Draft
Feasibility Study and Remedial Action Plan
Baker Beach Disturbed Area 2
Presidio of San Francisco, California

Prepared for

The Presidio Trust
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ACRONYM AND ABBREVIATION LIST

AMEC	AMEC Environment & Infrastructure
ARARs	Applicable or Relevant and Appropriate Requirements
Army	U.S. Army
BaP	benzo(a)pyrene
BaP PEQ	benzo(a)pyrene potency equivalency concentration
BBDA 2	Baker Beach Disturbed Area 2
BBDA 2A	Baker Beach Disturbed Area 2A
bgs	below ground surface
BMPs	best management practices
CEQA	California Environmental Quality Act
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
COCs	chemicals of concern
Conservancy	Golden Gate National Parks Conservancy
cPAHs	carcinogenic PAHs
CRP	Community Relations Plan
CSF	cancer slope factor
CSM	conceptual site model
cy	cubic yards
DDE	4,4'-dichlorodiphenyldichloroethylene
DDT	4,4'-dichlorodiphenyltrichloroethane
DPM	diesel particulate matter
DTSC	California E nvironmental P rotection A gency, Department o f Tox ic S ubstances Control
EKI	Erler & Kalinowski, Inc.
EPA	United States Environmental Protection Agency
EPC	exposure point concentration
FS	Feasibility Study
GGBHTD	Golden Gate Bridge Highway and Transportation District
GGNRA	Golden Gate National Recreation Area
GMPA	General Management Plan Amendment
GREM	Green Remediation Evaluation Matrix
HSC	Health and Safety Code
IS	Initial Study
LUC	Land Use Control
MACTEC	MACTEC Engineering and Consulting, Inc. (now AMEC)
mg/kg	milligrams per kilogram
MOA	Memorandum of Agreement
MSL	mean sea level
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPL	National Priority List
NPS	National Park Service
NPV	Net Present Value
O&M	operations and maintenance
OCP	organochlorine pesticides
OU	operable unit
PAHs	polynuclear aromatic hydrocarbons
PCBs	polychlorinated biphenyls

PCOCs	potential chemicals of concern
PPE	personal protective equipment
Presidio	Presidio of San Francisco
PRGs	preliminary remedial goals
RAOs	Remedial Action Objectives
RAB	Presidio Restoration Advisory Board
RAP	Remedial Action Plan
RCRA	Resource Conservation and Recovery Act
RDIP	Remedial Design Implementation Plan
RI	Remedial Investigation
SWPPP	Storm Water Pollution Prevention Plan
TBCs	To Be Considered Requirements
TMV	toxicity, mobility, or volume
TPH	total petroleum hydrocarbons
TPH-d	total petroleum hydrocarbons as diesel
TPH-fo/mo	total petroleum hydrocarbons as fuel oil/motor oil
TPH-g	total petroleum hydrocarbons as gasoline
Trust	Presidio Trust
UCL	upper confidence limit on the mean concentration
URS	URS Corporation
USACE	U.S. Army Corps of Engineers
VMP	Vegetation Management Plan
VOCs	volatile organic compounds
Water Board	Regional Water Quality Control Board, San Francisco Bay Region

EXECUTIVE SUMMARY

This Draft Feasibility Study and Remedial Action Plan (FS/RAP) for Baker Beach Disturbed Area 2 (BBDA 2; the site), Presidio of San Francisco (Presidio), California has been prepared on behalf of the Presidio Trust (Trust) by AMEC Environment & Infrastructure (AMEC) to identify and evaluate remedial alternatives and present the proposed remedial alternative for implementation at BBDA 2.

This Draft FS/RAP meets requirements specified by the California Environmental Protection Agency, Department of Toxic Substances Control (DTSC) in Guidance Document No. EO-95-007-PP, *Remedial Action Plan Policy* (DTSC, 1995) and is being released for a 30-day public comment period. After the public comment period ends, DTSC, in consultation with the Trust, will respond to comments received and prepare a Final FS/RAP.

BBDA 2 is situated on a sloping bluff top above Baker Beach, south of the Golden Gate Bridge and west of the Golden Gate Bridge Highway and Transportation District (GGBHTD) corporation yard and Highway 101 at the Presidio of San Francisco (Figure 1-1). The site is bounded by Battery Godfrey, a parking area, and former Baker Beach Disturbed Area 2A (BBDA 2A) to the north, and the slopes above Baker Beach to the west. A majority of the site comprises open space with steep slopes, and is densely vegetated with primarily non-native trees, vines, and shrubs.

BBDA 2 is comprised of a Debris Fill Area that is located generally south and west of the Battery Godfrey parking lot (Figure 1-2). The presence of fill material in this area is apparent on aerial photographs from as early as 1955 (Dames & Moore, 1997). The debris fill is characterized by a mixture of soil, construction debris, landscaping debris, and other miscellaneous debris (e.g., cans, bottles, glass, etc.). Debris fill at BBDA 2 appears to have been placed on a cut surface that removed some of the vestiges of earthworks associated with the West Battery magazines. East of the Debris Fill Area are remnants of a chert road surface that is the current location of the Coastal Trail (Figure 1-2).

As part of remedial investigations conducted at the site since 1992, 54 soil samples were collected from the Debris Fill Area and analyzed for the following chemicals: metals, polynuclear aromatic hydrocarbons (PAHs), volatile organic compounds (VOCs), pesticides, polychlorinated biphenyls (PCBs), and total petroleum hydrocarbons (TPH). In the *Remedial Investigation Summary Report, Baker Beach Disturbed Area 2, Presidio of San Francisco, California* (RI Summary Report; AMEC, 2012b), to assess the nature and extent of contamination, chemical data were compared to conservative screening levels (consisting of Presidio-wide human health and ecological preliminary remediation goals [PRGs]). The following compounds were identified as potential chemicals of concern (PCOCs) in debris fill at BBDA 2: copper, lead, silver, zinc, benzo[a]pyrene, chlordane, and 4,4'-dichlorodiphenyltrichloroethane (DDT).

In this FS/RAP, PCOCs were further evaluated to select COCs in soil in the Debris Fill Area that pose potential risk to humans or ecological receptors. The following COCs were identified for soil at BBDA 2:

- <u>COCs Presenting a Potential Human Health Risk</u>: Benzo(a)pyrene was identified as a human health COC.
- <u>COCs Presenting a Potential Ecological Risk</u>: Four metals (copper, lead, silver, and zinc) and two pesticides (chlordane and DDT) have been reported in soil samples at levels that pose potential risk to ecological receptors in areas designated as special status species zones (native plant zones and historic forest) at BBDA 2 and have

been identified as site COCs. Of these, only silver and zinc pose a potential risk to ecological receptors in ecological buffer zones (open landscaped areas) at BBDA 2.

Based on the presence and concentrations of COCs in soil at BBDA 2, debris fill over an approximate 0.7 acre area to depths of up to approximately 12.5 feet below ground surface (bgs) poses a potential risk to human health and the environment and requires remediation. The volume of contaminated debris fill is approximately 6,700 cubic yards (cy) of in-place soil, estimated to be 8,710 cy with a 30% expansion factor.

Considering planned future land use at BBDA 2 as a recreational natural open space area, the following remedial alternatives were developed for evaluation as part of the FS:

- Alternative 1 – No Action: No remediation measures would occur under this alternative.
- Alternative 2 – Land Use Controls (LUC): An administrative LUC would be implemented to prohibit reuses of the site that would pose a risk to potential human receptors and notify land managers of the presence and location of debris fill containing COCs at concentrations that pose a potential risk to sensitive ecological receptors.
- Alternative 3 – Excavation: Debris fill containing COCs at concentrations that pose a potential risk to sensitive ecological receptors would be excavated, as practicable, characterized, transported, and disposed off-site at a licensed landfill facility.
- Alternative 4 – Engineered Cover: An engineered soil cover would be placed over debris fill. A long-term monitoring and maintenance plan for the cover would be implemented post-construction. A LUC would be adopted to notify land managers of the presence and location of debris fill containing COCs at concentrations that pose a potential risk to sensitive ecological receptors underneath the soil cover and to prohibit reuses of the site that would pose a risk to potential human receptors.

The selected remedial action for BBDA 2 is Alternative 3, Excavation. This remedy provides a high level of protection to human health and the environment; meets Applicable or Relevant and Appropriate Requirements (ARARs); is compatible with the proposed land use of BBDA 2; is implementable to construct; meets some green remediation criteria; and allows for flexibility in addressing issues concerning slope stability and protection of cultural resources. The present worth of the selected remedy is $3.20 million.

1.0 INTRODUCTION

This Feasibility Study and Remedial Action Plan (FS/RAP) has been prepared by AMEC Environment & Infrastructure, Inc. (AMEC) on behalf of the Presidio Trust (the Trust) for Baker Beach Disturbed Area 2 (BBDA 2; the site), Presidio of San Francisco, California (the Presidio).

1.1 PURPOSE OF THE FS/RAP DOCUMENT

This FS/RAP has been prepared pursuant to the U.S. Environmental Protection Agency (USEPA) National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 Code of Federal Regulations (CFR), Part 300.400 (USEPA 1990) and provisions of the California Health and Safety Code, Chapter 6.8, Section 25356.1. This Draft FS/RAP develops and evaluates alternatives to remediate contamination identified in soil at BBDA 2. Following evaluation of the alternatives, a RAP is presented which presents the proposed remedial alternative.

The Draft RAP is being released for a 30-day public comment period. After the public comment period ends, DTSC, in consultation with the Trust, will respond to comments received and prepare a Final FS/RAP. The Final RAP will serve as the decision document for site remediation.

1.2 REPORT ORGANIZATION

The remainder of this FS/RAP is organized as follows:

- Section 2: Background
- Section 3: Summary of Site Conditions
- Section 4: Remedial Action Objectives
- Section 5: Applicable, Relevant, and Appropriate Requirements
- Section 6: Identification and Screening of Remedial Alternatives
- Section 7: Analysis of Alternatives
- Section 8: Remedial Action Plan
- Section 9: References.

Appendices of this FS/RAP contain the following:

- Appendix A: Soil Analytical Data and ProUCL Output
- Appendix B: LeadSpread 8 Output
- Appendix C: Green Remediation Evaluation Matrix Tables
- Appendix D: Preliminary Estimated Cost Tables and Construction Schedules
- Appendix E: Administrative Record List
- Appendix F: Statement of Reasons, Including the Non-Binding Preliminary Allocation of Responsibility (provided in later versions of the FS/RAP)
- Appendix G: Project Controls to Minimize Potential Impacts to Human Health and Resources
- Appendix H: California Environmental Quality Act (CEQA) Documentation (provided in later versions of the FS/RAP)

- Appendix I: Responsiveness Summary (provided in Final FS/RAP).

2.0 BACKGROUND

This section provides a summary of background information for the Presidio, regulatory framework for site remediation, site description, site history, and previous investigations at the site.

2.1 BACKGROUND AND REGULATORY FRAMEWORK

The Presidio is a 1,491-acre former U.S. Army military post that is the center of the Golden Gate National Recreation Area (GGNRA), created by Congress in 1972. In 1996, Congress enacted the Presidio Trust Act (Section 103 of the Omnibus Parks and Public Lands Management Act of 1996, Public Law 104-333, 110 Stat. 4097), creating the Trust and giving the Trust jurisdiction over the 1,168-acre inland area of the Presidio known as Area B. The National Park Service (NPS) continues to manage the shoreline area or Area A (Figure 1-1). The Trust is a wholly owned federal government corporation with the mission to preserve the Presidio in perpetuity for public benefit. Congress gave the Trust authority to lease property and generate revenues to manage the leasing, maintenance, rehabilitation, and improvement of Area B.

Subsequent to the transfer of the Presidio to the NPS and the Trust, the Trust assumed responsibility for remediation of Areas A and B by signing the Memorandum of Agreement Regarding Environmental Remediation at the Presidio of San Francisco (Presidio MOA) among the Trust, Army, and NPS (U.S. Army, Trust, and NPS, 1999). On August 30, 1999, the Trust entered into a Consent Agreement with DTSC and the NPS (*DTSC, 1999*). This agreement established responsibilities and procedures for cleanup of releases of hazardous substances and hazardous waste at the Presidio under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and Resource Conservation and Recovery Act (RCRA). The Consent Agreement specifically applies to cleanup of the following nine Operable Units (OUs):

- OU 1: Public Health Service Hospital
- OU 2: Main Installation
- OU 3: Firing Ranges
- OU 4: Crissy Field Area
- OU 5: Directorate of Engineering and Housing Area
- OU 6: Miscellaneous Sites
- OU 7: Basewide Cumulative Effects
- OU 8: Golden Gate Bridge Highway and Transportation District Site
- OU 9: California Department of Transportation Site.

BBDA 2 is located within the Main Installation, or OU2, and is completely within Area A of the Presidio (Figure 1-1). BBDA 2 was listed as a hazardous substances site in the Presidio MOA. The U.S. Army delegated to the Trust its authority for remediation of contamination at the Presidio (both Areas A and B) in 1994. The U.S. Army has retained responsibility for contamination that might be encountered related to unexploded ordnance; nuclear, biological, and chemical weapons or agents; offshore areas; and other unknown contamination as defined in the Presidio MOA. On May 24, 1999, the Trust and NPS also signed the Area A MOA, which delegated administrative responsibility of Area A to the NPS (Trust and NPS, 1999). The Presidio is not listed on the National Priority List (NPL); therefore, the lead regulatory oversight

agency for the Presidio hazardous substances sites, including BBDA 2, is the DTSC.

Although not on the NPL list, this FS/RAP follows the remedial selection process under CERCLA and includes technology screening, development of alternatives, and evaluation of the alternatives following NCP evaluation criteria.

2.2 PUBLIC PARTICIPATION

To facilitate information exchange between the Trust and the public, the Trust prepared a Community Relations Plan (CRP) (Trust, 2001). The CRP provides information on public participation in the environmental cleanup decisions at the Presidio and opportunities for public input. In accordance with the CRP and DTSC RAP Guidance (DTSC, 1995), this Draft FS/RAP is subject to public review and comment as follows:

- Early consultation and coordination with the Presidio Restoration Advisory Board (RAB), NPS, and regulatory agencies, including the DTSC, regarding the proposed remedial alternatives.
- Preparation and distribution of a fact sheet (called a Proposed Plan) on the Draft FS/RAP to a Presidio Environmental Remediation mailing list, DTSC RAP Mailing List, and Presidio tenants near the project site. The Proposed Plan for this Draft FS/RAP was distributed prior to the start of the public comment period.
- Announcement of the release of the Draft FS/RAP for public review in a Presidio E-Newsletter (transmitted to Presidio tenants), advertised in the San Francisco Chronicle, and posted on the Trust's public website and DTSC's EnviroStor website.
- A 60-day public comment period on the Draft FS/RAP that was announced by a public notice. The public comment period was specified in the Proposed Plan and public notice.
- A public meeting to present the contents of the Draft FS/RAP and receive comments.
- Preparation of a Responsiveness Summary that will respond to oral and written comments on the Draft FS/RAP received during the public comment period. The Responsiveness Summary will be included as Appendix I in the Final FS/RAP.
- Availability of the Administrative Record. Documents related to the FS/RAP are available for public review as part of the Administrative Record, maintained at the Presidio Library at 34 Graham Street, San Francisco. The Administrative Record List is included as Appendix E.
- Preparation of California Environmental Quality Act (CEQA) documents. CEQA requires state and local agencies to consider the environmental consequences of projects that they undertake, fund, or permit. The CEQA Initial Study and Draft Negative Declaration for the implementation of the proposed remedial alternative has been prepared for DTSC's compliance with CEQA. The CEQA documentation is subject to public review concurrently with the Draft FS/RAP for the 60-day public comment period.

2.3 BBDA 2 HISTORY AND DESCRIPTION

This section presents background information for the site including a description of the site, planned land use, and site history.

2.3.1 Site Description

BBDA 2 is located on a bluff top and slope above Baker Beach at the Presidio of San Francisco (Figure 1-1). The Debris Fill Area is bounded by the Battery Godfrey parking area to the north and west, former Baker Beach Disturbed Area 2A (BBDA 2A) to the north, the slopes above Baker Beach to the west, and Magazines 28 and 29 to the east (Figure 1-2).

Magazines 28 and 29 are remnants of the 1870s-era West Battery fortification that consisted of protective earthen berms, supported by a brick wall, behind which were gun pits and gun carriage platforms. On either side of the gun pits were brick ordnance magazines, which included Magazines 28 and 29. Magazines 28 and 29 are enveloped by protective earthen mounds covered with non-native vegetation.

Battery Godfrey, located north and east of BBDA 2, is a concrete gun emplacement that was part of the Endicott coastal defense fortification that was constructed between 1891 and 1898. Battery Godfrey and the West Battery (which includes Magazines 28 and 29) are contributing features to the Presidio National Historic Landmark District (NPS, 1993).

A majority of the site comprises steep slopes and is densely vegetated with primarily non-native trees, vines, and shrubs. Below BBDA 2, serpentinite outcrops are exposed on cliff faces where there is little to no vegetation. Cypress trees that are part of the Presidio Historic Forest are located east of the site. East of the Debris Fill Area are remnants of a chert road surface which is the current location of the Coastal Trail (Figure 1-2).

The Vegetation Management Plan (VMP; NPS and Trust, 2001) designates the area just east of the Debris Fill Area, where the Coastal Trail and Magazines 28 and 29 are located, as a Landscape Vegetation Zone. This area is shown in light green on Figure 1-2. The cypress forest east of the Coastal Trail and slopes below and west of the magazines are designated as Historic Forest and Native Plant Community zones, respectively, and are shown in dark green on Figure 1-2.

BBDA 2 is located in the Coastal Bluffs Planning Area within Area A of the Presidio, and is therefore subject to land uses identified in the General Management Plan Amendment (GMPA; NPS, 1994). In accordance with the GMPA, planned future use of BBDA 2 is recreational open space. Under the GMPA, in areas of native habitat visitor access in the future will be confined to developed trails to protect native species.

2.3.2 Site History

The West Battery was constructed in 1870 and Battery Godfrey was constructed between 1891 and 1898 (URS Corporation [URS], 2006). The West Battery was comprised of “earthen barbette batteries” that were situated at the edge of the bluff. These batteries consisted of protective earthen berms, behind which were gun pits and gun carriage platforms. The front of the battery was called the “superior slope” which rose to a crest, creating a parapet. This parapet was supported by a brick “breast height” wall stepping down into each gun or mortar pit. On either side of the gun pits were “traverses” or brick ordnance magazines that ran perpendicular to the frontal slope. These traverses were covered by protective earthen mounds. The batteries were finished by placement of a foot thick oat and barley sod bed (*URS, 2006*).

Behind the line of gun pits and traverse magazines was a road that was originally constructed in the early 1870s to serve gun emplacements at West Battery and is referred to as a “Covered Way,” based on the assumption that it was constructed with high sides to protect it from enemy fire. However, the road was not originally constructed as a feature below the surrounding

ground level. When it was originally built, the road was at approximately the same elevation as the surrounding landscape.

Based on review of historical photographs and maps, a secondary road, later named Dove Court, made a circular loop through the area. A secondary access road is also evident west of Magazine 28 and 29 earthworks in a 1961 photograph of the site. This photograph also that shows a graded area north of BBDA 2 in the current location of the Battery Godfrey parking area (Martini, 2009).

The BBDA 2 Debris Fill Area is located generally south and west of the Battery Godfrey parking lot. The presence of fill material in this area is apparent on aerial photographs from as early as 1955 (Dames & Moore, 1997). The debris fill is characterized by a mixture of soil, construction debris, landscaping debris, and other miscellaneous debris (e.g., cans, bottles, glass, etc.). Debris fill at BBDA 2 was placed on a cut surface that removed some of the vestiges of earthworks associated with the West Battery magazines (MACTEC, 2006).

2.4 PREVIOUS INVESTIGATIONS

Four phases of investigation were conducted at the Site between 1992 and 2011 consisting of the following:

- ***1992 Army Remedial Investigation*** **(Dames & Moore, 1997) –** Drilling and sampling three soil borings (BBSB06, BBSB07, and BBSB08).
- ***2005 Trust Investigation*** **(MACTEC, 2006) –** Logging and sampling four cultural resource trenches (Trenches 1, 2[1], 3, and D), two test pits (BB2TP100 and BB2TP101), and three soil borings (BB2SB100 through BB2SB101, and BB2SB110).
- ***2006 Trust Investigation*** **(MACTEC, 2007) –** Logging and sampling four soil borings (BB2SB111 through BB2SB114) and one exploratory test pit (BB2TP110).
- ***Trust 2011 Investigation*** **(AMEC, 2012a) –** Logging and sampling sixteen test pits (BB2TP500 through BB2TP515) in four 100 x 100-foot grid cells in and around the Debris Fill Area.

During these investigations, 54 soil samples were collected from the Debris Fill Area and analyzed for the following chemicals: metals, polynuclear aromatic hydrocarbons (PAHs), volatile organic compounds (VOCs), pesticides, polychlorinated biphenyls (PCBs), and total petroleum hydrocarbons (TPH). Figure 2-1 shows sample locations and the RI Summary Report provides a description of these investigations and presents an evaluation of the results.

[1] Samples from Trench 2 were designated as BBD2TP105[11.5], BBD2TP105[15], and BBD2TP106[2].

3.0 SUMMARY OF SITE CONDITIONS

The following presents a summary of site geology and hydrogeology, the nature and extent of contamination, and identification of COCs that are present in soil at the site at concentrations that pose potential risk to human health and the environment.

3.1 GEOLOGY AND HYDROGEOLOGY

Site elevations range from approximately 260 feet above mean sea level (MSL) at the Coastal Trail to 220 feet MSL on the western edge of the site. Surface drainage is to the west toward the Pacific Ocean. Soil and rock units present at the site consist of fill, Colma formation, and serpentinite residual soil and bedrock. Landslide material has also been identified in test pits and mapped in the site vicinity. Groundwater and surface water have not been encountered during investigation activities at the site. Based on a July 2011 site visit, there is evidence of ephemeral surface water ponding in the area between Magazines 28 and 29 based on soils and plants observed in that area.

The following provides a description of the soil and rock units present at the site.

Fill

Debris fill (afw) observed in the test pits and cultural resources trenches at the Debris Fill Area is generally composed of coarse and fine grained soils including sandy silt, sandy clay, silty sand, sandy gravel, and clayey gravel. Construction debris (asphalt, bricks, cobbles, concrete, ceramics, waste rock [including chert and slate]), landscape debris (pockets of tree-trimmings), and a refuse component (automotive parts, tire, cans, bottles, chain-link fence, fence posts, wire, sheet metal, piping, wood, plastic, paper, and glass) are present in the debris fill. Debris fill extends to depths ranging from 2 to 12.5 feet bgs.

Fill without debris (af1) generally underlies, but at some locations overlies, debris fill and includes historic fill that was part of construction of the batteries and the access road east of the batteries. This fill material consists of sandy silt, sand, silty sand, clay, sandy clay, sandy gravel, and clayey gravel and does not contain refuse material. The gravel generally comprises crushed or broken serpentinite, chert, and shale rock fragments.

Colma formation

Colma formation (Qcol) underlies fill material at depths between 1.25 to 12.5 feet bgs. The Colma formation generally consists of silty clay, sandy clay, silt, silty sand, and sandy silt. In some portions of the site, Colma formation is absent.

Franciscan Serpentinite and Residual Soil

Franciscan serpentinite bedrock (sp) and residual soil underlies Colma formation and/or fill material at depths ranging from 2 to greater than 14 feet bgs and is exposed on the slopes below the debris fill. At BBDA 2, serpentinite varies in hardness from low to hard, in strength from friable to strong, and in weathering from little to deep. At several locations, fracturing was observed within the serpentinite at levels ranging from moderate to intense. Residual soil consists of firm to hard clay.

3.2 NATURE AND EXTENT OF CONTAMINATION

Contamination in the Debris Fill Area is potentially derived from chemicals associated with the debris, fill soil, and rock disposed at the site. The debris consists of landscape waste, construction debris, and refuse. Sampling has shown metals (arsenic, barium, chromium

cadmium [in native soil only], copper, lead, mercury, selenium, silver, and zinc), PAHs (benzo[a]pyrene, benzo[a]anthracene, benzo[b]fluoranthene, and dibenzo[a,h]anthracene), and pesticides (dichlorodiphenyltrichloroethane [4,4'-DDT], chlordane [total and gamma], and endrin), in soil at concentrations above RI screening levels (AMEC, 2012b). PAHs are likely derived from asphalt material disposed at the site, elevated metals may be derived from construction debris as well as fill soil and rock, and the pesticides from debris disposed at the site or in soil that had been exposed to pesticide surface application and later buried during site filling events. The primary transport mechanism for these contaminants would be from 1) site grading and filling activities, 2) down slope movement, and 3) transport of suspended solids in water infiltrating through the soil, as well as down slope as sheet wash.

Analytical results for potential chemicals of concern detected in samples from the debris fill are illustrated on Figure 2-1. The extent of the debris fill as interpreted from test pit and soil boring logs and mapping of surface debris covers an approximate 0.7 acre area as shown on Figure 3-1 and extends to depths up to approximately 12.5 feet bgs. The distribution of chemicals in soil exceeding RI screening levels indicates that the debris fill is inhomogeneous with respect to chemical constituents (AMEC, 2012b).

There are no known or expected impacts to groundwater from contaminants in the Debris Fill Area. Groundwater has not been encountered in test pits excavated or soil borings drilled at the site and the chemicals present in soil above screening levels are not highly soluble and have low potential to migrate to groundwater.

3.3 RISK EVALUATION AND IDENTIFICATION OF COCS

3.3.1 PCOCs from the RI Summary Report

In the RI Summary Report, chemicals detected in soil were identified as PCOCs based on comparison of calculated exposure point concentrations (EPCs)[2] to conservative RI screening levels (AMEC, 2012b). The RI screening levels were the most stringent of ecological special-status species and Presidio-wide residential preliminary remediation goals (PRGs) from the Cleanup Level Document (EKI, 2002, Revised 2006) and *Technical Memorandum, Updated Human Health Preliminary Remediation Goals for Carcinogenic Polynuclear Aromatic Hydrocarbons in Soil, Presidio of San Francisco, California* (AMEC, 2011). For metals, if the most stringent of residential and ecological status PRGs were less than the background level for native soil at the site, then the background level was used as the screening level.[3]

Based on the RI screening evaluation, no PCOCs were identified in native soil in the Debris Fill Area. The following chemicals were identified as PCOCs in debris fill at the Debris Fill Area:

- Copper
- Lead
- Silver
- Zinc
- 4,4'-dichlorodiphenyl-trichloroethane (4,4'-DDT)
- Chlordane

[2] In the RI Summary Report, EPCs were calculated for samples collected from all depths.
[3] In the RI Summary Report, metals data were screened against the higher of Colma or serpentinite background threshold levels because both soil types exist at the Site and a receptor would be exposed to the chemical signatures of both soil types.

- Benzo(a)pyrene.

Table 3-1 provides a statistical summary of maximum detected concentrations, EPCs, and RI screening levels for PCOCs in the Debris Fill Area. Of these PCOCs, only the EPC for benzo(a)pyrene exceeded the screening level for human health based on a concentration associated with a cancer risk level of one-in-one-million (1.E-06) for a residential receptor. Benzo(a)pyrene did not exceed RI ecological screening levels; therefore, it was not identified as an ecological PCOC. The other six chemicals were identified as PCOCs in debris fill because they were detected at levels exceeding the most stringent of applicable ecological screening levels. It is noted that lead is not a human health PCOC because the calculated EPC of 200 mg/kg did not exceed lead PRGs for human health including a site-specific recreational PRG of 306 mg/kg calculated using DTSC Leadspread 8 (Appendix B).

In the following sections (Sections 3.3.3 and 3.3.4), PCOCs are evaluated to assess if they are present in soil at BBDA 2 at concentrations that pose potential risk to human and ecological receptors based on current and planned site use. Chemicals that pose a potential risk to human or ecological receptors at BBDA 2 are selected as COCs in soil for BBDA 2.

3.3.2 Potential Site Receptors and Exposure Pathways

In the RI Summary Report, a Conceptual Site Model (CSM) was developed to identify contaminant transport and human and ecological exposure pathways based on planned site use (NPS, 1994). Potential human receptors and exposure pathways are illustrated on Figure 3-2. The current and planned land use of BBDA 2 is recreational; specifically, the use of the 260-foot section of the Coastal Trail that traverses the site for hiking, running, bird watching, etc. Based on discussions with the NPS and the Conservancy, the area north and east of the Debris Fill Area and west of Battery Godfrey, will no longer be used for parking. There are conceptual plans to restore earthworks west of Battery Godfrey which would involve placement of soil over the existing parking surface. Although a design has not been prepared, there are also conceptual plans for an overlook that will serve as an informal gathering place and possibly, a picnic area in the vicinity of the BBDA 2 Debris Fill Area. At this time, the location of the overlook and picnic area relative to the BBDA 2 Debris Fill Area is not known.

Site restoration work and maintenance is expected to be performed by NPS and Conservancy staff and volunteer workers. Outdoor work by NPS and Conservancy staff, volunteer coordinators, and volunteers is expected to consist of planting, inspecting, and maintaining vegetation, and building and maintaining fences and trails. Thus, human receptors identified in the CSM are: 1) recreational visitors and 2) site workers (volunteers and volunteer coordinators) performing trail construction, maintenance, and habitat restoration and management work.

Site workers will have direct contact with soil during site restoration work and maintenance at the site. Chemicals present in soil may be absorbed through the following direct exposure pathways: inadvertent soil ingestion and dermal contact with soil during site activities (e.g., hiking, planting, and maintaining vegetation). Inhalation of non-volatile contaminants on soil particulates is not considered to be a significant exposure pathway because it accounts for only 1 to 2 percent of total exposure to contaminants (EKI, 2002, Revised 2006). It is noted that the Debris Fill Area is located west of the trail on the slope west of the batteries (Figure 1-2). Based on the GMPA (NPS, 1994), in the future, in native habitat areas recreational visitors will be restricted to trail areas to protect native species. Based on conceptual plans to construct an overlook and picnic area in the vicinity of BBDA 2, there is a possibility that a future recreational receptor may be exposed to soil in the Debris Fill Area.

Potential ecological receptors and exposure pathways are illustrated on Figure 3-3. The site and vicinity is planned to be restored and maintained as natural open space, native plant, and historic forest habitat (Trust and NPS, 2001). Based on these planned uses, potential ecological receptors include plants, soil invertebrates, omnivorous mammals, insectivorous and carnivorous birds and mammals, and herbivorous birds and mammals.

3.3.3 Human Health Risk Evaluation

This risk evaluation characterizes potential human cancer risks from the human health PCOC, benzo(a)pyrene (BaP), and calculated benzo(a)pyrene potency equivalent concentrations (BaP PEQs).[4] Non-cancer human health hazards are not evaluated because there are no Presidio non-carcinogenic risk-based PRGs for PAHs (Table 3-2).

Estimated cancer risks from exposure to benzo(a)pyrene and calculated BaP PEQs in debris fill were calculated for recreational receptors and for site workers by:

1. Calculating EPCs[5] for debris fill based on analytical results for samples collected from depths at which human receptors are likely to be exposed. These depths include the following:

    - Recreational Receptors – 0 to 2 feet bgs.

      Additionally, because contaminants in the Debris Fill Area appear to be heterogeneous, EPCs were calculated for fill samples collected from 0 to 10 feet bgs and all depths sampled. Furthermore, EPCs were separately calculated for samples collected from the bluff top and slope areas of the Debris Fill Area. Based on site topography, it is unlikely that recreational receptors will spend time on the steep slopes west of the magazines; therefore, EPCs for chemicals detected in samples from the bluff top would be more representative of recreational exposures.

      The conservative Presidio-wide recreational PRG (EKI, 2002, Revised 2006) was used to estimate human health risks at BBDA 2, rather than the site-specific soil target level developed for trail users at BBDA 1 (AMEC, 2012c) because the specifics of future recreational improvements at BBDA 2 have not been developed to the same extent as for BBDA 1A. Although future site use at BBDA 2 will remain recreational, the locations of trails and gathering places such as picnic tables and overlooks have not been finalized. As a conservative measure, the Trust, in consultation with NPS and DTSC, adopted the human health exposure assumptions used to determine the Presidio-wide recreational PRGs outlined in the 2002 Cleanup Level Document (EKI, 2002, Revised 2006). The Presidio-wide recreational PRGs were developed to be protective of all recreational uses, and as such, reflect very conservative assumptions about the exposure of individuals to site soils. The Presidio-wide recreational exposure scenario was based on a full day of exposure at a playing field (the soil adherence factor is based on that of a rugby player). Accordingly, the Presidio-

[4] The BaP PEQ represents a weighted sum of the carcinogenic PAHs (cPAHs) relative to benzo(a)pyrene, considered to be the most potent of the cPAH compounds. Table A-2, Appendix A presents BaP PEQ calculations.
[5] EPCs were calculated using ProUCL Version 4.1.00. The EPC is the 95% Upper Confidence Limit (UCL) on the mean or the maximum detected concentration, whichever is lower. The ProUCL output are presented in Attachment A.

wide recreational PRG would be protective of any future recreational uses at the site.

- Site Workers – 0 to 10 feet bgs and all depths.

2. Dividing the calculated EPCs by Presidio-wide recreational PRGs (0.11 mg/kg) and Presidio-wide commercial PRGs for site workers (0.38 mg/kg) (EKI, 2002; Revised 2006).
3. Multiplying the resultant quotient by 1.E-06.

Table 3-3 presents calculated EPCs, applicable PRGs, and estimated human health risks for recreational receptors and site workers. It is noted that the EPCs were calculated and risk estimated for samples collected from 0-2 feet (for recreational exposure), 0-10 feet (for site workers), and all depths (representative of the full range of contaminant concentrations in the fill). Separate EPCs were calculated and risks estimated for fill soil collected all depths from the bluff top and slopes at the Debris Fill Area. Estimated human health risks at BBDA 2 for these depth intervals and areas are as follows:

	Estimated Cancer Risks	
	Benzo(a)pyrene	**BaP PEQ**
Site Worker		
Presidio-wide Commercial Worker		
0-10 feet bgs	1.E-06	2.E-06
All Depths (0-11.5 ft bgs)	1.E-06	2.E-06
Recreational Receptor		
Presidio-wide Recreational Receptor		
0-2 feet bgs	3.E-06	4.E-06
0-10 feet bgs	4.E-06	6.E-06
All Depths (0-11.5 ft bgs)	4.E-06	5.E-06
Bluff top	2.E-06	7.E-06
Slope	4.E-06	5.E-06

These estimated cancer risks are at the low end of the United States Environmental Protection Agency's (EPA's) risk management range of 1.E-06 to 1.E-04 and above the California Environmental Protection Agency Department of Toxic Substances Control's (DTSC's) point of departure for risk management of 1.E-06.

3.3.4 Ecological Risk Evaluation

Potential ecological risks from exposure to ecological PCOCs in fill soil at the Debris Fill Area were evaluated by:

1. Calculating EPCs for ecological PCOCs in fill soil at the Debris Fill Area based on analytical results for samples collected from depths at which ecological receptors are likely to be exposed (0 to 3 feet bgs). Additionally, because contaminants in the Debris Fill Area appear to be heterogeneous, EPCs were calculated for fill soil samples collected from all depths.
2. Comparing the calculated EPCs for 0-3 ft and all depths to ecological PRGs from the Presidio-Wide Cleanup Level Document (EKI, 2002, Revised 2006). Ecological buffer zone PRGs apply where open space landscaped area is planned and ecological special status PRGs apply in native plant habitat portions of the site.

3. If the EPCs exceeded ecological PRGs, comparing the calculated EPCs to background threshold levels from the Presidio-Wide Cleanup Level Document (EKI, 2002, Revised 2006).

Table 3-4 provides calculated EPCs, ecological special-status and buffer zone PRGs, and metal background threshold levels for BBDA 2 ecological PCOCs. Comparison of EPCs to ecological PRGs and metals background threshold levels indicates the following:

- Copper – EPCs of 96 mg/kg for 0-3 feet and 94 mg/kg for all depths are greater than the special status PRG of 30 mg/kg but are below the buffer zone PRG of 120 mg/kg. The EPCs fall within the range of species-specific PRGs for plants and soil fauna (50 to 400 mg/kg) and the American robin (30 to 200 mg/kg). The EPCs are greater than the background level for Colma soil of 49 mg/kg, but are only slightly greater than the background level for serpentinite soil of 85 mg/kg.
- Lead – EPCs of 171 mg/kg for 0-3 feet and 200 mg/kg for all depths exceeds the special-status PRG of 160 mg/kg and is below the buffer zone PRG of 300 mg/kg. The EPCs fall within the species-specific PRG range for plants and soil fauna (160 to 300 mg/kg). The EPCs are also greater than background levels for serpentinite and Colma soils of 66 and 8 mg/kg, respectively.
- Silver – the EPC of 1.2 mg/kg for 0-3 feet bgs is less than the special status and buffer zone PRG of 2 mg/kg; however the EPC of 6 mg/kg for all depths exceeds background and ecological PRGs. The EPC for all depths exceeds the species-specific PRG for plants and soil fauna (2 mg/kg) and is at the lower end of the species-specific range of PRGs for the American robin (6 to 144 mg/kg).
- Zinc – EPCs of 207 mg/kg for 0-3 feet bgs and 232 mg/kg for all depths are greater than the special status and buffer zone PRGs of 4 and 50 mg/kg, respectively. The EPCs fall within the species-specific PRG range for plants and soil fauna (50 to 864 mg/kg) and are greater than the species-specific range of PRGs for the American robin (4 to 97 mg/kg). The EPCs are also greater than background levels for serpentinite and Colma soils of 160 and 60 mg/kg, respectively.
- 4,4'-DDT – the EPC of 0.0074 mg/kg for 0-3 feet bgs is less than the special status and buffer zone PRGs of 0.0082 and 0.53 mg/kg, respectively; however the EPC of 0.0224 mg/kg for all depths exceeds the special status PRG and is specifically within the species-specific range of PRGs for the American robin (0.008 to 2 mg/kg).
- Chlordane – the EPC of 0.0090 mg/kg is equal to the special status PRG of 0.009 mg/kg and is below the buffer zone PRG of 0.04 mg/kg. However the EPC of 0.020 mg/kg for all depths exceeds the ecological special status PRG and is within the species-specific range of PRGs for the American robin (0.009 to 0.071 mg/kg)

Based on evaluation of fill soil samples collected from all depths, four metals (copper, lead, silver, and zinc) and two pesticides (4,4'-DDT and chlordane) are present in soil at levels that pose potential risk to ecological receptors in special status species zones at BBDA 2. The ecological special status PRGs only apply in native plant areas of the site. Zinc and silver are the only PCOCs that pose a potential risk to ecological receptors in buffer zone areas. The buffer zone represents open space, landscaped areas of the site.

3.3.4 Soil COCs at BBDA 2

Based on the risk evaluation, the following COCs have been identified for soil at BBDA 2:

- COCs Presenting a Potential Human Health Risk: Benzo(a)pyrene was identified as a human health COC. The estimated cancer risk for site workers based on the BaP PEQ is 2.E-06. For recreational receptors, higher estimated risks for BaP PEQ (6.E-06) were associated with the 0 to 10 foot depth interval. Comparison of the risks from benzo(a)pyrene concentrations in debris fill on the bluff top to the slope indicates that the estimated risk was slightly lower in the bluff area (2.E-06) compared to the slope (4.E-06), but for the BaP PEQ, estimated risks were higher for the bluff area (7.E-06) compared to the slope (5.E-06).
- COCs Presenting a Potential Ecological Risk: Four metals (copper, lead, silver, and zinc) and two pesticides (4,4'-DDT and chlordane) are present in the debris fill at levels that pose potential risk to ecological receptors in areas designated as special status species zones at BBDA 2 (native plant zones) and have been identified as site COCs. Of these, only zinc and silver pose a potential risk to ecological receptors in ecological buffer zones (open landscaped areas) at BBDA 2. It is noted that the EPC for copper just exceeds background and the EPC for lead just exceeds the ecological special status species level.

4.0 REMEDIAL ACTION OBJECTIVES

CERCLA requires that remedial measures be protective of human health and the environment. CERCLA guidance also states that remedial action objectives (RAOs) for protection of human receptors should include criteria for COC concentration levels and exposure routes. RAOs have been developed for BBDA 2 based on current and planned land use. The following sections describe current and planned land use, specify cleanup objectives, and identify RAOs for BBDA 2.

4.1 PLANNED LAND USE

The site is located in the Coastal Bluffs Planning Area within Area A of the Presidio; and is therefore subject to land uses identified in the GMPA (NPS, 1994). Current and planned land use at the site and vicinity is recreational. The site is primarily vegetated by non-native invasive plant species. There are cypress trees east of the Debris Fill Area that are part of the Historic Forest Zone. A 260-foot section of the Coastal Trail which is used recreationally for hiking, running, bird watching, etc. is located east of the Debris Fill Area. Under the GMPA, in the future visitor access in native habitat areas will be confined to developed trails to protect native species. Based on discussions with the NPS and the Conservancy there are conceptual plans to restore earthworks west of Battery Godfrey and construct an overlook and possibly, a picnic area in the vicinity of the BBDA 2 Debris Fill Area.

Vegetation at the site is managed in accordance with the VMP and Environmental Assessment for the Presidio of San Francisco (Trust and NPS, 2001). As shown in the VMP, the western portion of BBDA 2 is planned to be managed as native plant habit and the eastern portion of the site as Landscape Vegetation Zone.

On September 5, 2012, the US Fish and Wildlife Service published a final rule listing Franciscan manzanita (Arctostaphylos franciscana) as endangered and announced a proposal to designate over 300 acres in San Francisco as critical habitat, including the Baker Beach bluffs. BBDA 2 falls within areas proposed for designation. The comment period on the proposed designation runs until November 5, 2012, after which the USFWS will consider the comments and make a determination on its proposed action.

4.2 PRESIDIO-WIDE CLEANUP OBJECTIVES

In the Cleanup Level Document (EKI, 2002, Revised 2006), the Trust developed PRGs for contaminants detected in various media at the Presidio, based on protection of human health and ecological receptors. Human health PRGs for soil were developed for residential, recreational, and commercial/industrial receptors. These PRGs were set at the lower of two calculated values: the concentration associated with a target cancer risk level of 1.E-06 and the concentration associated with a target non-cancer hazard index of one or unity. Ecological PRGs were also developed for two separate habitat areas 1) ecological special-status species zone – corresponding to areas that are currently or planned to be native species habitat or historic forest and 2) ecological buffer zone – corresponding to landscaped areas. The Cleanup Level Document also provides metals background threshold levels for four of the common soil types occurring at the Presidio (serpentinite, Beach Dune Sand, Colma Formation, and chert/shale).[6]

[6] It is noted that implementation of remedial actions may result in individual soil samples that exceed metals background levels but nonetheless may be naturally occurring. In these instances, the Trust may obtain approval from the DTSC to modify the cleanup level.

The Cleanup Level Document outlines procedures to identify which specific PRGs are applicable to a given contaminant release site based on site-specific considerations including future site land use.

Since 2002, the Trust has issued several updates to the Cleanup Level Document in response to identification of new PCOCs, changes in regulatory levels, and updated guidance regarding calculation of risk. The most recent of these updates, prepared in September 2011, provides updated PRGs for carcinogenic PAHs in soil based on current federal and state cancer slope factors for benzo(a)pyrene (AMEC, 2011); Table 4-1 provides a summary of the PRGs developed for carcinogenic PAHs in the 2002 Cleanup Level Document (EKI, 2002, Revised 2006) and the 2011 Update to the Cleanup Level Document (AMEC, 2011).

4.3 BBDA 2 CLEANUP LEVELS

The following cleanup levels are adopted for COCs in soil at BBDA 2:

- ***Protection of Human Health – Recreational Users, Volunteers, and Volunteer Coordinators***: As discussed in Section 3.3.4, benzo(a)pyrene (BaP) is the only COC at BBDA 2 that is present at concentrations that pose a potential risk to human health. Presidio-wide residential, recreational, and residential PRGs for BaP and other PAHs are presented in Table 4-1. Based on current and future site land use, PRGs for recreational and commercial workers are applicable to BBDA 2. Because PRGs for recreational receptors are more stringent than those for commercial workers, soil PRGs for recreational receptors will drive cleanup of BaP and other PAHs at the site and are selected as site cleanup levels. Table 4-1 also provides residential PRGs for soil based on target cancer risks of 1.E-05 and 1.E-04. As shown on this table, the recreational soil PRG is lower than the residential PRG based on cancer risks of 1.E-05; which is within the EPA's risk management range. Therefore, the recreational soil PRGs are also protective of hypothetical residential receptors. Accordingly, no land use control limiting residential or other sensitive use of the site would be necessary following cleanup of BaP and other PAHs to recreational PRGs.

  The Trust has also developed a site-specific recreational PRG for lead using DTSC's LeadSpread 8 model. The LeadSpread 8 model output is presented in Appendix B. The site-specific recreational PRG for lead is 306 mg/kg, which is:

  - Less than the Presidio-wide recreational human health PRG of 500 mg/kg,
  - Roughly equal to the ecological buffer zone PRG of 300 mg/kg, and
  - Greater than the ecological special status PRG of 160 mg/kg.

- ***Protection of Ecological Receptors – Special Status Species Ecological Receptors:*** Because the Debris Fill Area is primarily located in the special status species zone (Figure 1-2), ecological special status species cleanup levels have been adopted as cleanup levels for the site.

- ***Soil Lithology – Serpentinite and Colma Formation Soil:*** The higher of Colma or serpentinite background levels were selected to represent metals background because both soil types exist at BBDA 2 and a receptor will be exposed to both soil types.

Table 4-2 presents BBDA 2 cleanup levels for site COCs. For metals, if the ecological special

status species cleanup level is less than the background level, the background threshold level was selected as the BBDA 2 cleanup level.

4.4 REMEDIAL ACTION OBJECTIVES

Considering the current and planned future land use and the cleanup objectives described above, the RAOs for BBDA 2 are:

- Protection of human health and the environment consistent with the intended future land use
- Protection of water quality and ecological resources
- Preference for permanent ("clean closure") remedies whenever practicable, cost-effective, and consistent with planned land use.

5.0 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

In accordance with Section 121(d)(1) of CERCLA (42 USC Section 9621[d]), remedial actions performed under CERCLA must achieve a level of cleanup and control of hazardous substances, pollutants, or contaminants that assures protection of human health and the environment. Additionally, remedial actions that propose to leave hazardous substances onsite must meet the substantive requirements of federal environmental laws or more stringent state environmental and facility siting laws, referred to as ARARs.

ARARs fall into three general categories: chemical-specific, action-specific, and location-specific, as follows:

- Chemical-specific ARARs are health-based or risk-based concentration limits that are established for a specific chemical in a specific medium (typically groundwater, soil, surface water, or air). Chemical-specific ARARs represent the acceptable amount of concentration of a chemical that may be found in, or discharged to, the ambient environment. These criteria have been developed to protect potential receptors from adverse health effects from hazardous substances.
- Action-specific ARARs are activity- or technology-based requirements that establish how to perform a specific action. These ARARs either restrict or direct specific types of remedial or waste management activities.
- Location-specific ARARs are requirements that either restrict or direct certain activities, based solely on their location.

