**	NA	NA	NA	NA	NA	High	High	Low	TBD
	2[g]	High	High	High	NA	Revetment 1—$211,033 Revetment 2—$142,096 Revetment 3—$160,424 Revetment 4—$227,718 Revetment 6—$112,184 Revetment 7—$55,992 Revetment 11—$21,516 Revetment 12—$14,006 Revetment 13—$142,596 Revetment 14—$164,622 Revetment 15—$94,973 Revetment 16—$162,415 Revetment 19—$242,280 Revetment 20 —$170,446 Revetment 21—$167,867 Revetment 22—$156,872 Revetment 23—$226,934 Revetment 25—$164,373 Revetment 26—$156,810 Historic Revetments—$575,000	Medium	Medium	High	TBD
	3[h]	High	Low	Medium	NA	$10,000 per revetment	High	High	High	TBD
Inboard Area-Wide DDTs and PAHs Near Runway	**1**	NA	NA	NA	NA	NA	High	High	Low	TBD
	4	High	Low	Medium	NA	$5,880,000	Medium	High	High	TBD

[a] Alternative 2 seclected for Building 35/39 Area where DDTs are >1 ppm.
[b] Alternative 3 selected for Building 35/39 Area other than area where DDTs are >1 ppm.
[c] Alternative 2 selected for PDD unlined where DDTs are >1 ppm and PDD lined within proposed HWRP channel cut.
[d] Alternative 3 selected for PDD lined portion outside the proposed HWRP channel cut.
[e] Alternative 2 selected for PDD Spoils Pile F only.
[f] Alternative 3 selected for PDD Spoils Piles A, B, C, D, G, I, J, K, L, M, and N.
[g] Alternative 2 selected for Revetments 6 and 7.
[h] Alternative 3 selected for Revetments 1-4, 11-14, 16, 19, and 21-23, and historic revetments.
NA = not applicable
TMV = toxicity, mobility, and volume
TBD = to be determined
Shaded cells indicate the preferred alternative.
Alternative 1—No Further Action
Alternative 2—Excavation and Offsite Disposal
Alternative 3—Manage In-Situ, with Monitoring And Maintenance, for Army BRAC Sites
Alternative 4—Manage Onsite, with Monitoring and Maintenance, for Army Civil Works Issues

GRAPHIC SCALE

500 0 500 1000

(IN FEET)
1 inch = 500 ft.

NORTHWEST RUNWAY AREA, (ALT 3)

RADIOLOGICAL WASTE DISPOSAL CYLINDERS, (ALT 1)

PDD–UNLINED PORTION, (ALT 2)

NORTHWEST ALLEDGED DISPOSAL AREA (ASR SITE #8)

PDD SPOILS PILE A, (ALT 3)

NORTH LEVEE PERIMETER ROAD

PDD–UNLINED PORTION, (ALT 3)

ONSFL–54" DRAIN LINE SEGMENT, (ALT 3) SEE FIGURE 2.4–3

PDD SPOILS PILE B, (ALT 3)

BUILDING 20, (ALT 1)

BUILDING 26, (ALT 3)

PDD–LINED PORTION OUTSIDE HWRP CHANNEL CUT (ALT 3)

ONSFL–NORTHERN SEGMENT, (ALT 3) SEE FIGURE 2.4–4

PDD SPOILS PILE C, (ALT 3)

REVETMENT 16, (ALT 3)
REVETMENT 15, (ALT 1)
REVETMENT 14, (ALT 3)
REVETMENT 12, (ALT 3)
REVETMENT 28, (ALT 1)
REVETMENT 11, (ALT 3)
REVETMENT 10, BURN PIT (ALT 1)
REVETMENT 26, (ALT 3)
PDD SPOILS PILE D, (ALT 3)
REVETMENT 9, (ALT 1)
REVETMENT 8, (ALT 1)
REVETMENT 7, (ALT 2)

REVETMENT 18/BUILDING 15, (ALT 1)