Chemical-specific ARARs are the primary criteria used to establish cleanup levels, while action- and location-specific ARARs are used to identify and evaluate remedial action alternatives.

ARARs can be further categorized as either federal or state ARARs. State regulations are ARARs only if they are more stringent than federal requirements. In addition to promulgated laws and regulations, federal, state, and local agencies develop various guidance documents, criteria, and advisories; e.g., to be considered requirements (TBCs) that can provide useful information or procedures. There may also be local permitting requirements and ordinances that need to be complied with when performing remedial actions.

ARARs and TBCs for BBDA 2 are presented in Table 5-1.

6.0 IDENTIFICATION AND SCREENING OF REMEDIAL ALTERNATIVES

The goal of the remedial selection process under CERCLA is to develop and select remedial alternatives that protect human health and the environment, maintain protection over time, and minimize untreated waste (EPA 40 CFR 300.430(a)(1)(I)). Identifying and screening potential suitable technologies is the first step in the process of developing remedial alternatives. Technologies that pass the screening process are then retained and used to develop remedial alternatives.

Screening of remedial alternatives consisted of evaluating each alternative according to three criteria and assigning a relative ranking to each alternative based on the evaluation. The three criteria consist of the following:

- **Effectiveness:** Effectiveness is the degree to which an alternative meets RAOs; more specifically, the alternative's effectiveness at providing long-term and short-term protection of human health and the environment, minimizing residual risk, providing adequate and reliable controls for long-term management, complying with ARARs, and achieving protection of human health and the environment in the most efficient manner possible.
- **Implementability**: Implementability is the technical, practical, and administrative feasibility of applying an alternative. For example, alternatives that require equipment, specialists, or facilities that are unavailable may not be implementable and would be eliminated from further consideration.
- **Cost:** Costs of construction, long-term monitoring, and maintenance are considered. Costs are assigned based on a conceptual level of design and assumptions for unknown conditions are applied consistently among all alternatives. Capital costs and O&M or monitoring and maintenance costs are estimated, along with the net present value (NPV) associated with long-term costs. Capital costs include factored and contingency costs. A component of the cost evaluation is to ascertain the level of effectiveness and implementability for the cost expended. Alternatives providing equal or less effectiveness and implementability for a greater cost than another alternative that provides equal or greater effectiveness may be eliminated from further consideration.

6.1 TECHNOLOGY SCREENING

BBDA 2 debris fill is considered to contain chemicals that represent a low-level threat to human health and the environment. The debris fill at BBDA 2 can be reliably contained. At BBDA 2, a low-level threat is posed by PAHs, pesticides, and metals within the debris fill that generally exhibit limited mobility in the environment. The EPA has established presumptive remedies that apply to sites with low-level threat wastes. Presumptive remedies were developed to streamline the remedy selection process by narrowing the universe of technologies and alternatives that must be considered. In addition, the use of presumptive remedies is expected to promote consistency within diverse communities and responsible parties.

An initial evaluation of remedial technologies and alternatives was previously conducted for BBDA 2 in *Presidio Trust Revised Feasibility Study, Main Installation Sites, Presidio of San Francisco, California* (Main Installation Sites FS; Erler & Kalinowski, Inc. [EKI], 2003). However, the final remedy selection for BBDA 2 was postponed pending additional investigations performed in 2005, 2006, and 2011 (AMEC, 2012b). The remedial technologies that were considered in the Main Installation Sites FS (EKI, 2003) are still valid for contaminants and the

volume of impacted soil associated with the Debris Fill Area at BBDA 2. These technologies include:

- Land Use Control (LUC) and/or Engineered Controls that prohibit certain kinds of site uses, notifies potential owners or tenants of the presence of hazardous substances or other environmental concerns remaining onsite at concentrations that are not protective of all uses, or establishing procedures for subsurface soil disturbance;
- Excavation, removal, and off-site disposal of wastes;
- Containment using a cap or cover system.

6.2 SOIL REMEDIAL UNIT

The BBDA 2 soil remedial unit (RU) is comprised of debris fill that contains BaP at levels exceeding recreational and commercial human health PRGs, and metal and pesticide COCs at concentrations exceeding ecological special status PRGs. The soil RU covers an approximate 0.7 acre area and extends to a maximum depth of 12.5 feet. The estimated extent of debris fill and areal limit of the soil RU is shown on Figure 3-1. Table 6-1 provides the estimated depth of debris fill at each sample location.

6.3 DEVELOPMENT OF REMEDIAL ALTERNATIVES

The following remedial alternatives were developed for evaluation. These alternatives are summarized in Table 6-2:

- Alternative 1 – No Action
- Alternative 2 – Land Use Controls
- Alternative 3 – Excavation
- Alternative 4 – Engineered Cover.

6.3.1 Alternative 1 – No Action

No remediation measures would be implemented under this alternative. As required by the NCP 40 CFR 300.420(e)(6), this alternative is retained for analysis as a baseline for comparison with other alternatives.

6.3.2 Alternative 2 – Land Use Controls

This alternative includes a land use and engineered control to prohibit reuses of the site that would pose a risk to potential human receptors. Under this alternative, new fencing and signage would be installed and a recreational land use control would be implemented to limit visitor access to trails only. Maintenance workers and volunteers working in off-trail areas would be provided health & safety orientation and would use appropriate personal protective equipment (PPE) to reduce exposure to residual contaminants in soil. Engineering controls, including fencing and signage, would be maintained in conformance with an approved maintenance plan. This alternative would also include notification to present or future owners, tenants, maintenance workers, landscaping/planting crews, or other entities of the presence and location of the soil RU.

6.3.3 Alternative 3 – Excavation

This alternative consists of excavation, as practicable, characterization, transportation, and off-site disposal of debris fill associated with the soil RU at a licensed landfill facility. If all of the soil

RU cannot be excavated due to slope stability or for protection of cultural resources, a LUC would be implemented for debris fill left in place**.** As discussed in Section 3.0, existing human health risk is within the EPA's risk management range under the residential scenario; therefore, the presence of residual debris fill would not create an unacceptable risk to human receptors and no land use controls would be required post-excavation. Figure 6-1 shows the area that would be subject to excavation. The estimated volume of the soil RU is approximately 6,700 cubic yards (cy) of in-place material, estimated to be 8,710 cy with a 30% expansion factor. The excavated area would be backfilled with imported soil as necessary to stabilize slopes and structures, and the area would be re-vegetated in accordance with the VMP.

6.3.4 Alternative 4 – Engineered Cover

This alternative consists of placement of an engineered cover over the soil RU, implementation of a LUC, and long term monitoring and maintenance of the cover. Figure 6-2 shows the areas where a cover would be placed. A portion of debris fill near the edge of the bluff slope (approximately 400 cy) would be excavated and relocated prior to placement of engineered cover. The cover would comprise approximately two feet of imported clean fill soil (estimated at 2,900 cy). The cover would be re-vegetated in accordance with the VMP and a long-term cover monitoring and maintenance plan would be implemented post-construction.

7.0 ANALYSIS OF ALTERNATIVES

This section presents an analysis of the remedial alternatives for BBDA 2. The analysis consists of an assessment of individual alternatives against each of nine NCP evaluation criteria provided by the EPA, and a comparative analysis that focuses upon the relative performance of each alternative against those criteria (EPA, 1988). The criteria include two threshold criteria, six balancing criteria, and two modifying criteria. Balancing criteria are used to identify the preferred alternatives from those that meet the threshold criteria. Modifying criteria further shape the preferred alternatives by taking into account the concerns of state agencies and the public. Additional criteria provided by the state of California that were also considered for BBDA 2 are presented after the NCP criteria.

7.1 EVALUATION CRITERIA

The nine NCP evaluation criteria are presented below.

Threshold Criteria

- Overall Protection of Human Health and the Environment. This criterion addresses whether or not a remedy provides adequate protection and describes how risks posed through potential exposure pathways are eliminated, reduced, or controlled through treatment, engineering controls, or land use controls.
- Compliance with ARARs. This criterion addresses whether or not a remedy meets applicable or relevant and appropriate Federal, State, and local environmental laws and regulations for BBDA 2 identified in Table 5-1.

Balancing Criteria

- Long-term effectiveness and permanence. This criterion considers the ability of a remedy to provide reliable protection of human health and the environment over time after cleanup levels have been achieved.
- Reduction of toxicity, mobility, or volume through treatment. This criterion reflects the preference for treatment of contaminants by evaluating the potential reduction of toxicity, mobility, or volume (TMV) of contaminants.
- Short-term effectiveness. This criterion evaluates the period of time needed to complete the remedy, and any negative impact on human health and the environment that may be posed during remedy construction and implementation, until cleanup standards are achieved.
- Implementability. This criterion refers to the practical, technical, and administrative feasibility of implementation of a remedy, including the availability of materials and services needed to implement an alternative.
- Cost. This criterion evaluates the capital and net present value (NPV) long term operation and maintenance (O&M), and monitoring and maintenance costs of each alternative, based on a conceptual level of design detail. Capital costs include factored and contingency costs. Typically, preliminary cost estimates for an FS/RAP are considered accurate within a range of 30 percent less to 50 percent more than the estimated cost. Some of the reasons for this range are the level of design detail at the FS/RAP stage, variability of construction materials, variability in construction costs over time, the complexity of developing site-specific design factors, and the sensitivity of construction costs to economic factors such as interest rates, inflation,

and materials costs.

Modifying Criteria

- State acceptance. This criterion indicates whether, based on its review of the information, applicable state regulatory agencies agree with the preferred alternative. DTSC acceptance will be evaluated during the comment period on this Draft FS/RAP.
- Community acceptance. This criterion assesses whether community concerns have been addressed by the remedial action and whether the community has a remedial action preference. Community acceptance is being evaluated during the comment period on this Draft FS/RAP. A Responsiveness Summary will present and respond to public comments on this Draft FS/RAP.

Table 7-1 presents each retained alternative and evaluates how each alternative ranks against the threshold, balancing, and modifying criteria. A discussion of the detailed analysis of each alternative is presented below.

Additional State Criteria

The state of California in California Health and Safety Code (HSC) Section 25356.1 also requires that alternatives be evaluated relative to the following six criteria:

1. Health and safety risks posed by site conditions.
2. The effect of COCs present on probable present and future uses of contaminated or threatened resources.
3. The effect on available groundwater resources for present, future, and probable beneficial uses. Treatment that reduces the TMV of contaminants as opposed to alternatives that use off-site transport and disposal are preferred.
4. Site-specific conditions (potential for off-site migration) and existing contaminant background levels.
5. Cost-effectiveness, considering the short-term and long-term costs of the remedial action and whether deferral of a remedial action could result in a cost increase or hazard increase to human health or the environment.
6. The potential environmental impacts of the remedial alternative such as land disposal of contaminated material versus treatment to remove or reduce its TMV or prior to disposal.

Because the six HSC criteria are similar to and covered under the nine NCP criteria, the detailed analysis presented in this Revised FS/RAP consider the NCP and HSC criteria collectively.

In addition to California's HSC criteria, the DTSC has issued an Interim Advisory for Green Remediation (DTSC, 2009) to provide guidance on how sustainability and green remediation concepts can be incorporated into cleanup project elements, including treatment alternative selection and remedial design. The advisory presents a simple tool called the Green Remediation Evaluation Matrix (GREM) which can be used to perform qualitative comparisons of treatment alternatives.

As part of the alternative evaluation process, a GREM was prepared for each alternative considered in this FS/RAP; the GREMs are presented in Appendix C. The GREM analyses are

presented primarily to show the relative impact to environmental stressors associated with implementation of each alternative, rather than for decision-making purposes. Based on DTSC guidance, the GREMs are not intended as primary evaluation criteria (threshold or balancing criteria), but are presented as additional criteria that may be considered. For example, the GREM may be considered to be a component of the Modifying Criteria for state acceptance, because the DTSC may be more likely to accept a "greener" remedial alternative. For the selected remedial alternative, the GREM will be further considered during the future remedial design to identify and potentially mitigate impacts to environmental stressors.

A summary of the GREM analyses are further discussed under Modifying Criteria in the evaluation of alternatives provided in Table 7-1 and in the following sections.

7.2 DISCUSSION OF ALTERNATIVES

This section discusses the remedial alternatives for BBDA 2 based on their ability to meet the threshold criteria, balancing criteria, and modifying criteria. Table 7-1 presents the comparative analysis for the alternatives based on each of the evaluation criteria. Details regarding the cost estimate of each alternative are presented in Appendix D, and costs are summarized in Table D-1.

7.2.1 Threshold Criteria

Alternative 1 - No Action

This alternative would not meet ARARs for protection of human health and the environment. Alternative 1 does not meet To-Be-Considered requirements (TBCs) regarding cleanup levels for protection of human health and sensitive ecological receptors because COCs are present in debris fill comprising the soil RU at concentrations exceeding human and ecological cleanup levels.

Alternative 2 – Land Use Controls

This alternative is expected to substantively comply with ARARs and is protective of human health. Land use control provides a moderate level of protection to human health by preventing human receptors from coming in contact with the soil RU. Fencing and signage would be installed to limit visitor access to trails. Maintenance workers and volunteers working at the site would be provided health and safety orientation and would use appropriate PPE to reduce exposure to residual contaminants in soil. This alternative also provides notification to land use planners of the presence of COCs in the soil RU at levels that pose risk to human health and ecological receptors, but does not take action to remove or reduce COC concentrations. This alternative is likely to achieve most RAOs and is effective in both the long and short term, but is not consistent with planned future land uses and restoration of the site.

Alternative 3 – Excavation

This alternative would comply with ARARs and is protective of human health and the environment based on planned human land use and habitat restoration. Removal of the soil RU, as practicable, provides the highest level of overall protection to human health and the environment because debris fill containing COCs at concentrations above human health and ecological cleanup levels would be removed from BBDA 2, as practicable, based on slope stability issues and protection of cultural resources. This alternative meets RAOs and is effective in the long term, but could result in some short-term impacts during implementation.

Alternative 4 - Engineered Cover

This alternative would comply with ARARs and is protective of human health and the environment. Relocation of the portion of the soil RU near the bluff slope edge, placement of the engineered cover over the soil RU, long-term monitoring and maintenance of the cover, and implementing a LUC provides a high level of protection to human health and the environment. Placement of a physical barrier that separates potential human and ecological receptors from the soil RU, prohibiting reuses of the site that would pose a risk to potential human receptors, and notifying future land use planners/users of the presence of debris fill beneath the cover would provide a high level of protection to human health and the environment. This alternative would prevent direct contact with the soil RU and is compatible with intended land uses. Excavation and consolidation of the soil RU, grading, placement of a soil layer, and compacting the cover provides an increased level of protection for minimizing the potential contact with COCs and meets ARARs. This alternative incorporates long-term monitoring and maintenance of the cover so that the cover continues to perform as designed and meets RAOs. This alternative is effective in the long term through maintenance of the cover, but could result in some short-term impacts during implementation.

Threshold Criteria Comparison

Alternative 1 is protective of human health, but does not comply with ARARs and is not protective of the environment. Alternative 2 meets most ARARs, is protective of human health, but does not provide the highest level of environmental protection with respect to human health and sensitive ecological receptors. Alternatives 3 and 4 would meet ARARs and are protective of human health and the environment.

7.2.2 Balancing Criteria

Alternative 1 – No Action

This alternative would not prevent long-term exposure to COCs in the soil RU or result in a reduction of TMV of contaminants at the site. This alternative would not prevent short-term exposure to site contaminants. No implementation is necessary under this alternative and there is no associated cost.

Alternative 2 - Land Use Controls

This alternative would prevent long-term exposure of human receptors to COCs in the debris fill and would provide notification of the presence and location of the soil RU so that appropriate staff can make informed decisions regarding future use of the site, including plans for habitat restoration. The LUCs would mitigate potential short- and long-term exposure to COCs associated with the soil RU. However, this alternative does not permanently remove or cover debris fill with COCs at concentrations exceeding cleanup levels. This alternative also does not reduce the TMV of contaminants at the site. This alternative would not be difficult to implement as it does not require that any action be taken except to implement the LUC. This alternative would have no short-term impacts during implementation, and would be easy to implement.

The total estimated cost of $0.09 million associated with this alternative is higher than Alternative 1 (which has negligible cost), and significantly lower than Alternatives 3 and 4. The cost estimate is presented in Table D-2 of Appendix D; cost estimates for each of the alternatives are summarized in Table D-1.

Alternative 3 - Excavation

This alternative would prevent long-term exposure to COCs associated with the soil RU. This alternative would not provide for the direct reduction of TMV of contaminants through treatment, but the debris fill would be removed from the site and transferred to an off-site facility that is designed to control and contain the waste generated by excavation. This alternative would be effective in the short-term, and would not require long-term monitoring and maintenance to maintain its effectiveness. However, because there is a potential short-term risk of slope rebound or cracking around excavated areas where the overburden weight is reduced, not all of the soil RU may be excavated. The potential for slope instability due to rebound or cracking will be assessed as part of pre-design geotechnical analyses. The excavation plan and final site grading plan would incorporate measures to reduce anticipated or potential instability.

This alternative would be relatively difficult to implement as it requires excavation on and adjacent to historic structures and adjacent steep slopes. Construction work would require specialized equipment and fall protection measures. Implementation of this alternative would include removal of established vegetation with root systems that serve to stabilize soil. Excavation would require trucks to haul the excavated debris fill off-site, as well as equipment to excavate and transport debris fill to staging areas prior to off-site transport. Short-term impacts would occur during implementation. Excavation of the soil RU would impact ongoing use of the existing trail at the site and use of the beach below the site. Construction controls and monitoring for dust and other emissions would be required during excavation activities. There would also be traffic impacts due to the trucks required to transport debris fill off-site. Short-term impacts would occur over one construction season. Implementation of this alternative would result in disturbances including traffic, noise, dust, and increased risk of traffic-related death or injury from the trucks transporting and disposing of the excavated debris fill.

The total estimated cost of $3.20 million associated with this alternative is much higher than Alternative 1 (negligible cost) and 2 (low cost), and has the same relative cost as Alternative 4. The cost estimate is presented in Table D-3 of Appendix D; cost estimates for each of the alternatives are summarized in Table D-1.

Alternative 4 - Engineered Cover

This alternative would prevent long-term exposure to COCs associated with the soil RU. This alternative would not provide for the direct reduction of TMV of contaminants through treatment, but debris fill would be contained beneath the cover. This alternative would be effective in the short-term, and monitoring and maintenance would be needed to maintain its effectiveness until vegetation is established.

Because of its location along a bluff slope, it can be expected that there would be some erosion of cover material that would require replacement. This alternative would be relatively difficult to implement as it requires placement of cover material on and adjacent to historic structures and on adjacent steep slopes prone to erosion and mass wasting. Placement of additional soil as cover could affect overall slope stability. Potential effects would need to be evaluated as part of a pre-design geotechnical evaluation. Implementation of this alternative would include removal of established vegetation with root systems that serve to stabilize soil. Specialized equipment for working on steep slopes would be required for placement of the cover and slope stabilization measures or retaining structures would be constructed to maintain the integrity of the cover. The cover would also require monitoring and maintenance in the future.

Importing soil to be placed as the cover would result in trucks accessing the site and adjacent staging areas. As feasible, local sources of soil would be used for the cover layer. There would

be short-term impacts during implementation. Construction controls and monitoring for dust and other emissions would be required during grading and placement of the cover. There would also be traffic impacts due to the number of trucks required to haul import soil and other construction materials to the site. Short-term impacts would occur over one construction season. Implementation of this alternative would result in disturbances including traffic, noise, dust, and increased risk of traffic-related death or injury from the trucks transporting import material.

The total estimated cost of $3.21 million associated with this alternative is much higher than Alternatives 1 (negligible cost) and 2 (low cost), and has the same relative cost as Alternative 3. The cost estimate is presented in Table D-4 of Appendix D; cost estimates for each of the alternatives are summarized in Table D-1.

Balancing Criteria Comparison

Alternative 3 provides the highest degree of long-term effectiveness and permanence. Alternative 4 also provides long-term effectiveness through long-term maintenance and monitoring following remedial construction.

Only Alternative 3 would provide for the direct reduction of TMV for excavated debris fill removed from the site and managed at an off-site landfill facility.

Alternative 2 provides the highest degree of short-term effectiveness as implementation of a LUC could be completed within a relatively short time period. Alternatives 3 and 4 have a similar degree of short-term effectiveness, and can be completed within one construction season. For Alternatives 3 and 4 to be effective in the short-term, construction controls for dust, traffic, and air emissions would need to be implemented. In addition, because there is a potential short-term risk of slope rebound or cracking around excavated areas where the overburden weight is reduced during the removal of debris fill under Alternative 3, some portion of the soil RU may not be removed. Placement of additional soil as cover under Alternative 4 could also affect overall slope stability. The potential for slope instability will be assessed as part of pre-design geotechnical analyses and measures to reduce anticipated or potential instability will be incorporated into the remedial design.

Alternatives 3 and 4 are similar with respect to implementability. Although Alternative 3 requires debris fill excavation and off-site disposal, implementation of Alternative 4 requires construction and long-term monitoring and maintenance of the cover.

Cost estimates associated with implementation of each of the alternatives are presented in Appendix D, and summarized in Table D-1. There are negligible costs associated with Alternative 1. The estimated costs to implement Alternatives 2, 3, and 4 are $0.09 million for Alternative 2, $3.20 million for Alternative 3, and $3.21 million for Alternative 4. Alternatives 3 and 44 have the same relative higher overall cost.

7.2.3 Modifying Criteria

Alternative 1 - No Action

The GREM Analysis for this alternative is presented in Table C-1 of Appendix C. This alternative would meet most of the objectives of DTSC's Green Remediation program due to the lack of substance release, physical disturbance, and resource depletion. However, because this alternative takes no action to address potential risks to sensitive ecological receptors, it would not likely be favored by the community. Community and state acceptance will be assessed after the FS/RAP review and comment period is complete.

Alternative 2 – Land Use Controls

The GREM Analysis for this alternative is presented in Table C-2 of Appendix C. This alternative would meet most of the objectives of DTSC's Green Remediation program due to the lack of substance release, physical disturbance, and resource depletion. However, because this alternative does not involve active remediation to address potential risks to sensitive ecological receptors, it would not likely be favored by the community. Community acceptance will be assessed after the FS/RAP review and comment period is complete.

Alternative 3 - Excavation

The GREM Analysis for this alternative is presented in Table C-3 of Appendix C. This alternative would not meet all of the objectives of DTSC's Green Remediation program due to emissions from dust during construction, diesel particulate matter and other greenhouse gasses from vehicle exhaust, fossil fuel use, noise and traffic from haul trucks and construction equipment. However, because this alternative involves active remediation to address potential risks to human health and the environment it would likely to be acceptable to the state and the community. Community and state acceptance will be assessed after the FS/RAP review and comment period is complete.

Alternative 4 - Engineered Cover

The GREM Analysis for this alternative is presented in Table C-4 of Appendix C. This alternative would not meet all of the objectives of DTSC's Green Remediation program due to emissions from dust during construction, diesel particulate matter and other greenhouse gasses from vehicle exhaust, fossil fuel use from haul trucks and construction equipment. This alternative involves a combination of containment and a LUC to address potential risks to human health and sensitive ecological receptors, and would likely be favored by the regulatory agencies and the community. Community and state acceptance will be assessed after the FS/RAP review and comment period is complete.

Modifying Criteria Comparison

With respect to the DTSC Green Remediation criteria, Alternative 4 ranks slightly higher than Alternative 3 because implementation of Alternative 3 would result in more traffic, noise, dust, and increased risk of traffic-related death or injury from the trucks transporting and disposing excavated debris fill off-site. Alternatives 1 and 2 do not involve active remediation to address potential risks to human health and sensitive ecological receptors, so those alternatives would not likely be favored by the community. Alternatives 3 and 4 involve active remediation to address potential risks to human health and sensitive ecological receptors and therefore, would likely to be acceptable to the state and the community. Community and state acceptance will be assessed after the FS/RAP review and comment period is complete.

7.3 SELECTION OF THE PREFERRED ALTERNATIVE

In considering the detailed analysis of alternatives presented above and summarized in Table 7-1 as well as the screening and comparative analysis presented in this FS/RAP, the Trust has selected Alternative 3, Excavation, as the preferred alternative because it provides a high level of protection to human health and the environment; meets ARARs; is compatible with the proposed land use of BBDA 2; is implementable to construct; meets some green remediation criteria, does not require long-term maintenance and monitoring; and will likely result in the greatest benefit to human health and the environment.

8.0 REMEDIAL ACTION PLAN

Considering the screening and comparative analysis presented above, the Trust has selected Alternative 3 Excavation as the preferred alternative. This section presents how the selected alternative will be implemented.

8.1 BASIS OF DESIGN

Once the DTSC has approved a remedial action in the Final FS/RAP, a Remedial Design Implementation Plan (RDIP) will be developed for the selected remedy. The elements of the selected remedy are illustrated on Figure 6-1.

This remedy entails excavation and offsite disposal of debris fill associated with the soil RU as practicable with respect to slope stability, protection of cultural resources, and other engineering issues. The excavation will continue until cleanup goals are attained or it is deemed impracticable in consultation with the DTSC.

Details of the remedial action will be developed in the RDIP and remedial design. Remedial construction activities associated with the proposed remedial action are anticipated to consist of the following:

- Fencing will be installed around the work area. Trees will be removed and the excavation area will be cleared and grubbed.
- Removal of an estimated 6,700 cy of in-place debris fill (8,710 cy with 30% expansion) associated with the soil RU. It is anticipated that the final volume of excavated material will be greater due to constructability issues and bulking of material once it is excavated. Figure 6-1 shows the extent of excavation and Table D-3 in Appendix D provides assumptions for the costs of the estimated excavation.
- Characterization, transport, and disposal of excavated debris fill to permitted landfills. The Trust plans to dispose of Class I non-RCRA waste at ECDC Environmental, L.C., Salt Lake City, Utah (Operated by Waste Solutions Group), and Class II and Class III waste at Potrero Hills Landfill, Fairfield, California. If additional or alternate landfills are selected for off-site disposal after a contractor has been selected for the remedial action, the Trust will notify DTSC of the alternate landfill prior to transport of material offsite.
- Confirmation sampling of the excavated area for site COCs. Details of the confirmation sampling approach will be developed in the RDIP.
- Grading and backfilling of areas with clean soil material where required for slope stability and drainage.
- Re-vegetation of the excavated area in accordance with the VMP.

Backfill material that will be used will be soil imported from off-site. The potential backfill material will meet the following minimum requirements:

- The potential fill material will be sampled at each fill source at a frequency and analytical suite consistent with DTSC guidance (DTSC, 2001);
- The chemical constituent levels in the potential backfill soil shall be evaluated using site-specific cleanup levels identified in this FS/RAP to ensure that they do not pose a site risk to human health or the environment;

- The soil type for potential backfill material shall be compatible with site-specific restoration plans.

The excavation area will be re-graded, imported clean fill placed, and erosion control measures installed to allow for proper drainage and reduce the potential for mass wasting. Erosion control measures are discussed in Appendix G. Details on these measures will be included in the Storm Water Pollution Prevention Plan (SWPPP) that will be prepared for BBDA 2.

Construction activities will be coordinated with Presidio cultural and natural resources personnel to avoid and/or mitigate potential impacts to the site's cultural and ecological resources. Specific information regarding the pre-construction activities, vegetation clearance, excavation, stockpiling, backfill placement, staging and disposal of excavated debris fill, haul roads, traffic control elements, air monitoring programs, dust and erosion control measures, and other details regarding the remedy will be set forth in the RDIP, design documents, and air monitoring plan, as necessary. Construction will be scheduled and best management practices (BMPs) will be followed during the remedial action to reduce emissions and minimize impacts to human health and the environment. Project control measures to be included in the BBDA 2 remedial action to minimize impacts on resources are described in Appendix G. The site will be restored in a manner that protects the site's cultural features and re-vegetated following remedial activities in accordance with the VMP (NPS and Trust, 2001). Erosion control measures will be implemented until the vegetation is established. Specific plans containing the details of these measures will be submitted under a separate cover or included in the RDIP.

By combining the above elements, the selected remedy will meet the RAOs and will protect potential receptors and the environment during the remediation process.

8.2 REMEDY IMPLEMENTATION AND PROJECT CONTROLS

Construction will be scheduled and BMPs will be followed during the remedial action to reduce erosion and the potential impact from vehicle emissions and minimize impacts to human health and the environment. Project control measures to be included in the BBDA 2 remedial action to minimize impacts on resources are identified in Appendix G, Table G-1.

8.3 CALIFORNIA ENVIRONMENTAL QUALITY ACT

In accordance with CEQA, DTSC has evaluated the potential environmental impacts of the proposed remedial alternative for BBDA 2 in an Initial Study (IS), and has prepared a Draft Negative Declaration for the remediation project. The scope of the IS includes consideration of potential impacts to traffic, transportation, air quality, noise, cultural resources, biological resources, and greenhouse gas emissions, among other topics. DTSC has found that although there will be limited minor and short-term impacts, implementation of the proposed remedial alternative will improve the overall environmental quality, and therefore would have no significant negative impact on the environment. The IS and Draft Negative Declaration which determined that the remedial action has no significant negative impact on the environment, are included in Appendix H of this Draft FS/RAP.

9.0 REFERENCES

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TABLES

Table 3-1. Summary of Potential Chemicals of Concern in Soil
Debris Fill Area, Baker Beach Disturbed Area 2
Feasibilty Study/Remedial Action Plan
Presidio of San Francisco, California

Detected Chemicals	Summary of Soil Analytical Data				Presidio-Wide Screening Levels [b]						RI Screening Level [c]	EPC Exceeds RI Screening Level and Chemical Selected as PCOC
					Human Health Soil Target Level/PRGs		Ecological PRGs		Background Levels			
	Number of Samples Detected / Number of Samples Analyzed	Minimum Detected Concentration	Maximum Detected Concentration	Exposure Point Concentration (EPC) [a]	Residential	Recreational	Special-Status Species	Buffer Zone	Serpentinite Lithology	Colma Formation		
		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	
All Depths 0-11.5 ft (Debris and No Debris Fill)												
Inorganics												
Copper	27 / 27	15	220	94	--	--	30	120	***85***	49	85	Yes
Lead	27 / 27	5	330	200	400	500	***160***	300	66	7.5	160	Yes
Silver	25 / 27	0.034	14	6.0	360	870	***2.0***	2.0	1.7	1.0	2.0	Yes
Zinc	27 / 27	27	1200	232	22,000	52,000	4.0	50	***160***	60	160	Yes
Polycyclic Aromatic Hydrocarbons (PAHs)												
Benzo(a)pyrene	20 / 25	0.0012	0.8	0.45	***0.046***	0.11	30	40	--	--	0.046	Yes
Benzo(a)pyrene PEQ [d]	22 / 25	0.00234	1.082	0.60	***0.046***	0.11	30	40	--	--	0.046	Yes
Organochlorine Pesticides												
Total-Chlordane	6 / 23	0.00044	0.141	0.020	0.37	0.91	***0.009***	0.040	--	--	0.009	Yes
4,4'-DDT	10 / 23	0.0018	0.15	0.022	1.4	3.5	***0.008***	0.53	--	--	0.0082	Yes
0 - 2 feet (Debris and No Debris Fill)												
Inorganics												
Copper	18 / 18	15	220	92	--	--	30	120	***85***	49	85	Yes
Lead	18 / 18	5	330	126	400	500	***160***	300	66	7.5	160	Yes
Silver	16 / 18	0.034	1.65	1.0	360	870	***2.0***	2.0	1.7	1.0	2.0	No
Zinc	18 / 18	27	420	191	22,000	52,000	4.0	50	***160***	60	160	Yes
Polycyclic Aromatic Hydrocarbons (PAHs)												
Benzo(a)pyrene	14 / 16	0.0012	0.80	0.36	***0.046***	0.11	30	40	--	--	0.046	Yes
Benzo(a)pyrene PEQ [d]	15 / 16	0.00234	1.082	0.49	***0.046***	0.11	30	40	--	--	0.046	Yes
Organochlorine Pesticides												
Total-Chlordane	3 / 16	0.00105	0.00930	0.0090	0.37	0.91	***0.009***	0.040	--	--	0.009	No
4,4'-DDT	5 / 16	0.0018	0.022	0.0066	1.4	3.5	***0.008***	0.53	--	--	0.0082	No
0 - 3 feet (Debris and No Debris Fill)												
Inorganics												
Copper	20 / 20	15	220	96	--	--	30	120	***85***	49	85	Yes
Lead	20 / 20	5	330	171	400	500	***160***	300	66	7.5	160	Yes
Silver	18 / 20	0.034	2.1	1.2	360	870	***2.0***	2.0	1.7	1.0	2.0	No
Zinc	20 / 20	27	420	206	22,000	52,000	4.0	50	***160***	60	160	Yes
Polycyclic Aromatic Hydrocarbons (PAHs)												
Benzo(a)pyrene	15 / 18	0.0012	0.80	0.33	***0.046***	0.11	30	40	--	--	0.046	Yes
Benzo(a)pyrene PEQ [d]	17 / 18	0.00234	1.082	0.81	***0.046***	0.11	30	40	--	--	0.046	Yes
Organochlorine Pesticides												
Total-Chlordane	3 / 17	0.00105	0.00930	0.0090	0.37	0.91	***0.009***	0.040	--	--	0.009	No
4,4'-DDT	6 / 17	0.0018	0.022	0.0074	1.4	3.5	***0.008***	0.53	--	--	0.0082	No

Table 3-1. Summary of Potential Chemicals of Concern in Soil
Debris Fill Area, Baker Beach Disturbed Area 2
Feasibilty Study/Remedial Action Plan
Presidio of San Francisco, California

Detected Chemicals	Summary of Soil Analytical Data				Presidio-Wide Screening Levels [b]						RI Screening Level [c]	EPC Exceeds RI Screening Level and Chemical Selected as PCOC
					Human Health Soil Target Level/PRGs		Ecological PRGs		Background Levels			
	Number of Samples Detected / Number of Samples Analyzed	Minimum Detected Concentration	Maximum Detected Concentration	Exposure Point Concentration (EPC) [a]	Residential	Recreational	Special-Status Species	Buffer Zone	Serpentinite Lithology	Colma Formation		
		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	
0 - 10 feet (Debris and No Debris Fill)												
Inorganics												
Copper	26 / 26	15	220	97	--	--	30	120	***85***	49	85	Yes
Lead	26 / 26	5	330	214	400	500	***160***	300	66	7.5	160	Yes
Silver	24 / 26	0.034	14	6.2	360	870	***2.0***	2.0	1.7	1.0	2.0	Yes
Zinc	26 / 26	27	1200	241	22,000	52,000	4.0	50	***160***	60	160	Yes
Polycyclic Aromatic Hydrocarbons (PAHs)												
Benzo(a)pyrene	19 / 24	0.0012	0.80	0.47	***0.046***	0.11	30	40	--	--	0.046	Yes
Benzo(a)pyrene PEQ [d]	21 / 24	0.00234	1.082	0.62	***0.046***	0.11	30	40	--	--	0.046	Yes
Organochlorine Pesticides												
Total-Chlordane	6 / 22	0.00044	0.141	0.0210	0.37	0.91	***0.009***	0.040	--	--	0.009	Yes
4,4'-DDT	10 / 22	0.0018	0.15	0.0234	1.4	3.5	***0.008***	0.53	--	--	0.0082	Yes
Native/Disturbed Native Soil												
Inorganics												
Copper	20 / 20	15	50	NC	--	--	30	120	***85***	49	85	Max < SL
Lead	20 / 20	0.28	57	NC	400	500	***160***	300	66	7.5	160	Max < SL
Silver	16 / 20	0.043	0.654	NC	360	870	***2.0***	2.0	1.7	1.0	2.0	Max < SL
Zinc	20 / 20	27	270	89	22,000	52,000	4.0	50	***160***	60	160	No
Polycyclic Aromatic Hydrocarbons (PAHs)												
Benzo(a)pyrene	8 / 18	0.0012	0.068	0.018	***0.046***	0.11	30	40	--	--	0.046	No
Benzo(a)pyrene PEQ	NC / NC	NC	NC	NC	***0.046***	0.11	30	40	--	--	0.046	--
Organochlorine Pesticides												
Total-Chlordane	3 / 17	0.00033	0.00064	NC	0.37	0.91	***0.009***	0.040	--	--	0.009	Max < SL
4,4'-DDT	0 / 17	--	--	--	1.4	3.5	***0.008***	0.53	--	--	0.0082	--
0-10 ft Bluff Soil (Debris and No Debris Fill) [e]												
Inorganics												
Copper	18 / 18	15	220	120	--	--	30	120	***85***	49	85	Yes
Lead	18 / 18	5	330	188	400	500	***160***	300	66	7.5	160	Yes
Silver	17 / 18	0.034	14	8.7	360	870	***2.0***	2.0	1.7	1.0	2.0	Yes
Zinc	18 / 18	27	1200	304	22,000	52,000	4.0	50	***160***	60	160	Yes
Polycyclic Aromatic Hydrocarbons (PAHs)												
Benzo(a)pyrene	12 / 16	0.0012	0.8	0.27	***0.046***	0.11	30	40	--	--	0.046	Yes
Benzo(a)pyrene PEQ	14 / 16	0.00234	1.082	0.77	***0.046***	0.11	30	40	--	--	0.046	Yes
Organochlorine Pesticides												
Total-Chlordane	4 / 14	0.00044	0.141	0.031	0.37	0.91	***0.009***	0.040	--	--	0.009	Yes
4,4'-DDT	7 / 14	0.0018	0.15	0.037	1.4	3.5	***0.008***	0.53	--	--	0.0082	No

Table 3-1. Summary of Potential Chemicals of Concern in Soil
Debris Fill Area, Baker Beach Disturbed Area 2
Feasibilty Study/Remedial Action Plan
Presidio of San Francisco, California

Detected Chemicals	Summary of Soil Analytical Data				Presidio-Wide Screening Levels [b]						RI Screening Level [c]	EPC Exceeds RI Screening Level and Chemical Selected as PCOC
					Human Health Soil Target Level/PRGs		Ecological PRGs		Background Levels			
	Number of Samples Detected / Number of Samples Analyzed	Minimum Detected Concentration	Maximum Detected Concentration	Exposure Point Concentration (EPC) [a]	Residential	Recreational	Special-Status Species	Buffer Zone	Serpentinite Lithology	Colma Formation		
		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	
All Depths (0-2 ft) Slope Soil (Debris and No Debris Fill) [f]												
Inorganics												
Copper	8 / 8	23	118	75	--	--	30	120	***85***	49	85	No
Lead	8 / 8	20	210	151	400	500	***160***	300	66	7.5	160	No
Silver	7 / 8	0.058	1.65	1.6	360	870	***2.0***	2.0	1.7	1.0	2.0	No
Zinc	8 / 8	87	307	216	22,000	52,000	4.0	50	***160***	60	160	Yes
Polycyclic Aromatic Hydrocarbons (PAHs)												
Benzo(a)pyrene	6 / 8	0.0029	0.54	0.39	***0.046***	0.11	30	40	--	--	0.046	Yes
Benzo(a)pyrene PEQ	7 / 8	0.00494	0.685	0.50	***0.046***	0.11	30	40	--	--	0.046	Yes
Organochlorine Pesticides												
Total-Chlordane	2 / 8	0.00034	0.00930	0.0090	0.37	0.91	***0.009***	0.040	--	--	0.009	No
4,4'-DDT	3 / 8	0.0019	0.022	0.012	1.4	3.5	***0.008***	0.53	--	--	0.0082	Yes

Abbreviations:
-- = Not applicable/not available.
EPC = Exposure point concentration.
Max < SL = Maximum detected concentration did not exceed the screening level; no EPC was calculated
mg/kg = Milligrams per kilogram.
NC = Not calculated
UCL = Upper confidence limit on the mean

Notes:
Value shown in ***bold and italic*** was the value used as the RI screening level.
All depths indicate samples from 0 to 11.5 feet below ground surface.
Footnotes:
[a] The EPC is the upper confidence limit calculated using the United States Environmental Protection Agency's (EPA) ProUCL Version 4.1.00. For evaluation of human health risks, an EPC for the benzo(a)pyrene potency equivalent concentrations (BaP PEQ) was used to estimate cancer risk from cPAHs at the site.
[b] Values from Presidio-Wide Cleanup Document *(EKI, 2002 Revised May 16, 2006*) and cleanup levels for carcinogenic PAHs from *Updated Human Health Preliminary Remediation Goals for Carcinogenic Polynuclear Aromatic Hydrocarbons in Soil* (*AMEC, 2011*).
[c] Based on the most stringent of Presidio ecological special status species PRGs, human health recreational PRGs, and site-specific recreational soil target levels. For metals, if the detected concentration is less than the if the ecological or human health PRG background threshold level, then the cleanup level is set at the higher of background levels for Colma formation and serpentinite soil because both soil types exist at the Site and a receptor would be exposed to the chemical signatures of both soil types
[d] The benzo(a)pyrene PEQ is the sum of the PEF adjusted values for each carcinogenic PAH. The PEF Adj was calculated by multiplying the laboratory result by the PEF. For samples where at least one PAH compound was detected, a value equal to half of the detection limit was used as a surrogate value for non detect compounds. For samples where all of the PAHs were not detected, the designated BaP PEQ was represented as the detection limit for BaP.
[e] Bluff samples: BB2SB102(0.0), BB2SB102(2.0), , BBD2TP106(2.0), BB2TP110(3.0), BB2TP110(4.0), BB2TP500[2.0], BB2TP501[0.5], BB2TP502[3.0], BB2TP502[9.5], BB2TP504[1.5], BB2TP504[5.5], BB2TP514[3.5], BB2TP514[9.5], BB2TP515[1.0], BB2TP515[5.0], BB2SB519[0.0], BB2SB521[0.0], BB2TP503[1.5].
[f] Slope samples: BBSB06 (0 and 1.5 ft), BBSB08 (0 and 2.0 ft), BB2TP505[1.0], BB2TP506[1.0], BB2TP507[0.0], BB2TP508[0.5]. No deeper samples were collected from fill along the slope.
References:
AMEC Environmental & Infrastructure (AMEC), 2011. *Technical Memorandum, Updated Human Health Preliminary Remediation Goals for Carcinogenic Polynuclear Aromatic Hydrocarbons in Soil, Presidio of San Francisco, California*. September 26.
Erler & Kalinowski, Inc. (EKI), 2002. *Development of Presidio-Wide Cleanup Levels for Soil, Sediment, Groundwater, and Surface Water, Presidio of San Francisco. October.* Revised May 16, 2006.

Table 3-2. Cancer and Non-cancer Human Health Screening Levels for Potential Chemicals of Concern
Debris Fill Area, Baker Beach Disturbed Area 2
Feasibilty Study/Remedial Action Plan
Presidio of San Francisco, California

Chemicals of Potential Concern	Exposure Point Concentration (all depths in Fill Soil)	Presidio-Wide Human Health Preliminary Remediation Goals [a]					
		Residential		Recreational		Commercial/Industrial	
		Cancer	Non-cancer	Cancer	Non-cancer	Cancer	Non-cancer
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Inorganics							
Copper	94	--	--	--	--	--	--
Lead	200	--	--	--	--	--	--
Silver	6.0	--	360	--	870	--	9400
Zinc	232	--	22,000	--	52,000	--	570,000
Polycyclic Aromatic Hydrocarbons (PAHs)							
Benzo(a)pyrene	0.45	0.046	--	0.11	--	0.38	--
Benzo(a)pyrene PEQ	0.60	0.046	--	0.11	--	0.38	--
Organochlorine Pesticides							
Total-Chlordane	0.020	0.37	31	0.91	75	3.4	730
4,4'-DDT	0.022	1.4	31	3.5	75	13.0	730

Abbreviations:
-- = Not applicable/not available.
mg/kg = Milligrams per kilogram.
EPC = Exposure point concentration.

Footnotes:
[a] Values from Presidio-Wide Cleanup Document *(EKI, 2002 Revised May 16, 2006*) and cleanup levels for carcinogenic PAHs from *Updated Human Health Preliminary Remediation Goals for Carcinogenic Polynuclear Aromatic Hydrocarbons in Soil (AMEC, 2011).*

References:
AMEC Environmental & Infrastructure (AMEC), 2011. *Technical Memorandum, Updated Human Health Preliminary Remediation Goals for Carcinogenic Polynuclear Aromatic Hydrocarbons in Soil, Presidio of San Francisco, California. September 26.*

Erler & Kalinowski, Inc. (EKI), 2002. *Development of Presidio-Wide Cleanup Levels for Soil, Sediment, Groundwater, and Surface Water, Presidio of San Francisco.* October. Revised May 16, 2006.

Table 3-3. Human Health Risk Evaluation of Carcinogenic Potential Chemicals of Concern in Soil
Debris Fill Area, Baker Beach Disturbed Area 2
Feasibilty Study/Remedial Action Plan
Presidio of San Francisco, California

Depths of Fill and Receptor	Number of Samples [a]	Benzo(a)pyrene		Benzo(a)pyrene PEQ	
		Exposure Point Concentration [b]	Human Health Risk [c]	Exposure Point Concentration [b]	Human Health Risk [c]
		mg/kg		mg/kg	
Recreational Visitor					
Presidio-Wide					
0 - 2 Feet bgs	16	0.36	3.E-06	0.49	4.E-06
0 - 10 feet bgs	24	0.47	4.E-06	0.62	6.E-06
0 - 11.5 feet bgs	25	0.45	4.E-06	0.60	5.E-06
Bluff Area	18	0.27	2.E-06	0.77	7.E-06
Slope Area	8	0.39	4.E-06	0.50	5.E-06
Volunteer Worker					
Presidio-Wide Commercial Worker					
0 - 10 feet bgs	24	0.47	1.E-06	0.62	2.E-06
0 - 11.5 feet bgs	25	0.45	1.E-06	0.60	2.E-06
Preliminary Remediation Goals and Soil Target Levels [d]					
Presidio-Wide Recreational Human Health PRG (mg/kg)		0.11		0.11	
Presidio-Wide Commercial Human Health PRG (mg/kg)		0.38		0.38	

Abbreviations:
-- = Not applicable.
feet bgs = Feet below ground surface.
mg/kg = Milligrams per kilogram.
ND = Not detected above laboratory reporting limits.
NC = Not calculated
PEQ = Potency equivalent concentrations.
PRGs = Preliminary Remediation Goals.

Footnotes:
[a] Based on number of primary samples (excluding duplicates).
[b] The EPCs are set at lower of the upper confidence limit on the mean (UCL) calculated using the United States Environmental Protection Agency's (EPA) ProUCl version 4.1.00 and maximum detected value. For UCL calculations, where both the primary sample and duplicate sample were detected values, the average value was used in the calculation of the UCL. Where there was one detection and one nondetect value between the primary and duplicate samples, the detected value was used in the UCL calculation. Concentration ranges for each of these datasets are provided in Table 3-1.
[c] The human health risk was calculated by dividing the EPCs by the Preliminary Remediation Goal and multipling it by a cancer risk of 0.000001.
[d] Updated Preliminary Remediation Goals from AMEC, 2011 and Site Specific Soil Target Levels from AMEC, 2012c.