ONSFL–HANGAR SEGMENT, (ALT 3) SEE FIGURE 2.4–5

REVETMENT 19, (ALT 3)
REVETMENT 17, (ALT 1)
REVETMENT 20 (ALT 1)
REVETMENT 21, (ALT 3)
REVETMENT 22, (ALT 3)
REVETMENT 23, (ALT 3)
REVETMENT 24, (ALT 1)
REVETMENT 13, (ALT 3)
REVETMENT 27, (ALT 1)
REVETMENT 25, (ALT 3)
REVETMENT 3, (ALT 3)
REVETMENT 1, (ALT 3)

PDD SPOILS PILE E, (ALT 1)
BUILDINGS 35/39, (ALT 2 AND 3)
REVETMENT 6, (ALT 2)
PDD SPOILS PILE F, (ALT 2)
PDD–LINED WITHIN HWRP CHANNEL CUT (ALT 2)
BUILDING 41 AREA (ALT 2) (SEE FIGURE 2.4–2)
FORMER SEWAGE TREATMENT PLANT (including sanitary and industrial waste lines), (ALT 3)
REVETMENT 5, (ALT 1)
REVETMENT 4, (ALT 3)
REVETMENT 2, (ALT 3)
PDD SPOILS PILE G, (ALT 3)
EAST LEVEE GENERATOR PAD (ALT 1)
HISTORIC REVETMENTS (ALT 3)
PDD SPOILS PILE I, (ALT 1)
PDD LINED OUTSIDE HWRP CHANNEL CUT (ALT 3)

TARMAC EAST OF OUTPARCEL A–5, (ALT 1)

HISTORIC REVETMENTS (ALT 3)

BUILDINGS 82/87/92/94 (including storm drains), (ALT 3)

PDD SPOILS PILE H, (ALT 1)

BUILDINGS 84/90 (ALT 1)

BUILDING 86 (including storm drains), (ALT 3)

PDD SOILS PILE N (ALT 3)

PDD SPOILS PILE J, (ALT 3)

PDD SPOILS PILE K, (ALT 3)

PDD SPOILS PILE M, (ALT 3)

HISTORIC REVETMENTS (ALT 3)

PDD SPOILS PILE L (ALT 3)

LANDFILL 26

HOL HILL

GSA PHASE II SALE PARCEL

HOSPITAL HILL

U.S. COAST GUARD

TESTING RANGE, (ASR SITE #4)

FIRING–IN BUTT, (ASR SITE #19)

SKEET RANGE (ASR SITE #18)

AGRICULTURAL LAND

LEGEND

(ALT 1)	REMEDIAL ALTERNATIVE 1 - SELECTED FOR SITE
(ALT 2)	REMEDIAL ALTERNATIVE 2 - SELECTED FOR SITE
(ALT 3)	REMEDIAL ALTERNATIVE 3 - SELECTED FOR SITE
———	MAIN AIRFIELD PARCEL BOUNDARY
- - - - - -	AREAS ENLARGED IN FIGURE 2.4-2 THROUGH FIGURE 2.4-5
–o–o–	STORMWATER DRAINAGE SYSTEM
— · —	SEWER SYSTEM LINES

SELECTED ALTERNATIVES LEGEND

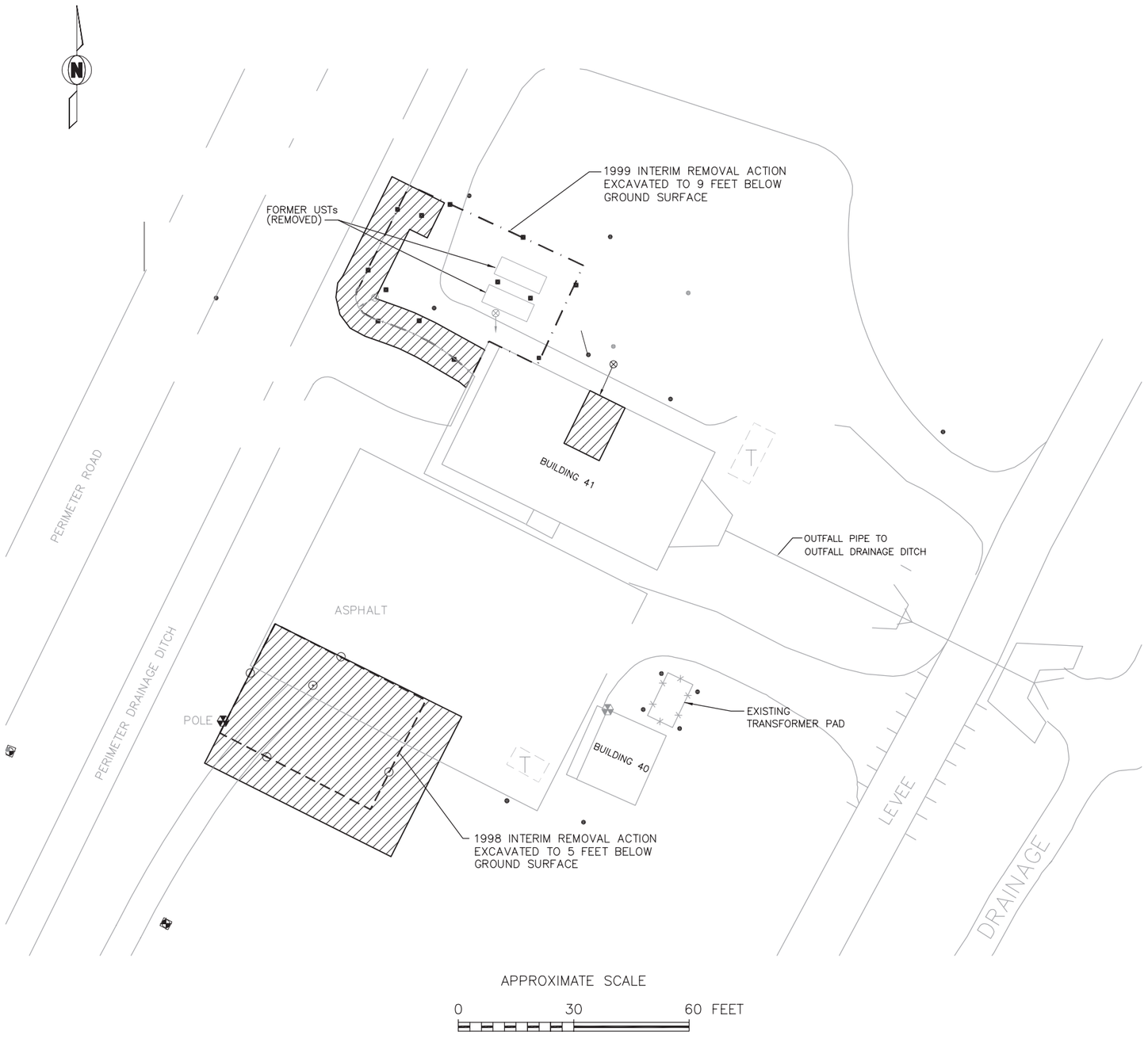
	ALTERNATIVE 1 - NO FURTHER ACTION
	ATERNATIVE 2 - EXCAVATION AND OFFSITE DISPOSAL
	ALTERNATIVE 3 - MANAGE IN-SITU WITH MONITORING AND MAINTENANCE, FOR ARMY BRAC SITES

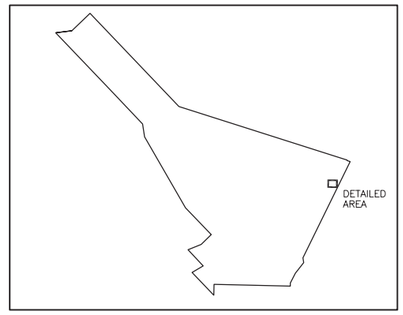
FIGURE 2.4-1
INBOARD AREA SITE LOCATIONS AND REMEDIAL ACTION AREAS
HAMILTON ARMY AIRFIELD

ROD/RAP

CH2MHILL

E042003005SAC_HAAF Fig2.4-1.ai 8/11/03 dash





KEY MAP

LEGEND:

- PROPOSED REMEDIAL ACTION AREA (ALTERNATIVE 2 - EXCAVATION AND OFFSITE DISPOSAL)
- ANGLED SOIL BORING SHOWING DIRECTION OF SLANT
- REMEDIAL INVESTIGATION SAMPLE (IT, 1999a)
- 1998 INTERIM REMOVAL ACTION SAMPLE
- 1999 INTERIM REMOVAL ACTION SAMPLE
- ABOVE GROUND STORAGE TANK (AST)
- SURVEY HUB
- MONITORING WELL LOCATION
- 1998 INTERIM REMOVAL ACTION EXCAVATION BOUNDARY
- 1999 INTERIM REMOVAL ACTION EXCAVATION BOUNDARY