References:
AMEC, 2011. Technical Memorandum, Updated Human Health Preliminary Remediation Goals for Carcinogenic Polynuclear Aromatic Hydrocarbons in Soil, Presidio of San Francisco, California. September 26.
_____, 2012c. Draft Feasibility Study/Remedial Action Plan (FS/RAP), Baker Beach Disturbed Area 1A, Presidio of San Francisco, December San Francisco, California.

Table 3-4. Ecological Risk Evaluation of Potential Chemicals of Concern in Soil
Debris Fill Area, Baker Beach Disturbed Area 2
Feasibilty Study/Remedial Action Plan
Presidio of San Francisco, California

Depths of Fill and Receptor	Number of Samples [a]	Copper		Lead [b]		Silver		Zinc		4,4'-DDT		Chlordane [c]	
		Concentration Range	Exposure Point Concentration [d]	Concentration Range	Exposure Point Concentration [d]	Concentration Range	Exposure Point Concentration [d]	Concentration Range	Exposure Point Concentration [d]	Concentration Range	Exposure Point Concentration [d]	Concentration Range	Exposure Point Concentration [d]
		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
0 - 3 feet bgs - Ecological	17 - 20	15-220	96	5-280	171	ND-2.1	1.2	27-420	206	ND-0.022	0.0074	ND-0.00895	0.009
All Depths	23 - 27	15-220	94	5-330	200	ND-14	6.0	27-1200	232	ND-0.15	0.0224	ND-0.141	0.020
Preliminary Remediation Goals [e]													
Ecological Buffer Zone		120		300		2		50		0.53		0.04	
Ecological Special Status		30		160		2		4		0.0082		0.009	
Background Metals - Colma [f]		49		7.5		1		60		--		--	
Background Metals - Serpentinite [f]		85		66		1.7		160		--		--	
Species-Specific Range of PRGs used to Develop Ecological CULs [e]													
Plants and soil fauna		50 - 400		160 - 300		2		50 - 864		40 - 200		--	
American robin		30 - 200		297		6 - 144		4 - 97		0.008 - 2		0.009 - 0.071	
Peregrine Falcon		672 - 8,824		NC		21 - 1,072		437 - 21,830		0.14 - 11		0.04 - 0.81	
Red-Tailed Hawk		4,715 - 30,975		NC		357 - 8,919		216 - 5,390		6 - 181		5 - 47	

Abbreviations:
-- = Not applicable.
feet bgs = Feet below ground surface.
mg/kg = Milligrams per kilogram.
NC = Not calculated.
ND = Not detected above laboratory reporting limits.
PRGs = Preliminary Remediation Goals.

Notes:
Underlined value = Exposure point concentration (EPC) exceeds ecological special status species PRG and for metals, the higher of background threshold levels for serpentinite and Colma soils.
Double underlined value = EPC exceeds ecological special status and ecological buffer zone PRGs and for metals, the background threshold level.
Purple highlighted indicates EPC exceeds the selected screening level.
Boxed cleanup level is the selected PRG or background level used for screening.
Yellow highlighted value indicates EPC exceeds PRGs for representative ecological receptor.

Checked: MJH

Footnotes:
[a] Based on number of primary samples (excluding duplicates).
[b] The prelimary remediation goals (PRGs) for ecological special status species were calculated using the Monte Carlo analysis for the most sensitive species, which include plants and the American robin, as discussed in Section 5.9 of the Cleanup Level Document (EKI, 2002, revised 2006).
[c] Based on sum of detected concentrations of alpha and gamma-chlordane.
[d] The EPCs are set at lower of the upper confidence limit on the mean (UCL) calculated using the United States Environmental Protection Agency's (EPA) ProUCL version 4.1.00 and maximum detected value. For UCL calculations, where both the primary sample and duplicate sample were detected values, the average value was used in the calculation of the UCL. Where there was one detection and one nondetect value between the primary and duplicate samples, the detected value was used in the UCL calculation.
[e] From EKI, 2002 Revised May 16, 2006.
[f] Both Colma and serpentinite underlie fill soil at BBDA 2.

References:
Erler & Kalinowski, Inc. (EKI), 2002. *Development of Presidio-Wide Cleanup Levels for Soil, Sediment, Groundwater, and Surface Water, Presidio of San Francisco. October.* Revised May 16, 2006.

Table 4-1. Summary of Preliminary Remediation Goals for Carcinogenic PAHs
Debris Fill Area, Baker Beach Disturbed Area 2
Feasibilty Study/Remedial Action Plan
Presidio of San Francisco, California

Carcinogenic Polycyclic Aromatic Hydrocarbons (PAHs)	PRGs from 2002 Presidio-Wide Cleanup Level Document [a]			Residential PRGs within Risk Management Range[b]		2011 Updated Human Health PRGs [c]		
	Residential	Recreational	Commercial/ Industrial	Carcinogenic Risk of 10^{-5}	Carcinogenic Risk of 10^{-4}	Residential PRG (carcinogenic risk of 10^{-6})	Recreational	Commercial/ Industrial
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Benzo(a)anthracene	0.27	0.65	2.3	4.6	46	0.46	1.1	3.8
Benzo(a)pyrene	0.027	0.065	0.23	0.46	4.6	0.046	0.11	0.38
Benzo(b)fluoranthene	0.27	0.65	2.3	4.6	46	0.46	1.1	3.8
Benzo(k)fluoranthene	0.27	0.65	2.3	46	460	4.6	11	38
Chrysene	2.7	6.5	23	460	4600	46	106	378
Dibenzo(a,h)anthracene	0.078	0.19	0.67	0.46	4.6	0.046	0.11	0.38
Indeno(1,2,3-cd)pyrene	0.27	0.65	2.3	4.6	46	0.46	1.1	3.8

Abbreviations:
mg/kg = Milligrams per kilogram.

Footnotes:
[a] From EKI, 2002 Revised May 16, 2006.
[b] Calculated from values presented in AMEC, 2011 by multiplying updated residential PRGs by 10 and 100, for PRGs based on carcinogenic risks of 10^{-5} and 10^{-4}, respectively.
[c] From AMEC, 2011.

References:
AMEC Environmental & Infrastructure (AMEC), 2011. *Technical Memorandum, Updated Human Health Preliminary Remediation Goals for Carcinogenic Polynuclear Aromatic Hydrocarbons in Soil, Presidio of San Francisco, California*. September 26.
Erler & Kalinowski, Inc. (EKI), 2002. *Development of Presidio-Wide Cleanup Levels for Soil, Sediment, Groundwater, and Surface Water, Presidio of San Francisco. October.* Revised May 16, 2006.

Table 4-2. Soil Cleanup Levels for COCs
Debris Fill Area, Baker Beach Disturbed Area 2
Feasibilty Study/Remedial Action Plan
Presidio of San Francisco, California

Detected Chemicals	Human Health Soil Target Levels/PRGs Presidio-Wide [a]		Ecological PRGs [b]		Background Levels [b]		Cleanup Level [c]
	Residential	Recreational	Special-Status Species	Buffer Zone	Serpentinite Lithology	Colma Formation	
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Metals							
Copper	--	--	30	120	***85***	49	85
Lead	400	500	***160***	300	66	7.5	160
Silver	360	840	***2***	2	1.7	1	2
Zinc	22,000	52,000	4.0	50	***160***	60	160
Pesticides							
Total-Chlordane	0.37	0.91	***0.009***	0.04	--	--	0.009
4,4'-DDT	1.4	3.5	***0.0082***	0.53	--	--	0.0082
Polycyclic Aromatic Hydrocarbons (PAHs)							
Benzo(a)pyrene	0.046	***0.11***	30	40	--	--	0.11

Abbreviations:
-- = Not applicable/not available.
mg/kg = Milligrams per kilogram.

Notes and Footnotes:
[a] Updated human health residential PRGs from T*echnical Memorandum, Updated Human Health Preliminary Remediation Goals for Carcinogenic Polynuclear Aromatic Hydrocarbons in Soil, Presidio of San Francisco, California* (AMEC, 2011); other human health PRGs from *Development of Presidio-Wide Cleanup Levels for Soil, Sediment, Groundwater, and Surface Water, Presidio of San Francisco* (Cleanup Level Document; EKI, 2002 Revised May 16, 2006). For PAHs, the lower of the human health PRGs presented in Tables 7-2 and 7-5 has been selected.
[b] Ecological PRGs and background levels from Table 7-2 of the Cleanup Level Document (EKI, 2002 Revised May 16, 2006).
[c] For carcinogenic PAHs, the cleanup level is the most stringent of Presidio ecological special status species PRGs and site-specific recreational soil target levels.

TABLE 5-1
APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs)
***DRAFT* FEASIBILITY STUDY/REMEDIAL ACTION PLAN, BAKER BEACH DISTURBED AREA 2 (BBDA 2)**
Presidio of San Francisco, California

ARAR	Citation	Description	ARAR Determination	Comments [(1)]
CHEMICAL-SPECIFIC ARARs AND TBCs				
Federal Chemical-Specific ARARs and TBCs				
Safe Drinking Water Act (SDWA)	42 USC § 300g-1	The National Contingency Plan (NCP) at 40 CFR §§300.43(e)(2)(i)(B)-(D) states that maximum contaminant level goals (MCLGs), established under the SDWA, that are set at levels above zero should be attained by remedial actions for surface water or groundwater that are current or potential sources of drinking water. For contaminants of concern (COCs) in groundwater that do not have MCLGs, or if the MCLGs have been set at zero, the remedial actions should achieve Maximum Contaminant Levels (MCLs).	Relevant and Appropriate	BBDA 2 is located within the Coastal Bluffs groundwater basin, a potential drinking water supply. Groundwater and surface water have not been encountered during investigation activities at the Site.
Residential Lead-Based Paint Hazard Reduction Act of 1992 (Title X of TSCA)	15 U.S.C. §2681,2683, and 2688; 40 Code of Federal Regulations (CFR) Section 745.65(c) and 745.227(h)(4)	66 Fed. Reg. 1206, 1238 (5 January 2001) revised 40 CFR Part 745 to establish a hazard standard of 400 mg/kg for lead in bare soil in a play area at residential sites and child-occupied facility sites.	Relevant and appropriate	Lead has been detected in soil at BBDA 2. BBDA 2 is planned to be used for recreational purposes. The human health residential lead cleanup level for the Presidio is based on this TSCA value (400 mg/kg), as well as a maximum average concentration of 370 mg/kg, calculated with the Department of Toxic Substances Control (DTSC) Leadspread model.
U.S. EPA Office of Solid Waste and Emergency Response (OSWER) Lead Guidance	OSWER Directive #9355.4-12 (Revised Interim Soil Lead Guidance for CERCLA sites and RCRA Corrective Action Facilities, July 1994); OSWER #9200.4-27P (Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities, August 27, 1998)	Outlines approach to determining protective levels for lead in soils at CERCLA sites and identifies 400 parts per million (ppm) as screening level for lead in soil for residential land use.	To be considered	Lead has been detected in soil at BBDA 2. The human health residential lead cleanup level for the Presidio is 400 mg/kg. BBDA 2 is planned to be used for recreational purposes.
U.S. EPA, Region 9, Regional Screening Levels (RSLs) for Chemical Contaminants at Superfund Sites	U.S. EPA (May 2012) (http://www.epa.gov/region9/superfund/prg/index.html)	RSLs are risk-based concentrations which can be used to evaluate whether a chemical release may pose a risk that warrants further investigation. RSLs are not legally enforceable standards. They are used for site "screening" and should not be used as cleanup levels for a CERCLA site until the other remedy selections identified in the relevant portions of the National Contingency Plan (NCP), 40 CFR Part 300, have been evaluated and considered.	To be considered	The cleanup levels for BBDA 2 were developed using a risk-based approach similar to the development of RSLs.
California Toxics Rule (CTR)	33 USC §1313(c)(2)(B); 40 CFR §131.38(b)(1), (2)	The California Toxics Rule sets forth freshwater and saltwater criteria for a number of metals and chemical compounds.	Applicable	BBDA 2 is located within the Coastal Bluffs groundwater basin. Groundwater and surface water have not been encountered during investigation activities at the Site.
State Chemical-Specific ARARs and TBCs				
California Regional Water Quality Control Board, San Francisco Bay Region (Water Board), Water Quality Control Plan (Basin Plan) – Chapter 3: Water Quality Objectives	Porter-Cologne Water Quality Control Act promulgated under California Water Code § 13240-13241, Basin Plan, Chapter 3	Chapter 3 of the Basin Plan sets forth water quality objectives for surface water and groundwater.	Relevant and Appropriate	BBDA 2 is located within the Coastal Bluffs groundwater basin. Groundwater and surface water have not been encountered during investigation activities at the Site.

TABLE 5-1
APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs)
***DRAFT* FEASIBILITY STUDY/REMEDIAL ACTION PLAN, BAKER BEACH DISTURBED AREA 2 (BBDA 2)**
Presidio of San Francisco, California

ARAR	Citation	Description	ARAR Determination	Comments [(1)]
Domestic Water Quality and Monitoring Regulations	Cal. Health and Safety Code §11635, 22 CCR §§64431, 64432, 64432.1, 64432.2, 64444, 64444.5	These sections of the California Code of Regulations, part of the state water quality standards, establish MCLs for organic and inorganic chemicals in drinking water.	Relevant and appropriate, where on a chemical by chemical basis, the standard is more stringent than federal standard	BBDA 2 is located within the Coastal Bluffs groundwater basin. Groundwater and surface water have not been encountered during investigation activities at the Site.
California Department of Public Health (CDPH) Drinking Water Program	CDPH Drinking Water Notification Level	Notification levels are health-based advisory levels established by CDPH for chemicals in drinking water that lack maximum contaminant levels (MCLs). When chemicals are found at concentrations greater than their notification levels, certain requirements and recommendations apply.	To be considered	BBDA 2 is located within the Coastal Bluffs groundwater basin. Groundwater and surface water have not been encountered during investigation activities at the Site.
Safe Drinking Water Act (SDWA)	Cal. Health and Safety Code § 116375, 22 CCR § 64449	This section of the SDWA establishes secondary MCLs for chemicals in drinking water that adversely affect its odor, taste, or appearance. They are desirable goals and are not enforceable.	To be considered	BBDA 2 is located within the Coastal Bluffs groundwater basin. Groundwater and surface water have not been encountered during investigation activities at the Site.
State Water Resources Control Board (SWRCB) Resolution No. 88-63	Porter-Cologne Water Quality Control Act promulgated under California Water Code § 13140	The resolution states that all surface and groundwaters of the State are considered to be suitable, or potentially suitable, for municipal or domestic water supply, unless the surface or groundwaters contain total dissolved solids ("TDS") in excess of 3,000 milligrams per liter ("mg/L"), the waters contain high levels of contamination, or the water source does not provide sufficient water to supply a well capable of producing 200 gallons per day.	To be considered	BBDA 2 is located within the Coastal Bluffs groundwater basin. Groundwater and surface water have not been encountered during investigation activities at the Site.
Water Board Order No. R2-2003-0080, Revised Site Cleanup Requirements and Rescission of Order No. 91-082 and Order No. 96-070. 96-070; U.S. Army Corps of Engineers (USACE), Fuel Product Action Level Development Report (FPALDR), Final, Oct. 1995 (soil cleanup levels)	Porter-Cologne Water Quality Control Act promulgated under California Water Code	Order No. R2-2003-0080 includes soil cleanup levels for petroleum hydrocarbons and a number of petroleum-related constituents including carcinogenic and noncarcinogenic polynuclear aromatic hydrocarbons (PAHs), benzene, toluene, ethylbenzene, xylenes (BTEX), methyl tert-butyl ether (MTBE), and lead: soil cleanup levels for the protection of human health (Table 1); soil cleanup levels for the protection of ecological receptors (Table 2); soil cleanup levels for the protection of water quality at detectable levels (Table 3); soil cleanup levels for the protection of water quality at drinking water standards (Table 4); and soil cleanup levels for Crissy Field (Table 5).	To be considered	The cleanup levels for petroleum hydrocarbons and related constituents in soil for sites meet or are more stringent than Board Order R2-2003-0080 Site Cleanup Requirements and FPALDR soil cleanup levels.
		Order No. R2-2003-0080 also includes point-of-compliance concentrations for soil and water for petroleum hydrocarbons, BTEX, and/or MTBE for the saltwater protection zone of the Presidio (Table 6) and the proposed freshwater stream (Table 7).		BBDA 2 is not located within the saltwater or freshwater ecological protection zones as defined in Order No. R2-2003-0080.
		Order No. R2-2003-0080 also specifies that groundwater cleanup levels shall meet drinking water standards (i.e. MCLs) using EPA/California MCLs as a basis.		BBDA 2 is located within the Coastal Bluffs groundwater basin. Groundwater and surface water have not been encountered during investigation activities at the Site.
Water Board Environmental Screening Levels (ESLs)	Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater, Interim Final, May 2008 (http://www.swrcb.ca.gov/sanfranciscobay/esl.shtml)	ESLs can be used to evaluate whether a chemical release may pose a risk that warrants further investigation. ESLs are not legally enforceable standards. They are used for site "screening".	To be considered	The cleanup levels for BBDA 2 were developed using a risk-based approach similar to the development of ESLs.

TABLE 5-1
APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs)
***DRAFT* FEASIBILITY STUDY/REMEDIAL ACTION PLAN, BAKER BEACH DISTURBED AREA 2 (BBDA 2)**
Presidio of San Francisco, California

ARAR	Citation	Description	ARAR Determination	Comments [(1)]
DTSC Leadspread, Computer Model, Version 8	Leadspread 8, DTSC Lead Risk Assessment Spreadsheet (http://www.dtsc.ca.gov/AssessingRisk/leadspread8.cfm)	A State of California computer model which calculates preliminary remediation goals for lead in soil based on DTSC default factors and exposure assumptions for a residential child.	To be considered	Based on BBDA 2 exposure assumptions for a recreational child, the preliminary remediation goal for lead in soil using the Leadspread 8 model is 306 mg/kg (Appendix B). The exposure point concentrations for lead in soil at BBDA 2 are less than 306 mg/kg.
Presidio-Wide Cleanup Levels	*Development of Presidio-Wide Cleanup Levels for Soil, Sediment, Groundwater, and Surface Water*, October 2002 (Revised May 2006)	The Cleanup Level Document presents cleanup levels for soil, sediment, groundwater, and surface water that are protective of human health and ecological habitat at the Presidio. The cleanup levels were developed under DTSC guidance and are anticipated to be applied to new decision documents for the Presidio.	To be considered	The soil cleanup levels for BBDA 2 were developed using a risk-based approach consistent with procedures specified in the Cleanup Level Document.
LOCATION-SPECIFIC ARARs AND TBCs				
Federal Location-Specific ARARs and TBCs				
National Historic Preservation Act (NHPA)	16 USC §§ 470–470x-6; 36 CFR §§ 800.1–.16, 60.2 (effect of listing in National Register), 65.2 (effect of designation as National Historic Landmark), 68.1–.4 (Dept. of Interior [DOI] standards for historic property projects assisted by the National Historic Preservation Fund)	This Act is applicable to the entire Presidio, since it is designated in the National Register as a historic landmark.	Applicable	
	NPS Programmatic Agreement	The Programmatic Agreement for the Presidio among the NPS, the State Historic Preservation Officer ("SHPO"), and the Advisory Council on Historic Preservation ("ACHP"), dated August 31, 1994, states that the Presidio of San Francisco shall manage and preserve its historic properties consistent with good historic preservation management and stewardship and sets forth the procedures to implement the historic compliance process of Section 106 of the NHPA.	To be considered	
Archeological Resources Protection Act (ARPA)	16 USC §§ 470aa–470mm; 43 CFR §§ 7.1–.37 (DOI regulations for protection of archeological and historical resources)	ARPA prohibits excavation of, damage to, or destruction of archeological resources on public lands without a permit issued by the federal land manager.	Applicable	The procedural permit requirement is not applicable to on-site remedial action. However, the substantive requirements of ARPA apply to remedial actions affecting archeological resources, Native American resources, or artifacts at the Presidio.
Federal Endangered Species Act (ESA)	16 USC §§ 1531(c)(1); 1532; 1533(d); 1536(a)–(d), (g), (h); 1538(a)(1)(B), (a)(1)(G), (a)(2)(B), (a)(2)(E); 1539(a), (c), (d); 1540(a)–(c); 50 CFR §§ 11.1–11.26, 13.1–13.29, 402.01–402.16, 424.01–424.21	Under the ESA, federal agencies must make sure that their actions are not likely to jeopardize the continued existence of endangered or threatened species or cause the destruction or adverse modification of critical habitat. Two federal endangered or threatened bird species have been recorded as casual visitors to the Presidio and vicinity: marbled murrulet, and snowy plover. Four federal threatened or endangered plant species have been identified at various locations at the Presidio: Raven's manzanita, Presidio clarkia, Marin dwarf flax, and San Francisco lessingia. Further, each federal agency must confer with U.S. Fish and Wildlife Service (USFWS) on any agency action which is likely to jeopardize the continued existence of any species proposed to be listed or result in the destruction or adverse modification of critical habitat proposed to be designated. On September 5, 2012, USFWS proposed critical habitat for the Franciscan manzanita (unoccupied) which coincides with BBDA 2.	Applicable	No ESA-listed species occur proximate to or within BBDA 2. However, the site is located within a recovery area for three federally-listed plant species: Raven's Manzanita, Marin dwarf flax, and Presidio clarkia, as well as a fourth candidate species Franciscan thistle. Based upon a request for formal consultation, in July 2002 the USFWS issued a "no jeopardy" Biological Opinion on the Presidio Environmental Remediation Program. With respect to remedial activities at BBDA 2, the USFWS concluded there would be no short or long-term negative effects to species and the cleanup of the site would result in beneficial effects to species habitat. With respect to the proposed critical habitat for the Franciscan manzanita, the proposed critical habitat will also benefit from the cleanup of the site and will continue to serve its intended conservation role for the species.

TABLE 5-1
APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs)
***DRAFT* FEASIBILITY STUDY/REMEDIAL ACTION PLAN, BAKER BEACH DISTURBED AREA 2 (BBDA 2)**
Presidio of San Francisco, California

ARAR	Citation	Description	ARAR Determination	Comments [(1)]
Archeological and Historic Preservation Act (AHPA)	16 USC §§ 469–469c-2; 43 CFR §§ 7.1-3.7 (DOI regulations for protection of archeological and historic resources)	AHPA requires federal agencies, prior to engaging in activities that could cause irreparable loss of scientific, prehistorical, historical, or archeological data, to notify the Secretary of the Interior of the threatened data and the proposed activities, and to preserve the data or request that the Secretary do so. The DOI must conduct a survey and recovery effort if it finds the data are significant and may be irrevocably lost without such action.	Applicable	
Native American Graves Protection and Repatriation Act (NAGPRA)	25 USC §§ 3001-3013; 43 CFR §§ 10.1-.17	NAGPRA establishes a system for determining ownership and proper disposal/removal of Native American cultural items discovered in federal lands and requires inventorying and identification of those items. Such items must be returned to the relevant tribe.	Applicable	
Migratory Bird Treaty Act	16 USC §§ 703–708; 50 CFR §§ 10.12, 10.13	The Act prohibits the taking of migratory birds, their nests and their eggs, unless permitted by the Secretary of the Interior. Migratory birds have been observed at the Presidio.	Applicable	
National Park Service (NPS) Organic Act	16 USC §§ 1 et seq.	The NPS Organic Act is intended to protect and conserve park resources and to provide for the enjoyment of those resources in a manner that will leave them unimpaired for future generations. The Act requires NPS to administer use of national parkland in a manner that conserves the scenery and natural and historic objects and wildlife therein.	Applicable	
Golden Gate National Recreation Area (GGNRA) Act	16 USC § 460bb–460bb-5, purposes of Section 1	Among the purposes stated in Section 1 of the GGNRA Act are to preserve the recreation area, to the degree possible, in its natural setting, and protect it from development and uses that would destroy the scenic beauty and natural character of the area.	Applicable	
	16 USC § 460bb–460bb-5	The GGNRA Act as a whole contains other general directives.	Applicable	
NPS Management Policies 2006	Sections 4.4.1 (General Principles for Managing Biological Resources), 4.4.1.2 (Genetic Resource Management Principles), 4.4.2.2 (Restoration of Native Plant and Animal Species), 4.4.2.4 (Management of Natural Landscapes), 4.4.2.5 (Maintenance of Altered Plant Communities), 4.4.4 (Management of Exotic Species), 4.4.4.2 (Removal of Exotic Species Already Present)	The NPS management policies contain Natural Resource Management preservation policies aimed at maintaining park natural resources in an unimpaired condition. The NPS Management Policies are to be considered for all Area A sites.	To be considered	
General Management Plan Amendment (GMPA)	*National Park Service, Creating a Park for the 21st Century, from Military Post to National Park* (1994)	The GMPA provides the overall land use plan for Area A of the Presidio.	To be considered	
Vegetation Management Plan (VMP)	*Presidio of San Francisco Vegetation Management Plan and Environmental Assessment*, December 2001	The VMP guides the management of vegetative resources within the Presidio, including enhancing, restoring, and rehabilitating native and planted vegetation at the Presidio. The VMP establishes the vegetative zones for the Presidio.	To be considered	

TABLE 5-1
APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs)
***DRAFT* FEASIBILITY STUDY/REMEDIAL ACTION PLAN, BAKER BEACH DISTURBED AREA 2 (BBDA 2)**
Presidio of San Francisco, California

ARAR	Citation	Description	ARAR Determination	Comments [(1)]
Memorandum of Agreement between the Presidio Trust and NPS (Area A MOA)	The Memorandum of Agreement for Environmental Remediation of Presidio of San Francisco Area A Property (Area A MOA), Sections 4, 5, and 6.1	Section 4 of the Area A MOA, Remedial Action Selection, sets forth standards for selection of final remedial actions. Section 5 of the Area A MOA guides the Trust's design and implementation of remedial actions. Section 6.1 guides the Trust's operation and maintenance and closure requirements.	To be considered	
Federal Coastal Zone Management Act (CZMA); California Government Code, title 7.2 (including McAteer-Petris Act); San Francisco Bay Conservation and Development Commission's (BCDC) San Francisco Bay Plan.	16 USC 1453, 1456; Cal. Gov. Code 66602.1, 66605, 66632; Cal. Code Regs., title 14 10300-10316; BCDC's San Francisco Bay Plan's water Quality Policies (pp.10-11), Recreation Policies (pp. 32-35), Public Access Policies (pp.36-37)	Remedial actions that affect any land or water use or natural resource of the coastal zone must comply with the CZMA section 307 mandates that federal agency activities be consistent to the maximum extent practicable with the enforceable policies of approved State management programs. BCDC's San Francisco Bay Plan policies include: protecting and increasing wetlands, maintenance of Bay water quality, protecting the Bay through erosion control, minimizing the impact of polluted runoff from projects, increasing recreational opportunities adjacent to the Bay, and providing maximum public access to the Bay.	Applicable	As federal property, by definition BBDA 2 is excluded from the coastal zone. Further, remediation activities should not result in coastal effects since groundwater and surface water have not been encountered during investigation activities at the Site.
Clean Water Act (CWA)	33 USC §1344; 33 CFR §323, 320-330; 40 CFR 230, 232	Section 404 of the CWA regulates the placement of dredged and fill material into waters of the U.S., including wetlands. The Act authorizes the issuance of permits for such discharges as long as the proposed activity complies with environmental requirements specified in Section 404(b)(1) of the CWA. The U.S. Army Corps of Engineers (USACE) has primary responsibility for the permit program and issues Section 404 permits. Section 404 of the CWA requires that states certify compliance of federal permits or licenses with state water quality requirements and other applicable state laws. Under Section 401, states have authority to review any federal permit or license that may result in a discharge to wetlands and other waters under state jurisdiction.	Applicable	There are no wetlands present at the BBDA 2 Soil Remedial Unit (RU). Based on preliminary observations during a July 2011 site visit, a small area between Magazines 28 and 29, located outside the remediation area at BBDA 2, may meet USACE criteria for wetlands (e.g., evidence of water inundation, presence of plants that evolved to grow in wet areas, and soils that show evidence of water saturation). This area will not be impacted by BBDA 2 remediation.
Federal wetlands regulations and state wetland policy	Executive Order 11990; 40 CFR § 6.302.(a), (d), (g); CA Fish & Game Commission's Wetlands Policy	Executive Order 11990 requires federal agencies conducting certain activities to avoid, to the extent practicable, adverse impacts associated with the destruction or loss of wetlands. The Cal. Dept. of Fish & Game Commission's wetlands policy instructs the Dept. of Fish & Game to recommend protection, preservation, restoration, enhancement and expansion of wetlands when the Dept. of Fish & Game acts in an advisory role.	Executive Order - Relevant and appropriate CA Wetlands Policy – To be considered	There are no wetlands present at the BBDA 2 Soil Remedial Unit. Based on preliminary observations during a July 2011 site visit, a small area between Magazines 28 and 29, located outside the remediation area at BBDA 2, may meet USACE criteria or Clean Water Act Executive Order 11990 criteria for wetlands (e.g., evidence of water inundation, presence of plants that evolved to grow in wet areas, and soils that show evidence of water saturation). This area will not be impacted by BBDA 2 remediation.
State Location-Specific ARARs and TBCs				
Basin Plan, Wetlands Protection Management	Porter-Cologne Water Quality Control Act promulgated under California Water Code, § 13240-13241, Basin Plan, pp. 4-49 to 4-51	The Basin Plan reaffirms the goal of the California Wetlands Conservation Policy of ensuring no net loss of wetlands.	To be considered	There are no wetlands present at the BBDA 2 Soil Remedial Unit. Based on preliminary observations during a July 2011 site visit, a small area between Magazines 28 and 29, located outside the remediation area at BBDA 2, may meet Clean Water Act Executive Order 11990 criteria for wetlands (e.g., evidence of water inundation, presence of plants that evolved to grow in wet areas, and soils that show evidence of water saturation). This area will not be impacted by BBDA 2 remediation.
California Regulations for Discovery of Human Remains	Cal. Health & Safety Code §§ 7050.5	The Cal. Health & Safety Code establishes intentional disturbance, mutilation, or removal of interred human remains as a misdemeanor. This Code requires that further excavation or disturbance of land, upon discovery of human remains outside of a dedicated cemetery, cease until a county coroner makes a report. This Code requires a county coroner to contact the Native American Heritage Commission within 24 hours if the coroner determines that the remains are not subject to his or her authority and if the coroner recognizes the remains to be those of a Native American.	To be considered	

TABLE 5-1
APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs)
***DRAFT* FEASIBILITY STUDY/REMEDIAL ACTION PLAN, BAKER BEACH DISTURBED AREA 2 (BBDA 2)**
Presidio of San Francisco, California

ARAR	Citation	Description	ARAR Determination	Comments [(1)]
California Endangered Species Act (CESA)	Cal. Fish & Game Code §§ 2053–2054, 2081, 2080.1, 2081.1; 14 CCR §§ 670.2, 670.5, 783.1-783.6; Cal. Fish & Game Code § 2014	The California ESA provides authority similar to the Federal ESA for the protection of threatened and endangered species listed by the State. Four California endangered or threatened plant species have been identified at the Presidio: Raven's Manzanita, Presidio clarkia, Marin dwarf flax, and San Francisco Lessingia. Four California endangered or threatened bird species have been recorded as casual visitors to the Presidio and vicinity: bald eagle, marbled murrulet, snowy plover, and willow flycatcher.	To be considered	The willow flycatcher may migrate through or nest at BBDA 2 but will not be impacted by BBDA 2 remediation because vegetation will not be removed during bird nesting season unless a survey is performed.
California Native Plant Protection Act	Cal. Fish & Game Code § 1908; 14 CCR §§ 783.1–783.6	The California Native Plant Protection Act prohibits the taking of endangered or rare native plants, unless authorized by an incidental take permit. The Presidio has a number of endangered or rare plants specified under the California Native Plant Protection Act.	To be considered	There are no listed endangered or rare plants under the California Native Plant Protection Act present within the BBDA 2 Remedial Unit. Four California Native Plant Society (Limited Distribution and Rare or Endangered) plant species are known to occur proximate to the site: *Arabis blepharophylla*, *Erysimum franciscanum, Grindelia hirsutula var. maritima*, and *Cirsium andrewsii*. Based on a July 2011 site visit, only *C. andrewsii*, a CNPS Rare or Endangered Species, was observed in the area between Magazines 28 and 29. This area will not be impacted by BBDA 2 remediation.
California Fish & Game Code regarding protection of birds, mammals, reptiles, or amphibia	Cal. Fish & Game Code §§ 3503, 3503.5, 3511, 3513; 14 CCR § 747	The California Fish & Game Code prohibits taking, possessing, or destroying certain birds, their nests, and their eggs; mammals; reptiles; or amphibia. Migratory and other birds have been observed at the Presidio. Remedial actions that include removal of vegetation that may provide nests for migratory birds may require additional review.	To be considered	
ACTION-SPECIFIC ARARs AND TBCs				
Federal Action-Specific ARARs and TBCs				
Resource Conservation and Recovery Act (RCRA)	40 CFR §§260-299; Subtitle C (hazardous waste requirements); State of California citation: Cal. Health & Safety Code, Title 22	RCRA is the primary federal law governing the disposal of hazardous and non-hazardous or municipal solid waste passed by Congress in 1976 and amended in 1984 by Hazardous and Solid Waste Amendments (HSWA). RCRA Subtitle C sets standards for the classification of hazardous waste, and requirements governing handling, management, transportation, treatment, and off-site disposal of these wastes. As specified in the Consent Agreement, the Trust addresses releases of (1) hazardous substances and hazardous waste at the Presidio under its hazardous substances and hazardous waste program overseen by the DTSC; and (2) non-hazardous petroleum hydrocarbons at the Presidio under its petroleum program overseen by the Water Board.	Relevant and appropriate	
	40 CFR §§257-258; Subtitle D (non-hazardous or municipal solid waste requirements); State of California citation: Cal. Health & Safety Code, Title 27	RCRA Subtitle D focuses on state and local governments as the primary planning, regulating, and implementing entities for the management of non-hazardous solid waste. Under Subtitle D, EPA developed federal criteria for the proper design and operation of municipal solid waste landfills (MSWLFs) and other solid waste disposal facilities. Pursuant to 42 USC § 7926, the State of California is authorized to implement the federal RCRA Program for solid waste. Federal statutes may apply to areas not covered by the state program, or where incorporated by reference.	Relevant and appropriate	

TABLE 5-1
APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs)
***DRAFT* FEASIBILITY STUDY/REMEDIAL ACTION PLAN, BAKER BEACH DISTURBED AREA 2 (BBDA 2)**
Presidio of San Francisco, California

ARAR	Citation	Description	ARAR Determination	Comments [(1)]
Toxic Substances Control Act (TSCA)	15 USC §§ 2602, 2605(e) (regulation of polychlorinated biphenyls [PCBs]); 40 CFR 761.1-761.3 (definitions) & Subparts C (§§ 761.40-.45)(marking of PCBs and PCB items), D (§§ 761.50-.79) (storage and disposal of PCBs), N-R (§§ 761.260-.359) (sampling and analysis of PCB waste	TSCA regulates the use and disposal of various chemicals, including PCBs. Subpart D of 40 CFR Part 761 outlines disposal and cleanup procedures for wastes with a PCB concentration of at least 50 ppm [40 CFR §§ 761.60-.61] and prohibits the unpermitted discharge of PCBs to navigable waters or a treatment works at more than 3 parts per billion (ppb) concentration [id. § 761.50(a)(3)]. Certain PCBs in soil must be cleaned up and disposed of in accordance with Section 761.61. Certain liquid PCBs must be incinerated or otherwise disposed of in accordance with Section 761.60(a) or (e) [id. § 761.61(b)]. TSCA also contains specified requirements for labeling of containers and equipment with PCB-containing materials, and of transport vehicles carrying a certain amount of liquid PCBs (id. § 761.40).	Relevant and appropriate	PCBs are not chemicals of concern at BBDA 2.
Clean Water Act (CWA)	33 USC §1342	Section 402 of the CWA regulates discharges of pollutants under the National Pollutant Discharge Elimination System (NPDES). The storm water discharges program is regulated by the State Water Board for certain municipal, industrial, and construction storm water discharges through NPDES permits. NPDES permits include requirements to prevent or reduce discharges of pollutants that cause or contribute to violations of water quality objectives.	Relevant and appropriate	The procedural permit requirement is not applicable to on-site remedial action at BBDA 2. Groundwater and surface water have not been encountered during investigation activities at the Site.
State Action-Specific ARARs and TBCs				
Consent Agreement for the Remediation of Hazardous Substances at the Presidio of San Francisco (Consent Agreement)	Consent Agreement Among the California Department of Toxic Substances Control, the Presidio Trust, and the US Department of the Interior, National Park Service for the Remediation of Hazardous Substances at the Presidio of San Francisco (August 30, 1999)	The Consent Agreement establishes responsibilities and procedures between these parties for cleanup of releases of hazardous substances and hazardous waste at the Presidio under CERCLA and RCRA, specifically governing cleanup of nine Operable Units (OUs). The Trust addresses releases of hazardous substances and hazardous waste at the Presidio under its hazardous substances and hazardous waste program overseen by the DTSC. The definition of hazardous substances governed under CERCLA excludes petroleum hydrocarbons, as specified in the NCP at 40 CFR, Part 300.5. Accordingly, the Trust addresses releases of petroleum hydrocarbons at the Presidio under its petroleum program overseen by the Water Board.	To be considered	
Institutional controls on soil and groundwater	California Civil Code § 1471; Cal. Health & Safety Code § 25355.5(a)(1)(C); CCR tit. 22 § 67391.1(e)	Provides conditions under which land use restrictions will apply to successive owners of land. The substantive provision is the following general narrative standard: "to do or refrain from doing some act on his or her own land…where (c) each such act relates to the use of land and each such act is reasonably necessary to protect present or future human health or safety of the environment as a result of the presence of hazardous materials, as defined in § 25260 of the Cal. Health & Safety Code." This language provides authority for establishing a durable institutional control that will be implemented through incorporation of restrictive environmental covenants that run with the land in both the federal deed at the time of transfer of the property and in the Covenant to Restrict Use of Property with DTSC to be executed at the time of transfer. Whenever DTSC determines that it is not feasible to record a land use covenant for property owned by the federal government, such as transfers from one federal agency to another, DTSC and federal government shall use other mechanisms to ensure that future land use will be compatible with the levels of hazardous materials, hazardous wastes or constituents, or hazardous substances which remain on the property. Examples include: amendments to the federal government facility master plan, physical monuments, or agreements between the federal government facility and DTSC.	Relevant and appropriate	

TABLE 5-1
APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs)
***DRAFT* FEASIBILITY STUDY/REMEDIAL ACTION PLAN, BAKER BEACH DISTURBED AREA 2 (BBDA 2)**
Presidio of San Francisco, California

ARAR	Citation	Description	ARAR Determination	Comments [(1)]
Basin Plan - Chapter 4: Effluent Limitations	Porter-Cologne Water Quality Control Act promulgated under California Water Code § 13240-13241, Basin Plan, pages 4-8 to 4-11	Limitations to construction-related storm water discharges are described in this provision.	To be considered	
Discharge of Treated Groundwater Table 4-1: Discharge Prohibitions	Porter-Cologne Water Quality Control Act promulgated under California Water Code § 13240-13241, Basin Plan, pp. 4-17 to 4-18; Table 4-1	Table 4-1 more broadly describes discharge prohibitions (e.g., with respect to toxic substances, solid wastes, silt, sediments, oil, and petroleum by-products). Page 4-17 of the Basin Plan refers to SWRCB Resolution No. 88-160, Disposal of Extracted Groundwater from Cleanup Projects, which urges dischargers of groundwater extracted from site clean-up projects to reclaim their effluent. It states that when reclamation is not feasible, discharges must be piped to a municipal treatment plant or discharged under a National Pollutant Discharge Elimination System (NPDES) permit authorizing the discharge from these sites.	To be considered	
-- Surface Water Protection	Porter-Cologne Water Quality Control Act promulgated under California Water Code, § 13240-13241, Basin Plan pp. 4-28, 4-32, 4-40 to 4-41	Surface Water Protection and Management through nonpoint source control is regulated by the Water Board. Under the Construction General Permit 99-08-DWQ, the Water Board requires a Notice of Intent (NOI) to be filed prior to construction, a Storm Water Pollution Prevent Plan (SWPPP) to be prepared and implemented, and a Notice of Termination to be filed upon construction completion for construction activities involving disturbance of one acre or greater total land. Permit conditions address pollutant and waste discharges occurring during construction activities and the discharge of pollutants in runoff after construction. The Erosion and Sediment Control program establishes guidelines for the regulation of erosion and sedimentation for the protection of beneficial uses of water due to the impairment by sediment.	To be considered	
Hazardous Waste Requirements - Generation, Transport, and Disposal Regulations	State of California citation: Cal. Health & Safety Code §§ 25100–25249, 25250–25250.26, 25260–25929; 22 CCR §§ 66260.1–68500.35. Federal citation: 42 USC §§ 6901–6991i; 40 CFR Parts 260–282. §§ 25100-25166.5, 25179.1–.12 (land disposal restrictions [LDRs]), 25244–25244.24 (waste reduction and recycling); 22 CCR §§ 66260.10–66262.41, 66264.1–.172, 66265.16–199; 66268.10–.44, .105–113 (LDRs + treatment standards); 49 CFR Parts 172, 173, 178, 179 (transportation) [incorporated by reference]	Pursuant to 42 USC § 7926, the State of California is authorized to implement the federal RCRA Program. Federal statutes may apply to areas not covered by the state program, or where incorporated by reference.	Relevant and appropriate	
Medical Waste Handling Requirements	Cal. Health and Safety Code 117600-118360; SF Municipal Health Code §§ 1501-1514	Medical waste is required to undergo certain treatment requirements prior to disposal so that it can be characterized as a “solid” waste. Without such treatment, land disposal of medical waste is not permitted.	Relevant and appropriate	Based on existing site data, medical waste is not expected to be present at BBDA 2.
Solid (Nonhazardous) Waste Requirements	Cal. Pub. Res. Code §40000-40201, 43000-44820; 27 CCR §§ 20005-20278	These requirements govern disposal of nonhazardous solid waste and closure and post closure of solid waste management units.	To be considered	

TABLE 5-1
APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs)
***DRAFT* FEASIBILITY STUDY/REMEDIAL ACTION PLAN, BAKER BEACH DISTURBED AREA 2 (BBDA 2)**
Presidio of San Francisco, California

ARAR	Citation	Description	ARAR Determination	Comments [(1)]
Clean Closure Requirements	27 CCR § 20380(d)(2); 27 CCR § 21090(f); CCR § 21410	For clean closure, all waste, waste residues, contaminated containment systems components, contaminated subsoil, and all other contaminated materials are removed or decontaminated at closure pursuant to the specific requirements for landfills, etc. Clean closure renders the landfill no longer a threat to water quality.	Relevant and appropriate	
Closure, Post-Closure Maintenance and Land Use Restrictions	Cal. Health and Safety Code §§ 25100-25124 (definitions), 25208-25208.17 (special rules for surface impoundments), 25209-25209.7 (land treatment units); 25245-25249 (financial responsibility and closure and maintenance of facilities), 25297.15, 25299.10-25299.99.3 (closure of/corrective action regarding USTs); 22 CCR §§ 66264.110-66264.120, 66265.110-66265.120; 67217 (post-closure care)	Provisions of the California Health and Safety Code and implementing regulations govern the method and timing of closure of certain types of locations with material above hazardous waste levels (e.g., landfills), and the required post-closure care of those facilities, including meeting associated financial requirements (H & S Code 25208-25208.17, 25245-25249 financial responsibility and closure and maintenance of facilities); 22 CCR 66264.110-66264.148, 66264.228 (surface impoundments); 22CCR 66264.258 (waste piles); H & S Code 25209-25209.7; 22CCR 66264.280 (land treatment units); 66264.310 (landfills); 66264.351 (incinerators).	To be considered	
Federal Clean Air Act (CAA), certain Bay Area Air Quality Management District (BAAQMD) Regulations	BAAQMD Regulations (see citations below)	Implementation of federal Clean Air Act requirements has been delegated, in part, to the State of California. The BAAQMD is the local implementing agency. Where BAAQMD requirements have been incorporated into the State Implementation Plan (SIP) and approved by EPA, they are federally-enforceable. Where BAAQMD requirements have not been incorporated into the SIP and approved by EPA, they are not federally enforceable.	Relevant and appropriate	
	Air Resources Board Executive Order G-02-026, Resolution 0128, Modification to Section 93105 of Title 17 of the CCR, Asbestos Air-borne Toxic Control Measures for Construction, Grading, Quarrying, and Surface Mining Operations	The Model Rule addresses potential asbestos releases that may occur during construction, grading, quarrying, and surface mining on areas that contain naturally occurring asbestos. Excavation in serpentine rock may result in the emission of naturally occurring asbestos. Such activities in areas larger than 1 acre will require a dust mitigation plan.	To be considered	
	BAAQMD Regulation 7; Regulation 8, Rule 40; and Regulation 9, Rule 2	These requirements regulate the emission of odorous substances, organic compounds, and hydrogen sulfide.	Relevant and appropriate	
	BAAQMD Regulation 8, Rule 15	BAAQMD Regulation 8, Rule 15 prohibits the use of certain types of liquid and emulsified asphalts (those that would emit large amounts of organic compounds). This rule was approved into the SIP on 22 March 1995, as amended by BAAQMD on 1 June 1994.	Relevant and appropriate	
California prohibitions on polluting waters of the State	Cal. Fish & Game Code § 5650	Cal. Fish & Game Code § 5650(a) prohibits depositing enumerated substances, including “any substance or material deleterious to fish, plant life, or bird life” into the waters of the state.	To be considered	
Underground Storage Tank (UST) Regulations	California Code of Regulations, Title 23, Chapter 16, Article 11	UST regulations protect waters of the state from discharges of hazardous substances from USTs.	Relevant and appropriate	No USTs are known to be present at BBDA 2.