FIGURE 2.4–2

BUILDING 41 AREA
PROPOSED
REMEDIAL ACTION AREAS
INBOARD AREA SITES
MAIN AIRFIELD PARCEL
HAMILTON ARMY AIRFIELD

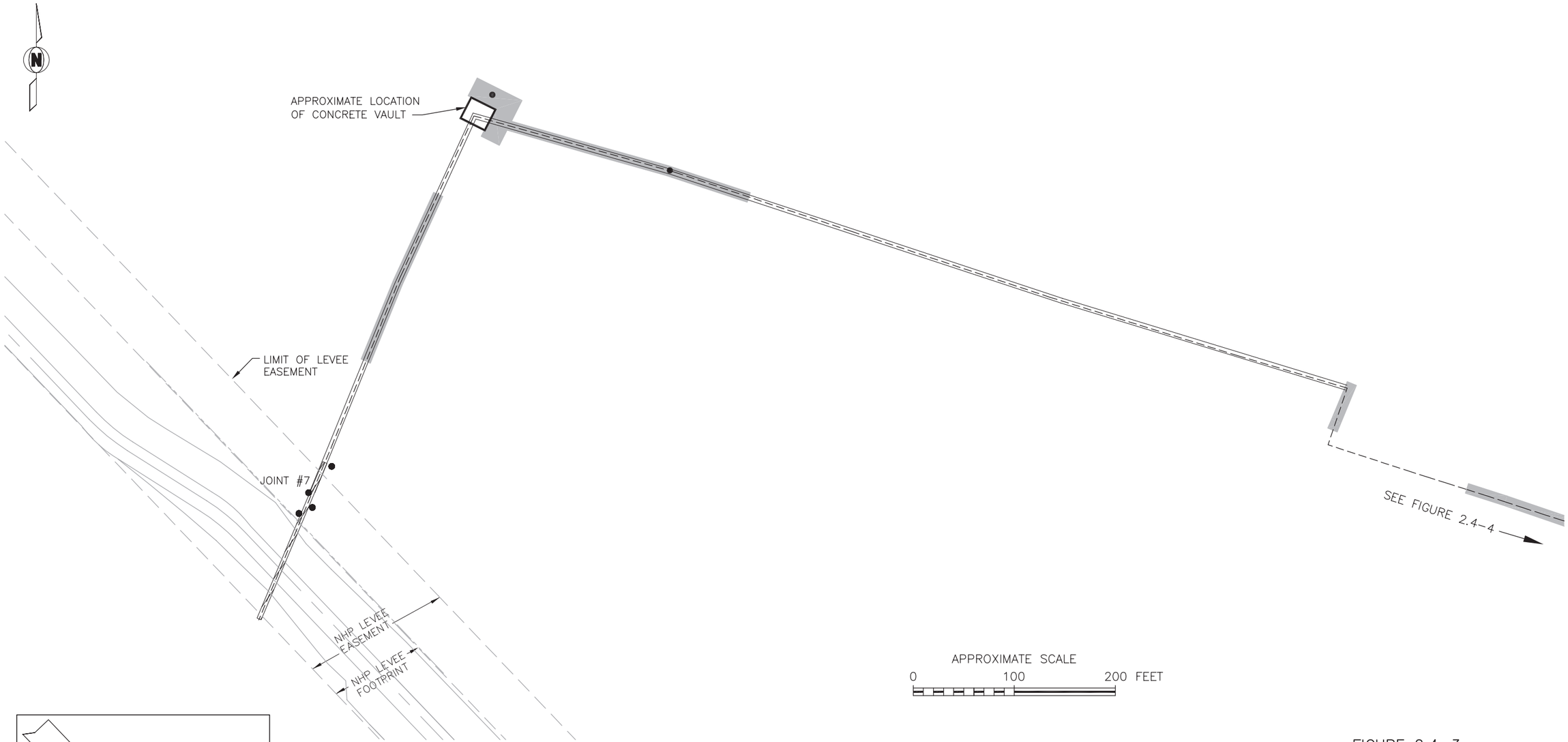
PREPARED FOR

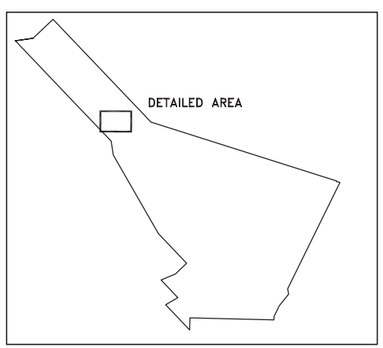
USACE SACRAMENTO

ROD / RAP
REFERENCE: IT CORPORATION (IT), FIGURE 2–5, BUILDING 41 AREA SAMPLE LOCATIONS AND PROPOSED EXCAVATION BOUNDARIES. (DWG. NO. 762538–R692.DWG)

CH2MHILL

E042003005SAC_HAAF Fig2.4-2.ai 8/7/03 esm





KEY MAP

LEGEND:

PROPOSED REMEDIAL ACTION AREA
(ALTERNATIVE 3 - MANAGE IN-SITU WITH MONITORING AND MAINTENANCE FOR ARMY BRAC SITES)

SOIL SAMPLE LOCATION

FORMER ONSHORE FUEL LINE

FIGURE 2.4–3

ONSHORE FUEL LINE
54–INCH DRAIN LINE SEGMENT
PROPOSED REMEDIAL ACTION AREAS
INBOARD AREA SITES
MAIN AIRFIELD PARCEL
HAMILTON ARMY AIRFIELD

PREPARED FOR

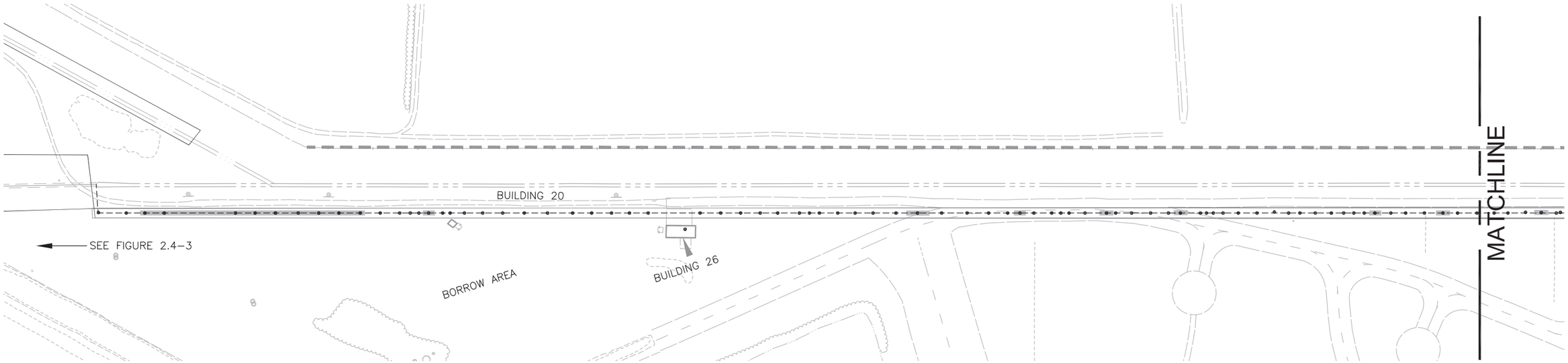
USACE SACRAMENTO

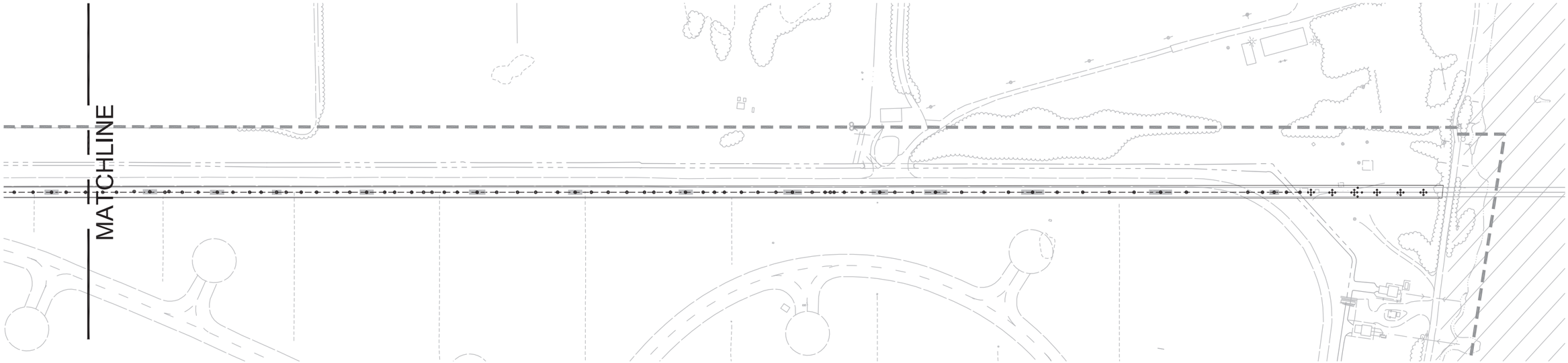
ROD / RAP

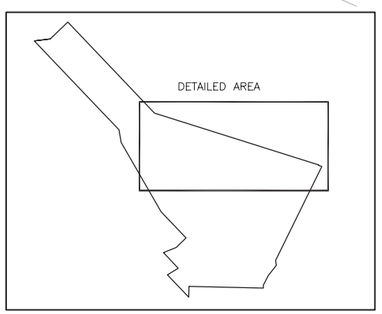
REFERENCE: IT CORPORATION (IT), FIGURE 2–2, ONSHORE FUEL LINE 54–INCH DRAIN LINE SEGMENT SAMPLE LOCATIONS AND PROPOSED EXCAVATION BOUNDARIES. (DWG. NO. 762538–R697.DWG)

CH2MHILL

E042003005SAC_HAAF Fig2.4-3.ai 8/7/03 esm







KEY MAP

LEGEND:

PROPOSED REMEDIAL ACTION AREA
(ALTERNATIVE 3 - MANAGE IN-SITU WITH MONITORING AND MAINTENANCE FOR ARMY BRAC SITES)

MAIN AIRFIELD BOUNDARY

PERIMETER DRAINAGE DITCH (CONCRETE LINED)

SAMPLE LOCATION (IT 1999a)

FORMER LOCATION OF FUEL LINE

APPROXIMATE SCALE
0 100 200 FEET

FIGURE 2.4–4

ONSHORE FUEL LINE
NORTHERN SECTION
PROPOSED REMEDIAL ACTION AREAS
INBOARD AREA SITES
MAIN AIRFIELD PARCEL
HAMILTON ARMY AIRFIELD