TABLE 5-1
APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs)
***DRAFT* FEASIBILITY STUDY/REMEDIAL ACTION PLAN, BAKER BEACH DISTURBED AREA 2 (BBDA 2)**
Presidio of San Francisco, California

ARAR	Citation	Description	ARAR Determination	Comments [(1)]
Water Board Order No. R2-2003-080	Porter-Cologne Water Quality Control Act promulgated under California Water Code Section 13304	Order No. R2-2003-0080, Task 16, outlines requirements for Contingency Petroleum Sites.	To be considered	
San Francisco Bay Water Board UST Program	California Health and Safety Code, Division 20, Chapters 6.7 and 6.75	The San Francisco Bay Water Board UST Program gives local agencies the authority to oversee investigation and cleanup of UST leak sites.	Relevant and appropriate	No USTs are known to be present at BBDA 2.
City and County of San Francisco UST Regulations	San Francisco Health Code, Article 21	These regulations describe procedures that the San Francisco Department of Public Health requires UST owners and operators to follow in removing USTs.	To be considered	No USTs are known to be present at BBDA 2.
City of San Francisco Noise Regulations	City of San Francisco Code, Article 29 § 2907 and 2908	These regulations describe provisions to regulate noise during operation of construction equipment and when performing construction work at night. Nighttime construction (between 8 p.m. to 7 a.m.) to erect, construct, demolish, excavate for, alter, or repair any building or structure if the noise level created thereby is in excess of the ambient noise level by 5 dBA requires a permit by the Director of Public Works.	To be considered	
San Francisco Public Utilities Commission, Permit No. 05-0246 Industrial User Class II Wastewater Permit, dated February 7, 2005	San Francisco Municipal Code: Public Works Code, Article 4.1	Permit No. 05-0246 from the San Francisco Public Utilities Commission authorizes the Trust to discharge wastewater into the City and County of San Francisco sewerage system, provided that such wastewater discharges are performed in accordance with the conditions set forth in this permit. Discharge to the sewer of groundwater from dewatering must meet these requirements.	To be considered	

(1) Locations for remote staging areas will be identified prior to remedial activities. Remote staging areas will have similar action- and chemical-specific ARARs and TBCs as BBDA 2. Location-specific ARARs and TBCs may be more or less stringent, depending on the location of the staging area.

Table 6-1. Summary of Depth of Debris Fill

Debris Fill Area, Baker Beach Disturbed Area 2

Feasibilty Study/Remedial Action Plan

Presidio of San Francisco, California

Sample Location	Sample Depth (ft)	Type of Material	Depth (ft) to Base of Debris Fill	Rationale and assumptions with respect to depth of debris fill
BB2TP500	2	afw	4	
	11	afh		Concrete debris observed to 4 ft bgs in adjacent Trench 1.
BB2TP501	0.5	afh	0	No debris
	2.5	Qcol		
BB2TP502	3	afw	12.25	Base of debris.
	9.5	afw		
	13	Qcol		
BB2TP503	1.5	afw	12.25	Adjacent to BB2SB101
	5.5	Qcol		
BB2TP504	1.5	afh	1	Concrete fragments within the top foot.
	5.5	afh		
BB2TP505	1	afw	3	Bottom of debris fill within the test pit.
	7.5	Sp		
BB2TP506	1	afw	4	Adjacent to BB2TP507
	6.5	Sp		
BB2TP507	0	afw	4	Bottom of debris within the trench.
	4	Qcol		
BB2TP508	0.5	afw	0.5	Construction debris observed at the surface.
BB2TP509	1	Qcol	0.5	Construction debris observed at the surface.
BB2TP510	0.5	Qcol	2.5	Adjacent to BBSB06
BB2TP511	2	Qcol	2.5	Adjacent to BBSB06
BB2TP512	1	Qcol	0.5	Construction debris observed at the surface.
	4.5	Qcol		
BB2TP513	1	Qcol	0	Not impacted, not debris fill
BB2TP514	3.5	afw	12	Bottom of debris fill within the test pit
	9.5	afw		
	12.5	Qcol		
BB2TP515	1	afw	9.5-10.0	Bottom of debris fill within the test pit.
	5	afw		
	11	Qcol		
BB2SB519	0	afw	8	Midway between BB2TP110 and BB2TP502.
BB2SB521	0	afh	4	Adjacent to BB2TP110

Table 6-1. Summary of Depth of Debris Fill

Debris Fill Area, Baker Beach Disturbed Area 2

Feasibilty Study/Remedial Action Plan

Presidio of San Francisco, California

Sample Location	Sample Depth (ft)	Type of Material	Depth (ft) to Base of Debris Fill	Rationale and assumptions with respect to depth of debris fill
BB2TP110	3	afw	4	Bottom of debris fill within the test pit.
	4	afh		
	9	Qcol		
BB2TP105	11.5	afh	10	Debris fill observed in trench down to 10 ft bgs.
	15	Qcol		
BB2TP106	2	afw	6	Bottom of debris fill within the test pit at location of sample.
BB2SB110	0.5	Qcol	0	Not debris fill
	1	Qcol	0	
BB2SB102	0	afw	6	
	2	afw		
BBSB06	0	afw	2.5	1 foot below observed debris fill.
	1.5	afw		
BBSB07	0	Qcol	0	Not debris fill
BBSB08	0	afw	12	Bottom of debris fill at that location base on log from BB2TP502
	1.5	afw		

Abbreviations:

afh = historic fill without debris

afw = debris fill

ft = Foot

Qcol = Colma formation

Sp = serpentinite

Table 6-2. Description of Potential Remedial Alternatives
Debris Fill Area, BBDA 2

Alternative 1 **No Action**	**Alternative 2** **Land Use Controls**	**Alternative 3** **Excavation**	**Alternative 4** **Engineered Cover**
Remedy Description			
No remedial action would be implemented. The site would be left in its current condition. No controls or actions for further protection of human health and the environment would be implemented for debris and fill soil containing chemicals of concern (COCs) at concentrations above cleanup levels protective of human health and sensitive ecological receptors (hereafter referred to as debris fill).	Human health would be protected by implementing engineering controls to prevent/minimize human contact with debris fill and placing land use controls on site access and preventing land use that would pose risk to human receptors. Additionally, land use planners would be notified of the presence of metals in debris fill at levels that pose potential risk to sensitive ecological receptors.	Human health and ecological receptors would be protected by removing debris fill as practicable.	Human health and ecological receptors would be protected by covering debris fill and maintaining the cover. Land use controls would be implemented to inform land use planners of the presence of COCs in debris fill beneath the cover at levels that pose a potential risk to human health and sensitive ecological receptors.
Site Construction			
Not applicable.	New fencing and signs would be installed to limit recreational visitor access to trails. Engineering controls would be maintained in conformance with an approved maintenance plan.	Additional geotechnical studies would be conducted to understand impacts of excavation on slope stability, potential for failure and erosion of excavated areas, and surface water runoff. Fencing would be installed around the work area and trees in the excavation area would be cut down and removed from the site. In addition, tree stumps, fallen trees and logs would be removed. The cover area would be cleared and grubbed. Debris fill would be excavated as practicable, and disposed of offsite. Because there is potential short-term risk of slope rebound or cracking around excavated areas where the overburden weight is reduced, not all of the debris fill may be removed. Potential slope stability issues would be addressed in the remedial design. Clean backfill material may be imported and placed to stabilize the area, as necessary. The site would be re-vegetated in accordance with the VMP. Erosion control measures would be placed until site vegetation is established.	Additional geotechnical studies would be conducted to provide recommendations to understand impacts of capping on slope stability, potential for failure and erosion of the engineered cover, and surface water runoff. Fencing would be installed around the work area and trees in the engineered cover area would be cut down and removed from the site. In addition, tree stumps, fallen trees and logs would be removed. The cover area would be cleared, grubbed, and graded. Debris fill at the edge of the bluff would be scraped back and consolidated a safe distance from the bluff edge to be under the cover. Clean backfill material would be imported, placed, and compacted over the debris fill. The cover would be designed to minimize erosion and maintain the integrity of the cover. Soil comprising the engineered cover would be selected based on planned site re-vegetation. Engineered slope stabilization measures would be installed on the west side of the cover a safe distance from the edge of the bluff to prevent down slope movement of cover materials. The site would be re-vegetated in accordance with the VMP. Erosion control measures would be placed until site vegetation is established. It is noted that BBDA 2 is located on a bluff slope above a wave-impacted beach and natural processes would result in slope failure and mass-wasting that could affect the integrity of the cover. Engineering measures would reduce potential for failure in the short term, but may require modification during the lifetime of the cover.

Table 6-2. Description of Potential Remedial Alternatives
Debris Fill Area, BBDA 2

Alternative 1 **No Action**	**Alternative 2** **Land Use Controls**	**Alternative 3** **Excavation**	**Alternative 4** **Engineered Cover**
Land Use and Engineering Controls and Post Construction Management			
Not applicable.	A recreational and ecological land use control would be implemented that would define areas where recreational visitor access would be allowed and where restricted access requiring health & safety orientation would be required. Controls would be placed on land use that would pose risk to human health and ecological receptors.	One year of post construction erosion control monitoring would be implemented following remedial construction.	Land use controls would be implemented that would define areas where COCs are present in debris fill at concentrations above human and ecological cleanup levels. A monitoring and maintenance plan for the cover would be implemented post-construction. The plan would include protocols for cover repairs and replacement. As discussed above, BBDA 2 is located on a bluff slope above a wave-impacted beach that is subject to natural processes of slope failure and mass wasting, therefore, the long term integrity of the cover may be compromised. To the extent any erosion or slope movement results in unacceptable risks to human health or ecological receptors, repairs would be made. The need for maintenance of the cover would be reduced by moving COC-impacted debris fill from the bluff edge and placing cover in areas considered to be more stable.

Table 7-1. Comparative Analysis of Remedial Alternatives
Debris Fill Area, BBDA 2

Alternative 1 **No Action**	**Alternative 2** **Land Use Controls**	**Alternative 3** **Excavation**	**Alternative 4** **Engineered Cover**
DESCRIPTION OF ALTERNATIVE			
No remedial action would be implemented. The site would be left in its current condition.	Land use controls would be implemented restricting site access and preventing land use that would pose risk to human receptors. Additionally, land use planners would be informed of the presence and location of the debris and fill soil containing COCs at concentrations above cleanup levels protective of human health and sensitive ecological receptors (hereafter referred to as debris fill).	Human and ecological receptors would be protected by removing debris fill, as practicable, from the site.	Human health and ecological receptors would be protected by covering debris fill and maintaining the cover. Land use controls would be implemented to inform land use planners of the presence debris fill beneath the cover.
THRESHOLD CRITERIA			
1) Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)			
Alternative is not expected to substantively comply with ARARs. The alternative does not meet To-Be-Considered requirements (TBCs) regarding cleanup levels for protection of human health and sensitive ecological receptors.	Alternative is expected to substantively comply with ARARs. The alternative may not meet some TBCs regarding future sensitive habitat plans for the site and potential trail and overlook construction plans.	Alternative is expected to comply with ARARs. Human health and ecological receptors would be protected from potential exposure to COCs by removing debris fill, as practicable, from the site.	Alternative is expected to comply with ARARs. Human health and ecological receptors would be protected from exposure to COCs in debris fill by placement and maintenance of an engineered cover. Soil comprising the engineered cover would be selected based on planned site re-vegetation.
2) Overall protection of human health and the environment			
Alternative is not anticipated to be protective of human health and the environment based on cleanup levels associated with a target cancer risk level of 1.E-06 and the concentration associated with a target non-cancer hazard index of one or unity and at the most stringent of cleanup levels for protection of ecological receptors.	Alternative is protective of human health and the environment based on restricting site access and prohibiting land use where there is potential risk to human health and ecological receptors.	Alternative is protective of human health and the environment by removing debris fill, as practicable, from the site.	Alternative is protective of human health and the environment by preventing exposure to COCs in the debris fill by placement of the cover. Land use controls would be implemented to inform land use planners of the presence of debris fill beneath the cover.

Table 7-1. Comparative Analysis of Remedial Alternatives
Debris Fill Area, BBDA 2

Alternative 1 **No Action**	**Alternative 2** **Land Use Controls**	**Alternative 3** **Excavation**	**Alternative 4** **Engineered Cover**
BALANCING CRITERIA			
1) Long-term effectiveness and permanence			
Alternative would not offer long-term protection for human health and ecological receptors from exposure to COCs in debris fill or provide permanence in remediating concentrations of COCs in the debris fill.	Alternative offers long-term protection for human health and ecological receptors through implementation of land use controls, but would not permanently remove or cover the debris fill.	Alternative would offer long-term protection for human health and ecological receptors from exposure to COCs in debris fill and would provide permanence by removing debris fill, as practicable, from the site.	Alternative would offer long-term protection for human health and ecological receptors from exposure to COCs in debris fill, and would provide permanence by placing a cover over debris fill. The cover would need to be maintained to assure long-term effectiveness and permanence.
2) Reduction of toxicity, mobility, or volume (TMV) through treatment			
Alternative would not reduce TMV of debris fill at the site.	Alternative would not reduce TMV of debris fill at the site.	Alternative would not provide for the direct reduction of TMV of contaminants through treatment, but the debris fill would be removed from the site and transferred to an off-site facility that is designed to control and contain the waste generated by excavation.	Alternative would not reduce TMV of contaminants in debris fill through treatment, although the mobility would be reduced through placement of the engineered cover over the debris fill.
3) Short term effectiveness			
Alternative is not anticipated to be effective in the short term at achieving all remedial action objectives (RAOs), and would not pose any short-term disruptions to the community.	Alternative would be effective in the short term at achieving some RAOs, and would not pose any short-term disruptions to the community.	Alternative would be effective in the short term at achieving RAOs, and would pose short-term disruptions to the community during excavation, as recreational access to the area would be limited during construction. Because there is a potential short-term risk of slope rebound or cracking around excavated areas where the overburden weight is reduced, not all of the debris fill may be removed from the site.	Alternative would be effective in the short term at achieving RAOs, and would pose short-term disruptions to the community during placement of the cover as recreational access to the area would be limited during construction.

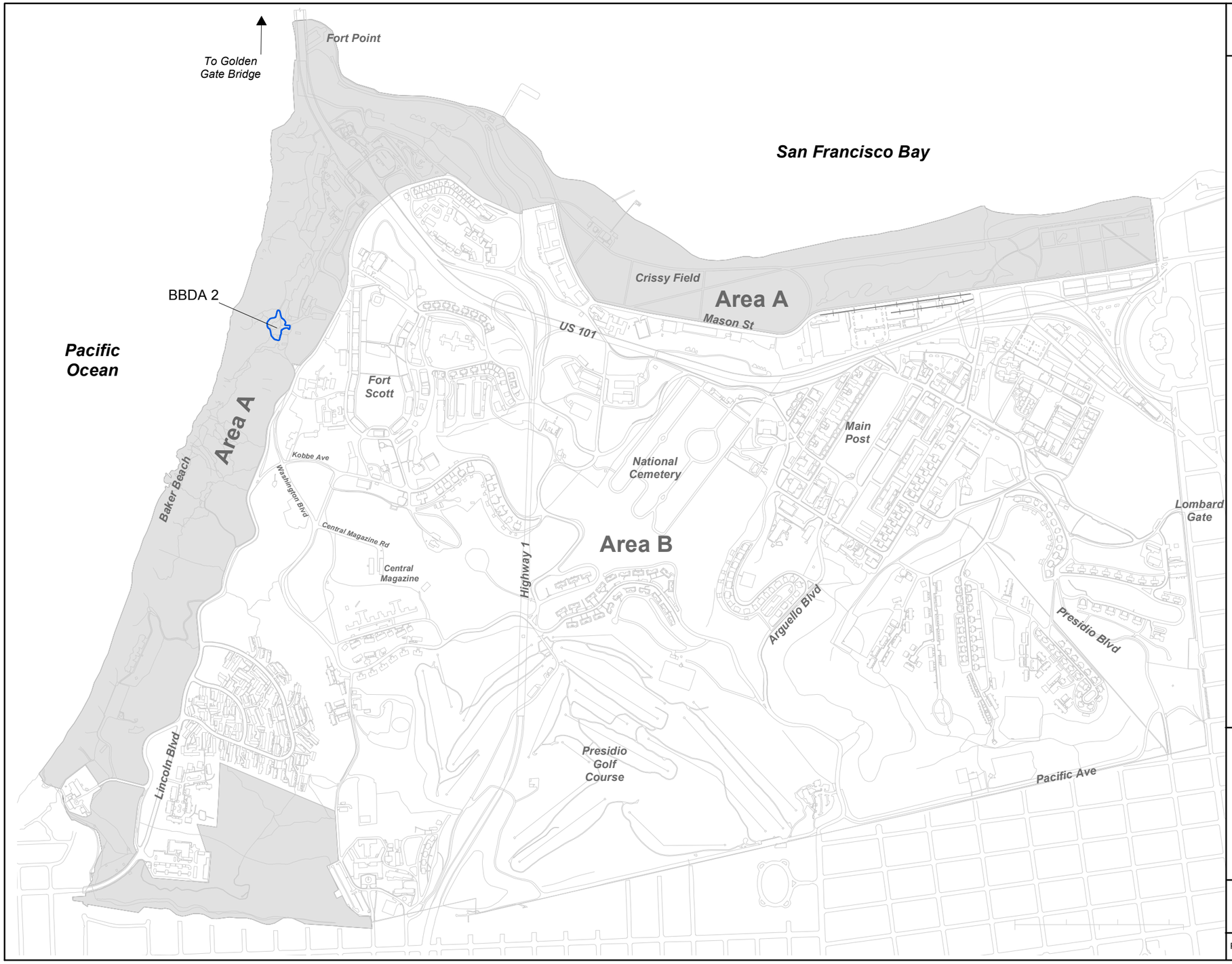
Table 7-1. Comparative Analysis of Remedial Alternatives
Debris Fill Area, BBDA 2

Alternative 1 **No Action**	**Alternative 2** **Land Use Controls**	**Alternative 3** **Excavation**	**Alternative 4** **Engineered Cover**
4) Implementability			
Alternative would not be difficult to implement as it does not require any action be taken.	Alternative would not be difficult to implement as it does not require any action be taken except to implement land use controls.	Alternative would be relatively difficult to implement as it requires excavation on and adjacent to historic magazines and on steep unstable slopes. Construction work would require specialized equipment and fall protection measures. Implementation of this alternative would include removal of established vegetation with root systems that serve to stabilize soil. Because removal of soil from areas down slope of the magazines may compromise the long-term stability of the magazines, not all of the debris fill may be removed. Remedial construction for this alternative is estimated to be completed over approximately 4 months.	Alternative would be relatively difficult to implement as it requires placement of an engineered cover adjacent to historic magazines and on steep slopes prone to erosion and mass wasting. Placement of additional soil as cover could affect overall slope stability. Potential effects would need to be evaluated as part of a pre-design geotechnical evaluation. Construction work would require specialized equipment and fall protection measures. Implementation of this alternative would include removal of established vegetation with root systems that serve to stabilize soil. Specialized equipment for working on steep slopes would be required for placement of the cover and slope stabilization measures or retaining structures would be constructed to maintain the integrity of the cover. The cover would also require monitoring and maintenance until vegetation is re-established. Remedial construction for this alternative is estimated to be completed over approximately 3 to 4 months.
5) Cost			
NEGLIGIBLE COST	LOW COST Total Cost: $90,000 Capital Cost: $90,000 (includes factored & contingency costs from Table D-2) Monitoring & Maintenance Cost: $0	HIGH COST Total Cost: $3,200,000 Capital Cost: $3,200,000 (includes factored & contingency costs from Table D-3) Monitoring & Maintenance Cost: $0	HIGH COST Total Cost: $3,210,000 Capital Cost: $2,930,000 (includes factored & contingency costs from Table D-4) Monitoring & Maintenance Cost: $280,000
MODIFYING CRITERIA			
1) State acceptance			
Formal state acceptance determined during public comment period on FS/RAP.	Formal state acceptance determined during public comment period on FS/RAP.	Formal state acceptance determined during public comment period on FS/RAP.	Formal state acceptance determined during public comment period on FS/RAP.
2) Community acceptance			
To be determined during public comment period on FS/RAP.	To be determined during public comment period on FS/RAP.	To be determined during public comment period on FS/RAP.	To be determined during public comment period on FS/RAP.

Table 7-1. Comparative Analysis of Remedial Alternatives
Debris Fill Area, BBDA 2

Alternative 1 **No Action**	**Alternative 2** **Land Use Controls**	**Alternative 3** **Excavation**	**Alternative 4** **Engineered Cover**
ADDITIONAL STATE CRITERIA			
State of California Health and Safety Code (HSC) Criteria			
This alternative does not address the State of California HSC Criteria regarding the regarding the effect of contamination on future uses of the site, because it would not remove debris fill from the site. .	This alternative would address the State of California HSC Criteria regarding the effect of contamination on future uses of the site, because it would not remove debris fill from the site.	This alternative would address the State of California HSC Criteria regarding the effect of contamination on future uses of the site, because it would remove debris fill, as practicable from the site.	This alternative would address the State of California HSC Criteria regarding the effect of contamination on future uses of the site, because it would place an engineered cover over debris fill. The effect of contamination on future uses of the site would be addressed by monitoring and maintaining the cover.
OTHER CRITERIA			
Green Remediation Evaluation			
This alternative would not make use of or require consideration of alternative/green energy resources, meeting the intent of green energy initiatives, or promoting resource recovery.	This alternative would not make use of or require consideration of alternative/green energy resources, meeting the intent of green energy initiatives, or promoting resource recovery.	This alternative could make use of alternative/green energy resources if materials for temporary construction fencing and signs are manufactured in accordance with such practices, and would promote resource recovery by removal of non native plant species prior to re-vegetation of the site. The remedy would include removal of a large quantity of soil that would deplete energy resources by using earthmoving equipment for excavation and trucks for transport of soil for offsite disposal.	This alternative could make use of alternative/green energy resources if materials for temporary and permanent fencing and signs are manufactured in accordance with such practices, and would promote resource recovery by re-vegetating the site. Import of soil for the cover and placement of the cover would deplete energy resources by using earthmoving equipment for cover placement and trucks for transport of cover soil.
SUMMARY OF EVALUATION CRITERIA			
Alternative is Not Recommended.	**Alternative is Not Recommended.**	**Alternative is Recommended as the Preferred Remedy.**	**Alternative is Not Recommended.**

FIGURES



amec

EXPLANATION

- Area A - Stewardship by the National Parks Service
- Area B - Stewardship by the Presidio Trust
- BBDA 2

N

0 500 1,000 2,000 Feet

Site Location Map
Feasibility Study/Remedial Action Plan
Baker Beach Disturbed Area 2
Presidio of San Francisco, California

CHECKED	JHD	THE PRESIDIO TRUST	FIGURE **1-1**
APPROVED	MJH		
DATE	8/2012		

PROJECT NUMBER OD12163020.03.032

Friday, August 10, 2012 3:06:38 PM
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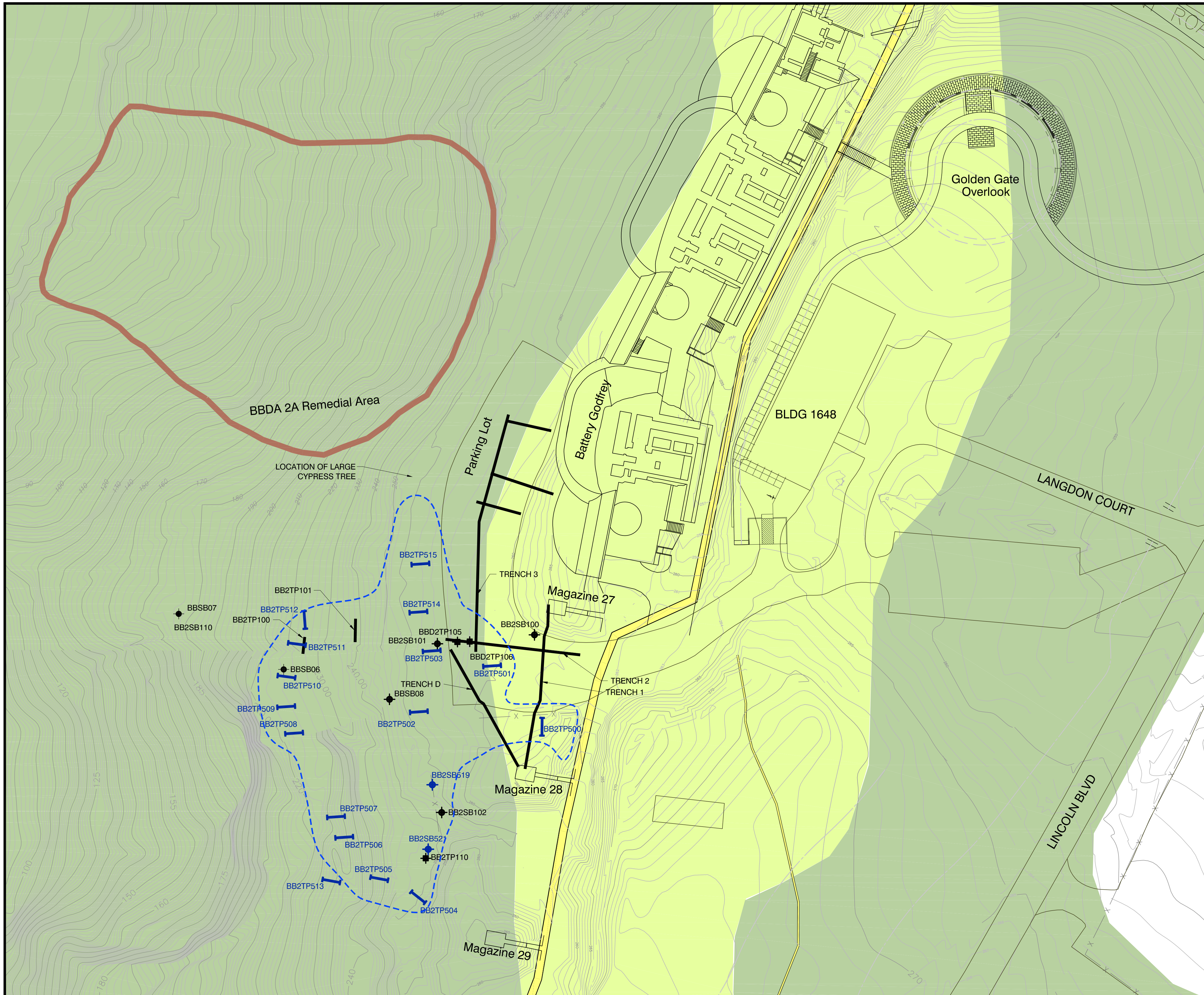

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LEGEND

- Previous Soil Boring or Test Pit Sample
- 2011 Soil Boring or Test Pit Sample
- Former Test Pit and Cultural Resource Trench Location
- Estimated Extent of Debris Fill
- BBDA 2A Remedial Area
- Coastal Trail
- Buffer Zone Ecological PRG
- Special Status Ecological PRG

References:

1. Topographic Datums:
   Horizontal - NAD 27 CA State Plane, Zone 3
   Vertical - NAVD 88 US Survey Feet
2. Topographic Surveys:
   2010 Trail Survey (20100325_ADDITIONAL SURVEY.dwg)
   2008 BBDA 2A Post Construction Survey (Geocad Aerial Surveys, 2/27/2008)
   2003 Estimated BBDA 1A Survey (Chaudary and Assoc. Survey, 2/27/2003)
   2000 Flyover Survey (Kucera International Inc, 3/24/2000)

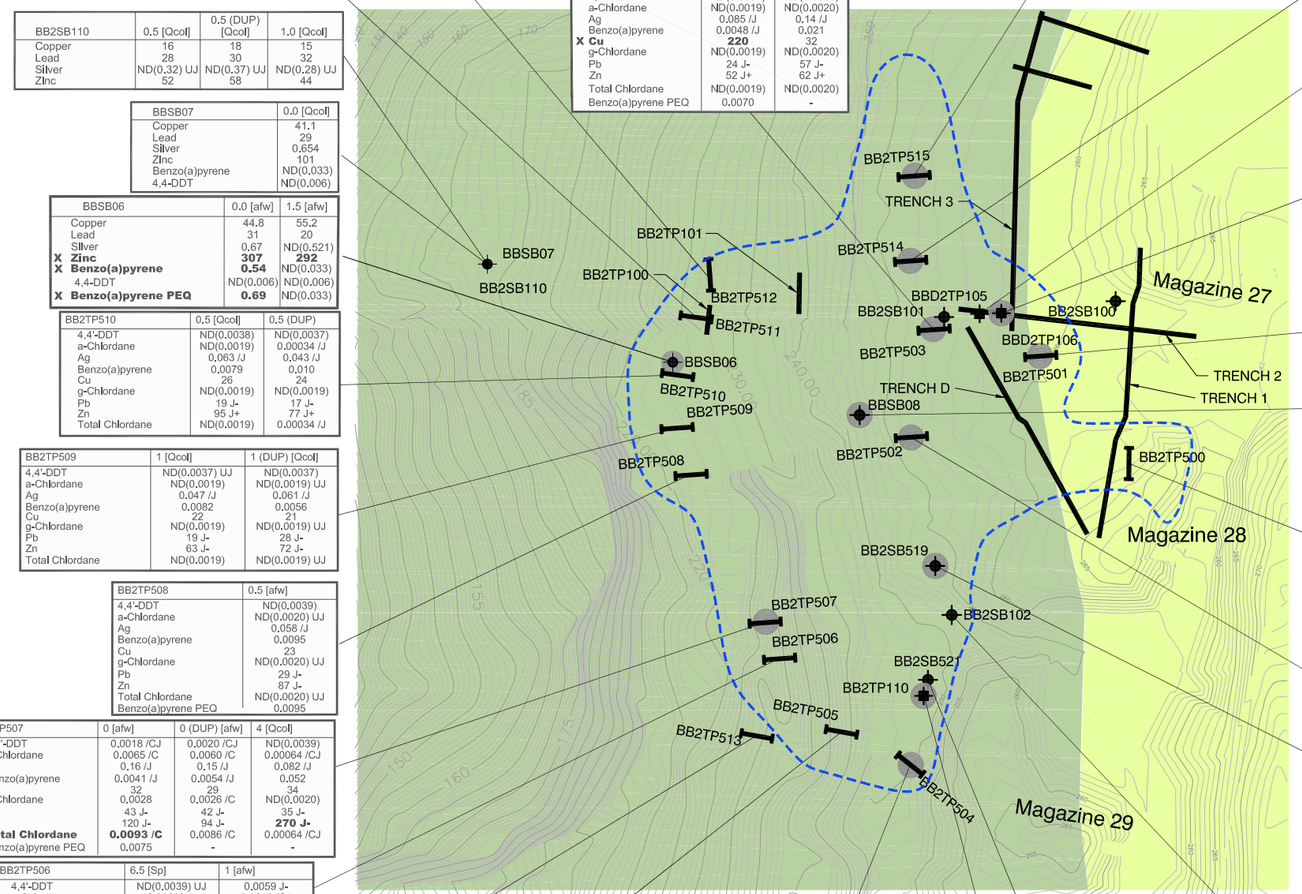
All locations are approximate.

0 35 70
SCALE IN FEET

THE PRESIDIO TRUST

Site Map and Planned Ecological Land Use Zones
Baker Beach Disturbed Area 2
Feasibility Study/Remedial Action Plan
Presidio of San Francisco, CA

CHECKED	JHD	FIGURE **1-2**
APPROVED	MJH	
DATE	9/2012	
PROJECT NUMBER	OD12163020.03.02	



BB2TP511	2 [Qcol]
4,4'-DDT	ND(0.0036)
a-Chlordane	ND(0.0019)
Ag	0.062 /J
Benzo(a)pyrene	ND(0.0055)
Cu	17
g-Chlordane	ND(0.0019)
Pb	4.2 J-
Zn	35 J+
Total Chlordane	ND(0.0019)

BB2TP512	4.5 [Qcol]	1 [Qcol]
4,4'-DDT	ND(0.0040) UJ	ND(0.0037) UJ
a-Chlordane	ND(0.0020)	ND(0.0019)
Ag	0.23 /J	0.12 /J
Benzo(a)pyrene	ND(0.0059)	0.068
Cu	25	20
g-Chlordane	ND(0.0020)	ND(0.0019)
Pb	6.1 J-	8.3 J-
Zn	56 J+	110 J+
Total Chlordane	ND(0.0020)	ND(0.0019)

BB2TP503	1.5 [afw]	5.5 [Qcol]
4,4'-DDT	ND(0.0037)	ND(0.0039)
a-Chlordane	ND(0.0019)	ND(0.0020)
Ag	0.085 /J	0.14 /J
Benzo(a)pyrene	0.0048 /J	0.021
X Cu	**220**	32
g-Chlordane	ND(0.0019)	ND(0.0020)
Pb	24 J-	57 J-
Zn	52 J+	62 J+
Total Chlordane	ND(0.0019)	ND(0.0020)
Benzo(a)pyrene PEQ	0.0070	-

BB2TP515	11 [Qcol]	1 [afw]	1 (DUP) [afw]	5 [afw]
X 4,4'-DDT	ND(0.0046)	0.0062	0.0044	**0.0090**
a-Chlordane	ND(0.0024)	ND(0.0019)	0.00033 /CJ	0.0013 /CJ
Ag	0.062 /J	0.12 /J	0.099 /J	0.32
Benzo(a)pyrene	0.0019 /J	0.037	0.025	0.039
X Cu	33	**150**	**100**	**160**
X g-Chlordane	ND(0.0024)	ND(0.0019)	0.00072 /J	**0.014 /C**
X Pb	13 J-	**230 J-**	**330 J-**	**210 J-**
Zn	58 J-	110 J-	100 J-	140 J-
X Total Chlordane	ND(0.0024)	ND(0.0019)	0.00105	**0.0141**
Benzo(a)pyrene PEQ	-	0.0501	-	0.054

BB2TP514	3.5 [afw]	9.5 [afw]	12.5 [Qcol]
X 4,4'-DDT	**0.15**	0.0035 /CJ	ND(0.0040)
a-Chlordane	0.0078 /C	ND(0.0019)	ND(0.0021)
Ag	0.087 /J	0.25 /J	0.13 /J
Benzo(a)pyrene	0.0032 /J	0.0052	ND(0.0060)
X Cu	20	**190**	20
g-Chlordane	0.0043	ND(0.0019)	ND(0.0021)
X Pb	23 J-	**220 J-**	3.9 J-
Zn	160 J+	140 J+	38 J+
X Total Chlordane	**0.0121**	ND(0.0019)	ND(0.0021)
Benzo(a)pyrene PEQ	0.0048	0.0081	-

BB2SB110	0.5 [Qcol]	0.5 (DUP) [Qcol]	1.0 [Qcol]
Copper	16	18	15
Lead	28	30	32
Silver	ND(0.32) UJ	ND(0.37) UJ	ND(0.28) UJ
Zinc	52	58	44

BBSB07	0.0 [Qcol]
Copper	41.1
Lead	29
Silver	0.654
Zinc	101
Benzo(a)pyrene	ND(0.033)
4,4-DDT	ND(0.006)

BBSB06	0.0 [afw]	1.5 [afw]
Copper	44.8	55.2
Lead	31	20
Silver	0.67	ND(0.521)
X Zinc	**307**	**292**
X Benzo(a)pyrene	**0.54**	ND(0.033)
4,4-DDT	ND(0.006)	ND(0.006)
X Benzo(a)pyrene PEQ	**0.69**	ND(0.033)

BB2TP510	0.5 [Qcol]	0.5 (DUP)
4,4'-DDT	ND(0.0038)	ND(0.0037)
a-Chlordane	ND(0.0019)	0.00034 /J
Ag	0.063 /J	0.043 /J
Benzo(a)pyrene	0.0079	0.010
Cu	26	24
g-Chlordane	ND(0.0019)	ND(0.0019)
Pb	19 J-	17 J-
Zn	95 J+	77 J+
Total Chlordane	ND(0.0019)	0.00034 /J

BB2TP509	1 [Qcol]	1 (DUP) [Qcol]
4,4'-DDT	ND(0.0037) UJ	ND(0.0037)
a-Chlordane	ND(0.0019)	ND(0.0019) UJ
Ag	0.047 /J	0.061 /J
Benzo(a)pyrene	0.0082	0.0056
Cu	22	21
g-Chlordane	ND(0.0019)	ND(0.0019) UJ
Pb	19 J-	28 J-
Zn	63 J-	72 J-
Total Chlordane	ND(0.0019)	ND(0.0019) UJ

BB2TP508	0.5 [afw]
4,4'-DDT	ND(0.0039)
a-Chlordane	ND(0.0020) UJ
Ag	0.058 /J
Benzo(a)pyrene	0.0095
Cu	23
g-Chlordane	ND(0.0020) UJ
Pb	29 J-
Zn	87 J-
Total Chlordane	ND(0.0020) UJ
Benzo(a)pyrene PEQ	0.0095

BB2TP507	0 [afw]	0 (DUP) [afw]	4 [Qcol]
4,4'-DDT	0.0018 /CJ	0.0020 /CJ	ND(0.0039)
a-Chlordane	0.0065 /C	0.0060 /C	0.00064 /CJ
Ag	0.16 /J	0.15 /J	0.082 /J
Benzo(a)pyrene	0.0041 /J	0.0054 /J	0.052
Cu	32	29	34
g-Chlordane	0.0028	0.0026 /C	ND(0.0020)
Pb	43 J-	42 J-	35 J-
X Zn	120 J-	94 J-	**270 J-**
X Total Chlordane	**0.0093 /C**	0.0086 /C	0.00064 /CJ
Benzo(a)pyrene PEQ	0.0075	-	-

BB2TP506	6.5 [Sp]	1 [afw]
4,4'-DDT	ND(0.0039) UJ	0.0059 J-
a-Chlordane	0.00033 /J	0.0012 /CJ
Ag	ND(0.30)	0.074 /J
Benzo(a)pyrene	ND(0.0059)	0.0029 /J
Cu	33	29
g-Chlordane	ND(0.0020)	ND(0.0019)
Pb	0.62 J-	36 J-
Zn	27 J-	99 J-
Total Chlordane	0.00033 /J	0.0012 /CJ
Benzo(a)pyrene PEQ	-	0.0049

BB2TP513	1 [Qcol]
4,4'-DDT	ND(0.0040)
a-Chlordane	ND(0.0020)
Ag	0.065 /J
Benzo(a)pyrene	0.0012 /J
Cu	25
g-Chlordane	ND(0.0020)
Pb	14 J-
Zn	53 J-
Total Chlordane	ND(0.0020)

BB2TP505	7.5 [Sp]	1 [afw]
4,4'-DDT	ND(0.0045)	ND(0.0038)
a-Chlordane	ND(0.0023)	ND(0.0019)
Ag	ND(0.34)	0.11 /J
Benzo(a)pyrene	ND(0.0068)	0.0039 /J
Cu	17	64
g-Chlordane	ND(0.0023)	ND(0.0019)
Pb	0.28 J-/J	44 J-
Zn	38 J-	130 J-
Total Chlordane	ND(0.0023)	ND(0.0019)
Benzo(a)pyrene (PEQ)	-	0.0064

BB2TP504	1.5 [afh]	1.5 (DUP) [afh]	5.5 [afh]
4,4'-DDT	ND(0.0037)	ND(0.0036)	ND(0.0040)
a-Chlordane	ND(0.0019)	ND(0.0019)	0.00044 /CJ
Ag	0.12 /J	0.22 /J	0.034 /J
Benzo(a)pyrene	ND(0.0056)	0.0021 /J	ND(0.0060)
X Cu	**110**	64	16
g-Chlordane	ND(0.0019)	ND(0.0019)	ND(0.0020)
Pb	29 J-	31 J-	6.9 J-
Zn	110 J-	110 J-	36 J-
Total Chlordane	ND(0.0019)	ND(0.0019)	0.00044 /CJ
Benzo(a)pyrene PEQ	0.0042	-	ND(0.0060)

BB2SB521	0 [afh]
Ag	0.076 /J
Cu	31
Pb	80 J-
Zn	83 J-

BB2TP110	3 [afw]	4 [afh]	9 [Qcol]
Copper	60	30	35
X Lead	**240**	13	14
X Silver	**2.1**	0.064 J	0.14 J
X Zinc	**390**	59	59
Benzo(a)pyrene	ND(0.0057)	ND(0.0060)	ND(0.0063)
Benzo(a)pyrene PEQ	0.0025	ND(0.006)	-

BB2SB102	0 [afw]	2 [afw]
Copper	36	29
Lead	80	40
Silver	0.061 J	0.034 J
Zinc	110 /J+	97 /J+
X Benzo(a)pyrene	**0.14**	0.084 /J-
4,4'-DDT	ND(0.021)	ND(0.019)
X Benzo(a)pyrene PEQ	**0.19**	0.11

BB2TP105	11.5 [afh]	15 [Qcol]
Copper	20	25
Lead	35 /J-	7.7 /J-
Silver	0.042 J	0.043 J
Zinc	56 /J-	52 /J-
Benzo(a)pyrene	0.0017 J	0.0064 J
4,4-DDT	ND(0.0039) /UJ	ND(0.0039) /UJ
Benzo(a)pyrene PEQ	0.0033	-

BB2TP106	2 [afw]
Copper	35
X Lead	**200 /J-**
Silver	0.19 J
X Zinc	**420 /J-**
X Benzo(a)pyrene	**0.80 /J-**
4,4'-DDT	ND(0.018)
X Benzo(a)pyrene PEQ	**1.1**

BB2TP501	0.5 [afh]	2.5 [Qcol]
4,4'-DDT	ND(0.0035)	ND(0.0037)
a-Chlordane	ND(0.0018)	ND(0.0019)
Ag	0.041 /J	0.077 /J
Benzo(a)pyrene	ND(0.0053)	ND(0.0055)
X Cu	**150**	17
g-Chlordane	ND(0.0018)	ND(0.0019)
Pb	13 J-	6.9 J-
Zn	27 J+	45 J+
Total Chlordane	ND(0.0018)	ND(0.0019)
Benzo(a)pyrene PEQ	0.0023	-

BBSB08	0.0 [afw]	2.0 [afw]
X Copper	68.4	**118**
X Lead	**210**	110
Silver	ND(1.47)	ND(1.65)
Zinc	129	97.2
Benzo(a)pyrene	0.11	0.11
X 4,4-DDT	ND(0.06)	**0.022**
X Benzo(a)pyrene PEQ	**0.18**	**0.15**

BB2TP500	11 [Sp]	2 [afh]
4,4'-DDT	ND(0.0037)	0.0018 J-/J
a-Chlordane	ND(0.0019)	ND(0.0018)
Ag	0.075 /J	ND(0.27)
Benzo(a)pyrene	ND(0.0055)	0.0023 /J
Cu	50	15
g-Chlordane	ND(0.0019)	ND(0.0018)
Pb	19 J-	5.0 J-
Zn	110 J+	41 J+
Total Chlordane	ND(0.0019)	ND(0.0018)
Benzo(a)pyrene PEQ	-	0.0034

BB2TP502	9.5 [afw]	13 [Qcol]	3 [afw]
X 4,4'-DDT	0.0045 J-	ND(0.0041) UJ	**0.013**
a-Chlordane	ND(0.0020)	ND(0.0021)	ND(0.0020)
X Ag	**14**	0.067 /J	0.061 /J
Benzo(a)pyrene	0.017	ND(0.0063)	0.0012 /J
X Cu	82	36	**160**
g-Chlordane	ND(0.0020)	ND(0.0021)	ND(0.0020)
X Pb	**330 J-**	10 J-	37 J-
X Zn	**1200 J+**	68 J+	54 J+
Total Chlordane	ND(0.0020)	ND(0.0021)	ND(0.0020)
Benzo(a)pyrene PEQ	0.028	-	0.0024

BB2SB519	0 [afw]	0 (DUP)
Ag	0.093 /J	0.089 /J
Cu	45	44
X Pb	**190 J-**	**190 J-**
Zn	110 J-	100 J-

LEGEND

- Result exceeds soil screening level
- Soil Boring Sample
- Test Pit Sample
- Buffer Zone Ecological PRG
- Special Status Ecological PRG
- Former test pit and cultural resource trench location
- Estimated Extent of Debris

Sample Location

Sample Depth (feet BGS)

Lithologic Description of Sample Material

BBSB07	0.0 [Qcol]
Copper	41.1
Lead	29
Silver	0.654
Zinc	101
Benzo(a)pyrene	ND(0.033)
4,4-DDT	ND(0.006)

Analyte

Analytical Result in milligrams per kilogram (mg/kg)

Chemical	Soil Screening Levels: Serpentinite/Colma, Residential, Ecological Special-Status Species (mg/kg)	Soil Screening Levels: Serpentinite/Colma, Residential, Ecological Buffer Zone (mg/kg)
Copper (Cu)	85	120
Lead (Pb)	160	300
Silver (Ag)	2	2
Zinc (Zn)	160	160
Benzo(a)pyrene	0.11	0.11
Chlordane	0.009	0.04
4,4'-DDT	0.0082	0.53

Lithologic Descriptions:

[afh] - Historic Fill
[afw] - Debris/Waste Fill
[Qcol]- Colma Fm/Native Soils
[Sp] - Serpentinite/Native Soils

Notes:

1. Analytical results are shown for PCOCs only.
2. Chemicals listed in the above table that are not posted for a specific sample were not analyzed in the sample.
3. X = Reported concentration exceeds screening levels.
4. Results shown in bold indicate that the concentration exceeds screening levels.
5. Data posted in green were compared to Ecological Buffer Zone PRGs, while data posted in black were compared to Ecological Special Status Species PRGs.

References:

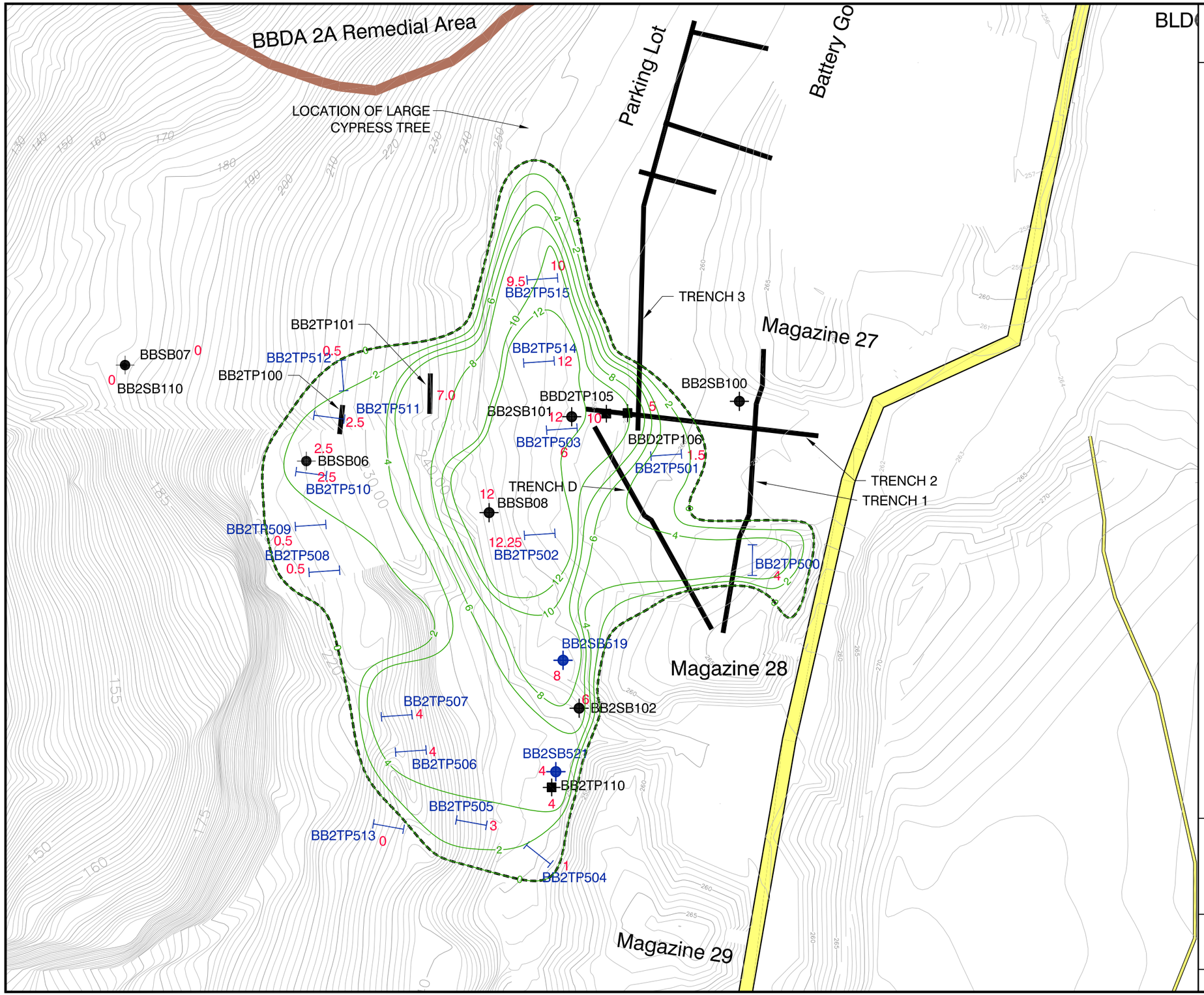
1. Topographic Datums:
   Horizontal - NAD 27 CA State Plane, Zone 3
   Vertical - NAVD 88 US Survey Feet
2. Topographic Surveys:
   2010 Trail Survey (20100325_ADDITIONAL SURVEY.dwg)
   2008 BBDA 2A Post Construction Survey (Geocad Aerial Surveys, 2/27/2008)
   2003 Estimated BBDA 1A Survey (Chaudary and Assoc. Survey, 2/27/2003)
   2000 Flyover Survey (Kucera International Inc, 3/24/2000)

All locations are approximate.

Sample Locations and PCOC Results - Debris Fill Area
Baker Beach Disturbed Area 2
Feasibility Study/Remedial Action Plan
Presidio of San Francisco, CA

CHECKED	JHD	FIGURE	**2-1**
APPROVED	MJH		
DATE	11/2012		
PROJECT NUMBER	OD12163020.03.032		

FS-RAP_2-1_11-21-2012.DWG 40.0
20120810.1635



LEGEND

- Previous Soil Boring or Test Pit Sample
- 2011 Soil Boring or Test Pit Sample
- Former Test Pit and Cultural Resource Trench Location
- BBDA 2A Remedial Area
- Coastal Trail
- 4.0 — Estimated Depth of Debris Fill
- Estimated Limit of Soil Remedial Unit

References:
1. Topographic Datums:
   Horizontal - NAD 27 CA State Plane, Zone 3
   Vertical - NAVD 88 US Survey Feet
2. Topographic Surveys:
   2010 Trail Survey (20100325_ADDITIONAL SURVEY.dwg)
   2008 BBDA 2A Post Construction Survey (Geocad Aerial Surveys, 2/27/2008)
   2003 Estimated BBDA 1A Survey (Chaudary and Assoc. Survey, 2/27/2003)
   2000 Flyover Survey (Kucera International Inc, 3/24/2000)

All locations are approximate.

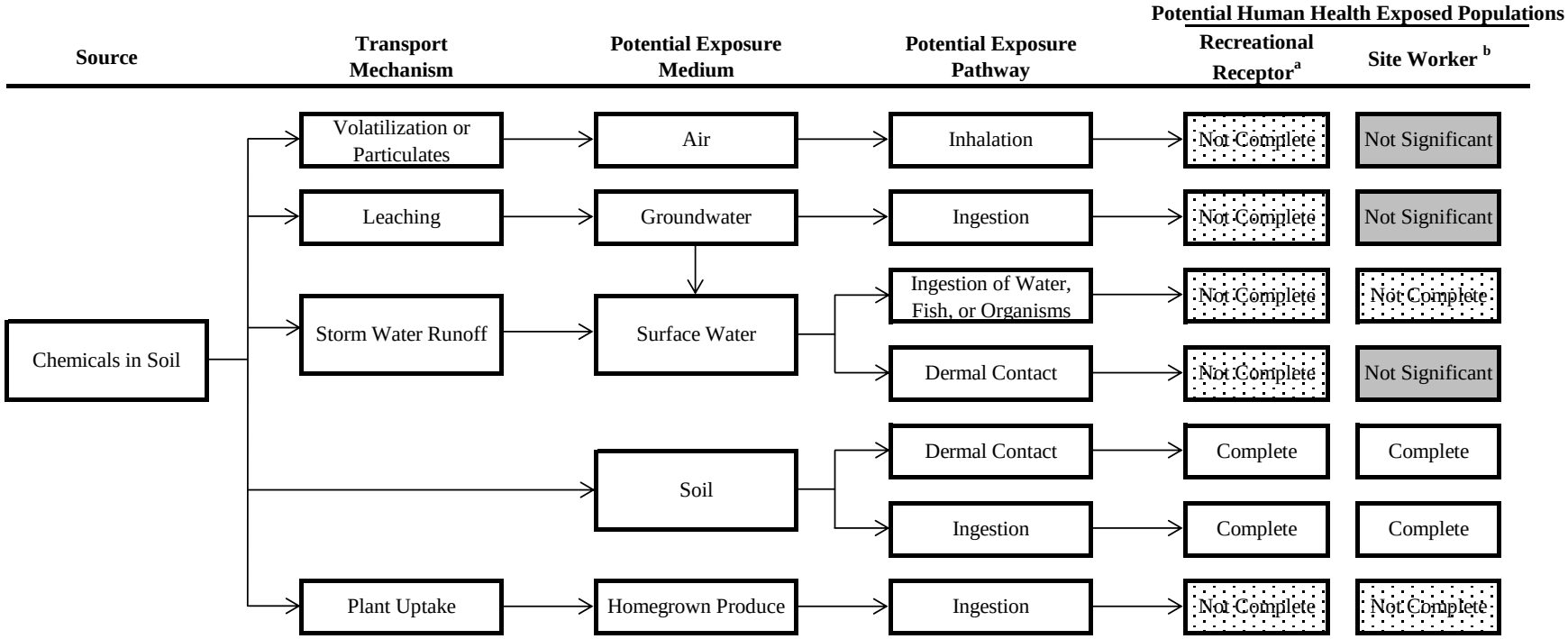
SCALE IN FEET

Estimated Extent of Debris Fill and Soil Remedial Unit
Baker Beach Disturbed Area 2
Feasibility Study/Remedial Action Plan
Presidio of San Francisco, CA

CHECKED	JHD	FIGURE	**3-1**
APPROVED	MJH		
DATE	11/2012		
PROJECT NUMBER	OD12163020.03.032		

FS-RAP_3-1_11-21-2012.DWG 40.0
20120810.1516

Figure 3-2. Potential Exposure Pathways for Human Health



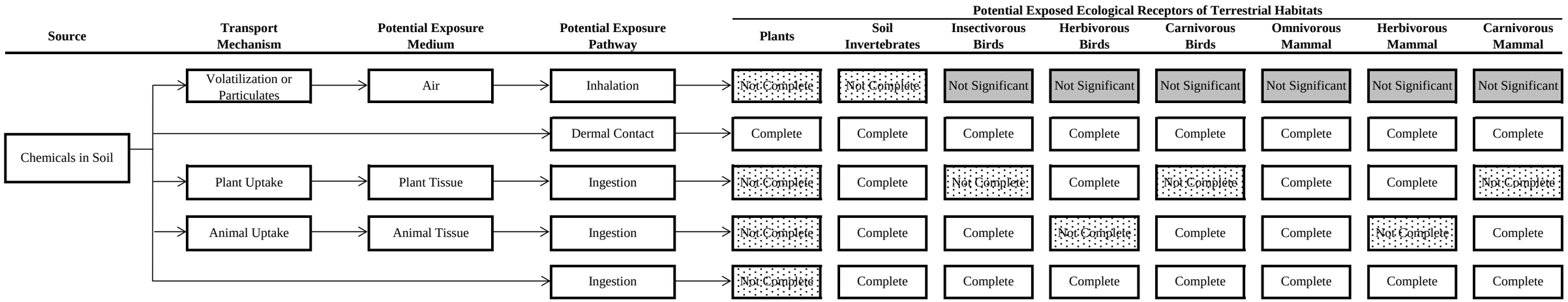
Complete	Pathway complete or potentially complete. Pathway has been quantitatively evaluated.
Not Significant	Pathway complete or potentially complete. Exposure is not considered significant.
Not Complete	Pathway is not considered complete.

Footnotes:

[a] Recreational receptor includes both the site-specific recreational visitor and Presidio-wide recreational receptor.

[b] Site worker includes both site volunteer and volunteer coordinator (planting and maintaining vegetation and building and maintaining fences and trails) and Presidio-wide recreational receptor.

Figure 3-3. Potential Ecological Exposure Pathways for Terrestrial Habitats [a]



Complete	Pathway complete or pontentially complete. Pathway has been quantitatively evaluated.
Not Significant	Pathway complete or pontentially complete. Exposure is not considered significant. Pathway has not been evaluated quantitatively.
Not Complete	Pathway is not considered complete.

Footnotes:

[a] The potential ecological exposure pathways for terrestrial habitats is based on Figure 5-1 from Presidio-Wide Cleanup Document (EKI, 2002a; Revised 2006).

References:

Erler & Kalinowski, Inc. (*EKI) 2006 . Development of Presidio-Wide Cleanup Levels for Soil, Sediment, Groundwater, and Surface Water*. October 2002. Revised May 2006.

amec

Feasibility Study and Remedial Action Plan
Baker Beach Disturbed Area 2
Presidio of San Francisco, California

Figure **3-3**

CHECKED	JOB NUMBER	APPROVED	DATE	REVISED DATE
NAM	OD12163020	MJH	9/11/2012	12/5/2012

BBDA 2A Remedial Area

LOCATION OF LARGE CYPRESS TREE

Parking Lot

Battery G

Magazine 27

Magazine 28

Magazine 29

TRENCH 3

TRENCH 2

TRENCH 1

TRENCH D

BB2TP515

BB2TP514

BB2TP512

BB2TP511

BB2TP503

BB2TP501

BB2TP510

BB2TP509

BB2TP508

BB2TP502

BB2TP500

BB2TP507

BB2TP506

BB2TP505

BB2TP513

BB2TP504

BB2TP101

BB2TP100

BBSB07

BB2SB110

BBSB06

BBSB08

BBD2TP105

BB2SB101

BBD2TP106

BB2SB100

BB2SB519

BB2SB102

BB2SB521

BB2TP110

LEGEND

- Previous Soil Boring or Test Pit Sample
- 2011 Soil Boring or Test Pit Sample
- Former Test Pit and Cultural Resource Trench Location
- BBDA 2A Remedial Area
- Coastal Trail
- 4 — Estimated Depth of Excavation
- Estimated Limit of Soil Remedial Unit

References:
1. Topographic Datums:
   Horizontal - NAD 27 CA State Plane, Zone 3
   Vertical - NAVD 88 US Survey Feet
2. Topographic Surveys:
   2010 Trail Survey (20100325_ADDITIONAL SURVEY.dwg)
   2008 BBDA 2A Post Construction Survey (Geocad Aerial Surveys, 2/27/2008)
   2003 Estimated BBDA 1A Survey (Chaudary and Assoc. Survey, 2/27/2003)
   2000 Flyover Survey (Kucera International Inc, 3/24/2000)

All locations are approximate.

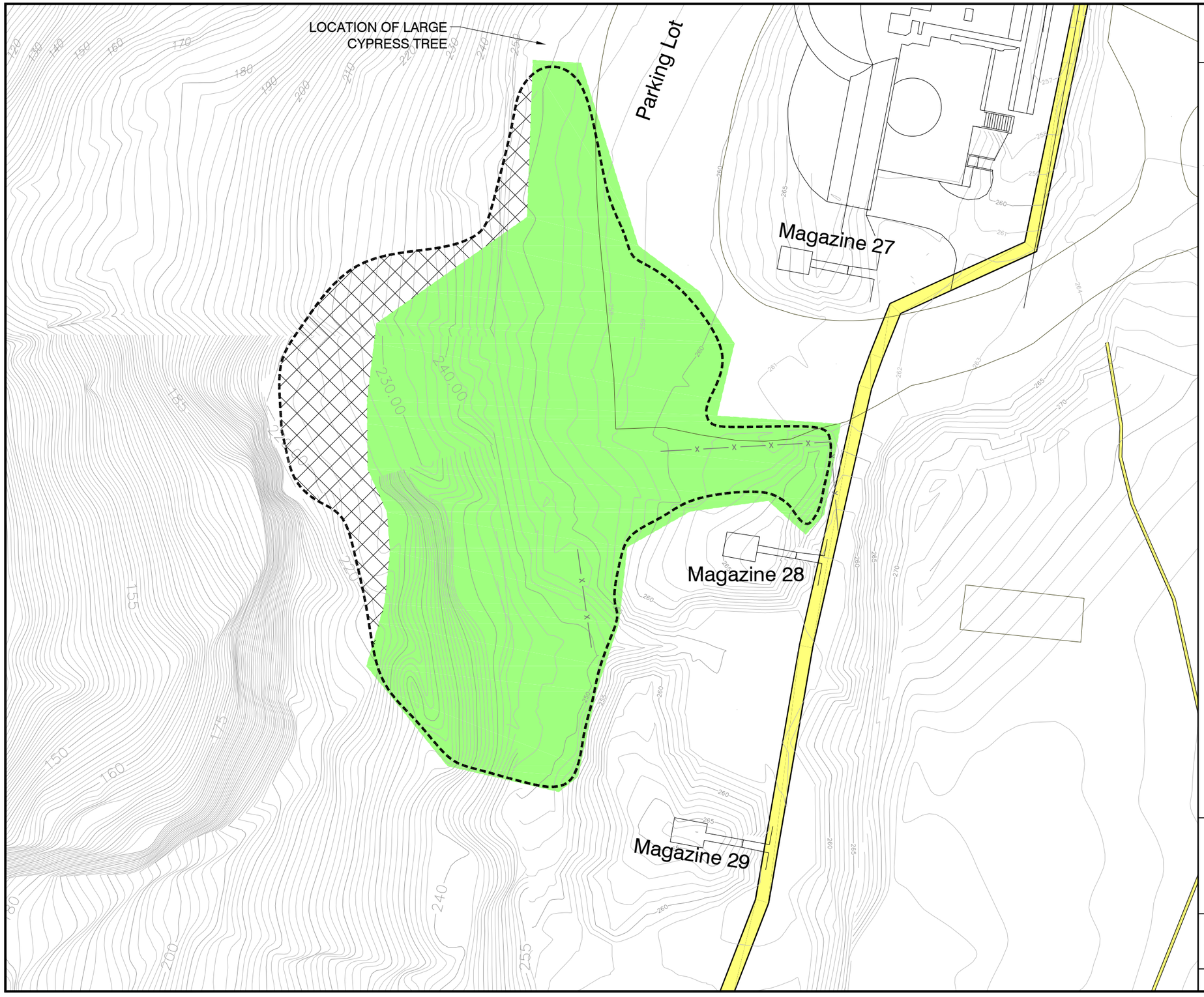
N

0 20 40
SCALE IN FEET

Remedial Alternative 3 (Excavation)
Baker Beach Disturbed Area 2
Feasibility Study/Remedial Action Plan
Presidio of San Francisco, CA

CHECKED	JHD	FIGURE	**6-1**
APPROVED	MJH		
DATE	8/2012		
PROJECT NUMBER	OD12163020.03.032		

FS-RAP_6-1_8-10-2012.DWG 40.0
20120810.1610



amec

LEGEND

- Coastal Trail
- Estimated Limit of Soil Remedial Unit
- 185 — Topographic Elevation (feet)
- Proposed BBDA 2 Engineered Cover (approx: 2ft thick)
- Area where debris fill will be removed and re-located within the area to be covered.

References:
1. Topographic Datums:
   Horizontal - NAD 27 CA State Plane, Zone 3
   Vertical - NAVD 88 US Survey Feet
2. Topographic Surveys:
   2010 Trail Survey (20100325_ADDITIONAL SURVEY.dwg)
   2008 BBDA 2A Post Construction Survey (Geocad Aerial Surveys, 2/27/2008)
   2003 Estimated BBDA 1A Survey (Chaudary and Assoc. Survey, 2/27/2003)
   2000 Flyover Survey (Kucera International Inc, 3/24/2000)

All locations are approximate.

N

0 20 40
SCALE IN FEET

THE PRESIDIO TRUST

Remedial Alternative 4
(Engineered Cover)
Baker Beach Disturbed Area 2
Feasibility Study/Remedial Action Plan
Presidio of San Francisco, CA

CHECKED	JHD
APPROVED	MJH
DATE	8/2012

FIGURE **6-2**

PROJECT NUMBER OD12163020.03.032

FS_RAP_6-2_8-10-2012.DWG 40.0
20120810.1626

APPENDIX A

Soil Analytical Data and ProUCL Output

Table A-1. Soil Analytical Data - Detected Chemicals
Debris Fill Area

Station Name	Sample Number	Depth (feet bgs)	Sample Date	Soil Type	Antimony (mg/kg)	Arsenic (mg/kg)	Barium (mg/kg)	Beryllium (mg/kg)	Cadmium (mg/kg)	Chromium (mg/kg)	Cobalt (mg/kg)	Copper (mg/kg)	Lead (mg/kg)	Mercury (mg/kg)	Molybdenum (mg/kg)	Nickel (mg/kg)
BBSB06	BBSB06	0.0	8/13/1992	Fill	<41.3 R	5.21	205	1.25	0.762	93.8	44.7	44.8	31	0.046	NT	127
	BBSB06	1.5	8/13/1992	Fill	<41.3 R	4.87	218	1.31	1.3	106	46.2	55.2	20	0.032	NT	120
BBSB08	BBSB08	0.0	8/13/1992	Fill	<41.3 R	3.67	138	1.07	0.9	69.7	37.4	68.4	210	0.088	NT	68.9
	BBSB08	2.0	8/13/1992	Fill	<41.3 R	1.9	224	1.11	0.978	44.9	39.5	118	110	0.042	NT	51.1
BB2SB102	BB2SB102(0.0)	0.0	5/12/2005	Fill	0.57	4	110	0.33	0.32	57	13	36	80	0.13	0.49	51
	BB2SB102(2.0)	2.0	5/12/2005	Fill	<0.32	4.4	120	0.47	0.2	49	11	29	40	0.046	0.44	47
BBD2TP105	BBD2TP105(11.5)	11.5	4/28/2005	Fill	0.61	7.4	95	0.34	0.16	63	18	20	35	0.04	0.53	89
BBD2TP106	BBD2TP106(2.0)	2.0	4/28/2005	Fill	0.56	4.2	520	0.33	0.5	77	11	35	200	0.49	0.53	88
BB2TP110	BB2TP110(3.0)	3.0	12/22/2006	Fill	2.3	7.2	300	0.47	0.48	50	12	60	240	0.043	0.68	60
	BB2TP110(4.0)	4.0	12/22/2006	Fill	<3.6	8.1	170	0.64	<0.31	40	12	30	13	0.076	0.54	48
BB2TP500	BB2TP500[2.0]	2	8/29/2011	Fill	0.18	4	100	0.21	0.25	160	62	15	5	0.028	<0.4	490
BB2TP501	BB2TP501[0.5]	0.5	8/29/2011	Fill	0.24	3.7	340	0.43	<0.27	19	18	150	13	0.0079	<0.57	25
BB2TP502	BB2TP502[3.0]	3	8/29/2011	Debris Fill	0.63	4.1	560	0.89	<0.29	20	16	160	37	0.055	<0.67	16
	BB2TP502[9.5]	9.5	8/29/2011	Debris Fill	2.4	4.9	240	0.55	1	95	17	82	330	1.2	<0.75	40
BB2TP503	BB2TP503[1.5]	1.5	8/29/2011	Debris Fill	1.3	4.2	520	1.1	<0.27	24	23	220	24	0.0074	<0.43	26
BB2TP504	BB2TP504[1.5]	1.5	8/30/2011	Fill	0.38	6.8	370	0.88	0.15	64	22	110	29	0.04	0.34	68
	DUP083011-003	1.5	8/30/2011	Fill	0.4	6.2	210	0.55	0.092	42	12	64	31	0.05	0.31	56
	BB2TP504[5.5]	5.5	8/30/2011	Fill	<0.3	4.6	120	0.42	0.032	63	13	16	6.9	0.014	0.24	39
BB2TP505	BB2TP505[1.0]	1	8/30/2011	Fill	0.4	9.6	260	0.96	0.22	54	20	64	44	0.078	0.49	69
BB2TP506	BB2TP506[1.0]	1	8/30/2011	Debris Fill	0.23	6.5	150	0.68	0.16	100	24	29	36	0.031	0.37	110
BB2TP507	BB2TP507[0.0]	0	8/30/2011	Debris Fill	0.44	5.4	100	0.5	0.21	240	18	32	43	0.041	0.31	210
	DUP083011-002	0	8/30/2011	Debris Fill	0.5	5.2	110	0.4	0.26	93	14	29	42	0.045	0.28	110
BB2TP508	BB2TP508[0.5]	0.5	8/30/2011	Debris Fill	0.19	4.6	150	0.41	0.16	170	27	23	29	0.047	0.31	170
BB2TP514	BB2TP514[3.5]	3.5	8/29/2011	Debris Fill	0.073	0.98	75	<0.29	0.26	1000	73	20	23	0.069	<0.44	1700
	BB2TP514[9.5]	9.5	8/29/2011	Debris Fill	0.67	2.7	230	0.55	0.1	33	14	190	220	0.21	<0.44	36
BB2TP515	BB2TP515[1.0]	1	8/30/2011	Debris Fill	0.57	3.6	440	0.77	0.48	34	25	150	230	0.063	<1.4	37
	DUP083011-004	1	8/30/2011	Debris Fill	0.33	3.1	340	0.55	0.44	32	19	100	330	0.033	0.44	40
	BB2TP515[5.0]	5	8/30/2011	Debris Fill	0.36	4.5	480	0.53	0.37	48	18	160	210	0.68	0.52	64
BB2SB519	BB2SB519[0.0]	0	8/23/2011	Fill	1	4.8	150	0.35	0.42	70	13	45	190	0.13	<0.36	57
	DUP082311-002	0	8/23/2011	Fill	0.63	4.2	150	0.29	0.51	52	12	44	190	0.18	<0.45	56
BB2SB521	BB2SB521[0.0]	0	8/23/2011	Fill	1.1	4	140	0.39	0.3	62	12	31	80	0.091	<0.34	57

Abbreviations:
-- = Not applicable/not available.
<# = Not detected above the reporting limit.
feet bgs = feet below ground surface.
mg/kg = Milligrams per kilogram.
NT = Not tested.
R = Rejected.

Notes:
Peach highlights indicate the primary and duplicate samples were averaged for the 95% upper confidence limit calculations.
Blue highlights indicate the value from the duplicate pair used in the 95% upper confidence limit calculations.
The source of the data for samples collected prior to 2000 is the Main Installation Sites RI (Dames & Moore, 1997).
Rejected sample results were not included in the summary table or in the calculations of upper confidence limit (UCLs).

Table A-1. Soil Analytical Data - Detected Chemicals
Debris Fill Area

Station Name	Sample Number	Depth (feet bgs)	Sample Date	Soil Type	Selenium (mg/kg)	Silver (mg/kg)	Thallium (mg/kg)	Vanadium (mg/kg)	Zinc (mg/kg)	Acenaphthene (mg/kg)	Acenaphthylene (mg/kg)	Anthracene (mg/kg)	Benzo(a) anthracene (mg/kg)	Benzo(a)pyrene (mg/kg)	Benzo(b) fluoranthene (mg/kg)	Benzo(g,h,i) perylene (mg/kg)
BBSB06	BBSB06	0.0	8/13/1992	Fill	0.477	0.67	97.5 R	55.7	307	<0.033	0.1	0.81	0.52	0.54	0.47	<0.25
	BBSB06	1.5	8/13/1992	Fill	<0.25	<0.521	115 R	61.9	292	<0.033	<0.033	<0.033	<0.033	<0.033	<0.033	<0.25
BBSB08	BBSB08	0.0	8/13/1992	Fill	0.541	1.47	100 R	62.2	129	<0.033	<0.033	0.061	0.22	0.11	0.14	<0.25
	BBSB08	2.0	8/13/1992	Fill	<0.25	1.65	108 R	53.7	97.2	<0.033	<0.033	<0.033	0.084	0.11	0.13	<0.25
BB2SB102	BB2SB102(0.0)	0.0	5/12/2005	Fill	0.24	0.061	<0.25	50	110	0.0049	0.014	0.024	0.099	0.14	0.12	0.068
	BB2SB102(2.0)	2.0	5/12/2005	Fill	0.37	0.034	<0.26	51	97	0.0021	0.011	0.0087	0.052	0.084	0.068	0.038
BBD2TP105	BBD2TP105(11.5)	11.5	4/28/2005	Fill	<0.33	0.042	0.28	46	56	<0.006	<0.006	<0.006	0.0014	0.0017	0.0029	0.0032
BBD2TP106	BBD2TP106(2.0)	2.0	4/28/2005	Fill	<0.27	0.19	0.064	46	420	0.022	0.22	0.12	0.54	0.8	0.61	0.26
BB2TP110	BB2TP110(3.0)	3.0	12/22/2006	Fill	<0.29	2.1	<0.29	48	390	<0.0057	<0.0057	<0.0057	<0.0057	<0.0057	<0.0057	<0.0057
	BB2TP110(4.0)	4.0	12/22/2006	Fill	<0.31	0.064	<0.31	42	59	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006
BB2TP500	BB2TP500[2.0]	2	8/29/2011	Fill	<0.27	<0.27	0.13	56	41	<0.0053	<0.0053	<0.0053	0.0017	0.0023	0.0024	<0.0053
BB2TP501	BB2TP501[0.5]	0.5	8/29/2011	Fill	0.36	0.041	0.34	45	27	<0.0053	<0.0053	<0.0053	<0.0053	<0.0053	0.0015	<0.0053
BB2TP502	BB2TP502[3.0]	3	8/29/2011	Debris Fill	0.37	0.061	0.14	56	54	<0.0058	<0.0058	<0.0058	<0.0058	0.0012	0.0023	0.0014
	BB2TP502[9.5]	9.5	8/29/2011	Debris Fill	<0.29	14	0.11	53	1200	<0.0058	0.0037	0.0049	0.019	0.017	0.055	0.0065
BB2TP503	BB2TP503[1.5]	1.5	8/29/2011	Debris Fill	0.91	0.085	0.25	59	52	<0.0055	<0.0055	0.0012	0.0033	0.0048	0.0082	0.003
BB2TP504	BB2TP504[1.5]	1.5	8/30/2011	Fill	0.18	0.12	0.055	59	110	<0.0056	<0.0056	<0.0056	<0.0056	<0.0056	<0.0056	<0.0056
	DUP083011-003	1.5	8/30/2011	Fill	0.15	0.22	<0.28	38	110	<0.0055	<0.0055	<0.0055	0.0023	0.0021	0.0037	0.0017
	BB2TP504[5.5]	5.5	8/30/2011	Fill	0.32	0.034	<0.3	55	36	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006
BB2TP505	BB2TP505[1.0]	1	8/30/2011	Fill	0.2	0.11	0.23	53	130	<0.0058	<0.0058	<0.0058	0.004	0.0039	0.0052	0.0026
BB2TP506	BB2TP506[1.0]	1	8/30/2011	Debris Fill	<0.28	0.074	0.047	59	99	<0.0055	<0.0055	<0.0055	0.0034	0.0029	0.0038	0.0021
BB2TP507	BB2TP507[0.0]	0	8/30/2011	Debris Fill	0.13	0.16	0.079	64	120	<0.0055	<0.0055	<0.0055	0.0036	0.0041	0.0063	0.0036
	DUP083011-002	0	8/30/2011	Debris Fill	0.092	0.15	0.037	61	94	<0.0057	<0.0057	0.0012	0.0045	0.0054	0.0077	0.0049
BB2TP508	BB2TP508[0.5]	0.5	8/30/2011	Debris Fill	0.14	0.058	0.095	52	87	<0.0058	0.0022	0.0034	0.01	0.0095	0.015	0.0068
BB2TP514	BB2TP514[3.5]	3.5	8/29/2011	Debris Fill	<0.29	0.087	0.1	30	160	<0.0057	0.0013	0.0016	0.0024	0.0032	0.0055	<0.0057
	BB2TP514[9.5]	9.5	8/29/2011	Debris Fill	<0.28	0.25	0.25	39	140	<0.011	<0.011	<0.011	0.0039	0.0052	0.0092	0.0025
BB2TP515	BB2TP515[1.0]	1	8/30/2011	Debris Fill	0.085	0.12	0.078	53	110	<0.0054	0.012	0.0099	0.026	0.037	0.086	0.03
	DUP083011-004	1	8/30/2011	Debris Fill	<0.27	0.099	0.11	46	100	<0.0055	0.0079	0.0075	0.019	0.025	0.062	0.02
	BB2TP515[5.0]	5	8/30/2011	Debris Fill	<0.3	0.32	0.052	48	140	<0.024	<0.024	0.0054	0.034	0.039	0.048	0.022
BB2SB519	BB2SB519[0.0]	0	8/23/2011	Fill	0.26	0.093	0.14	44	110	--	--	--	--	--	--	--
	DUP082311-002	0	8/23/2011	Fill	0.24	0.089	0.16	37	100	--	--	--	--	--	--	--
BB2SB521	BB2SB521[0.0]	0	8/23/2011	Fill	0.11	0.076	0.13	46	83	--	--	--	--	--	--	--

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Notes:
Peach highlights indicate the primary and duplicate samples were averaged for the 95% upper confidence limit calculations.
Blue highlights indicate the value from the duplicate pair used in the 95% upper confidence limit calculations.
The source of the data for samples collected prior to 2000 is the Main Installation Sites RI (Dames & Moore, 1997).
Rejected sample results were not included in the summary table or in the calculations of upper confidence limit (UCLs).

Table A-1. Soil Analytical Data - Detected Chemicals
Debris Fill Area

Station Name	Sample Number	Depth (feet bgs)	Sample Date	Soil Type	Benzo(k) fluoranthene (mg/kg)	Chrysene (mg/kg)	Dibenzo(a,h) anthracene (mg/kg)	Fluoranthene (mg/kg)	Fluorene (mg/kg)	Indeno(1,2,3-c,d)pyrene (mg/kg)	2-Methyl naphthalene (mg/kg)	Napthalene (mg/kg)	Phenanthrene (mg/kg)	Pyrene (mg/kg)	4,4'-DDD (mg/kg)	4,4'-DDE (mg/kg)
BBSB06	BBSB06	0.0	8/13/1992	Fill	0.38	0.47	<0.033	0.56	<0.033	<0.033	--	0.051	0.15	0.91	<0.006	<0.006
	BBSB06	1.5	8/13/1992	Fill	<0.033	<0.22	<0.033	<0.085	<0.033	<0.033	--	<0.033	<0.033	<0.033	<0.006	<0.006
BBSB08	BBSB08	0.0	8/13/1992	Fill	0.18	<0.22	<0.033	0.4	0.051	0.09	--	0.046	0.44	<0.033	<0.06	<0.06
	BBSB08	2.0	8/13/1992	Fill	0.14	<0.22	<0.033	0.26	<0.033	0.045	--	<0.033	<0.033	0.22	<0.006	0.12
BB2SB102	BB2SB102(0.0)	0.0	5/12/2005	Fill	0.09	0.13	0.035	0.18	0.0067	0.072	--	0.0051	0.12	0.22	<0.021	<0.021
	BB2SB102(2.0)	2.0	5/12/2005	Fill	0.055	0.069	0.019	0.076	0.0038	0.036	--	0.004	0.051	0.1	<0.019	<0.019
BBD2TP105	BBD2TP105(11.5)	11.5	4/28/2005	Fill	0.003	0.0029	0.0016	0.003	<0.006	0.0028	--	<0.006	0.0019	0.0028	<0.0039	<0.0039
BBD2TP106	BBD2TP106(2.0)	2.0	4/28/2005	Fill	0.54	0.87	0.22	1.5	0.12	0.29	--	0.064	1.8	1.8	<0.018	<0.018
BB2TP110	BB2TP110(3.0)	3.0	12/22/2006	Fill	<0.0057	0.001	<0.0057	0.0013	<0.0057	<0.0057	--	<0.0057	<0.0057	0.0011	NT	NT
	BB2TP110(4.0)	4.0	12/22/2006	Fill	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	--	<0.006	<0.006	<0.006	NT	NT
BB2TP500	BB2TP500[2.0]	2	8/29/2011	Fill	<0.0053	0.0023	<0.0053	0.0015	<0.0053	<0.0053	<0.0053	<0.0053	<0.0053	0.0017	<0.0035	<0.0035
BB2TP501	BB2TP501[0.5]	0.5	8/29/2011	Fill	<0.0053	0.0018	<0.0053	0.0015	<0.0053	<0.0053	<0.0053	<0.0053	<0.0053	0.0016	<0.0035	<0.0035
BB2TP502	BB2TP502[3.0]	3	8/29/2011	Debris Fill	<0.0058	0.0022	<0.0058	0.0019	<0.0058	<0.0058	<0.0058	<0.0058	<0.0058	0.0018	<0.0038	<0.0038
	BB2TP502[9.5]	9.5	8/29/2011	Debris Fill	0.012	0.054	0.0027	0.015	<0.0058	0.0059	0.008	0.0098	0.015	0.018	<0.0038	0.0032
BB2TP503	BB2TP503[1.5]	1.5	8/29/2011	Debris Fill	0.0024	0.0062	<0.0055	0.0083	<0.0055	0.003	<0.0055	<0.0055	0.0057	0.0083	<0.0037	<0.0037
BB2TP504	BB2TP504[1.5]	1.5	8/30/2011	Fill	<0.0056	<0.0056	<0.0056	<0.0056	<0.0056	<0.0056	<0.0056	<0.0056	<0.0056	<0.0056	<0.0037	<0.0037
	DUP083011-003	1.5	8/30/2011	Fill	<0.0055	0.0051	0.0029	0.0072	<0.0055	0.0021	<0.0055	<0.0055	0.0064	0.006	<0.0036	<0.0036
	BB2TP504[5.5]	5.5	8/30/2011	Fill	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.004	<0.004
BB2TP505	BB2TP505[1.0]	1	8/30/2011	Fill	0.0014	0.0062	0.0031	0.009	<0.0058	0.0029	<0.0058	<0.0058	0.0046	0.0099	<0.0038	<0.0038
BB2TP506	BB2TP506[1.0]	1	8/30/2011	Debris Fill	<0.0055	0.0044	0.0028	0.0057	<0.0055	0.0019	<0.0055	<0.0055	0.0024	0.0072	<0.0036	0.0087
BB2TP507	BB2TP507[0.0]	0	8/30/2011	Debris Fill	0.0023	0.008	0.0036	0.0092	<0.0055	0.0038	<0.0055	<0.0055	0.0057	0.01	<0.0037	<0.0037
	DUP083011-002	0	8/30/2011	Debris Fill	0.0058	0.0084	0.0012	0.01	<0.0057	0.0028	<0.0057	<0.0057	0.006	0.011	<0.0037	0.0029
BB2TP508	BB2TP508[0.5]	0.5	8/30/2011	Debris Fill	0.0038	0.016	0.0046	0.019	<0.0058	0.0077	<0.0058	<0.0058	0.012	0.02	<0.0039	<0.0039
BB2TP514	BB2TP514[3.5]	3.5	8/29/2011	Debris Fill	<0.0057	0.0035	<0.0057	0.0055	<0.0057	<0.0057	<0.0057	<0.0057	0.0034	0.0047	0.011	0.15
	BB2TP514[9.5]	9.5	8/29/2011	Debris Fill	0.003	0.0078	<0.011	0.0063	<0.011	0.0023	0.0028	0.0037	0.0081	0.0048	<0.0038	<0.0038
BB2TP515	BB2TP515[1.0]	1	8/30/2011	Debris Fill	0.027	0.081	0.013	0.088	0.0026	0.034	0.0021	0.0025	0.042	0.08	<0.0037	0.0029
	DUP083011-004	1	8/30/2011	Debris Fill	0.018	0.061	0.0088	0.067	0.0019	0.022	0.0016	0.0019	0.031	0.065	<0.0036	0.0028
	BB2TP515[5.0]	5	8/30/2011	Debris Fill	0.016	0.042	0.0086	0.042	<0.024	0.02	0.0072	0.006	0.025	0.048	0.019	0.024
BB2SB519	BB2SB519[0.0]	0	8/23/2011	Fill	--	--	--	--	--	--	--	--	--	--	--	--
	DUP082311-002	0	8/23/2011	Fill	--	--	--	--	--	--	--	--	--	--	--	--
BB2SB521	BB2SB521[0.0]	0	8/23/2011	Fill	--	--	--	--	--	--	--	--	--	--	--	--

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Notes:
Peach highlights indicate the primary and duplicate samples were averaged for the 95% upper confidence limit calculations.
Blue highlights indicate the value from the duplicate pair used in the 95% upper confidence limit calculations.
The source of the data for samples collected prior to 2000 is the Main Installation Sites RI (Dames & Moore, 1997).
Rejected sample results were not included in the summary table or in the calculations of upper confidence limit (UCLs).

Table A-1. Soil Analytical Data - Detected Chemicals
Debris Fill Area

Station Name	Sample Number	Depth (feet bgs)	Sample Date	Soil Type	4,4'-DDT (mg/kg)	alpha-Chlordane (mg/kg)	gamma-Chlordane (mg/kg)	Total-Chlordane (mg/kg)	Dieldrin (mg/kg)	Endosulfan I (mg/kg)	Endrin (mg/kg)	TPH as Gasoline (mg/kg)	TPH as Diesel (mg/kg)	TPH as Fuel/Motor Oil (mg/kg)	1,2,4-Trimethylbenzene (mg/kg)	2-Butanone (mg/kg)
BBSB06	BBSB06	0.0	8/13/1992	Fill	<0.006	--	--	<0.03	<0.006	--	0.006	<1	58	NT	NT	<0.005
	BBSB06	1.5	8/13/1992	Fill	<0.006	--	--	<0.03	<0.006	--	<0.006	<1	13	NT	NT	<0.005
BBSB08	BBSB08	0.0	8/13/1992	Fill	<0.06	--	--	<0.30	<0.06	--	<0.06	<1	19	NT	NT	<0.005
	BBSB08	2.0	8/13/1992	Fill	0.022	--	--	<0.03	<0.006	--	<0.006	<1	14	NT	NT	<0.005
BB2SB102	BB2SB102(0.0)	0.0	5/12/2005	Fill	<0.021	<0.011	<0.011	<0.011	<0.021	--	<0.021	NT	NT	NT	NT	NT
	BB2SB102(2.0)	2.0	5/12/2005	Fill	<0.019	<0.0097	<0.0097	<0.0097	<0.019	--	<0.019	NT	NT	NT	NT	NT
BBD2TP105	BBD2TP105(11.5)	11.5	4/28/2005	Fill	<0.0039	<0.002	<0.002	<0.002	<0.0039	--	<0.0039	0.27	5.3	32	<0.0051	0.011
BBD2TP106	BBD2TP106(2.0)	2.0	4/28/2005	Fill	<0.018	<0.0094	<0.0094	<0.0094	<0.018	--	<0.018	0.57	180	360	0.013	<0.011
BB2TP110	BB2TP110(3.0)	3.0	12/22/2006	Fill	NT	NT	--	--	NT	--	NT	NT	NT	NT	NT	NT
	BB2TP110(4.0)	4.0	12/22/2006	Fill	NT	NT	--	--	NT	--	NT	NT	NT	NT	NT	NT
BB2TP500	BB2TP500[2.0]	2	8/29/2011	Fill	0.0018	<0.0018	<0.0018	<0.0018	<0.0035	<0.0018	<0.0035	--	--	--	--	--
BB2TP501	BB2TP501[0.5]	0.5	8/29/2011	Fill	<0.0035	<0.0018	<0.0018	<0.0018	<0.0035	<0.0018	<0.0035	--	--	--	--	--
BB2TP502	BB2TP502[3.0]	3	8/29/2011	Debris Fill	0.013	<0.002	<0.002	<0.002	<0.0038	<0.002	<0.0038	--	--	--	--	--
	BB2TP502[9.5]	9.5	8/29/2011	Debris Fill	0.0045	<0.002	<0.002	<0.002	<0.0038	<0.002	<0.0038	--	--	--	--	--
BB2TP503	BB2TP503[1.5]	1.5	8/29/2011	Debris Fill	<0.0037	<0.0019	<0.0019	<0.0019	<0.0037	<0.0019	<0.0037	--	--	--	--	--
BB2TP504	BB2TP504[1.5]	1.5	8/30/2011	Fill	<0.0037	<0.0019	<0.0019	<0.0019	<0.0037	<0.0019	<0.0037	--	--	--	--	--
	DUP083011-003	1.5	8/30/2011	Fill	<0.0036	<0.0019	<0.0019	<0.0019	<0.0036	<0.0019	<0.0036	--	--	--	--	--
	BB2TP504[5.5]	5.5	8/30/2011	Fill	<0.004	0.00044	<0.002	0.00044	<0.004	<0.002	<0.004	--	--	--	--	--
BB2TP505	BB2TP505[1.0]	1	8/30/2011	Fill	<0.0038	<0.0019	<0.0019	<0.0019	<0.0038	<0.0019	<0.0038	--	--	--	--	--
BB2TP506	BB2TP506[1.0]	1	8/30/2011	Debris Fill	0.0059	0.0012	<0.0019	0.0012	<0.0036	<0.0019	<0.0036	--	--	--	--	--
BB2TP507	BB2TP507[0.0]	0	8/30/2011	Debris Fill	0.0018	0.0065	0.0028	0.0093	<0.0037	<0.0019	<0.0037	--	--	--	--	--
	DUP083011-002	0	8/30/2011	Debris Fill	0.002	0.006	0.0026	0.0086	<0.0037	<0.0019	<0.0037	--	--	--	--	--
BB2TP508	BB2TP508[0.5]	0.5	8/30/2011	Debris Fill	<0.0039	<0.002	<0.002	<0.002	<0.0039	<0.002	<0.0039	--	--	--	--	--
BB2TP514	BB2TP514[3.5]	3.5	8/29/2011	Debris Fill	0.15	0.0078	0.0043	0.0121	<0.0038	<0.002	<0.0038	--	--	--	--	--
	BB2TP514[9.5]	9.5	8/29/2011	Debris Fill	0.0035	<0.0019	<0.0019	<0.0019	<0.0038	<0.0019	<0.0038	--	--	--	--	--
BB2TP515	BB2TP515[1.0]	1	8/30/2011	Debris Fill	0.0062	<0.0019	<0.0019	<0.0019	<0.0037	0.00074	<0.0037	--	--	--	--	--
	DUP083011-004	1	8/30/2011	Debris Fill	0.0044	0.00033	0.00072	0.00105	0.0016	<0.0018	<0.0036	--	--	--	--	--
	BB2TP515[5.0]	5	8/30/2011	Debris Fill	0.009	0.0013	0.014	0.1413	<0.0039	0.0027	<0.0039	--	--	--	--	--
BB2SB519	BB2SB519[0.0]	0	8/23/2011	Fill	--	--	--	--	--	--	--	--	--	--	--	--
	DUP082311-002	0	8/23/2011	Fill	--	--	--	--	--	--	--	--	--	--	--	--
BB2SB521	BB2SB521[0.0]	0	8/23/2011	Fill	--	--	--	--	--	--	--	--	--	--	--	--

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Notes:
Peach highlights indicate the primary and duplicate samples were averaged for the 95% upper confidence limit calculations.
Blue highlights indicate the value from the duplicate pair used in the 95% upper confidence limit calculations.
The source of the data for samples collected prior to 2000 is the Main Installation Sites RI (Dames & Moore, 1997).
Rejected sample results were not included in the summary table or in the calculations of upper confidence limit (UCLs).

Table A-1. Soil Analytical Data - Detected Chemicals
Debris Fill Area

Station Name	Sample Number	Depth (feet bgs)	Sample Date	Soil Type	Acetone (mg/kg)	Benzene (mg/kg)	Ethylbenzene (mg/kg)	Methylene Chloride (mg/kg)	p-Isopropyltoluene (mg/kg)	Toluene (mg/kg)	Xylenes (o-) (mg/kg)	Xylenes (total) (mg/kg)
BBSB06	BBSB06	0.0	8/13/1992	Fill	<0.046	<0.002	<0.002	<0.04	NT	<0.002	NT	<0.002
	BBSB06	1.5	8/13/1992	Fill	<0.046	<0.002	<0.002	<0.04	NT	<0.002	NT	<0.002
BBSB08	BBSB08	0.0	8/13/1992	Fill	<0.046	0.002	<0.002	<0.04	NT	<0.002	NT	<0.002
	BBSB08	2.0	8/13/1992	Fill	<0.046	<0.002	<0.002	<0.04	NT	<0.002	NT	0.004
BB2SB102	BB2SB102(0.0)	0.0	5/12/2005	Fill	NT	NT	NT	NT	NT	NT	NT	NT
	BB2SB102(2.0)	2.0	5/12/2005	Fill	NT	NT	NT	NT	NT	NT	NT	NT
BBD2TP105	BBD2TP105(11.5)	11.5	4/28/2005	Fill	0.063	<0.0051	<0.0051	<0.02	<0.0051	<0.0051	<0.0051	<0.0051
BBD2TP106	BBD2TP106(2.0)	2.0	4/28/2005	Fill	<0.022	<0.0056	0.013	<0.022	<0.0056	0.04	0.018	0.048
BB2TP110	BB2TP110(3.0)	3.0	12/22/2006	Fill	NT	NT	NT	NT	NT	NT	NT	NT
	BB2TP110(4.0)	4.0	12/22/2006	Fill	NT	NT	NT	NT	NT	NT	NT	NT
BB2TP500	BB2TP500[2.0]	2	8/29/2011	Fill	--	--	--	--	--	--	--	--
BB2TP501	BB2TP501[0.5]	0.5	8/29/2011	Fill	--	--	--	--	--	--	--	--
BB2TP502	BB2TP502[3.0]	3	8/29/2011	Debris Fill	--	--	--	--	--	--	--	--
	BB2TP502[9.5]	9.5	8/29/2011	Debris Fill	--	--	--	--	--	--	--	--
BB2TP503	BB2TP503[1.5]	1.5	8/29/2011	Debris Fill	--	--	--	--	--	--	--	--
BB2TP504	BB2TP504[1.5]	1.5	8/30/2011	Fill	--	--	--	--	--	--	--	--
	DUP083011-003	1.5	8/30/2011	Fill	--	--	--	--	--	--	--	--
	BB2TP504[5.5]	5.5	8/30/2011	Fill	--	--	--	--	--	--	--	--
BB2TP505	BB2TP505[1.0]	1	8/30/2011	Fill	--	--	--	--	--	--	--	--
BB2TP506	BB2TP506[1.0]	1	8/30/2011	Debris Fill	--	--	--	--	--	--	--	--
BB2TP507	BB2TP507[0.0]	0	8/30/2011	Debris Fill	--	--	--	--	--	--	--	--
	DUP083011-002	0	8/30/2011	Debris Fill	--	--	--	--	--	--	--	--
BB2TP508	BB2TP508[0.5]	0.5	8/30/2011	Debris Fill	--	--	--	--	--	--	--	--
BB2TP514	BB2TP514[3.5]	3.5	8/29/2011	Debris Fill	--	--	--	--	--	--	--	--
	BB2TP514[9.5]	9.5	8/29/2011	Debris Fill	--	--	--	--	--	--	--	--
BB2TP515	BB2TP515[1.0]	1	8/30/2011	Debris Fill	--	--	--	--	--	--	--	--
	DUP083011-004	1	8/30/2011	Debris Fill	--	--	--	--	--	--	--	--
	BB2TP515[5.0]	5	8/30/2011	Debris Fill	--	--	--	--	--	--	--	--
BB2SB519	BB2SB519[0.0]	0	8/23/2011	Fill	--	--	--	--	--	--	--	--
	DUP082311-002	0	8/23/2011	Fill	--	--	--	--	--	--	--	--
BB2SB521	BB2SB521[0.0]	0	8/23/2011	Fill	--	--	--	--	--	--	--	--

Abbreviations:
-- = Not applicable/not available.
<# = Not detected above the reporting limit.
feet bgs = feet below ground surface.
mg/kg = Milligrams per kilogram.
NT = Not tested.
R = Rejected.