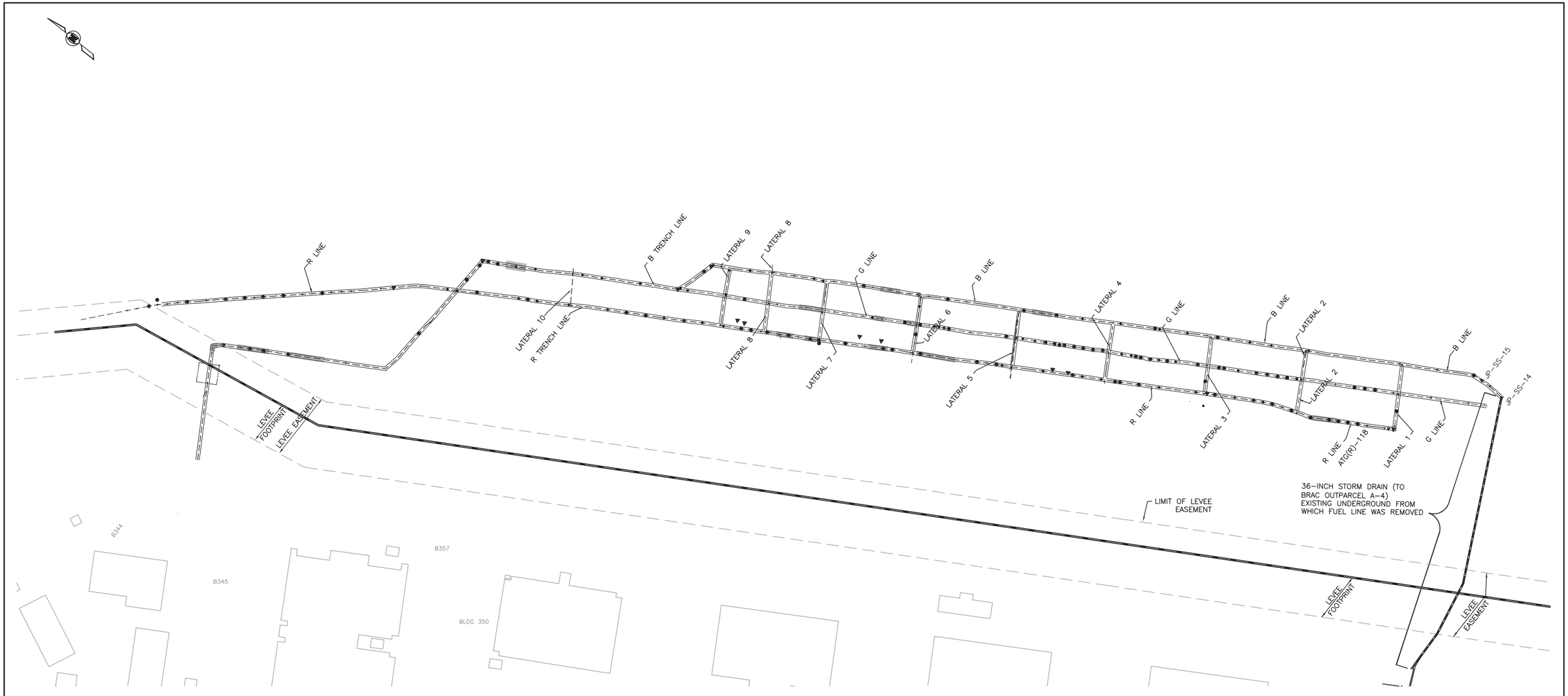
PREPARED FOR

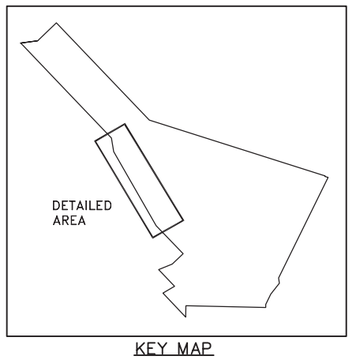
USACE SACRAMENTO

ROD /RAP
REFERENCE: IT CORPORATION (IT), FIGURE 2–3, ONSHORE FUEL LINE NORTHERN SECTION SAMPLE LOCATIONS AND PROPOSED EXCAVASTION BOUNDARIES (DWG NO. 762538 – R108.DWG)

CH2MHILL

E042003005SAC_HAAF Fig2.4-4.ai 8/7/03 esm





KEY MAP

LEGEND:

PROPOSED REMEDIAL ACTION AREA (ALTERNATIVE 3 - MANAGE IN-SITU WITH MONITORING AND MAINTENANCE FOR ARMY BRAC SITES)

SAMPLE LOCATIONS CONFIRMATION SAMPLE (IT, 1999a)

FORMER ONSHORE FUEL LINE SAMPLE

BOUNDARY BETWEEN LEVEE FOOTPRINT AND EASEMENT

LEVEE EASEMENT

FORMER ONSHORE FUEL LINE

APPROXIMATE SCALE

0 100 200 FEET

FIGURE 2.4-5

ONSHORE FUEL LINE HANGAR AREA
PROPOSED
REMEDIAL ACTION AREAS
INBOARD AREA SITES
MAIN AIRFIELD PARCEL
HAMILTON ARMY AIRFIELD

PREPARED FOR

USACE SACRAMENTO

ROD / RAP

REFERENCE: IT CORPORATION (IT), FIGURE 2-4, ONSHORE FUEL LINE HANGAR AREA SAMPLE LOCATIONS AND PROPOSED EXCAVATION BOUNDARIES. (DWG. NO. 762538-R109.DWG)