Notes:
Peach highlights indicate the primary and duplicate samples were averaged for the 95% upper confidence limit calculations.
Blue highlights indicate the value from the duplicate pair used in the 95% upper confidence limit calculations.
The source of the data for samples collected prior to 2000 is the Main Installation Sites RI (Dames & Moore, 1997).
Rejected sample results were not included in the summary table or in the calculations of upper confidence limit (UCLs).

Notes:
confidence limit (UCLs).
between the primary and duplicate samples, the detected value was used in the UCL calculation.
The source of the data for samples collected prior to 2000 is the Main Installation Sites RI
Rejected sample results were not included in the summary table or in the calculations of upper
detected concentrations. However, when providing sample counts, only the values used for UCL
samples was used in the UCL calculation. Where there was one detected value and one nondetect
(Dames & Moore, 1997).

Blue highlighting indicates which value between the primary and the duplicate samples was used to calculate the UCL.
<# = Not detected above the detection limit.
R = Sample was rejected and not used in the summary table or calculation of upper confidence limits.
Orange highlighting indicates the samples that were averaged for calculating the UCL.

mg/kg = Milligrams per kilogram.

Table A-2. Benzo(a)pyrene Potency Equivalent Concentrations
Debris Fill Area, Baker Beach Disturbed Area 2

Polycyclic Aromatic Hydrocarbons (PAHs)	Potency Equivalent Factor (PEF) [a]	BBSB06		BBSB06		BBSB08		BBSB08		BB2SB102(0.0)		BB2SB102(2.0)		BBD2TP105(11.5)		BBD2TP106(2.0)		BB2TP110(3.0)		BB2TP110(4.0)		BB2TP500[2.0]		BB2TP501[0.5]	
		0 feet bgs		1.5 feet bgs		0 feet bgs		2 feet bgs		0 feet bgs		2 feet bgs		11.5 feet bgs		2 feet bgs		3 feet bgs		4 feet bgs		2 feet bgs		0.5 feet bgs	
		8/13/1992		8/13/1992		8/13/1992		8/13/1992		5/12/2005		5/12/2005		4/28/2005		4/28/2005		12/22/2006		12/22/2006		8/29/2011		8/29/2011	
		Lab Results	PEF Adj [b]	Lab Results	PEF Adj [b]	Lab Results	PEF Adj [b]	Lab Results	PEF Adj [b]	Lab Results	PEF Adj [b]	Lab Results	PEF Adj [b]	Lab Results	PEF Adj [b]	Lab Results	PEF Adj [b]	Lab Results	PEF Adj [b]	Lab Results	PEF Adj [b]	Lab Results	PEF Adj [b]	Lab Results	PEF Adj [b]
	(unitless)	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Benzo(a)anthracene	0.1	0.52	0.052	< 0.033	--	0.22	0.022	0.084	0.0084	0.099	0.0099	0.052	0.0052	0.0014	0.00014	0.54	0.054	< 0.00285	0.00014	< 0.006	--	0.0017	0.00017	< 0.00265	0.00013
Benzo(a)pyrene	1	0.54	0.54	< 0.033	--	0.11	0.11	0.11	0.11	0.14	0.14	0.084	0.084	0.0017	0.0017	0.8	0.80	< 0.00285	0.0014	< 0.006	--	0.0023	0.0023	< 0.00265	0.0013
Benzo(b)fluoranthene	0.1	0.47	0.047	< 0.033	--	0.14	0.014	0.13	0.013	0.12	0.012	0.068	0.0068	0.0029	0.00029	0.61	0.061	< 0.00285	0.00014	< 0.006	--	0.0024	0.00024	0.0015	0.00015
Benzo(k)fluoranthene	0.1	0.38	0.038	< 0.033	--	0.18	0.018	0.14	0.014	0.09	0.0090	0.055	0.0055	0.003	0.00030	0.54	0.054	< 0.00285	0.00014	< 0.006	--	< 0.00265	0.00013	< 0.00265	0.00013
Chrysene	0.01	0.47	0.0047	< 0.22	--	< 0.11	0.00055	< 0.11	0.00055	0.13	0.0013	0.069	0.00069	0.0029	0.000029	0.87	0.0087	0.001	0.000010	< 0.006	--	0.0023	0.000023	0.0018	0.000018
Dibenzo(a,h)anthracene	0.34	< 0.0165	0.0028	< 0.033	--	< 0.0165	0.0028	< 0.0165	0.0028	0.035	0.012	0.019	0.0065	0.0016	0.00054	0.22	0.075	< 0.00285	0.00048	< 0.006	--	< 0.00265	0.00045	< 0.00265	0.00045
Indeno(1,2,3-cd)pyrene	0.1	< 0.0165	0.00083	< 0.033	--	0.09	0.0090	0.045	0.0045	0.072	0.0072	0.036	0.0036	0.0028	0.00028	0.29	0.029	< 0.00285	0.00014	< 0.006	--	< 0.00265	0.00013	< 0.00265	0.00013
Benzo(a)pyrene PEQ [c]			0.69		<0.033		0.18		0.15		0.19		0.11		0.0033		1.1		0.0025		<0.006		0.0034		0.0023

Polycyclic Aromatic Hydrocarbons (PAHs)	Potency Equivalent Factor (PEF) [a]	BB2TP502[3.0]		BB2TP502[9.5]		BB2TP503[1.5]		BB2TP504[1.5] [a]		BB2TP504[5.5]		BB2TP505[1.0]		BB2TP506[1.0]		BB2TP507[0.0] [a]		BB2TP508[0.5]		BB2TP514[3.5]		BB2TP514[9.5]		BB2TP515[1.0] [a]	
		3 feet bgs		9.5 feet bgs		1.5 feet bgs		1.5 feet bgs		5.5 feet bgs		1 feet bgs		1 feet bgs		0 feet bgs		0.5 feet bgs		3.5 feet bgs		9.5 feet bgs		1 feet bgs	
		8/29/2011		8/29/2011		8/29/2011		8/30/2011		8/30/2011		8/30/2011		8/30/2011		8/30/2011		8/30/2011		8/29/2011		8/29/2011		8/30/2011	
		Lab Results	PEF Adj [b]	Lab Results	PEF Adj [b]	Lab Results	PEF Adj [b]	Lab Results	PEF Adj [b]	Lab Results	PEF Adj [b]	Lab Results	PEF Adj [b]	Lab Results	PEF Adj [b]	Lab Results	PEF Adj [b]	Lab Results	PEF Adj [b]	Lab Results	PEF Adj [b]	Lab Results	PEF Adj [b]	Lab Results	PEF Adj [b]
	(unitless)	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Benzo(a)anthracene	0.1	< 0.0029	0.00015	0.019	0.0019	0.0033	0.00033	0.0023	0.00023	< 0.006	--	0.004	0.00040	0.0034	0.00034	0.00405	0.000405	0.01	0.0010	0.0024	0.00024	0.0039	0.00039	0.0225	0.00225
Benzo(a)pyrene	1	0.0012	0.0012	0.017	0.017	0.0048	0.0048	0.0021	0.0021	< 0.006	--	0.0039	0.0039	0.0029	0.0029	0.00475	0.00475	0.0095	0.0095	0.0032	0.0032	0.0052	0.0052	0.031	0.031
Benzo(b)fluoranthene	0.1	0.0023	0.00023	0.055	0.0055	0.0082	0.00082	0.0037	0.00037	< 0.006	--	0.0052	0.00052	0.0038	0.00038	0.007	0.0007	0.015	0.0015	0.0055	0.00055	0.0092	0.00092	0.074	0.0074
Benzo(k)fluoranthene	0.1	< 0.0029	0.00015	0.012	0.0012	0.0024	0.00024	< 0.004175	0.00021	< 0.006	--	0.0014	0.00014	< 0.00275	0.00014	0.00405	0.000405	0.0038	0.00038	< 0.00285	0.00014	0.003	0.00030	0.0225	0.00225
Chrysene	0.01	0.0022	0.000022	0.054	0.00054	0.0062	0.000062	0.0051	0.000051	< 0.006	--	0.0062	0.000062	0.0044	0.000044	0.0082	0.000082	0.016	0.00016	0.0035	0.000035	0.0078	0.000078	0.071	0.00071
Dibenzo(a,h)anthracene	0.34	< 0.0029	0.00049	0.0027	0.00092	< 0.00275	0.00047	0.0029	0.00099	< 0.006	--	0.0031	0.0011	0.0028	0.00095	0.0024	0.00082	0.0046	0.0016	< 0.00285	0.00048	< 0.0055	0.00094	0.0109	0.00371
Indeno(1,2,3-cd)pyrene	0.1	< 0.0029	0.00015	0.0059	0.00059	0.003	0.00030	0.0021	0.00021	< 0.006	--	0.0029	0.00029	0.0019	0.00019	0.0033	0.00033	0.0077	0.00077	< 0.00285	0.00014	0.0023	0.00023	0.028	0.0028
Benzo(a)pyrene PEQ [c]			0.0024		0.028		0.0070		0.0042		<0.006		0.0064		0.0049		0.0075		0.0149		0.0048		0.0081		0.0501

Polycyclic Aromatic Hydrocarbons (PAHs)	Potency Equivalent Factor (PEF) [a]	BB2TP515[5.0]	
		5 feet bgs	
		8/30/2011	
		Lab Results	PEF Adj [b]
	(unitless)	mg/kg	mg/kg
Benzo(a)anthracene	0.1	0.034	0.0034
Benzo(a)pyrene	1	0.039	0.039
Benzo(b)fluoranthene	0.1	0.048	0.0048
Benzo(k)fluoranthene	0.1	0.016	0.0016
Chrysene	0.01	0.042	0.00042
Dibenzo(a,h)anthracene	0.34	0.0086	0.0029
Indeno(1,2,3-cd)pyrene	0.1	0.02	0.0020
Benzo(a)pyrene PEQ [c]			0.054

Abbreviations:
bgs = Below ground surface.
Adj = Adjusted.
Dup = Duplicate sample.
mg/kg = Milligrams per kilogram.
<# = Not detected above detection limit.
-- = Not applicable.
PEF = Potency equivalent factor.
BaP = Benzo(a)pyrene.
PEQ = Potency equivalent concentration.

Footnotes:
[a] PEFs were obtained from *Human Health Risk Assessment Note 4, Screening Level Human Health Risk Assessments* (*DTSC, 2009*).
[b] The PEF Adj was calculated by multiplying the laboratory result by the PEF. For samples where at least one PAH compound was detected, a value equal to half of the detection limit was used as a surrogate value for non detect compounds. For samples where all of the PAHs were not detected, the designated BaP PEQ was represented as the detection limit for BaP
[c] The BaP PEQ is the sum of the PEF Adj values for each chemical.
[d] For samples with duplicates, if primary and duplicate sample results were detected values, the average value of the two are used and if only one of the primary and duplicate sample has a detected value, the detected value is used.

1	**General UCL Statistics for Data Sets with Non-Detects**											
2	**User Selected Options**											
3	From File	Fill.wst										
4	Full Precision	OFF										
5	Confidence Coefficient	95%										
6	Number of Bootstrap Operations	2000										
7												
8												
9	**Copper (Fill Data 0-10 feet bgs)**											
10												
11	**General Statistics**											
12	Number of Valid Observations	27					Number of Distinct Observations	24				
13												
14	**Raw Statistics**						**Log-transformed Statistics**					
15	Minimum	15					Minimum of Log Data	2.708				
16	Maximum	220					Maximum of Log Data	5.394				
17	Mean	71.98					Mean of log Data	3.966				
18	Geometric Mean	52.8					SD of log Data	0.803				
19	Median	44.8										
20	SD	58.96										
21	Std. Error of Mean	11.35										
22	Coefficient of Variation	0.819										
23	Skewness	1.155										
24												
25	**Relevant UCL Statistics**											
26	**Normal Distribution Test**						**Lognormal Distribution Test**					
27	Shapiro Wilk Test Statistic	0.835					Shapiro Wilk Test Statistic	0.946				
28	Shapiro Wilk Critical Value	0.923					Shapiro Wilk Critical Value	0.923				
29	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
30												
31	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
32	95% Student's-t UCL	91.33					95% H-UCL	104.3				
33	**95% UCLs (Adjusted for Skewness)**						95% Chebyshev (MVUE) UCL	124.9				
34	95% Adjusted-CLT UCL (Chen-1995)	93.34					97.5% Chebyshev (MVUE) UCL	147.9				
35	95% Modified-t UCL (Johnson-1978)	91.75					99% Chebyshev (MVUE) UCL	193				
36												
37	**Gamma Distribution Test**						**Data Distribution**					
38	k star (bias corrected)	1.591					**Data Follow Appr. Gamma Distribution at 5% Significance Level**					
39	Theta Star	45.25										
40	MLE of Mean	71.98										
41	MLE of Standard Deviation	57.07										
42	nu star	85.9										
43	Approximate Chi Square Value (.05)	65.53					**Nonparametric Statistics**					
44	Adjusted Level of Significance	0.0401					95% CLT UCL	90.64				
45	Adjusted Chi Square Value	64.4					95% Jackknife UCL	91.33				
46							95% Standard Bootstrap UCL	90.2				
47	Anderson-Darling Test Statistic	0.763					95% Bootstrap-t UCL	94.84				
48	Anderson-Darling 5% Critical Value	0.76					95% Hall's Bootstrap UCL	91.95				
49	Kolmogorov-Smirnov Test Statistic	0.157					95% Percentile Bootstrap UCL	90.1				
50	Kolmogorov-Smirnov 5% Critical Value	0.171					95% BCA Bootstrap UCL	93.13				
51	**Data follow Appr. Gamma Distribution at 5% Significance Level**						95% Chebyshev(Mean, Sd) UCL	121.4				
52							97.5% Chebyshev(Mean, Sd) UCL	142.8				
53	**Assuming Gamma Distribution**						99% Chebyshev(Mean, Sd) UCL	184.9				
54	95% Approximate Gamma UCL (Use when n >= 40)	94.34										
55	95% Adjusted Gamma UCL (Use when n < 40)	96.01										
56												
57	**Potential UCL to Use**						Use 95% Approximate Gamma UCL	94.34				
58												
59	**Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
60	**These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)**											
61	**and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.**											
62												

	A	B	C	D	E	F	G	H	I	J	K	L
63	**Copper (Fill Data 0-3 feet bgs)**											
64												
65						**General Statistics**						
66					Number of Valid Observations	20				Number of Distinct Observations		19
67												
68					**Raw Statistics**					**Log-transformed Statistics**		
69					Minimum	15				Minimum of Log Data		2.708
70					Maximum	220				Maximum of Log Data		5.394
71					Mean	71.27				Mean of log Data		4.01
72					Geometric Mean	55.15				SD of log Data		0.727
73					Median	50						
74					SD	55.39						
75					Std. Error of Mean	12.38						
76					Coefficient of Variation	0.777						
77					Skewness	1.386						
78												
79					**Relevant UCL Statistics**							
80					**Normal Distribution Test**					**Lognormal Distribution Test**		
81					Shapiro Wilk Test Statistic	0.834				Shapiro Wilk Test Statistic		0.965
82					Shapiro Wilk Critical Value	0.905				Shapiro Wilk Critical Value		0.905
83					**Data not Normal at 5% Significance Level**					**Data appear Lognormal at 5% Significance Level**		
84												
85					**Assuming Normal Distribution**					**Assuming Lognormal Distribution**		
86					95% Student's-t UCL	92.69				95% H-UCL		104.8
87					**95% UCLs (Adjusted for Skewness)**					95% Chebyshev (MVUE) UCL		124.3
88					95% Adjusted-CLT UCL (Chen-1995)	95.74				97.5% Chebyshev (MVUE) UCL		147.5
89					95% Modified-t UCL (Johnson-1978)	93.32				99% Chebyshev (MVUE) UCL		193
90												
91					**Gamma Distribution Test**					**Data Distribution**		
92					k star (bias corrected)	1.819				**Data appear Gamma Distributed at 5% Significance Level**		
93					Theta Star	39.18						
94					MLE of Mean	71.27						
95					MLE of Standard Deviation	52.84						
96					nu star	72.77						
97					Approximate Chi Square Value (.05)	54.13				**Nonparametric Statistics**		
98					Adjusted Level of Significance	0.038				95% CLT UCL		91.64
99					Adjusted Chi Square Value	52.86				95% Jackknife UCL		92.69
100										95% Standard Bootstrap UCL		90.83
101					Anderson-Darling Test Statistic	0.572				95% Bootstrap-t UCL		100.4
102					Anderson-Darling 5% Critical Value	0.752				95% Hall's Bootstrap UCL		95.46
103					Kolmogorov-Smirnov Test Statistic	0.15				95% Percentile Bootstrap UCL		92.51
104					Kolmogorov-Smirnov 5% Critical Value	0.196				95% BCA Bootstrap UCL		97.11
105					**Data appear Gamma Distributed at 5% Significance Level**					95% Chebyshev(Mean, Sd) UCL		125.3
106										97.5% Chebyshev(Mean, Sd) UCL		148.6
107					**Assuming Gamma Distribution**					99% Chebyshev(Mean, Sd) UCL		194.5
108					95% Approximate Gamma UCL (Use when n >= 40)	95.82						
109					95% Adjusted Gamma UCL (Use when n < 40)	98.12						
110												
111					**Potential UCL to Use**					Use 95% Approximate Gamma UCL		95.82
112												
113	**Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
114	**These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)**											
115	**and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.**											
116												

	A	B	C	D	E	F	G	H	I	J	K	L
117	**Lead (Fill Data 0-10 feet bgs)**											
118												
119	**General Statistics**											
120	Number of Valid Observations					27	Number of Distinct Observations					24
121												
122	**Raw Statistics**						**Log-transformed Statistics**					
123	Minimum					5	Minimum of Log Data					1.609
124	Maximum					330	Maximum of Log Data					5.799
125	Mean					95.53	Mean of log Data					3.969
126	Geometric Mean					52.94	SD of log Data					1.177
127	Median					40						
128	SD					98.04						
129	Std. Error of Mean					18.87						
130	Coefficient of Variation					1.026						
131	Skewness					1.032						
132												
133	**Relevant UCL Statistics**											
134	**Normal Distribution Test**						**Lognormal Distribution Test**					
135	Shapiro Wilk Test Statistic					0.798	Shapiro Wilk Test Statistic					0.939
136	Shapiro Wilk Critical Value					0.923	Shapiro Wilk Critical Value					0.923
137	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
138												
139	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
140	95% Student's-t UCL					127.7	95% H-UCL					200.2
141	**95% UCLs (Adjusted for Skewness)**						95% Chebyshev (MVUE) UCL					220.1
142	95% Adjusted-CLT UCL (Chen-1995)					130.6	97.5% Chebyshev (MVUE) UCL					271.3
143	95% Modified-t UCL (Johnson-1978)					128.3	99% Chebyshev (MVUE) UCL					372
144												
145	**Gamma Distribution Test**						**Data Distribution**					
146	k star (bias corrected)					0.896	**Data appear Lognormal at 5% Significance Level**					
147	Theta Star					106.6						
148	MLE of Mean					95.53						
149	MLE of Standard Deviation					100.9						
150	nu star					48.38						
151	Approximate Chi Square Value (.05)					33.41	**Nonparametric Statistics**					
152	Adjusted Level of Significance					0.0401	95% CLT UCL					126.6
153	Adjusted Chi Square Value					32.62	95% Jackknife UCL					127.7
154							95% Standard Bootstrap UCL					125.7
155	Anderson-Darling Test Statistic					1.056	95% Bootstrap-t UCL					134.9
156	Anderson-Darling 5% Critical Value					0.774	95% Hall's Bootstrap UCL					128.2
157	Kolmogorov-Smirnov Test Statistic					0.22	95% Percentile Bootstrap UCL					126.7
158	Kolmogorov-Smirnov 5% Critical Value					0.173	95% BCA Bootstrap UCL					132.1
159	**Data not Gamma Distributed at 5% Significance Level**						95% Chebyshev(Mean, Sd) UCL					177.8
160							97.5% Chebyshev(Mean, Sd) UCL					213.4
161	**Assuming Gamma Distribution**						99% Chebyshev(Mean, Sd) UCL					283.3
162	95% Approximate Gamma UCL (Use when n >= 40)					138.3						
163	95% Adjusted Gamma UCL (Use when n < 40)					141.7						
164												
165	**Potential UCL to Use**						Use 95% H-UCL					200.2
166												
167	**ProUCL computes and outputs H-statistic based UCLs for historical reasons only.**											
168	**H-statistic often results in unstable (both high and low) values of UCL95 as shown in examples in the Technical Guide.**											
169	**It is therefore recommended to avoid the use of H-statistic based 95% UCLs.**											
170	**Use of nonparametric methods are preferred to compute UCL95 for skewed data sets which do not follow a gamma distribution.**											
171												
172	**Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
173	**These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)**											
174	**and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.**											
175												

	A	B	C	D	E	F	G	H	I	J	K	L
176	**Lead (Fill Data 0-3 feet bgs)**											
177												
178	**General Statistics**											
179	Number of Valid Observations					20	Number of Distinct Observations					19
180												
181	**Raw Statistics**						**Log-transformed Statistics**					
182	Minimum					5	Minimum of Log Data					1.609
183	Maximum					280	Maximum of Log Data					5.635
184	Mean					87.08	Mean of log Data					3.972
185	Geometric Mean					53.09	SD of log Data					1.07
186	Median					41.25						
187	SD					86.25						
188	Std. Error of Mean					19.29						
189	Coefficient of Variation					0.991						
190	Skewness					1.144						
191												
192	**Relevant UCL Statistics**											
193	**Normal Distribution Test**						**Lognormal Distribution Test**					
194	Shapiro Wilk Test Statistic					0.793	Shapiro Wilk Test Statistic					0.947
195	Shapiro Wilk Critical Value					0.905	Shapiro Wilk Critical Value					0.905
196	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
197												
198	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
199	95% Student's-t UCL					120.4	95% H-UCL					184.3
200	**95% UCLs (Adjusted for Skewness)**						95% Chebyshev (MVUE) UCL					196.7
201	95% Adjusted-CLT UCL (Chen-1995)					124.1	97.5% Chebyshev (MVUE) UCL					242.8
202	95% Modified-t UCL (Johnson-1978)					121.2	99% Chebyshev (MVUE) UCL					333.3
203												
204	**Gamma Distribution Test**						**Data Distribution**					
205	k star (bias corrected)					1.01	**Data appear Lognormal at 5% Significance Level**					
206	Theta Star					86.24						
207	MLE of Mean					87.08						
208	MLE of Standard Deviation					86.66						
209	nu star					40.39						
210	Approximate Chi Square Value (.05)					26.82	**Nonparametric Statistics**					
211	Adjusted Level of Significance					0.038	95% CLT UCL					118.8
212	Adjusted Chi Square Value					25.95	95% Jackknife UCL					120.4
213							95% Standard Bootstrap UCL					118.1
214	Anderson-Darling Test Statistic					0.796	95% Bootstrap-t UCL					128.7
215	Anderson-Darling 5% Critical Value					0.765	95% Hall's Bootstrap UCL					118.7
216	Kolmogorov-Smirnov Test Statistic					0.229	95% Percentile Bootstrap UCL					118.2
217	Kolmogorov-Smirnov 5% Critical Value					0.199	95% BCA Bootstrap UCL					122
218	**Data not Gamma Distributed at 5% Significance Level**						95% Chebyshev(Mean, Sd) UCL					171.1
219							97.5% Chebyshev(Mean, Sd) UCL					207.5
220	**Assuming Gamma Distribution**						99% Chebyshev(Mean, Sd) UCL					279
221	95% Approximate Gamma UCL (Use when n >= 40)					131.1						
222	95% Adjusted Gamma UCL (Use when n < 40)					135.5						
223												
224	**Potential UCL to Use**						Use 95% Chebyshev (Mean, Sd) UCL					171.1
225												
226	**Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
227	**These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)**											
228	**and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.**											
229												

	A	B	C	D	E	F	G	H	I	J	K	L
230	**Silver (Fill Data 0-10 feet bgs)**											
231												
232						**General Statistics**						
233					Number of Valid Data	27				Number of Detected Data		25
234					Number of Distinct Detected Data	23				Number of Non-Detect Data		2
235										Percent Non-Detects		7.41%
236												
237				**Raw Statistics**					**Log-transformed Statistics**			
238					Minimum Detected	0.034				Minimum Detected		-3.381
239					Maximum Detected	14				Maximum Detected		2.639
240					Mean of Detected	0.88				Mean of Detected		-1.807
241					SD of Detected	2.789				SD of Detected		1.506
242					Minimum Non-Detect	0.27				Minimum Non-Detect		-1.309
243					Maximum Non-Detect	0.521				Maximum Non-Detect		-0.652
244												
245	Note: Data have multiple DLs - Use of KM Method is recommended									Number treated as Non-Detect		22
246	For all methods (except KM, DL/2, and ROS Methods),									Number treated as Detected		5
247	Observations < Largest ND are treated as NDs									Single DL Non-Detect Percentage		81.48%
248												
249						**UCL Statistics**						
250				**Normal Distribution Test with Detected Values Only**					**Lognormal Distribution Test with Detected Values Only**			
251					Shapiro Wilk Test Statistic	0.323				Shapiro Wilk Test Statistic		0.842
252					5% Shapiro Wilk Critical Value	0.918				5% Shapiro Wilk Critical Value		0.918
253				**Data not Normal at 5% Significance Level**					**Data not Lognormal at 5% Significance Level**			
254												
255				**Assuming Normal Distribution**					**Assuming Lognormal Distribution**			
256					DL/2 Substitution Method					DL/2 Substitution Method		
257					Mean	0.83				Mean		-1.797
258					SD	2.686				SD		1.45
259					95% DL/2 (t) UCL	1.711				95% H-Stat (DL/2) UCL		1.166
260												
261					Maximum Likelihood Estimate(MLE) Method	N/A				Log ROS Method		
262				**MLE yields a negative mean**						Mean in Log Scale		-1.839
263										SD in Log Scale		1.452
264										Mean in Original Scale		0.823
265										SD in Original Scale		2.688
266										95% t UCL		1.705
267										95% Percentile Bootstrap UCL		1.805
268										95% BCA Bootstrap UCL		2.373
269										95% H-UCL		1.122
270												
271				**Gamma Distribution Test with Detected Values Only**					**Data Distribution Test with Detected Values Only**			
272					k star (bias corrected)	0.372			**Data do not follow a Discernable Distribution (0.05)**			
273					Theta Star	2.363						
274					nu star	18.62						
275												
276					A-D Test Statistic	3.406			**Nonparametric Statistics**			
277					5% A-D Critical Value	0.831				Kaplan-Meier (KM) Method		
278					K-S Test Statistic	0.831				Mean		0.822
279					5% K-S Critical Value	0.187				SD		2.638
280				**Data not Gamma Distributed at 5% Significance Level**						SE of Mean		0.518
281										95% KM (t) UCL		1.706
282				**Assuming Gamma Distribution**						95% KM (z) UCL		1.674
283					Gamma ROS Statistics using Extrapolated Data					95% KM (jackknife) UCL		1.705
284					Minimum	0.000001				95% KM (bootstrap t) UCL		5.088
285					Maximum	14				95% KM (BCA) UCL		1.8
286					Mean	0.815				95% KM (Percentile Bootstrap) UCL		1.833
287					Median	0.087				95% KM (Chebyshev) UCL		3.081
288					SD	2.69				97.5% KM (Chebyshev) UCL		4.058
289					k star	0.273				99% KM (Chebyshev) UCL		5.977
290					Theta star	2.98						
291					Nu star	14.77			**Potential UCLs to Use**			
292					AppChi2	7.1				99% KM (Chebyshev) UCL		5.977
293					95% Gamma Approximate UCL (Use when n >= 40)	1.695						
294					95% Adjusted Gamma UCL (Use when n < 40)	1.78						
295	**Note: DL/2 is not a recommended method.**											
296												
297						**Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**						
298						**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**						
299						**For additional insight, the user may want to consult a statistician.**						
300												

	A	B	C	D	E	F	G	H	I	J	K	L
301	**Silver (Fill Data 0-3 feet bgs)**											
302												
303						**General Statistics**						
304					Number of Valid Data	20				Number of Detected Data		18
305					Number of Distinct Detected Data	17				Number of Non-Detect Data		2
306										Percent Non-Detects		10.00%
307												
308					**Raw Statistics**					**Log-transformed Statistics**		
309					Minimum Detected	0.034				Minimum Detected		-3.381
310					Maximum Detected	2.1				Maximum Detected		0.742
311					Mean of Detected	0.4				Mean of Detected		-1.864
312					SD of Detected	0.642				SD of Detected		1.291
313					Minimum Non-Detect	0.27				Minimum Non-Detect		-1.309
314					Maximum Non-Detect	0.521				Maximum Non-Detect		-0.652
315												
316	Note: Data have multiple DLs - Use of KM Method is recommended									Number treated as Non-Detect		16
317	For all methods (except KM, DL/2, and ROS Methods),									Number treated as Detected		4
318	Observations < Largest ND are treated as NDs									Single DL Non-Detect Percentage		80.00%
319												
320						**UCL Statistics**						
321					**Normal Distribution Test with Detected Values Only**					**Lognormal Distribution Test with Detected Values Only**		
322					Shapiro Wilk Test Statistic	0.603				Shapiro Wilk Test Statistic		0.841
323					5% Shapiro Wilk Critical Value	0.897				5% Shapiro Wilk Critical Value		0.897
324					**Data not Normal at 5% Significance Level**					**Data not Lognormal at 5% Significance Level**		
325												
326					**Assuming Normal Distribution**					**Assuming Lognormal Distribution**		
327					DL/2 Substitution Method					DL/2 Substitution Method		
328					Mean	0.38				Mean		-1.845
329					SD	0.611				SD		1.228
330					95% DL/2 (t) UCL	0.616				95% H-Stat (DL/2) UCL		0.777
331												
332					Maximum Likelihood Estimate(MLE) Method	N/A				Log ROS Method		
333					**MLE yields a negative mean**					Mean in Log Scale		-1.903
334										SD in Log Scale		1.227
335										Mean in Original Scale		0.371
336										SD in Original Scale		0.614
337										95% t UCL		0.608
338										95% Percentile Bootstrap UCL		0.616
339										95% BCA Bootstrap UCL		0.683
340										95% H-UCL		0.733
341												
342					**Gamma Distribution Test with Detected Values Only**					**Data Distribution Test with Detected Values Only**		
343					k star (bias corrected)	0.574				**Data do not follow a Discernable Distribution (0.05)**		
344					Theta Star	0.697						
345					nu star	20.68						
346												
347					A-D Test Statistic	2.065				**Nonparametric Statistics**		
348					5% A-D Critical Value	0.787				Kaplan-Meier (KM) Method		
349					K-S Test Statistic	0.787				Mean		0.37
350					5% K-S Critical Value	0.213				SD		0.599
351					**Data not Gamma Distributed at 5% Significance Level**					SE of Mean		0.138
352										95% KM (t) UCL		0.608
353					**Assuming Gamma Distribution**					95% KM (z) UCL		0.597
354					Gamma ROS Statistics using Extrapolated Data					95% KM (jackknife) UCL		0.608
355					Minimum	0.034				95% KM (bootstrap t) UCL		0.773
356					Maximum	2.1				95% KM (BCA) UCL		0.611
357					Mean	0.371				95% KM (Percentile Bootstrap) UCL		0.607
358					Median	0.105				95% KM (Chebyshev) UCL		0.971
359					SD	0.614				97.5% KM (Chebyshev) UCL		1.231
360					k star	0.601				99% KM (Chebyshev) UCL		1.742
361					Theta star	0.617						
362					Nu star	24.04				**Potential UCLs to Use**		
363					AppChi2	13.88				97.5% KM (Chebyshev) UCL		1.231
364					95% Gamma Approximate UCL (Use when n >= 40)	0.642						
365					95% Adjusted Gamma UCL (Use when n < 40)	0.672						
366	**Note: DL/2 is not a recommended method.**											
367												
368					**Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**							
369					**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**							
370					**For additional insight, the user may want to consult a statistician.**							
371												

	A	B	C	D	E	F	G	H	I	J	K	L
372	**Zinc (Fill Data 0-10 feet bgs)**											
373												
374						**General Statistics**						
375					Number of Valid Observations	27				Number of Distinct Observations		24
376												
377					**Raw Statistics**					**Log-transformed Statistics**		
378					Minimum	27				Minimum of Log Data		3.296
379					Maximum	1200				Maximum of Log Data		7.09
380					Mean	171.6				Mean of log Data		4.735
381					Geometric Mean	113.8				SD of log Data		0.825
382					Median	105						
383					SD	229.4						
384					Std. Error of Mean	44.15						
385					Coefficient of Variation	1.337						
386					Skewness	3.784						
387												
388						**Relevant UCL Statistics**						
389					**Normal Distribution Test**					**Lognormal Distribution Test**		
390					Shapiro Wilk Test Statistic	0.536				Shapiro Wilk Test Statistic		0.937
391					Shapiro Wilk Critical Value	0.923				Shapiro Wilk Critical Value		0.923
392					**Data not Normal at 5% Significance Level**					**Data appear Lognormal at 5% Significance Level**		
393												
394					**Assuming Normal Distribution**					**Assuming Lognormal Distribution**		
395					95% Student's-t UCL	246.9				95% H-UCL		232.1
396					**95% UCLs (Adjusted for Skewness)**					95% Chebyshev (MVUE) UCL		277.4
397					95% Adjusted-CLT UCL (Chen-1995)	278.6				97.5% Chebyshev (MVUE) UCL		329.4
398					95% Modified-t UCL (Johnson-1978)	252.3				99% Chebyshev (MVUE) UCL		431.5
399												
400					**Gamma Distribution Test**					**Data Distribution**		
401					k star (bias corrected)	1.234				**Data appear Lognormal at 5% Significance Level**		
402					Theta Star	139.1						
403					MLE of Mean	171.6						
404					MLE of Standard Deviation	154.5						
405					nu star	66.64						
406					Approximate Chi Square Value (.05)	48.85				**Nonparametric Statistics**		
407					Adjusted Level of Significance	0.0401				95% CLT UCL		244.2
408					Adjusted Chi Square Value	47.88				95% Jackknife UCL		246.9
409										95% Standard Bootstrap UCL		245.1
410					Anderson-Darling Test Statistic	1.596				95% Bootstrap-t UCL		348.1
411					Anderson-Darling 5% Critical Value	0.766				95% Hall's Bootstrap UCL		506.4
412					Kolmogorov-Smirnov Test Statistic	0.252				95% Percentile Bootstrap UCL		251.8
413					Kolmogorov-Smirnov 5% Critical Value	0.172				95% BCA Bootstrap UCL		297.6
414					**Data not Gamma Distributed at 5% Significance Level**					95% Chebyshev(Mean, Sd) UCL		364
415										97.5% Chebyshev(Mean, Sd) UCL		447.3
416					**Assuming Gamma Distribution**					99% Chebyshev(Mean, Sd) UCL		610.8
417					95% Approximate Gamma UCL (Use when n >= 40)	234.1						
418					95% Adjusted Gamma UCL (Use when n < 40)	238.8						
419												
420					**Potential UCL to Use**					Use 95% H-UCL		232.1
421												
422						**ProUCL computes and outputs H-statistic based UCLs for historical reasons only.**						
423						**H-statistic often results in unstable (both high and low) values of UCL95 as shown in examples in the Technical Guide.**						
424						**It is therefore recommended to avoid the use of H-statistic based 95% UCLs.**						
425						**Use of nonparametric methods are preferred to compute UCL95 for skewed data sets which do not follow a gamma distribution.**						
426												
427						**Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**						
428						**These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)**						
429						**and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.**						
430												

	A	B	C	D	E	F	G	H	I	J	K	L
431	**Zinc (Fill Data 0-3 feet bgs)**											
432												
433	**General Statistics**											
434	Number of Valid Observations					20	Number of Distinct Observations					18
435												
436	**Raw Statistics**						**Log-transformed Statistics**					
437	Minimum					27	Minimum of Log Data					3.296
438	Maximum					420	Maximum of Log Data					6.04
439	Mean					142.8	Mean of log Data					4.711
440	Geometric Mean					111.1	SD of log Data					0.713
441	Median					105						
442	SD					113.7						
443	Std. Error of Mean					25.43						
444	Coefficient of Variation					0.797						
445	Skewness					1.561						
446												
447	**Relevant UCL Statistics**											
448	**Normal Distribution Test**						**Lognormal Distribution Test**					
449	Shapiro Wilk Test Statistic					0.754	Shapiro Wilk Test Statistic					0.927
450	Shapiro Wilk Critical Value					0.905	Shapiro Wilk Critical Value					0.905
451	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
452												
453	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
454	95% Student's-t UCL					186.7	95% H-UCL					207.1
455	**95% UCLs (Adjusted for Skewness)**						95% Chebyshev (MVUE) UCL					245.9
456	95% Adjusted-CLT UCL (Chen-1995)					194.1	97.5% Chebyshev (MVUE) UCL					291.3
457	95% Modified-t UCL (Johnson-1978)					188.2	99% Chebyshev (MVUE) UCL					380.4
458												
459	**Gamma Distribution Test**						**Data Distribution**					
460	k star (bias corrected)					1.859	**Data appear Lognormal at 5% Significance Level**					
461	Theta Star					76.77						
462	MLE of Mean					142.8						
463	MLE of Standard Deviation					104.7						
464	nu star					74.38						
465	Approximate Chi Square Value (.05)					55.52	**Nonparametric Statistics**					
466	Adjusted Level of Significance					0.038	95% CLT UCL					184.6
467	Adjusted Chi Square Value					54.23	95% Jackknife UCL					186.7
468							95% Standard Bootstrap UCL					182.8
469	Anderson-Darling Test Statistic					1.133	95% Bootstrap-t UCL					203.7
470	Anderson-Darling 5% Critical Value					0.752	95% Hall's Bootstrap UCL					191.6
471	Kolmogorov-Smirnov Test Statistic					0.262	95% Percentile Bootstrap UCL					185.7
472	Kolmogorov-Smirnov 5% Critical Value					0.196	95% BCA Bootstrap UCL					191.7
473	**Data not Gamma Distributed at 5% Significance Level**						95% Chebyshev(Mean, Sd) UCL					253.6
474							97.5% Chebyshev(Mean, Sd) UCL					301.6
475	**Assuming Gamma Distribution**						99% Chebyshev(Mean, Sd) UCL					395.8
476	95% Approximate Gamma UCL (Use when n >= 40)					191.3						
477	95% Adjusted Gamma UCL (Use when n < 40)					195.8						
478												
479	**Potential UCL to Use**						Use 95% H-UCL					207.1
480												
481	**ProUCL computes and outputs H-statistic based UCLs for historical reasons only.**											
482	**H-statistic often results in unstable (both high and low) values of UCL95 as shown in examples in the Technical Guide.**											
483	**It is therefore recommended to avoid the use of H-statistic based 95% UCLs.**											
484	**Use of nonparametric methods are preferred to compute UCL95 for skewed data sets which do not follow a gamma distribution.**											
485												
486	**Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
487	**These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)**											
488	**and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.**											
489												

	A	B	C	D	E	F	G	H	I	J	K	L
490	**Benzo(a)pyrene (Fill Data 0-10 feet bgs)**											
491												
492						**General Statistics**						
493					Number of Valid Data	25			Number of Detected Data			20
494					Number of Distinct Detected Data	19			Number of Non-Detect Data			5
495									Percent Non-Detects			20.00%
496				**Raw Statistics**					**Log-transformed Statistics**			
497					Minimum Detected	0.0012			Minimum Detected			-6.725
498					Maximum Detected	0.8			Maximum Detected			-0.223
499					Mean of Detected	0.0956			Mean of Detected			-4.179
500					SD of Detected	0.206			SD of Detected			1.991
501					Minimum Non-Detect	0.0053			Minimum Non-Detect			-5.24
502					Maximum Non-Detect	0.033			Maximum Non-Detect			-3.411
503												
504	Note: Data have multiple DLs - Use of KM Method is recommended								Number treated as Non-Detect			18
505	For all methods (except KM, DL/2, and ROS Methods),								Number treated as Detected			7
506	Observations < Largest ND are treated as NDs								Single DL Non-Detect Percentage			72.00%
507												
508						**UCL Statistics**						
509				**Normal Distribution Test with Detected Values Only**					**Lognormal Distribution Test with Detected Values Only**			
510					Shapiro Wilk Test Statistic	0.516			Shapiro Wilk Test Statistic			0.912
511					5% Shapiro Wilk Critical Value	0.905			5% Shapiro Wilk Critical Value			0.905
512				**Data not Normal at 5% Significance Level**					**Data appear Lognormal at 5% Significance Level**			
513												
514				**Assuming Normal Distribution**					**Assuming Lognormal Distribution**			
515					DL/2 Substitution Method				DL/2 Substitution Method			
516					Mean	0.0776			Mean			-4.444
517					SD	0.187			SD			1.88
518					95% DL/2 (t) UCL	0.141			95% H-Stat (DL/2) UCL			0.294
519					Maximum Likelihood Estimate(MLE) Method	N/A			Log ROS Method			
520				**MLE yields a negative mean**					Mean in Log Scale			-4.451
521									SD in Log Scale			1.866
522									Mean in Original Scale			0.0774
523									SD in Original Scale			0.187
524									95% t UCL			0.141
525									95% Percentile Bootstrap UCL			0.145
526									95% BCA Bootstrap UCL			0.174
527									95% H-UCL			0.279
528												
529				**Gamma Distribution Test with Detected Values Only**					**Data Distribution Test with Detected Values Only**			
530					k star (bias corrected)	0.343			**Data appear Lognormal at 5% Significance Level**			
531					Theta Star	0.279						
532					nu star	13.73						
533												
534					A-D Test Statistic	1.409			**Nonparametric Statistics**			
535					5% A-D Critical Value	0.831			Kaplan-Meier (KM) Method			
536					K-S Test Statistic	0.831			Mean			0.0773
537					5% K-S Critical Value	0.208			SD			0.183
538				**Data not Gamma Distributed at 5% Significance Level**					SE of Mean			0.0375
539									95% KM (t) UCL			0.141
540				**Assuming Gamma Distribution**					95% KM (z) UCL			0.139
541					Gamma ROS Statistics using Extrapolated Data				95% KM (jackknife) UCL			0.141
542					Minimum	0.000001			95% KM (bootstrap t) UCL			0.326
543					Maximum	0.8			95% KM (BCA) UCL			0.149
544					Mean	0.0765			95% KM (Percentile Bootstrap) UCL			0.14
545					Median	0.00475			95% KM (Chebyshev) UCL			0.241
546					SD	0.187			97.5% KM (Chebyshev) UCL			0.312
547					k star	0.209			99% KM (Chebyshev) UCL			0.451
548					Theta star	0.366						
549					Nu star	10.44			**Potential UCLs to Use**			
550					AppChi2	4.22			99% KM (Chebyshev) UCL			0.451
551					95% Gamma Approximate UCL (Use when n >= 40)	0.189						
552					95% Adjusted Gamma UCL (Use when n < 40)	0.202						
553	**Note: DL/2 is not a recommended method.**											
554	**Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
555	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
556	**For additional insight, the user may want to consult a statistician.**											
557												

	A	B	C	D	E	F	G	H	I	J	K	L
558	**Benzo(a)pyrene (Fill Data 0-2 feet bgs)**											
560						**General Statistics**						
561						Number of Valid Data	16				Number of Detected Data	14
562						Number of Distinct Detected Data	13				Number of Non-Detect Data	2
563											Percent Non-Detects	12.50%
565						**Raw Statistics**					**Log-transformed Statistics**	
566						Minimum Detected	0.0021				Minimum Detected	-6.166
567						Maximum Detected	0.8				Maximum Detected	-0.223
568						Mean of Detected	0.132				Mean of Detected	-3.725
569						SD of Detected	0.239				SD of Detected	2.087
570						Minimum Non-Detect	0.0053				Minimum Non-Detect	-5.24
571						Maximum Non-Detect	0.033				Maximum Non-Detect	-3.411
573	Note: Data have multiple DLs - Use of KM Method is recommended										Number treated as Non-Detect	10
574	For all methods (except KM, DL/2, and ROS Methods),										Number treated as Detected	6
575	Observations < Largest ND are treated as NDs										Single DL Non-Detect Percentage	62.50%
577						**UCL Statistics**						
578						**Normal Distribution Test with Detected Values Only**					**Lognormal Distribution Test with Detected Values Only**	
579						Shapiro Wilk Test Statistic	0.606				Shapiro Wilk Test Statistic	0.893
580						5% Shapiro Wilk Critical Value	0.874				5% Shapiro Wilk Critical Value	0.874
581						**Data not Normal at 5% Significance Level**					**Data appear Lognormal at 5% Significance Level**	
583						**Assuming Normal Distribution**					**Assuming Lognormal Distribution**	
584						DL/2 Substitution Method					DL/2 Substitution Method	
585						Mean	0.117				Mean	-3.886
586						SD	0.226				SD	2.021
587						95% DL/2 (t) UCL	0.216				95% H-Stat (DL/2) UCL	1.662
588						Maximum Likelihood Estimate(MLE) Method	N/A				Log ROS Method	
589						**MLE yields a negative mean**					Mean in Log Scale	-3.916
590											SD in Log Scale	2.014
591											Mean in Original Scale	0.116
592											SD in Original Scale	0.226
593											95% t UCL	0.215
594											95% Percentile Bootstrap UCL	0.218
595											95% BCA Bootstrap UCL	0.258
596											95% H-UCL	1.57
597												
598						**Gamma Distribution Test with Detected Values Only**					**Data Distribution Test with Detected Values Only**	
599						k star (bias corrected)	0.353				**Data Follow Appr. Gamma Distribution at 5% Significance Level**	
600						Theta Star	0.373					
601						nu star	9.895					
602						A-D Test Statistic	0.825				**Nonparametric Statistics**	
603						5% A-D Critical Value	0.815				Kaplan-Meier (KM) Method	
604						K-S Test Statistic	0.815				Mean	0.116
605						5% K-S Critical Value	0.245				SD	0.219
606						**Data follow Appr. Gamma Distribution at 5% Significance Level**					SE of Mean	0.0569
607											95% KM (t) UCL	0.216
608						**Assuming Gamma Distribution**					95% KM (z) UCL	0.21
609						Gamma ROS Statistics using Extrapolated Data					95% KM (jackknife) UCL	0.215
610						Minimum	0.000001				95% KM (bootstrap t) UCL	0.502
611						Maximum	0.8				95% KM (BCA) UCL	0.219
612						Mean	0.115				95% KM (Percentile Bootstrap) UCL	0.22
613						Median	0.00715				95% KM (Chebyshev) UCL	0.364
614						SD	0.227				97.5% KM (Chebyshev) UCL	0.471
615						k star	0.246				99% KM (Chebyshev) UCL	0.682
616						Theta star	0.469					
617						Nu star	7.863				**Potential UCLs to Use**	
618						AppChi2	2.656				95% KM (Chebyshev) UCL	0.364
619						95% Gamma Approximate UCL (Use when n >= 40)	0.341					
620						95% Adjusted Gamma UCL (Use when n < 40)	0.39					
621	**Note: DL/2 is not a recommended method.**											
622						**Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**						
623						**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**						
624						**For additional insight, the user may want to consult a statistician.**						
625												

	A	B	C	D	E	F	G	H	I	J	K	L
626	**Benzo(a)pyrene PEQ (Fill Data 0-10 feet bgs)**											
627												
628						**General Statistics**						
629					Number of Valid Data	25			Number of Detected Data			22
630					Number of Distinct Detected Data	22			Number of Non-Detect Data			3
631									Percent Non-Detects			12.00%
632												
633					**Raw Statistics**				**Log-transformed Statistics**			
634					Minimum Detected	0.00234			Minimum Detected			-6.057
635					Maximum Detected	1.082			Maximum Detected			0.0783
636					Mean of Detected	0.118			Mean of Detected			-3.966
637					SD of Detected	0.262			SD of Detected			1.931
638					Minimum Non-Detect	0.006			Minimum Non-Detect			-5.116
639					Maximum Non-Detect	0.033			Maximum Non-Detect			-3.411
640												
641	Note: Data have multiple DLs - Use of KM Method is recommended								Number treated as Non-Detect			17
642	For all methods (except KM, DL/2, and ROS Methods),								Number treated as Detected			8
643	Observations < Largest ND are treated as NDs								Single DL Non-Detect Percentage			68.00%
644												
645						**UCL Statistics**						
646					**Normal Distribution Test with Detected Values Only**				**Lognormal Distribution Test with Detected Values Only**			
647					Shapiro Wilk Test Statistic	0.5			Shapiro Wilk Test Statistic			0.88
648					5% Shapiro Wilk Critical Value	0.911			5% Shapiro Wilk Critical Value			0.911
649					**Data not Normal at 5% Significance Level**				**Data not Lognormal at 5% Significance Level**			
650												
651					**Assuming Normal Distribution**				**Assuming Lognormal Distribution**			
652					DL/2 Substitution Method				DL/2 Substitution Method			
653					Mean	0.105			Mean			-4.119
654					SD	0.248			SD			1.877
655					95% DL/2 (t) UCL	0.19			95% H-Stat (DL/2) UCL			0.402
656												
657					Maximum Likelihood Estimate(MLE) Method	N/A			Log ROS Method			
658					**MLE yields a negative mean**				Mean in Log Scale			-4.153
659									SD in Log Scale			1.889
660									Mean in Original Scale			0.104
661									SD in Original Scale			0.248
662									95% t UCL			0.189
663									95% Percentile Bootstrap UCL			0.191
664									95% BCA Bootstrap UCL			0.226
665									95% H-UCL			0.405
666												
667					**Gamma Distribution Test with Detected Values Only**				**Data Distribution Test with Detected Values Only**			
668					k star (bias corrected)	0.346			**Data do not follow a Discernable Distribution (0.05)**			
669					Theta Star	0.342						
670					nu star	15.2						
671												
672					A-D Test Statistic	1.838			**Nonparametric Statistics**			
673					5% A-D Critical Value	0.834			Kaplan-Meier (KM) Method			
674					K-S Test Statistic	0.834			Mean			0.104
675					5% K-S Critical Value	0.199			SD			0.243
676					**Data not Gamma Distributed at 5% Significance Level**				SE of Mean			0.0498
677									95% KM (t) UCL			0.19
678					**Assuming Gamma Distribution**				95% KM (z) UCL			0.186
679					Gamma ROS Statistics using Extrapolated Data				95% KM (jackknife) UCL			0.189
680					Minimum	0.000001			95% KM (bootstrap t) UCL			0.426
681					Maximum	1.082			95% KM (BCA) UCL			0.189
682					Mean	0.104			95% KM (Percentile Bootstrap) UCL			0.191
683					Median	0.00702			95% KM (Chebyshev) UCL			0.321
684					SD	0.248			97.5% KM (Chebyshev) UCL			0.415
685					k star	0.244			99% KM (Chebyshev) UCL			0.6
686					Theta star	0.426						
687					Nu star	12.19			**Potential UCLs to Use**			
688					AppChi2	5.354			99% KM (Chebyshev) UCL			0.6
689					95% Gamma Approximate UCL (Use when n >= 40)	0.237						
690					95% Adjusted Gamma UCL (Use when n < 40)	0.251						
691	**Note: DL/2 is not a recommended method.**											
692												
693	**Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
694	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
695	**For additional insight, the user may want to consult a statistician.**											
696												

	A	B	C	D	E	F	G	H	I	J	K	L
697	**Benzo(a)pyrene PEQ (Fill Data 0-2 feet bgs)**											
698												
699						**General Statistics**						
700					Number of Valid Data	16				Number of Detected Data		15
701					Number of Distinct Detected Data	15				Number of Non-Detect Data		1
702										Percent Non-Detects		6.25%
703												
704					**Raw Statistics**					**Log-transformed Statistics**		
705					Minimum Detected	0.00234				Minimum Detected		-6.057
706					Maximum Detected	1.082				Maximum Detected		0.0783
707					Mean of Detected	0.166				Mean of Detected		-3.522
708					SD of Detected	0.308				SD of Detected		2.07
709					Minimum Non-Detect	0.033				Minimum Non-Detect		-3.411
710					Maximum Non-Detect	0.033				Maximum Non-Detect		-3.411
711												
712												
713						**UCL Statistics**						
714					**Normal Distribution Test with Detected Values Only**					**Lognormal Distribution Test with Detected Values Only**		
715					Shapiro Wilk Test Statistic	0.597				Shapiro Wilk Test Statistic		0.887
716					5% Shapiro Wilk Critical Value	0.881				5% Shapiro Wilk Critical Value		0.881
717					**Data not Normal at 5% Significance Level**					**Data appear Lognormal at 5% Significance Level**		
718												
719					**Assuming Normal Distribution**					**Assuming Lognormal Distribution**		
720					DL/2 Substitution Method					DL/2 Substitution Method		
721					Mean	0.157				Mean		-3.558
722					SD	0.3				SD		2.005
723					95% DL/2 (t) UCL	0.289				95% H-Stat (DL/2) UCL		2.16
724												
725					Maximum Likelihood Estimate(MLE) Method	N/A				Log ROS Method		
726					**MLE yields a negative mean**					Mean in Log Scale		-3.608
727										SD in Log Scale		2.029
728										Mean in Original Scale		0.156
729										SD in Original Scale		0.3
730										95% t UCL		0.288
731										95% Percentile Bootstrap UCL		0.289
732										95% BCA Bootstrap UCL		0.356
733										95% H-UCL		2.273
734												
735					**Gamma Distribution Test with Detected Values Only**					**Data Distribution Test with Detected Values Only**		
736					k star (bias corrected)	0.351				**Data appear Lognormal at 5% Significance Level**		
737					Theta Star	0.474						
738					nu star	10.53						
739												
740					A-D Test Statistic	0.992				**Nonparametric Statistics**		
741					5% A-D Critical Value	0.818				Kaplan-Meier (KM) Method		
742					K-S Test Statistic	0.818				Mean		0.156
743					5% K-S Critical Value	0.237				SD		0.291
744					**Data not Gamma Distributed at 5% Significance Level**					SE of Mean		0.0753
745										95% KM (t) UCL		0.288
746					**Assuming Gamma Distribution**					95% KM (z) UCL		0.28
747					Gamma ROS Statistics using Extrapolated Data					95% KM (jackknife) UCL		0.288
748					Minimum	0.000001				95% KM (bootstrap t) UCL		0.614
749					Maximum	1.082				95% KM (BCA) UCL		0.289
750					Mean	0.156				95% KM (Percentile Bootstrap) UCL		0.284
751					Median	0.00849				95% KM (Chebyshev) UCL		0.485
752					SD	0.301				97.5% KM (Chebyshev) UCL		0.627
753					k star	0.285				99% KM (Chebyshev) UCL		0.906
754					Theta star	0.548						
755					Nu star	9.108				**Potential UCLs to Use**		
756					AppChi2	3.392				99% KM (Chebyshev) UCL		0.906
757					95% Gamma Approximate UCL (Use when n >= 40)	0.419						
758					95% Adjusted Gamma UCL (Use when n < 40)	0.473						
759	**Note: DL/2 is not a recommended method.**											
760												
761						**Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**						
762						**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**						
763						**For additional insight, the user may want to consult a statistician.**						
764												

	A	B	C	D	E	F	G	H	I	J	K	L
765	**Benzo(a)pyrene (Native Data)**											
766												
767						**General Statistics**						
768					Number of Valid Data	18				Number of Detected Data		8
769					Number of Distinct Detected Data	8				Number of Non-Detect Data		10
770					Number of Missing Values	2				Percent Non-Detects		55.56%
771												
772					**Raw Statistics**					**Log-transformed Statistics**		
773					Minimum Detected	0.0012				Minimum Detected		-6.725
774					Maximum Detected	0.068				Maximum Detected		-2.688
775					Mean of Detected	0.0208				Mean of Detected		-4.655
776					SD of Detected	0.0253				SD of Detected		1.441
777					Minimum Non-Detect	0.0055				Minimum Non-Detect		-5.203
778					Maximum Non-Detect	0.033				Maximum Non-Detect		-3.411
779												
780	Note: Data have multiple DLs - Use of KM Method is recommended									Number treated as Non-Detect		16
781	For all methods (except KM, DL/2, and ROS Methods),									Number treated as Detected		2
782	Observations < Largest ND are treated as NDs									Single DL Non-Detect Percentage		88.89%
783												
784						**Warning: There are only 8 Detected Values in this data**							
785						**Note: It should be noted that even though bootstrap may be performed on this data set**							
786						**the resulting calculations may not be reliable enough to draw conclusions**							
787						**It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.**							
788						**UCL Statistics**						
789					**Normal Distribution Test with Detected Values Only**					**Lognormal Distribution Test with Detected Values Only**		
790					Shapiro Wilk Test Statistic	0.775				Shapiro Wilk Test Statistic		0.949
791					5% Shapiro Wilk Critical Value	0.818				5% Shapiro Wilk Critical Value		0.818
792					**Data not Normal at 5% Significance Level**					**Data appear Lognormal at 5% Significance Level**		
793												
794					**Assuming Normal Distribution**					**Assuming Lognormal Distribution**		
795					DL/2 Substitution Method					DL/2 Substitution Method		
796					Mean	0.0117				Mean		-5.206
797					SD	0.0186				SD		1.126
798					95% DL/2 (t) UCL	0.0193				95% H-Stat (DL/2) UCL		0.0224
799												
800					Maximum Likelihood Estimate(MLE) Method	N/A				Log ROS Method		
801					**MLE method failed to converge properly**					Mean in Log Scale		-5.685
802										SD in Log Scale		1.382
803										Mean in Original Scale		0.0102
804										SD in Original Scale		0.019
805										95% t UCL		0.018
806										95% Percentile Bootstrap UCL		0.0182
807										95% BCA Bootstrap UCL		0.0204
808										95% H-UCL		0.0261
809												
810					**Gamma Distribution Test with Detected Values Only**					**Data Distribution Test with Detected Values Only**		
811					k star (bias corrected)	0.56				**Data appear Gamma Distributed at 5% Significance Level**		
812					Theta Star	0.0371						
813					nu star	8.967						
814												
815					A-D Test Statistic	0.352				**Nonparametric Statistics**		
816					5% A-D Critical Value	0.745				Kaplan-Meier (KM) Method		
817					K-S Test Statistic	0.745				Mean		0.0103
818					5% K-S Critical Value	0.304				SD		0.0184
819					**Data appear Gamma Distributed at 5% Significance Level**					SE of Mean		0.00466
820										95% KM (t) UCL		0.0184
821					**Assuming Gamma Distribution**					95% KM (z) UCL		0.0179
822					Gamma ROS Statistics using Extrapolated Data					95% KM (jackknife) UCL		0.0181
823					Minimum	0.000001				95% KM (bootstrap t) UCL		0.0337
824					Maximum	0.068				95% KM (BCA) UCL		0.0216
825					Mean	0.00929				95% KM (Percentile Bootstrap) UCL		0.0188
826					Median	0.00046453				95% KM (Chebyshev) UCL		0.0306
827					SD	0.0194				97.5% KM (Chebyshev) UCL		0.0394
828					k star	0.172				99% KM (Chebyshev) UCL		0.0566
829					Theta star	0.054						
830					Nu star	6.198				**Potential UCLs to Use**		
831					AppChi2	1.742				95% KM (t) UCL		0.0184
832					95% Gamma Approximate UCL (Use when n >= 40)	0.0331						
833					95% Adjusted Gamma UCL (Use when n < 40)	0.0378						
834	**Note: DL/2 is not a recommended method.**											
835						**Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**						
836						**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**						
837						**For additional insight, the user may want to consult a statistician.**						
838												

	A	B	C	D	E	F	G	H	I	J	K	L
839	**4,4'-DDT (Fill Data 0-10 feet bgs)**											
840												
841	**General Statistics**											
842	Number of Valid Data					23	Number of Detected Data					10
843	Number of Distinct Detected Data					10	Number of Non-Detect Data					13
844	Number of Missing Values					2	Percent Non-Detects					56.52%
845												
846	**Raw Statistics**						**Log-transformed Statistics**					
847	Minimum Detected					0.0018	Minimum Detected					-6.32
848	Maximum Detected					0.15	Maximum Detected					-1.897
849	Mean of Detected					0.0217	Mean of Detected					-4.878
850	SD of Detected					0.0455	SD of Detected					1.308
851	Minimum Non-Detect					0.0035	Minimum Non-Detect					-5.655
852	Maximum Non-Detect					0.06	Maximum Non-Detect					-2.813
853												
854	Note: Data have multiple DLs - Use of KM Method is recommended						Number treated as Non-Detect					22
855	For all methods (except KM, DL/2, and ROS Methods),						Number treated as Detected					1
856	Observations < Largest ND are treated as NDs						Single DL Non-Detect Percentage					95.65%
857												
858	**UCL Statistics**											
859	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
860	Shapiro Wilk Test Statistic					0.477	Shapiro Wilk Test Statistic					0.895
861	5% Shapiro Wilk Critical Value					0.842	5% Shapiro Wilk Critical Value					0.842
862	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
863												
864	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
865	DL/2 Substitution Method						DL/2 Substitution Method					
866	Mean					0.0128	Mean					-5.294
867	SD					0.0307	SD					1.146
868	95% DL/2 (t) UCL					0.0238	95% H-Stat (DL/2) UCL					0.0188
869												
870	Maximum Likelihood Estimate(MLE) Method					N/A	Log ROS Method					
871	**MLE method failed to converge properly**						Mean in Log Scale					-5.598
872							SD in Log Scale					1.094
873							Mean in Original Scale					0.0107
874							SD in Original Scale					0.0307
875							95% t UCL					0.0217
876							95% Percentile Bootstrap UCL					0.0234
877							95% BCA Bootstrap UCL					0.0295
878							95% H-UCL					0.0125
879												
880	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
881	k star (bias corrected)					0.48	**Data Follow Appr. Gamma Distribution at 5% Significance Level**					
882	Theta Star					0.0451						
883	nu star					9.609						
884												
885	A-D Test Statistic					1.118	**Nonparametric Statistics**					
886	5% A-D Critical Value					0.77	Kaplan-Meier (KM) Method					
887	K-S Test Statistic					0.77	Mean					0.0111
888	5% K-S Critical Value					0.279	SD					0.03
889	**Data follow Appr. Gamma Distribution at 5% Significance Level**						SE of Mean					0.00661
890							95% KM (t) UCL					0.0224
891	**Assuming Gamma Distribution**						95% KM (z) UCL					0.0219
892	Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL					0.0221
893	Minimum					0.000001	95% KM (bootstrap t) UCL					0.0788
894	Maximum					0.15	95% KM (BCA) UCL					0.0243
895	Mean					0.00949	95% KM (Percentile Bootstrap) UCL					0.0234
896	Median					0.000001	95% KM (Chebyshev) UCL					0.0399
897	SD					0.0311	97.5% KM (Chebyshev) UCL					0.0523
898	k star					0.163	99% KM (Chebyshev) UCL					0.0768
899	Theta star					0.0581						
900	Nu star					7.509	**Potential UCLs to Use**					
901	AppChi2					2.454	95% KM (t) UCL					0.0224
902	95% Gamma Approximate UCL (Use when n >= 40)					0.029						
903	95% Adjusted Gamma UCL (Use when n < 40)					0.0317						
904	**Note: DL/2 is not a recommended method.**											
905	**Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
906	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
907	**For additional insight, the user may want to consult a statistician.**											
908												

	A	B	C	D	E	F	G	H	I	J	K	L
909	**4,4'-DDT (Fill Data 0-3 feet bgs)**											
910												
911						**General Statistics**						
912					Number of Valid Data	17			Number of Detected Data			6
913					Number of Distinct Detected Data	6			Number of Non-Detect Data			11
914					Number of Missing Values	1			Percent Non-Detects			64.71%
915												
916					**Raw Statistics**				**Log-transformed Statistics**			
917					Minimum Detected	0.0018			Minimum Detected			-6.32
918					Maximum Detected	0.022			Maximum Detected			-3.817
919					Mean of Detected	0.00832			Mean of Detected			-5.186
920					SD of Detected	0.00785			SD of Detected			1.004
921					Minimum Non-Detect	0.0035			Minimum Non-Detect			-5.655
922					Maximum Non-Detect	0.06			Maximum Non-Detect			-2.813
923												
924	Note: Data have multiple DLs - Use of KM Method is recommended								Number treated as Non-Detect			17
925	For all methods (except KM, DL/2, and ROS Methods),								Number treated as Detected			0
926	Observations < Largest ND are treated as NDs								Single DL Non-Detect Percentage			100.00%
927												
928					**Warning: There are only 6 Detected Values in this data**							
929					**Note: It should be noted that even though bootstrap may be performed on this data set**							
930					**the resulting calculations may not be reliable enough to draw conclusions**							
931												
932					**It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.**							
933												
934						**UCL Statistics**						
935					**Normal Distribution Test with Detected Values Only**				**Lognormal Distribution Test with Detected Values Only**			
936					Shapiro Wilk Test Statistic	0.848			Shapiro Wilk Test Statistic			0.924
937					5% Shapiro Wilk Critical Value	0.788			5% Shapiro Wilk Critical Value			0.788
938					**Data appear Normal at 5% Significance Level**				**Data appear Lognormal at 5% Significance Level**			
939												
940					**Assuming Normal Distribution**				**Assuming Lognormal Distribution**			
941					DL/2 Substitution Method				DL/2 Substitution Method			
942					Mean	0.0073			Mean			-5.39
943					SD	0.00803			SD			0.967
944					95% DL/2 (t) UCL	0.0107			95% H-Stat (DL/2) UCL			0.0137
945					Maximum Likelihood Estimate(MLE) Method	N/A			Log ROS Method			
946					**MLE method failed to converge properly**				Mean in Log Scale			-5.764
947									SD in Log Scale			0.741
948									Mean in Original Scale			0.00446
949									SD in Original Scale			0.0053
950									95% t UCL			0.00671
951									95% Percentile Bootstrap UCL			0.00664
952									95% BCA Bootstrap UCL			0.00763
953									95% H-UCL			0.00632
954												
955					**Gamma Distribution Test with Detected Values Only**				**Data Distribution Test with Detected Values Only**			
956					k star (bias corrected)	0.813			**Data appear Normal at 5% Significance Level**			
957					Theta Star	0.0102						
958					nu star	9.752						
959					A-D Test Statistic	0.318			**Nonparametric Statistics**			
960					5% A-D Critical Value	0.709			Kaplan-Meier (KM) Method			
961					K-S Test Statistic	0.709			Mean			0.0047
962					5% K-S Critical Value	0.338			SD			0.00545
963					**Data appear Gamma Distributed at 5% Significance Level**				SE of Mean			0.00157
964									95% KM (t) UCL			0.00743
965					**Assuming Gamma Distribution**				95% KM (z) UCL			0.00727
966					Gamma ROS Statistics using Extrapolated Data				95% KM (jackknife) UCL			0.00731
967					Minimum	0.000001			95% KM (bootstrap t) UCL			0.0102
968					Maximum	0.022			95% KM (BCA) UCL			0.00891
969					Mean	0.00423			95% KM (Percentile Bootstrap) UCL			0.00798
970					Median	0.00329			95% KM (Chebyshev) UCL			0.0115
971					SD	0.00559			97.5% KM (Chebyshev) UCL			0.0145
972					k star	0.528			99% KM (Chebyshev) UCL			0.0203
973					Theta star	0.00801						
974					Nu star	17.95			**Potential UCLs to Use**			
975					AppChi2	9.355			95% KM (t) UCL			0.00743
976					95% Gamma Approximate UCL (Use when n >= 40)	0.00812			95% KM (Percentile Bootstrap) UCL			0.00798
977					95% Adjusted Gamma UCL (Use when n < 40)	0.00872						
978	**Note: DL/2 is not a recommended method.**											
979					**Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**							
980					**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**							
981					**For additional insight, the user may want to consult a statistician.**							
982												

	A	B	C	D	E	F	G	H	I	J	K	L
983	**Total-Chlordane (Fill Data 0-10 feet bgs)**											
984												
985	**General Statistics**											
986	Number of Valid Data					23	Number of Detected Data					6
987	Number of Distinct Detected Data					6	Number of Non-Detect Data					17
988	Number of Missing Values					2	Percent Non-Detects					73.91%
989												
990	**Raw Statistics**						**Log-transformed Statistics**					
991	Minimum Detected					0.00044	Minimum Detected					-7.729
992	Maximum Detected					0.141	Maximum Detected					-1.957
993	Mean of Detected					0.0275	Mean of Detected					-5.4
994	SD of Detected					0.056	SD of Detected					2.126
995	Minimum Non-Detect					0.0018	Minimum Non-Detect					-6.32
996	Maximum Non-Detect					0.3	Maximum Non-Detect					-1.204
997												
998	Note: Data have multiple DLs - Use of KM Method is recommended						Number treated as Non-Detect					23
999	For all methods (except KM, DL/2, and ROS Methods),						Number treated as Detected					0
1000	Observations < Largest ND are treated as NDs						Single DL Non-Detect Percentage					100.00%
1001												
1002	**Warning: There are only 6 Detected Values in this data**											
1003	**Note: It should be noted that even though bootstrap may be performed on this data set**											
1004	**the resulting calculations may not be reliable enough to draw conclusions**											
1005	**It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.**											
1006	**UCL Statistics**											
1007	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
1008	Shapiro Wilk Test Statistic					0.569	Shapiro Wilk Test Statistic					0.925
1009	5% Shapiro Wilk Critical Value					0.788	5% Shapiro Wilk Critical Value					0.788
1010	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
1011												
1012	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
1013	DL/2 Substitution Method						DL/2 Substitution Method					
1014	Mean					0.0167	Mean					-5.751
1015	SD					0.041	SD					1.657
1016	95% DL/2 (t) UCL					0.0314	95% H-Stat (DL/2) UCL					0.0431
1017												
1018	Maximum Likelihood Estimate(MLE) Method					N/A	Log ROS Method					
1019	**MLE method failed to converge properly**						Mean in Log Scale					-6.559
1020							SD in Log Scale					1.443
1021							Mean in Original Scale					0.00814
1022							SD in Original Scale					0.0292
1023							95% t UCL					0.0186
1024							95% Percentile Bootstrap UCL					0.02
1025							95% BCA Bootstrap UCL					0.027
1026							95% H-UCL					0.0106
1027												
1028	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
1029	k star (bias corrected)					0.296	**Data appear Gamma Distributed at 5% Significance Level**					
1030	Theta Star					0.0931						
1031	nu star					3.547						
1032	A-D Test Statistic					0.575	**Nonparametric Statistics**					
1033	5% A-D Critical Value					0.756	Kaplan-Meier (KM) Method					
1034	K-S Test Statistic					0.756	Mean					0.00839
1035	5% K-S Critical Value					0.354	SD					0.0292
1036	**Data appear Gamma Distributed at 5% Significance Level**						SE of Mean					0.00682
1037							95% KM (t) UCL					0.0201
1038	**Assuming Gamma Distribution**						95% KM (z) UCL					0.0196
1039	Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL					0.0194
1040	Minimum					0.000001	95% KM (bootstrap t) UCL					0.0848
1041	Maximum					0.141	95% KM (BCA) UCL					0.0218
1042	Mean					0.00885	95% KM (Percentile Bootstrap) UCL					0.0212
1043	Median					0.000001	95% KM (Chebyshev) UCL					0.0381
1044	SD					0.0293	97.5% KM (Chebyshev) UCL					0.051
1045	k star					0.149	99% KM (Chebyshev) UCL					0.0763
1046	Theta star					0.0596						
1047	Nu star					6.831	**Potential UCLs to Use**					
1048	AppChi2					2.078	95% KM (t) UCL					0.0201
1049	95% Gamma Approximate UCL (Use when n >= 40)					0.0291						
1050	95% Adjusted Gamma UCL (Use when n < 40)					0.0319						
1051	**Note: DL/2 is not a recommended method.**											
1052	**Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
1053	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
1054	**For additional insight, the user may want to consult a statistician.**											
1055												

	A	B	C	D	E	F	G	H	I	J	K	L
1056	**Total-Chlordane (Fill Data 0-3 feet bgs)**											
1057												
1058						**General Statistics**						
1059					Number of Valid Data	17			Number of Detected Data			3
1060					Number of Distinct Detected Data	3			Number of Non-Detect Data			14
1061					Number of Missing Values	1			Percent Non-Detects			82.35%
1062												
1063					**Raw Statistics**				**Log-transformed Statistics**			
1064					Minimum Detected	0.00105			Minimum Detected			-6.859
1065					Maximum Detected	0.00895			Maximum Detected			-4.716
1066					Mean of Detected	0.00373			Mean of Detected			-6.1
1067					SD of Detected	0.00452			SD of Detected			1.2
1068					Minimum Non-Detect	0.0018			Minimum Non-Detect			-6.32
1069					Maximum Non-Detect	0.3			Maximum Non-Detect			-1.204
1070												
1071	Note: Data have multiple DLs - Use of KM Method is recommended								Number treated as Non-Detect			17
1072	For all methods (except KM, DL/2, and ROS Methods),								Number treated as Detected			0
1073	Observations < Largest ND are treated as NDs								Single DL Non-Detect Percentage			100.00%
1074												
1075	**Warning: There are only 3 Distinct Detected Values in this data set**											
1076	**The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.**											
1077	**Those methods will return a 'N/A' value on your output display!**											
1078												
1079	**It is necessary to have 4 or more Distinct Values for bootstrap methods.**											
1080	**However, results obtained using 4 to 9 distinct values may not be reliable.**											
1081	**It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.**											
1082												
1083						**UCL Statistics**						
1084					**Normal Distribution Test with Detected Values Only**				**Lognormal Distribution Test with Detected Values Only**			
1085					Shapiro Wilk Test Statistic	0.764			Shapiro Wilk Test Statistic			0.797
1086					5% Shapiro Wilk Critical Value	0.767			5% Shapiro Wilk Critical Value			0.767
1087					**Data not Normal at 5% Significance Level**				**Data appear Lognormal at 5% Significance Level**			
1088												
1089					**Assuming Normal Distribution**				**Assuming Lognormal Distribution**			
1090					DL/2 Substitution Method				DL/2 Substitution Method			
1091					Mean	0.0134			Mean			-5.73
1092					SD	0.0356			SD			1.504
1093					95% DL/2 (t) UCL	0.0285			95% H-Stat (DL/2) UCL			0.0374
1094					Maximum Likelihood Estimate(MLE) Method	N/A			Log ROS Method			
1095					**MLE method failed to converge properly**				Mean in Log Scale			-6.552
1096									SD in Log Scale			0.619
1097									Mean in Original Scale			0.00182
1098									SD in Original Scale			0.00192
1099									95% t UCL			0.00264
1100									95% Percentile Bootstrap UCL			0.00265
1101									95% BCA Bootstrap UCL			0.00314
1102									95% H-UCL			0.00242
1103												
1104					**Gamma Distribution Test with Detected Values Only**				**Data Distribution Test with Detected Values Only**			
1105					k star (bias corrected)	N/A			**Data appear Lognormal at 5% Significance Level**			
1106					Theta Star	N/A						
1107					nu star	N/A						
1108												
1109					A-D Test Statistic	N/A			**Nonparametric Statistics**			
1110					5% A-D Critical Value	N/A			Kaplan-Meier (KM) Method			
1111					K-S Test Statistic	N/A			Mean			0.00191
1112					5% K-S Critical Value	N/A			SD			0.00235
1113					**Data not Gamma Distributed at 5% Significance Level**				SE of Mean			0.00091106
1114									95% KM (t) UCL			0.0035
1115					**Assuming Gamma Distribution**				95% KM (z) UCL			0.00341
1116					Gamma ROS Statistics using Extrapolated Data				95% KM (jackknife) UCL			0.00331
1117					Minimum	N/A			95% KM (bootstrap t) UCL			0.0218
1118					Maximum	N/A			95% KM (BCA) UCL			N/A
1119					Mean	N/A			95% KM (Percentile Bootstrap) UCL			N/A
1120					Median	N/A			95% KM (Chebyshev) UCL			0.00588
1121					SD	N/A			97.5% KM (Chebyshev) UCL			0.0076
1122					k star	N/A			99% KM (Chebyshev) UCL			0.011
1123					Theta star	N/A						
1124					Nu star	N/A			**Potential UCLs to Use**			
1125					AppChi2	N/A			95% KM (BCA) UCL			N/A
1126					95% Gamma Approximate UCL (Use when n >= 40)	N/A						
1127					95% Adjusted Gamma UCL (Use when n < 40)	N/A						
1128	**Note: DL/2 is not a recommended method.**											
1129	**Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
1130	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
1131	**For additional insight, the user may want to consult a statistician.**											

APPENDIX B

LeadSpread 8 Output

Table 1. LEAD RISK ASSESSMENT SPREADSHEET 8
Child Recreational Receptor - Baker Beach Disturbed Area 2
CALIFORNIA DEPARTMENT OF TOXIC SUBSTANCES CONTROL

INPUT	
MEDIUM	LEVEL
Lead in Soil/Dust (ug/g)	77.0
Respirable Dust (ug/m^3)	1.5

OUTPUT						
Percentile Estimate of Blood Pb (ug/dl						PRG-90
	50th	90th	95th	98th	99th	(ug/g)
BLOOD Pb, CHILD (recreational)	0.14	0.25	0.30	0.36	0.41	306

EXPOSURE PARAMETERS		
	units	Child Recreational
Days per week[a]	days/wk	3.5
Geometric Standard Deviation[b]		1.6
Blood lead level of concern	ug/dl	1
Skin area[b]	cm^2	2900
Soil adherence[b]	ug/cm^2	200
Dermal uptake constant[b]	(ug/dl)/(ug/day)	0.0001
Soil ingestion[c]	mg/day	50
Ingestion constant[b]	(ug/dl)/(ug/day)	0.16
Bioavailability[b]	unitless	0.44
Breathing rate[b]	m^3/day	6.8
Inhalation constant[b]	(ug/dl)/(ug/day)	0.192

PATHWAYS			
	Recreational		
CHILDREN	Pathway contribution		
Pathway	PEF	ug/dl	percent
Soil Contact	2.9E-5	0.0022	1.6%
Soil Ingestion	1.8E-3	0.14	98%
Inhalation	9.8E-7	0.000075	0.055%

Abbreviations:

ug/g = Micrograms per gram.
ug/m^3 = Micrograms per cubic meter.
days/wk = Days per week
ug/dl = Micrograms per deciliter of blood.
cm^2 = centimeter squared.
ug/cm^2 = Micrograms per centimeter squared.
ug/day = Micrograms per day.
mg/day = Milligrams per day
m^3/day = Cubic meters per day.

Footnotes:

[a] Exposure frequency for a site-specific recreational visitor scenario is 175 days per year or 3.5 days per week.
[b] DTSC default value as presented in Appendix A of the Presidio-Wide Cleanup Level Document (EKI, 2002 revised 2006).
[c] The recreational soil ingestion rate assumes that 25 percent of the daily incidental soil ingestion will take place while walking or running the Coastal Trail at Baker Beach Disturbed Area 2 (BBDA 2). Specifically, one quarter of the daily soil ingestion of 200 mg/day or 50 mg/day is from exposure to soil at BBDA

References:

Erler & Kalinowski, Inc. (EKI), 2002.*Development of Presidio-Wide Cleanup Levels for Soil, Sediment, Groundwater, and Surface Water, Presidio of San Francisc*. October. Revised May 16, 2006

APPENDIX C

Green Remediation Evaluation Matrix Tables

Appendix C Table C-1
Green Remediation Evaluation Matrix (GREM) - ALTERNATIVE 1: No Action
Baker Beach Disturbed Area 2

Stressors	Affected Media	Mechanism/ Effect	Y/N	Score *
Substance Release/Production				
Airborne NOx & SOx	Air	Acid rain & photochemical smog	N	This remedial alternative will not be a source of NOx or SOx.
Chloro-fluorocarbon vapors	Air	Ozone depletion	N	This remedial alternative will not result in an increase in chloro-fluorocarbon vapors.
Greenhouse gas emissions	Air	Atmospheric warming	N	This remedial alternative will not cause an increase in greenhouse gas emissions.
Airborne particulates/toxic vapors/gases/water vapor	Air	General air pollution/toxic air/humidity increase	N	This remedial alternative will not increase airborne particulates, toxic vapors, gases, or water vapor.
Liquid waste production	Water	Water toxicity/sediment toxicity/sediment	N	This remedial alternative will not produce liquid waste.
Solid waste production	Land	Land use/toxicity	N	This remedial alternative will not produce solid waste.
Thermal Releases				
Warm water	Water	Habitat warming	N	This remedial alternative will not produce warm water.
Warm vapor	Air	Atmospheric humidity	N	This remedial alternative will not generate warm vapor.
Physical Disturbances/Disruptions				
Soil structure disruption	Land	Habitat destruction/ soil Infertility	N	This remedial alternative will not disrupt soil structure.
Noise/Odor/Vibration/ Aesthetics	General environment	Nuisance & safety	N	This remedial alternative will not be a source of noise, odor, vibration, or aesthetic disruptions.
Traffic	Land; general environment	Nuisance & safety	N	This remedial alternative will not result in ttraffic disruption.
Land Stagnation	Land; general environment	Remediation time; cleanup efficiency; re-development	N	This alternative will not result in land stagnation because BBDA 2 will continue to be used for recreational purposes.
Resource Depletion/Gain (Recycling)				
Petroleum (energy)	Subsurface	Consumption	N	This remedial alternative will not result in petroleum or energy depletion or gain.
Mineral	Subsurface	Consumption	N	This remedial alternative will not be a source of mineral depletion or gain.
Construction materials (soil/concrete/plastic)	Land	Consumption/reuse	N	This remedial alternative will not result in depletion or gain in construction materials.
Land & space	Land	Impoundment/reuse	N	This alternative will not result in land & space depletion.
Surface water & groundwater	Water, land (subsidence)	Impoundment/ sequester/reuse	N	This remedial alternative will not result in water resource depletion or gain.
Biology resources (plants/trees/animals/ microorganisms)	Air, water, land/forest, subsurface	Species disappearance/ diversity reduction regenerative ability reduction	N	This remedial alternative will not significantly affect biological resources, although debris fill will remain at the site, decreasing the quality of the habitat. It is noted that the No Action Alternative will not provide for protection of sensitive ecological receptors from COCs in the debris fill.

Notes:
Template provided by DTSC's "Interim Advisory for Green Remediation" (December 2009).

Appendix D Table C-2
Green Remediation Evaluation Matrix (GREM) - ALTERNATIVE 2: Land Use Control
Baker Beach Disturbed Area 2

Stressors	Affected Media	Mechanism/ Effect	Y/N	Score *
Substance Release/Production				
Airborne NOx & SOx	Air	Acid rain & photochemical smog	N	This remedial alternative will not be a source of NOx or SOx.
Chloro-fluorocarbon vapors	Air	Ozone depletion	N	This remedial alternative will not result in an increase in chloro-fluorocarbon vapors.
Greenhouse gas emissions	Air	Atmospheric warming	N	This remedial alternative will not cause an increase in greenhouse gas emissions.
Airborne particulates/toxic vapors/gases/water vapor	Air	General air pollution/toxic air/humidity increase	N	This remedial alternative will not increase airborne particulates, toxic vapors, gases, or water vapor.
Liquid waste production	Water	Water toxicity/sediment toxicity/sediment	N	This remedial alternative will not produce liquid waste.
Solid waste production	Land	Land use/toxicity	N	This remedial alternative will not produce solid waste.
Thermal Releases				
Warm water	Water	Habitat warming	N	This remedial alternative will not produce warm water.
Warm vapor	Air	Atmospheric humidity	N	This remedial alternative will not generate warm vapor.
Physical Disturbances/Disruptions				
Soil structure disruption	Land	Habitat destruction/ soil Infertility	N	This remedial alternative will not disrupt soil structure.
Noise/Odor/Vibration/ Aesthetics	General environment	Nuisance & safety	N	This remedial alternative will not be a source of noise, odor, vibration, or aesthetic disruptions.
Traffic	Land; general environment	Nuisance & safety	N	This remedial alternative will not result in traffic disruption.
Land Stagnation	Land; general environment	Remediation time; cleanup efficiency; re-development	N	This alternative will result in some land stagnation because access to the BBDA 2 Debris Fill Area will be restricted.
Resource Depletion/Gain (Recycling)				
Petroleum (energy)	Subsurface	Consumption	N	This remedial alternative will not result in substantial petroleum or energy depletion or gain.
Mineral	Subsurface	Consumption	N	This remedial alternative will not be a source of substantial mineral depletion or gain.
Construction materials (soil/concrete/plastic)	Land	Consumption/reuse	N	This remedial alternative will not result in substantial depletion or gain in construction materials.
Land & space	Land	Impoundment/reuse	N	This alternative will not result in land & space depletion.
Surface water & groundwater	Water, land (subsidence)	Impoundment/ sequester/reuse	N	This remedial alternative will not result in water resource depletion or gain.
Biology resources (plants/trees/animals/ microorganisms)	Air, water, land/forest, subsurface	Species disappearance/ diversity reduction regenerative ability reduction	N	This remedial alternative will not significantly affect biological resources, although debris fill will remain at the site, decreasing the quality of the habitat. This alternative will mitigate potential risk to sensitive ecological receptors through implementation of the Land Use Control but will not remove or cover the debris fill.

Notes:
Template provided by DTSC's "Interim Advisory for Green Remediation" (December 2009).

Appendix C Table C-3
Green Remediation Evaluation Matrix (GREM) - ALTERNATIVE 3: Excavation
Baker Beach Disturbed Area 2

Stressors	Affected Media	Mechanism/ Effect	Y/N	Score *
Substance Release/Production				
Airborne NOx & SOx	Air	Acid rain & photochemical smog	Y	Engine exhaust from construction equipment and transport vehicles used during remedy implementation will result in emissions that may increase airborne NOx and SOx concentrations. Emissions would be associated with vehicles and equipment used for excavation, transport, and offsite disposal of approximately 8,700 cubic yards (cy) of debris fill (based on 30% expansion factor). Emissions would also be associated with vehicles and equipment used to import, grade, and compact approximately 6,500 cubic yards of clean fill. Fill will be obtained from local sources as practicable.
Chloro-fluorocarbon vapors	Air	Ozone depletion	N	Implementation of this remedial alternative will not result in generation of substantial quantities of chloro-fluorocarbon vapors.
Greenhouse gas emissions	Air	Atmospheric warming	Y	Engine exhaust from equipment and vehicles used during construction and for transportation of material will result in an increase in greenhouse gas emissions. Emissions would be associated with vehicles and equipment used for excavation, transport, and disposal of approximately 8,700 cy of debris fill. Emissions would also be associated with vehicles and equipment used to import, grade, and compact 6,500 cy of clean fill. Fill will be obtained from local sources as practicable.
Airborne particulates/toxic vapors/gases/water vapor	Air	General air pollution/toxic air/humidity increase	Y	The primary airborne particulate emissions from this alternative are expected to be diesel particulate matter (DPM) and fugitive dust from soil and debris material handling. This alternative entails excavation and transport of approximately 8,700 cy of debris fill for disposal at offsite disposal/recycling facilities. DPM and fugitive dust will also be generated from import, grading, and compaction of approximately 6,500 cy of clean fill. Fill will be obtained from local sources as practicable.
Liquid waste production	Water	Water toxicity/sediment toxicity/sediment	Y	Liquid waste potentially generated would be water from decontamination rinsate. It is not anticipated that substantial quantities of liquid waste will be generated during implementation of this remedial alternative due to the short duration of construction activities (approximately 4 months) and implementation of Best Management Practices (BMPs) during construction. A Stormwater Pollution Protection Plan (SWPPP) will be developed to minimize construction impacts to storm water runoff. Additionally, construction activities would be scheduled to take place in the dry season to minimize or eliminate construction impacts to stormwater runoff.
Solid waste production	Land	Land use/toxicity	Y	The primary solid waste that will be produced during implementation of this remedial alternative is approximately 8,700 cy of excavated soil and debris material requiring offsite disposal/recycling.

Appendix C Table C-3
Green Remediation Evaluation Matrix (GREM) - ALTERNATIVE 3: Excavation
Baker Beach Disturbed Area 2

Stressors	Affected Media	Mechanism/ Effect	Y/N	Score *
Thermal Releases				
Warm water	Water	Habitat warming	N	No significant quantities of warm water are expected to be generated during implementation of this remedial alternative.
Warm vapor	Air	Atmospheric humidity	Y	The primary warm vapor expected to be released during implementation of this remedial alternative is related to engine exhaust from vehicles and equipment used during construction. This alternative entails excavation and transport of approximately 8,700 cy of soil and debris material for disposal at offsite disposal/recycling facilities. This alternative also includes import, grading, and compaction of approximately 6,500 cy of clean fill. Fill will be obtained from local sources if possible.
Physical Disturbances/Disruptions				
Soil structure disruption	Land	Habitat destruction/ soil Infertility	Y	This remedial alternative will involve extensive soil structure disruption because earth-moving equipment will be mobilized to the site and approximately 8,700 cy of soil will be excavated, fill placed, and an approximate 0.7 acre area graded for slope stabilization.
Noise/Odor/Vibration/ Aesthetics	General environment	Nuisance & safety	Y	The primary aesthetic disruption from implementation of this remedial alternative will be related to noise, odor, vibration, and visual impact of construction activities associated with excavation of approximately 8,700 cy of soil and import, grading, and compaction of approximately 6,500 cy of clean fill. This remedial alternative is expected to entail approximately 4 months of active construction. Following remedial construction activities and site restoration, it is anticipated that the aesthetics of the site will be improved because debris fill will be removed and the site restored to native plant habitat.
Traffic	Land; general environment	Nuisance & safety	Y	Traffic disruption during implementation of this remedial alternative will be associated with trucks used to haul approximately 8,700 cubic yards of excavated soil to offsite disposal/recycling facilities, and trucks used to import approximately 6,500 cy of clean fill, potentially from a local source area. Traffic disruption associated with construction work will occur over approximately 4 months.
Land Stagnation	Land; general environment	Remediation time; cleanup efficiency; re-development	Y	Land stagnation associated with implementation of this remedial alternative is related to the loss of recreational use of BBDA 2 during the anticipated 4 month remedial construction period and during the subsequent site restoration work.

Appendix C Table C-3
Green Remediation Evaluation Matrix (GREM) - ALTERNATIVE 3: Excavation
Baker Beach Disturbed Area 2

Stressors	Affected Media	Mechanism/ Effect	Y/N	Score *
Resource Depletion/Gain (Recycling)				
Petroleum (energy)	Subsurface	Consumption	Y	The primary petroleum energy resource depletion during remedy implementation is due to engine fuel demands of construction equipment and trucks used for material transport. This alternative entails excavation and transport of approximately 8,700 cy of soil and debris material for disposal at offsite disposal/recycling facilities. This alternative also entails import, grading, and compaction of approximately 6,500 cy of clean fill. Fill will be obtained from local sources as practicable.
Mineral	Subsurface	Consumption	N	This remedial alternative will not be a source of substantial mineral depletion or gain.
Construction materials (soil/concrete/plastic)	Land	Consumption/reuse	Y	The primary construction material that will be depleted during implementation of this remedial alternative is approximately 6,500 cy of imported clean fill material. As practicable, fill will be obtained from an onsite source - potentially where clean fill is being excavated for subsurface structures.
Land & space	Land	Impoundment/reuse	Y	During implementation of this alternative, access to BBDA 2 will be restricted. However, after completion of the remedy, there will be full access to the site for recreational purposes and the site will be restored as native plant habitat. In addition, this alternative entails excavation and transport of approximately 8,700 cy of soil and debris material to a disposal/recycling facility which will fill up landfill capacity/space. In addition, fill imported to the Site will be obtained from a borrow area impacting future use of the borrow area. To mitigate this effect, as practicable, fill will be obtained from areas where clean soil is being excavated locally for subsurface structures.
Surface water & groundwater	Water, land (subsidence)	Impoundment/ sequester/reuse	N	Implementation of this remedial alternative will not result in substantial water resource depletion or gain because no dewatering is expected to be necessary because groundwater or perennial surface water bodies do not occur within the area of impacted soil.
Biology resources (plants/trees/animals/ microorganisms)	Air, water, land/forest, subsurface	Species disappearance/ diversity reduction regenerative ability reduction	Y	There will be short term impact to biological resources during construction. However, site restoration following remedy implementation will result in enhancement of native plant and wildlife habitat.