CH2MHILL

E042003005SAC_HAAF Fig2.4-5.ai 8/7/03 esm

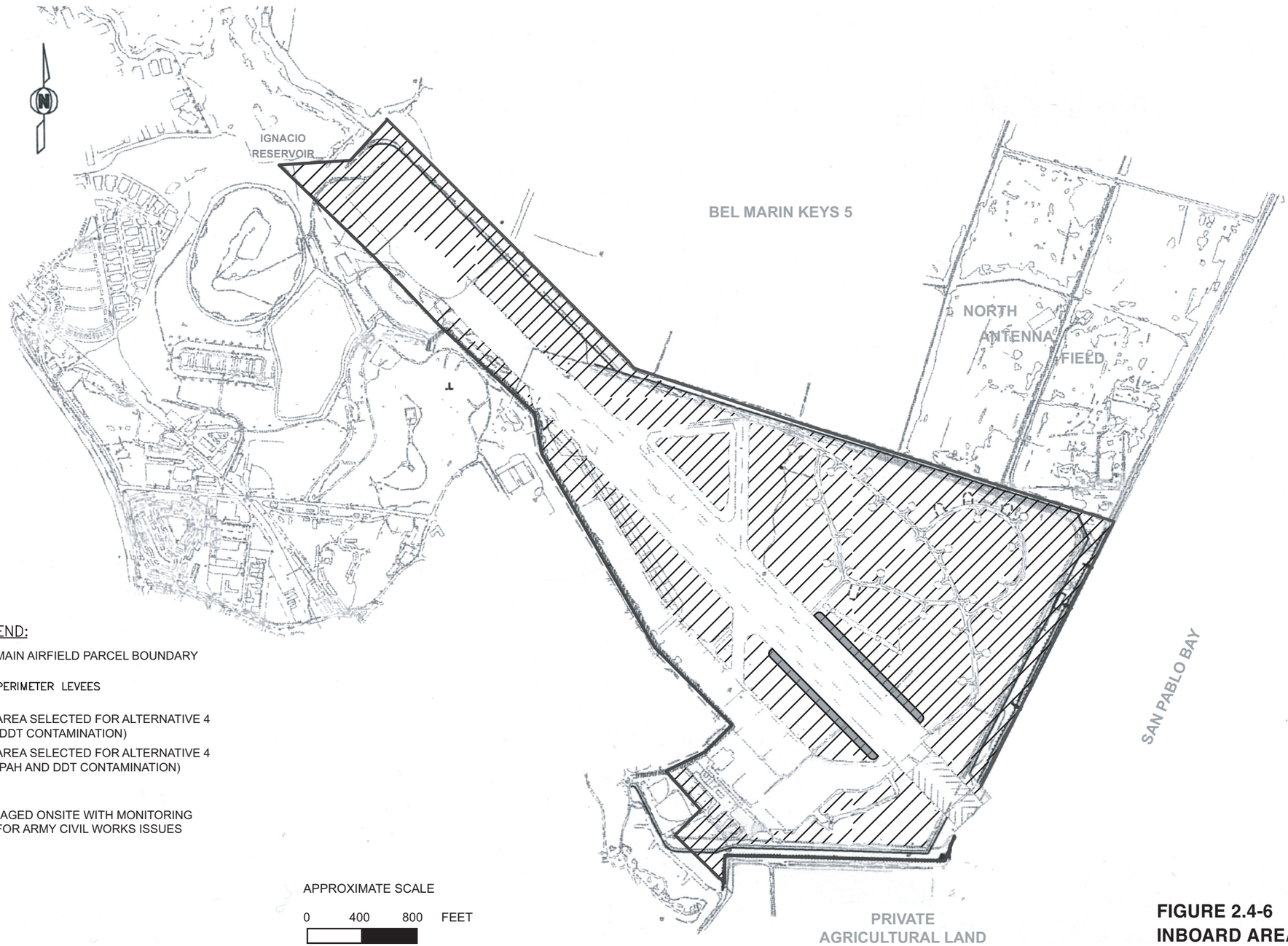


FIGURE 2.4-6
INBOARD AREA-WIDE DDTs
AND PAHs NEAR THE RUNWAY
PROPOSED REMEDIAL ACTION AREAS
HAMILTON ARMY AIRFIELD
PREPARED FOR USACE SACRAMENTO

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

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