Notes:
Template provided by DTSC's "Interim Advisory for Green Remediation" (December 2009).

Appendix C Table C-4
Green Remediation Evaluation Matrix (GREM) - ALTERNATIVE 4: Engineered Cover
Baker Beach Disturbed Area 2

Stressors	Affected Media	Mechanism/ Effect	Y/N	Score
Substance Release/Production				
Airborne NOx & SOx	Air	Acid rain & photochemical smog	Y	Engine exhaust from construction equipment and transport vehicles used during remedy implementation will result in emissions that may increase airborne NOx and SOx concentrations. Emissions would be associated with vehicles and equipment used for clearing vegetation and trees, site grading, minor excavation and debris removal. Emissions would also be associated with vehicles and equipment used to import, grade, compact, and construct the engineered cover (2 ft soil layer) corresponding to 3,000 cy of import soil, and associated soil and slope stabilization measures as well as from maintenance of the cover. Fill will be obtained from local sources as practicable.
Chloro-fluorocarbon vapors	Air	Ozone depletion	N	This remedial alternative will not be a source of substantial quantities of chloro-fluorocarbon vapors.
Greenhouse gas emissions	Air	Atmospheric warming	Y	Engine exhaust from construction equipment and transport vehicles used during remedy implementation will result in emissions that may increase airborne NOx and SOx concentrations. Emissions would be associated with vehicles and equipment used for clearing vegetation and trees, site grading, minor excavation and debris removal. Emissions would also be associated with vehicles and equipment used to import, grade, compact, and construct the engineered cover (2 ft soil layer) corresponding to 3,000 cy of import soil, and associated soil and slope stabilization measures as well as from maintenance of the cover. Fill will be obtained from local sources as practicable.
Airborne particulates/toxic vapors/gases/water vapor	Air	General air pollution/toxic air/humidity increase	Y	The primary airborne particulate emissions from this alternative are expected to be diesel particulate matter (DPM) and fugitive dust from soil and material handling. This alternative entails clearing vegetation and trees, site grading, minor excavation and debris removal. DPM and fugitive dust will also be generated from import, grading, compaction and construction of the engineered cover (2 ft soil layer) corresponding to 3,000 cy of import soil, and associated soil and slope stabilization measures as well as from maintenance of the cover. Fill will be obtained from local sources as practicable.
Liquid waste production	Water	Water toxicity/sediment toxicity/sediment	Y	Liquid waste potentially generated would be water from decontamination rinsate. It is not anticipated that substantial quantities of liquid waste will be generated during implementation of this remedial alternative due to the short duration of construction activities (approximately 3 months) and implementation of best management practices (BMPs) during construction. A Stormwater Pollution Prevention Plan (SWPPP) will be developed to minimize construction impacts to storm water runnoff. Additionally, construction activities would be scheduled to take place in the dry season to minimize or eliminate construction impacts to stormwater runoff.
Solid waste production	Land	Land use/toxicity	N	This remedial alternative will not be a source of substantial quantities of solid waste.
Thermal Releases				
Warm water	Water	Habitat warming	N	No significant quantities of warm water are expected to be generated during implementation of this remedial alternative.
Warm vapor	Air	Atmospheric humidity	Y	The primary warm vapor expected to be released during implementation of this remedial alternative is related to engine exhaust from vehicles and equipment used during construction. This alternative entails clearing vegetation and trees, site grading, minor excavation and debris removal. This alternative also includes import, grading, compaction and construction of the engineered cover (2 ft soil layer) corresponding to 3,000 cy of import soil, and associated slope and soil stabilization/retaining measures and structures as well as from maintenance of the cover. Fill will be obtained from local sources as practicable.
Physical Disturbances/Disruptions				
Soil structure disruption	Land	Habitat destruction/ soil Infertility	Y	This remedial alternative will involve some soil structure disruption because vegetation and trees at the site will be removed, earth-moving equipment will be mobilized to the site and approximately 3,000 cy of fill placed as a engineered cover, an approximate 0.7 acre area graded, and engineered structures installed for slope stabilization.
Noise/Odor/Vibration/ Aesthetics	General environment	Nuisance & safety	Y	The primary aesthetic disruption from implementation of this remedial alternative will be related to noise, odor, vibration, and visual impact of construction activities associated with vegetation clearance, tree removal, excavation, and installation/construction of slope and soil stabilization/retaining measures and structures; and import, grading, and compaction of 2 ft of clean fill which corresponds to 3,000 cy of import soil to be used as an engineered cover. This remedial alternative is expected to entail approximately 3 months of active construction. Following remedial construction activities and site restoration, it is anticipated that the aesthetics of the site will be improved because the site will be restored to native plant habitat.

Appendix C Table C-4
Green Remediation Evaluation Matrix (GREM) - ALTERNATIVE 4: Engineered Cover
Baker Beach Disturbed Area 2

Stressors	Affected Media	Mechanism/ Effect	Y/N	Score
Traffic	Land; general environment	Nuisance & safety	Y	Traffic disruption during implementation of this remedial alternative will be associated with trucks used to import approximately 2900 cy (2 ft soil cover) of clean fill, and materials required for the construction of soil and slope stabilization/retaining structures. Fill will be obtained from local sources as practicable. Traffic disruption associated with construction work will occur over approximately 3 months.
Land Stagnation	Land; general environment	Remediation time; cleanup efficiency; re-development	Y	Land stagnation associated with implementation of this remedial alternative is related to the loss of recreational use of BBDA 2 during the anticipated 3 month construction period and during the following site restoration work. Because engineered controls will be in place at the site, they will need to be addressed in future site development plans.
Resource Depletion/Gain (Recycling)				
Petroleum (energy)	Subsurface	Consumption	Y	The primary petroleum energy resource depletion during remedy implementation is due to engine fuel demands of construction equipment and trucks used for material transport, cover placement, and construction of soil and slope stabilization/retaining structures. This alternative entails vegetation clearance, tree removal, excavation, soil and slope stabilization/retaining structure construction, and import, grading, and compaction of 2 ft of clean fill which corresponds to 3,000 cy of import soil to be used as an engineered cover. Fill will be obtained from local sources as practicable.
Mineral	Subsurface	Consumption	N	This remedial alternative will not be a source of substantial mineral depletion or gain.
Construction materials (soil/concrete/plastic)	Land	Consumption/reuse	Y	The primary construction material that will be depleted during implementation of this remedial alternative is approximately 3,000 cy (2 ft cover) of imported clean fill material. As practicable, fill will be obtained from an onsite source - potentially where clean fill is being excavated for subsurface structures.
Land & space	Land	Impoundment/reuse	Y	During implementation of this alternative, access to BBDA 2 will be restricted. However, after completion of the remedy, there will be full access to the established recreational trail through the site for recreational purposes and the site restored as native plant habitat. In addition, fill imported to the site will be obtained from a borrow area impacting future use of the borrow area. To mitigate this effect, as practicable, fill will be obtained from areas where clean soil is being excavated locally for subsurface structures.
Surface water & groundwater	Water, land (subsidence)	Impoundment/ sequester/reuse	N	Implementation of this remedial alternative will not result in substantial water resource depletion or gain.
Biology resources (plants/trees/animals/ microorganisms)	Air, water, land/forest, subsurface	Species disappearance/ diversity reduction regenerative ability reduction	Y	There will be short term impact to biological resources during construction. However, site restoration following remedy implementation will result in enhancement of native plant and wildlife habitat.

Notes:
Template provided by DTSC's "Interim Advisory for Green Remediation" (December 2009).

APPENDIX D

Preliminary Estimated Cost Tables

Table D-1. Remedial Alternative Cost Estimate Summary
Feasibility Study and Remedial Action Plan, Baker Beach Disturbed Area 2

Remedial Alternative	Capital Cost*	Monitoring & Maintenance Cost**	Total Cost
Alternative 1 No Action	--	--	--
Alternative 2 Land Use Controls	$90,000	--	$90,000
Alternative 3 Excavation	$3,200,000	--	$3,200,000
Alternative 4 Engineered Cover	$2,930,000	$280,000	$3,210,000

-- No associated costs.
* Includes subtotal of capital costs, factored costs, and cost contingency.
** Includes cost contingency.

Table D-2. Cost Estimate: Alternative 2 - Land Use Restrictions

Feasibility Study and Remedial Action Plan, Baker Beach Disturbed Area 2

Category	Description	Quantity	Unit	Unit Price	Cost	Source	Assumptions
FACTORED COSTS							
	Regulatory Negotiations	1	LS	1%	$492	Landfills 8 & 10 PHSH FS	
	Agency Oversight During Implementation	1	LS	1%	$492	Landfills 8 & 10 PHSH FS	
	Program Management	1	LS	5%	$2,461	Landfills 8 & 10 PHSH FS	
	Field Construction Management	1	LS	10%	$4,922	Landfills 8 & 10 PHSH FS	
	Trust Management	1	LS	10%	$4,922	Trust funding	10% of capital costs
CAPITAL COSTS							
Pre and Post Field Planning	Geotechnical Grading Review	0	LS	$15,000	$0	AMEC estimate	Complete excavation
	Remedial Work Plan	0	LS	$100,000	$0	AMEC estimate	
	Remedial Design (construction drawings, specifications, bid documents)	0	LS	$1,706	$0	AMEC estimate	12% of capital/construction costs per Exhibit 5-8; EPA 2000, Guide to Developing and Documenting Cost Estimates during the Feasibility Study
	Drafting and Reporting of Land Use Restrictions	50%	LS	$50,000	$25,000	Landfills 8 & 10 PHSH FS	
	Preconstruction Survey	0	LS	$15,000	$0	Subcontractor estimate	Chaudhary & Associates Inc
	Schedule	0	LS	$5,000	$0	Landfills 8 & 10 PHSH FS	
	Preconstruction Meetings/Inspections	0	LS	$10,000	$0	Landfills 8 & 10 PHSH FS	
	Health and Safety Plan (HASP) and Emergency Response Plan	0	LS	$15,000	$0	Landfills 8 & 10 PHSH FS	
	Storm Water Control Plan/SWPPP	0	LS	$9,600	$0	Landfills 8 & 10 PHSH FS	Increase unit cost 20% for cultural resource and cliff conditions
	Construction Quality Assurance Plan (CQAP)	0	LS	$5,000	$0	Landfills 8 & 10 PHSH FS	
	Permitting	0	LS	$2,500	$0	Landfills 8 & 10 PHSH FS	
	Archaeological Oversight	0	LS	$35,000	$0	Landfills 8 & 10 PHSH FS	
	Construction Completion Report/As-Builts	0	LS	$75,000	$0	Landfills 8 & 10 PHSH FS	
	O&M Plan for Erosion Control	0	LS	$15,000	$0	Landfills 8 & 10 PHSH FS	
	O&M Plan for Engineering Controls	0	LS	$15,000	$0	Landfills 8 & 10 PHSH FS	
	Soil Management Plan	1	LS	$10,000	$10,000	AMEC estimate	
Site Preparation	Clear and Grub-Sloped Area	0	SF	$1.20	$0	Subcontractor estimate	Unit cost based on AIS Construction cost estimate for brush clearing and removal for BBDA 2 performed Fall 2011.
	Tree Removal	0	EA	$1,320.00	$0	Landfill E FS/RAP	increase cost by 20% for sloped conditions
	Grade Lay Down Area	0	SF	$0.55	$0	Landfills 8 & 10 PHSH FS	Assume existing parking area and Langdon Court are adequate for use as project lay down area.
	Build Construction Access Road	0	LF	$17	$0.00	Landfills 8 & 10 PHSH FS	Assume access to interior of site necessary to remove excavated material from western edge. Assume temporary access road and bench where long reach excavator will excavate western most material and swing around and stockpile in parking lot.
	Mob / De-Mob Earthwork Contractor	0	LS	$30,000	$0	RS Means-AMEC estimate	
	Install Construction Fence	0	LF	$19	$0	Landfills 8 & 10 PHSH FS	2 crews working at the same time, Increase unit cost 20% for cultural resource and cliff conditions
	Remove Existing Post and Cable Fence	0	LF	$3.14	$0	RS Means 0241133601770	No existing post and cable fence present.
Earthworks							
	Excavate Soil and Stockpile	0	BCY	$12	$0	Landfills 8 & 10 PHSH FS	Unit price for sloped area. Increase unit cost 20% for cultural resource, difficult access and cliff conditions. Assume soil stockpiled at existing parking lot.
	Load Soil (and transport to staging area)	0	LCY	$2.30	$0	Landfills 8 & 10 PHSH FS	Load soil into dump truck to convey to staging area for stockpiling. Increase by 30% to account for 30% fluffing
	Load Soil (and transport for disposal)	0	LCY	$2.76	$0	Landfills 8 & 10 PHSH FS	Load soil into semi-trailer truck for disposal.
	Soil and Debris Classification Sampling and Testing	0	EA	$579	$0	Landfills 8 & 10 PHSH FS	1 composite sample per 250 CY. Includes; Sampling & Sample Handling, Title 22 Metals, CAM Wet, Lead, Pesticides, and PAHs
	Screen, Segregate	0	CY	$7.5	$0.00	Landfills 8 & 10 PHSH FS	

Table D-2. Cost Estimate: Alternative 2 - Land Use Restrictions

Feasibility Study and Remedial Action Plan, Baker Beach Disturbed Area 2

Category	Description	Quantity	Unit	Unit Price	Cost	Source	Assumptions
	Recycle	0	TON	$20	$0	Landfills 8 & 10 PHSH FS	
	Haul Soil and/or Debris for Disposal	0	TON	$18	$0	Landfills 8 & 10 PHSH FS	Assume 1.5 tons per BCY.
	Impacted Soil/Debris Disposal Fees - Class II	0	TON	$50	$0	Landfills 8 & 10 PHSH FS	Assumes 90% as Class II
	Impacted Soil/Debris Disposal Fees - Class I	0	TON	$105	$0.00		10% of material will be disposed at Class I facility
	California Generator Fees	0%	LS	$79,890	$0	Board of Equalization January 2010 Annual Fee (www.boe.ca.gov)	Assume hazardous waste from BBDA 2 complete excavation will make up 15% of total disposed offsite for entire Presidio for the year.
	Furnish Import Fill from Off-site Source	0	CY	$21.60	$0	Landfills 8 & 10 PHSH FS	Fill corresponding to 75% of excavated material Includes 30% to account for compaction.
	Furnish Borrow Fill from On-site Source	0	CY	$5.34	$0	RS Means	
	Load Fill (to small truck to site stockpile for placement)	0	CY	$2.76	$0	Landfills 8 & 10 PHSH FS	Increase unit cost 20% for cultural resource and cliff conditions
	Placement of Fill from Stockpile	0	CY	$8.00	$0	Landfills 8 & 10 PHSH FS	Increase unit cost 20% for cultural resource and cliff conditions
	Grade and Compact	0	CY	$3.12	$0	EKI-Landfills 8 & 10 PHSH FS	Increase unit cost 20% for cultural resource and cliff conditions
	Finish Grading	0	SF	$0.60	$0	AMEC estimate	Double the RS Means 312216101050 due to sloping conditions and increase by 20%.
	Remedial Grading	0	SF	$0.12	$0	Landfills 8 & 10 PHSH FS/Means	
	Remove Construction Fence	0	LF	$10	$0	Landfills 8 & 10 PHSH FS	2 crews working at the same time. Increase unit cost 20% for site access/cultural resource and cliff conditions
	Construction of Storm Drainage Feature	0	EA	$5,000	$0	AMEC estimate	Feature to be constructed post remediation to ensure stormwater control
Other Site Works							
	Construction Observation	0	DAYS	$1,700	$0	AMEC estimate	Oversight during each day of field activity.
	Revegetation	0.00	AC	$78,000	$0	Landfills 8 & 10 PHSH FS	Includes erosion control measures. Increase unit cost 20% for site access/cultural resource and cliff conditions
	Signage (Engineered Control)	2	EA	$92.71	$185	RS Means	1 sign every 500 feet of fence
	New Post and Cable Fence	690	LF	$20.34	$14,035	RS Means	
	Post construction Survey	0	LS	$15,000	$0	Subcontractor estimate	Chaudhary & Associates Inc
Post-Construction	Maintenance-Erosion Repair (Furnish Soil/Fill and Place)	0	CY	$59.21	$0	Landfills 8 & 10 PHSH FS	10% import fill quantity
	General site Inspections (1 yr)	0	EA	$1,500	$0	AMEC estimate	assumed quarterly inspections

Capital Costs	**$49,220**
Factored Costs	**$13,289**
Subtotal Costs	$62,509
Total with 30% contingency	**$90,000**

Acronyms & Abbreviations

Acres (AC)
AMEC Environment & Infrastructure, Inc. (AMEC)
Baker Beach Disposal Area (BBDA)
Bank Cubic Yards (BCY)
California Assessment Manual (CAM)
Construction Quality Assurance Plan (CQAP)
Cubic Yards (CY)
Curtis & Tompkins (C&T)
Each (EA)
Demobilization (Demob)
Environmental Protection Agency (EPA)
Linear Feet (LF)
Loose Cubic Yards (LCY)
Lump Sum (LS)
Mobilization (Mob)
Net Present Value (NPV)
Office of Management and Budget (OMB)
Square Feet (SF)
Standard Operating Procedures (SOP)
Square (SQ)
Storm Water Pollution Prevention Plan (SWPPP)
Year (YR)

References

Landfills 8 & 10 Public Health Service Hospital Feasibility Study, 2008 (Landfills 8 & 10 PHSH FS)
Landfill E Feasibility Study/Remedial Action Plan, 2011 (Landfill E FS/RAP)
Guide to Developing and Documenting Cost Estimates During the Feasibility Study (EPA 2000)
RS Means Reed Construction Data (RS Means)

Table D-3. Cost Estimate: Alternative 3 - Excavation

Feasibility Study and Remedial Action Plan, Baker Beach Disturbed Area 2

Category	Description	Quantity	Unit	Unit Price	Cost	Source	Assumptions
FACTORED COSTS							
	Regulatory Negotiations	1	LS	1%	$19,683	Landfills 8 & 10 PHSH FS	
	Agency Oversight During Implementation	1	LS	1%	$19,683	Landfills 8 & 10 PHSH FS	
	Program Management	1	LS	5%	$98,413	Landfills 8 & 10 PHSH FS	
	Field Construction Management	1	LS	8%	$157,461	Landfills 8 & 10 PHSH FS	
	Trust Management	1	LS	10%	$196,826	Trust funding	10% of capital costs
CAPITAL COSTS							
Pre and Post Field Planning	Geotechnical Grading Review	1	LS	$15,000	$15,000	AMEC estimate	Complete excavation
	Remedial Work Plan	1	LS	$100,000	$100,000	AMEC estimate	
	Remedial Design (construction drawings, specifications, bid documents)	1	LS	$175,839	$175,839	AMEC estimate	12% of capital/construction costs per Exhibit 5-8; EPA 2000, Guide to Developing and Documenting Cost Estimates during the Feasibility Study
	Drafting and Reporting of Land Use Restrictions	0%	LS	$50,000	$0	Landfills 8 & 10 PHSH FS	
	Preconstruction Survey	1	LS	$15,000	$15,000	Subcontractor estimate	Chaudhary & Associates Inc
	Schedule	1	LS	$5,000	$5,000	Landfills 8 & 10 PHSH FS	
	Preconstruction Meetings/Inspections	1	LS	$10,000	$10,000	Landfills 8 & 10 PHSH FS	
	Health and Safety Plan (HASP) and Emergency Response Plan	1	LS	$15,000	$15,000	Landfills 8 & 10 PHSH FS	
	Storm Water Control Plan/SWPPP	1	LS	$9,600	$9,600	Landfills 8 & 10 PHSH FS	Increase unit cost 20% for cultural resource and cliff conditions
	Construction Quality Assurance Plan (CQAP)	1	LS	$5,000	$5,000	Landfills 8 & 10 PHSH FS	
	Permitting	1	LS	$2,500	$2,500	Landfills 8 & 10 PHSH FS	
	Archaeological Oversight	1	LS	$35,000	$35,000	Landfills 8 & 10 PHSH FS	
	Construction Completion Report/As-Builts	1	LS	$75,000	$75,000	Landfills 8 & 10 PHSH FS	
	O&M Plan for Erosion Control	1	LS	$15,000	$15,000	Landfills 8 & 10 PHSH FS	
	O&M Plan for Engineering Controls	1	LS	$15,000	$15,000	Landfills 8 & 10 PHSH FS	
	Soil Management Plan	1	LS	$10,000	$10,000	AMEC estimate	
Site Preparation	Clear and Grub-Sloped Area	30,000	SF	$1.20	$36,000	Subcontractor estimate	Unit cost based on AIS Construction cost estimate for brush clearing and removal for BBDA 2 performed Fall 2011.
	Tree Removal	5	EA	$1,320.00	$6,600	Landfill E FS/RAP	increase cost by 20% for sloped conditions
	Grade Lay Down Area	0	SF	$0.55	$0	Landfills 8 & 10 PHSH FS	Assume existing parking area and Langdon Court are adequate for use as project lay down area.
	Build Construction Access Road	0	LF	$17	$0.00	Landfills 8 & 10 PHSH FS	Assume access to interior of site necessary to remove excavated material from western edge. Assume temporary access road and bench where long reach excavator will excavate western most material and swing around and stockpile in parking lot.
	Mob / De-Mob Earthwork Contractor	1	LS	$30,000	$30,000	RS Means-AMEC estimate	
	Install Construction Fence	1,100	LF	$19	$21,120	Landfills 8 & 10 PHSH FS	2 crews working at the same time, Increase unit cost 20% for cultural resource and cliff conditions
	Remove Existing Post and Cable Fence	0	LF	$3.14	$0	RS Means 0241133601770	No existing post and cable fence present.
Earthworks							
	Excavate Soil and Stockpile	6,700	BCY	$12	$80,400	Landfills 8 & 10 PHSH FS	Unit price for sloped area. Increase unit cost 20% for cultural resource, difficult access and cliff conditions. Assume soil stockpiled at existing parking lot.
	Load Soil (and transport to staging area)	8,710	LCY	$2.30	$20,033	Landfills 8 & 10 PHSH FS	Load soil into dump truck to convey to staging area for stockpiling. Increase by 30% to account for 30% fluffing
	Load Soil (and transport for disposal)	8,710	LCY	$2.76	$24,040	Landfills 8 & 10 PHSH FS	Load soil into semi-trailer truck for disposal.
	Soil and Debris Classification Sampling and Testing	35	EA	$579	$20,265	Landfills 8 & 10 PHSH FS	1 composite sample per 250 CY. Includes; Sampling & Sample Handling, Title 22 Metals, CAM Wet, Lead, Pesticides, and PAHs
	Screen, Segregate	0	CY	$7.5	$0.00	Landfills 8 & 10 PHSH FS	
	Recycle	0	TON	$20	$0	Landfills 8 & 10 PHSH FS	

Table D-3. Cost Estimate: Alternative 3 - Excavation

Feasibility Study and Remedial Action Plan, Baker Beach Disturbed Area 2

Category	Description	Quantity	Unit	Unit Price	Cost	Source	Assumptions
	Haul Soil and/or Debris for Disposal	10,050	TON	$18	$180,900	Landfills 8 & 10 PHSH FS	Assume 1.5 tons per BCY.
	Impacted Soil/Debris Disposal Fees - Class II	9,045	TON	$50	$452,250	Landfills 8 & 10 PHSH FS	Assumes 90% as Class II
	Impacted Soil/Debris Disposal Fees - Class I	1,005	TON	$105	$105,525.00		10% of material will be disposed at Class I facility
	California Generator Fees	15%	LS	$79,890	$11,984	Board of Equalization January 2010 Annual Fee (www.boe.ca.gov)	Assume hazardous waste from BBDA 2 complete excavation will make up 15% of total disposed offsite for entire Presidio for the year.
	Furnish Import Fill from Off-site Source	6,500	CY	$21.60	$140,400	Landfills 8 & 10 PHSH FS	Fill corresponding to 75% of excavated material Includes 30% to account for compaction.
	Furnish Borrow Fill from On-site Source	0	CY	$5.34	$0	RS Means	
	Load Fill (to small truck to site stockpile for placement)	6,500	CY	$2.76	$17,940	Landfills 8 & 10 PHSH FS	Increase unit cost 20% for cultural resource and cliff conditions
	Placement of Fill from Stockpile	6,500	CY	$8.00	$52,026	Landfills 8 & 10 PHSH FS	Increase unit cost 20% for cultural resource and cliff conditions
	Grade and Compact	6,500	CY	$3.12	$20,280	EKI-Landfills 8 & 10 PHSH FS	Increase unit cost 20% for cultural resource and cliff conditions
	Finish Grading	30,000	SF	$0.60	$18,000	AMEC estimate	Double the RS Means 312216101050 due to sloping conditions and increase by 20%.
	Remedial Grading	0	SF	$0.12	$0	Landfills 8 & 10 PHSH FS/Means	
	Remove Construction Fence	1,100	LF	$10	$10,560	Landfills 8 & 10 PHSH FS	2 crews working at the same time. Increase unit cost 20% for site access/cultural resource and cliff conditions
	Construction of Storm Drainage Feature	2	EA	$5,000	$10,000	AMEC estimate	Feature to be constructed post remediation to ensure stormwater control
Other Site Works							
	Construction Observation	75	DAYS	$1,700	$127,500	AMEC estimate	Oversight during each day of field activity.
	Revegetation	0.75	AC	$78,000	$58,500	Landfills 8 & 10 PHSH FS	Includes erosion control measures. Increase unit cost 20% for site access/cultural resource and cliff conditions
	Signage (Engineered Control)	0	EA	$92.71	$0	RS Means	1 sign every 500 feet of fence
	Reinstall Post and Cable Fence	0	LF	$7.32	$0	RS Means	
	Post construction Survey	1	LS	$15,000	$15,000	Subcontractor estimate	Chaudhary & Associates Inc
Post-Construction	Maintenance-Erosion Repair (Furnish Soil/Fill and Place)	0	CY	$59.21	$0	Landfills 8 & 10 PHSH FS	10% import fill quantity
	General site Inspections (1 yr)	4	EA	$1,500	$6,000	AMEC estimate	assumed quarterly inspections

Capital Costs	**$1,968,261**
Factored Costs	**$492,065**
Subtotal Costs	$2,460,326
Total with 30% contingency	**$3,200,000**

Acronyms & Abbreviations

Acres (AC)
AMEC Environment & Infrastructure, Inc. (AMEC)
Baker Beach Disposal Area (BBDA)
Bank Cubic Yards (BCY)
California Assessment Manual (CAM)
Construction Quality Assurance Plan (CQAP)
Cubic Yards (CY)
Curtis & Tompkins (C&T)
Each (EA)
Demobilization (Demob)
Environmental Protection Agency (EPA)
Emergency Response Plan (ERP)
Feet (FT)
Health and Safety Plan (HASP)
Operations and Maintenance (O&M)
Polynuclear Aromatic Hydrocarbon (PAH)
Linear Feet (LF)
Loose Cubic Yards (LCY)
Lump Sum (LS)
Mobilization (Mob)
Net Present Value (NPV)
Office of Management and Budget (OMB)
Square Feet (SF)
Standard Operating Procedures (SOP)
Square (SQ)
Storm Water Pollution Prevention Plan (SWPPP)
Year (YR)

References

Landfills 8 & 10 Public Health Service Hospital Feasibility Study, 2008 (Landfills 8 & 10 PHSH FS)
Landfill E Feasibility Study/Remedial Action Plan, 2011 (Landfill E FS/RAP)
Guide to Developing and Documenting Cost Estimates During the Feasibility Study (EPA 2000)
RS Means Reed Construction Data (RS Means)

Table D-4. Cost Estimate: Alternative 4 - Engineered Cover
Feasibility Study and Remedial Action Plan, Baker Beach Disturbed Area 2

Category	Description	Quantity	Unit	Unit Price	Cost	Source	Assumptions
FACTORED COSTS							
	Regulatory Negotiations	1	LS	1%	$17,988	Landfills 8 & 10 PHSH FS	
	Agency Oversight During Implementation	1	LS	1%	$17,988	Landfills 8 & 10 PHSH FS	
	Program Management	1	LS	5%	$89,940	Landfills 8 & 10 PHSH FS	
	Field Construction Management	1	LS	8%	$143,904	Exhibit 5-8; EPA 2000	Exhibit 5-8; EPA 2000
	Trust Management	1	LS	10%	$179,880	Trust funding	10% of capital costs
CAPITAL COSTS							
Pre and Post Field Planning							
	Geotechnical Grading Review	1	LS	$50,000	$50,000	AMEC estimate	Additional geotechnical review required for analyzing cap and retaining features
	Remedial Work Plan	1	LS	$100,000	$100,000	AMEC estimate	
	Remedial Design (construction drawings, specifications, bid documents)	1	LS	$151,253	$151,253	AMEC estimate	12% of capital/construction costs per Exhibit 5-8; EPA 2000, Guide to Developing and Documenting Cost Estimates during the Feasibility Study
	Drafting and Reporting of Land Use Restrictions	50%	LS	$50,000	$25,000	Landfills 8 & 10 PHSH FS	
	Preconstruction Survey	1	LS	$15,000	$15,000	Subcontractor Estimate	Chaudhary & Associates Inc
	Schedule	1	LS	$5,000	$5,000	Landfills 8 & 10 PHSH FS	
	Preconstruction Meetings/Inspections	1	LS	$10,000	$10,000	Landfills 8 & 10 PHSH FS	
	Health and Safety Plan (HASP) and Emergency Response Plan	1	LS	$15,000	$15,000	Landfills 8 & 10 PHSH FS	
	Sampling and Analysis Plan Including SOPs	0	LS	$10,000	$0	Landfills 8 & 10 PHSH FS	
	Storm Water Control Plan/SWPPP	1	LS	$9,600	$9,600	Landfills 8 & 10 PHSH FS	Increase unit cost 20% for site access/cultural resource and cliff conditions
	Construction Quality Assurance Plan (CQAP)	1	LS	$5,000	$5,000	Landfills 8 & 10 PHSH FS	
	Permitting	1	LS	$2,500	$2,500	Landfills 8 & 10 PHSH FS	
	Archeological Oversight	1	LS	$35,000	$35,000	Landfills 8 & 10 PHSH FS	
	Construction Completion Report/As-Builts	1	LS	$75,000	$75,000	Landfills 8 & 10 PHSH FS	
	O&M Plan for Engineering Controls	1	LS	$15,000	$15,000	Landfills 8 & 10 PHSH FS	
	O&M Plan for Erosion Controls	1	LS	$15,000	$15,000	Landfills 8 & 10 PHSH FS	
	Soil Management Plan	1	LS	$10,000	$10,000	AMEC estimate	
Site Preparation							
	Clear and Grub	30,000	SF	$1.20	$36,000	Subcontractor estimate	Unit cost based on AIS Construction cost estimate for brush clearing and removal for BBDA 2 performed Fall 2011.
	Tree Removal	5	EA	$1,320	$6,600	Landfill E FS/RAP	increase cost by 20% for slopping conditions
	Grade Lay Down Area	0	SF	$0.55	$0	Landfills 8 & 10 PHSH FS	Assume existing parking area and Langdon Court are adequate for use as project lay down area.
	Build Construction Access Road	0	LF	$17	$0.00	Landfills 8 & 10 PHSH FS	
	Mob / De-Mob Earthwork Contractor	1	LS	$30,000	$30,000	RS Means-AMEC estimate	
	Install Construction Fence	1,100	LF	$19	$21,120	Landfills 8 & 10 PHSH FS	2 crews working at the same time, Increase unit cost 20% for site access/cultural resource and cliff conditions
Earthworks							
	Debris fill excavation and relocation	450	BCY	$18	$8,100	AMEC Estimate	Unit rate for low volume/low production and limited access.
	Excavate and stockpile protruding debris	50	BCY	$16	$800	Landfills 8 & 10 PHSH FS	Logs, tree stumps...Unit price for sloped area. Increase unit cost 20% for site access/cultural resource and cliff conditions
	Load debris (and transport to staging area)	50	CY	$2.76	$138	Landfills 8 & 10 PHSH FS	Logs, tree stumps...Includes 30% expansion. Material will be double handled, therefore two loading costs are included. Increase unit cost 20% for site access/cultural resource and cliff conditions
	Load debris (and transport for disposal)	50	CY	$2.76	$138	Landfills 8 & 10 PHSH FS	Logs, tree stumps..Material double handled; therefore two loading costs are included. Increase unit cost 20% for site access/cultural resource and cliff conditions

Table D-4. Cost Estimate: Alternative 4 - Engineered Cover
Feasibility Study and Remedial Action Plan, Baker Beach Disturbed Area 2

Category	Description	Quantity	Unit	Unit Price	Cost	Source	Assumptions
	Screen, Segregate and Place	0	CY	$7.50	$0.00	Landfills 8 & 10 PHSH FS	
	Recycle Debris	0	TON	$20	$0.00	Landfills 8 & 10 PHSH FS	
	Soil and Debris Classification Sampling and Testing	1	EA	$579	$579.00	Landfills 8 & 10 PHSH FS	1 composite sample per 250 CY. Includes; Sampling & Sample Handling, Title 22 Metals, CAM Wet, Lead, Pesticides, and PAHs
	Haul Debris for Disposal and/or Recycling - max 150 miles	75	TON	$18	$1,350	Landfills 8 & 10 PHSH FS	Assumes 1.5 conversion from CY to TONS.
	Soil/Debris Recycling/Disposal	75	TON	$20	$1,500	Landfills 8 & 10 PHSH FS	Assumes 1.5 conversion from CY to TONS.
	California Generator Fees	0%	LS	$79,890	$0	Board of Equalization January 2010 Annual Fee (www.boe.ca.gov)	Hazardous waste from BBDA 1A complete excavation will make up 2% of total disposed offsite for entire Presidio for the year.
	Furnish and Place Geosynthetic Barrier Fabric	30,000	SF	$1.20	$36,000	Landfills 8 & 10 PHSH FS	Increase unit cost 20% for site access/cultural resource and cliff conditions
	Furnish Import Soil from Off-site Source	3,000	CY	$21.60	$64,800	Landfills 8 & 10 PHSH FS	Assumes 3 foot cover thickness, includes 30% to account for compaction., Increase unit cost 20% for site access/cultural resource and cliff conditions
	Furnish Borrow Fill from On-site Source	0	CY	$5.34	$0.00	RS Means	
	Load Fill (to truck to site stockpile for placement)	3,000	CY	$2.76	$8,280	Landfills 8 & 10 PHSH FS	Increase unit cost 20% for site access/cultural resource and cliff conditions
	Placement of Fill (Soil Cap) from Stockpile	3,000	CY	$10.00	$30,000	Landfills 8 & 10 PHSH FS	Area receiving fill is not flat, double handling of soil because of site access issues. Increase unit cost 50% for site access/cultural resource and cliff conditions
	Grade and Compact	3,000	CY	$3.90	$11,700	Landfills 8 & 10 PHSH FS	Increase unit cost 50% for site access/cultural resource and cliff conditions
	Remedial Grading	0	SF	$0.12	$0	Double the RS Means 312216101050 due to access issues and sloping conditions.	Grade entire site, plus 20%. Increase unit cost 20% for site access/cultural resource and cliff conditions
	Finish Grading	30,000	SF	$0.75	$22,500	Landfills 8 & 10 PHSH FS/RS Means	Area east of trails plus 50%. Increase unit cost 20% for site access/cultural resource and cliff conditions
	Construct Retaining Feature	1	LS	$750,000	$750,000	AMEC Estimate, previous experience w/ similar work	3,000 sq ft concrete and steel retaining wall to bedrock. This represents a conservative cost assumption. To be designed based on geotechnical recommendations
	Construction of Storm Drainage Features	6	EA	$6,000	$36,000	AMEC estimate	Feature to be constructed to ensure storm water control and protection of cover
	Remove Construction Fence	1,100	LF	$9.60	$10,560	Landfills 8 & 10 PHSH FS	2 crews working at the same time. Increase unit cost 20% for site access/cultural resource and cliff conditions
Other Site Works							
	Construction Observation	65	DAYS	$1,700	$110,500	AMEC estimate	Assumes oversight during each day of activity
	Revegetation	0.75	AC	$78,000	$58,500	Landfills 8 & 10 PHSH FS	Includes erosion control measures and native plants. Increase unit cost 20% for site access/cultural resource and cliff conditions
	Signage (Engineered Control)	3	EA	$92.71	$278	RS Means	
	Reinstall Post and Cable Fence	0	LF	$7.32	$0	RS Means 323129101360	
	New Post and Cable Fence	0	LF	$20.34	$0	RS Means 323129101360	No wood cross members in post and cable fence. Add 15% in assumed length for adjustments to trail alignment.
	Post construction Survey	1	LS	$15,000	$15,000	Subcontractor estimate	Chaudhary & Associates Inc
Maintenance & Monitoring							
	Maintenance-Erosion Repair	1	each	$20,000	$20,000	Landfil E	
	General site Inspections (30 years)	30	each	$2,500	$75,000	AMEC estimate	
	Annual Inspection Report (30 years)	30	each	$4,000	$120,000	AMEC estimate	

Table D-4. Cost Estimate: Alternative 4 - Engineered Cover
Feasibility Study and Remedial Action Plan, Baker Beach Disturbed Area 2

Capital Costs	$1,798,797
Factored Costs	$449,699
Subtotal Costs	$2,248,496
Subtotal Costs with 30% contingency	**$2,930,000**
Monitoring & Maintenance Costs	$215,000
Monitoring & Maintenance Costs with 30% contingency	**$280,000**
Total Costs	**$3,210,000**

Notes
* OMB interest rate is the "Real Interest Rate" with inflation premium removed. Source is the *Federal Office of Management and Budget, Circular A-94 Appendix C, Revised December 2011* .

Acronyms & Abbreviations

Acres (AC)
AMEC Environment & Infrastructure, Inc. (AMEC)
Baker Beach Disposal Area (BBDA)
Bank Cubic Yards (BCY)
California Assessment Manual (CAM)
Construction Quality Assurance Plan (CQAP)
Cubic Yards (CY)
Curtis & Tompkins (C&T)
Each (EA)
Demobilization (Demob)
Environmental Protection Agency (EPA)
Emergency Response Plan (ERP)
Feet (FT)
Health and Safety Plan (HASP)
Operations and Maintenance (O&M)
Polynuclear Aromatic Hydrocarbon (PAH)
Linear Feet (LF)
Loose Cubic Yards (LCY)
Lump Sum (LS)
Mobilization (Mob)
Net Present Value (NPV)
Office of Management and Budget (OMB)
Square Feet (SF)
Standard Operating Procedures (SOP)
Square (SQ)
Storm Water Pollution Prevention Plan (SWPPP)
Year (YR)

References

Landfills 8 & 10 Public Health Service Hospital Feasibility Study, 2008 (Landfills 8 & 10 PHSH FS)
Landfill E Feasibility Study/Remedial Action Plan, 2011 (Landfill E FS/RAP)
Guide to Developing and Documenting Cost Estimates During the Feasibility Study (EPA 2000)
RS Means Reed Construction Data (RS Means)

APPENDIX E

Administrative Record List

Table E-1. Administrative Record List

Date	Author	Recipient	Title of Document
Oct-88	United States Environmental Protection Agency (EPA)	Public	*Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA. EPA/540/G-89/004, OSWER Directive 9355.3-01.*
1990	EPA Environmental Photographic Interpretation Center, Environmental Monitoring Systems; by Ringden and Sitton	Public	*Installation Assessment Army Base Closure Program, Presidio Military Reservation, San Francisco, CA.*
1993	National Park Service (NPS)	Public	*National Historic Landmark District Update, Contributing Resources List, Presidio of San Francisco, San Francisco, California.*
Mar-93	National Park Service (NPS)	Public	*National Register of Historic Places Registration Form for the Presidio of San Francisco.*
Jul-94	NPS	Public	*Creating a Park for the 21st Century, from Military Post to National Park – Final General Management Plan Amendment, Presidio of San Francisco, Golden Gate National Park Recreation Area, California.* Department of Interior.
Dec-95	Department of Toxic Substances Control (DTSC)	Public	*Remedial Action Plan Policy, Guidance Document No. EO095-007-PP.*
1995	City and County of San Francisco Planning Department (SF Planning)	Public	*Transportation: An Element of the General Plan of the City and County of San Francisco*.
Jan-97	Dames & Moore	Army	*Final Remedial Investigation Report, Presidio Main Installation, Presidio of San Francisco*.
May-99	U.S. Army, Presidio Trust, and National Park Service (U.S. Army, Trust, and NPS)	Public	*Memorandum of Agreement, Environmental Remediation at the Presidio of San Francisco*.
May-99	Presidio Trust and National Parks Service (Trust and NPS)	Public	*Memorandum of Agreement for Environmental Remediation of Presidio of San Francisco "Area A" Property*.
Aug-99	DTSC	Public	*Consent Agreement Between the California Department of Toxic Substances Control, the Presidio Trust, and the U.S. Department of the Interior, National Park Service for the Remediation of Hazardous Substances at the Presidio of San Francisco.*
May-01	Trust and NPS	Public	*Vegetation Management Plan and Environmental Assessment for the Presidio of San Francisco.*
Jun-01	Trust	Public	*Community Relations Plan.*

Table E-1. Administrative Record List

Date	Author	Recipient	Title of Document
Jul-01	California Air Resources Board (CARB)	Public	*Resolution 01-28*.
Oct-01	DTSC	Public	*Information Advisory, Clean Imported Fill Materia*l.
Oct-01	Jones and Stokes	Parsons Brinckerhoff	*Archaeological Survey Report/Historical Study Report, Doyle Drive Corridor Project, Presidio of San Francisco National Historic Landmark District, City and County of San Francisco, California.*
Nov-01	Trust and Golden Gate National Recreation Area (GGNRA)	Public	*Presidio of San Francisco Biological Assessment, Draft Presidio Environmental Remediation Program, Draft Presidio Trails and Bikeways Master Plan, Draft Presidio Trust Implementation Plan.*
Jul-02	U.S. Department of the Interior Fish and Wildlife Service (USFWS)	Trust	*Formal Consultation on Four Projects at the Presidio of San Francisco and Golden Gate National Recreation Area, San Francisco, California.* File No. 1-1-02-F-0228. July 23.
Oct-2002; revised 2006	Erler & Kalinowski, Inc. (EKI)	Trust	*Development of Presidio-Wide Cleanup Levels for Soil, Sediment, Groundwater, and Surface Water, Presidio of San Francisco*. October. Revised May 16, 2006.
2003	Regional Water Quality Control Board (RWQCB)	Public	*Order No. R2-2003-0080. Revised Site Cleanup Requirements and Rescission of Order No. 91-082 and Order no. 96-070 for the Property Located at the Presidio of San Francisco, City and County of San Francisco.*
Mar-03	EKI	Trust	*Presidio Trust Revised Feasibility Study Report, Main Installation Sites, Presidio of San Francisco, California.*
Jan-05	Trust	U.S. Army Corps of Engineers	*Wetland Summary Letter to the U.S. Army Corps of Engineers*. Letter from Mr. Craig Cooper, Trust, to Mr. Bob Smith, USACE.
Apr-03	NPS and URS Corporation	Public	*Presidio Wetland Resources, U.S. Army Corps of Engineers Potential Jurisdictional Wetlands and U.S. Fish and Wildlife Service Wetland Habitat on the Presidio of San Francisco.*
Jul-03	NPS and Trust	Public	*Presidio Trails and Bikeways Master Plan and Environmental Assessment.*
2004	Royston, Hanamoto, Alley, and Abbey (RHAA)	Trust and NPS	*Presidio Coastal Trail Master Plan.*
Apr-05	May & Associates	Trust	*Amendment to the Presidio of San Francisco Biological Assessment (dated November 16, 2001), Presidio of San Francisco, Golden Gate National Recreation Area, San Francisco, California*.

Table E-1. Administrative Record List

Date	Author	Recipient	Title of Document
Jul-05	Trust and NPS	United States Fish and Wildlife Service (USFWS)	*Request to re-open formal consultation under the Endangered Species Act (ESA Section 7) for three environmental remediation sites and a portion of trail at the Presidio of San Francisco (Reference: Biological Opinion dated July 23, 2002, File No. 1-1-02-F-0228*. Letter from Ms. Terri Thomas, Trust and Ms. Daphne Hatch, NPS to Mr. Ryan Olah, USFWS. July 29.
Aug-05	USFS	Trust	*Amendment to the Biological Opinion for the Modification of Three Environmental Remediation Sites, and the Presidio Trails and Bikeways Management Plan, The Presidio, San Francisco, California (USFWS file 1-1-02-F-0228)*. August 31.
Oct-05	Anthropological Studies Center, Sonoma State University	Trust	*Protocols for Archaeological Artifacts on Presidio Park Lands.*
Feb-06	URS Corporation (URS)	Trust	*Cultural Resource Baseline and Impact Assessment for the Baker Beach Disturbed Areas (BBDAs) 1, 1A, 2, and 2A Remedial Action*
Feb-06	NPS and URS Corporation	Trust	*Cultural Resource Baseline and Impact Assessment for the Baker Beach Disturbed Areas (BBDAs) 1, 1A, 2, and 2A Remedial Action. Draft Technical Report.* (Report published in Appendix B of *Field Investigation Report, Baker Beach Disturbed Areas 1, 1A, 2, and 2A, Presidio of San Francisco, California [in MACTEC, June 2006]*.
Mar-06	Climate Action Team (CAT)	Public	*Climate Action Team and California Environmental Protection Agency. Climate Action Team Report to Governor Schwarzenegger and the Legislature.*
Mar-06	U.S. Army (Corps of Engineers, Sacramento District)	Public	*Chemical Warfare Investigation Work Plan.*
Jun-06	MACTEC Engineering and Consulting, Inc. (MACTEC)	Trust	*Field Investigation Report, Baker Beach Disturbed Areas 1, 1A, 2, and 2A, Presidio of San Francisco, California.*
Apr-07	MACTEC	Trust	*Transmittal: Revised Figures and Tables, Potential Chemicals of Concern in Soil and Proposed Phase 2 Sampling Locations, Bluff Top and Frontal Slope Areas, Baker Beach Disturbed Areas and Merchant Road Fill Site, Presidio of San Francisco, California*
May-07	Intergovernmental Panel on Climate Change (IPCC)	Public	*Climate Change 2007: Synthesis Report, the Fourth IPCC Assessment Report.*
Jun-07	NPS	Public	*Vegetation Restoration Action Plan – Ecological Restoration of Remediation Sites Baker Beach Disturbed Areas 1, 2A*. Project memorandum.
Jun-07	MACTEC	Trust	*Remedial Action Plan, Baker Beach Disturbed Areas 1 and 2A and Twenty-Six Other Sites, Presidio of San Francisco, San Francisco, California*.

Table E-1. Administrative Record List

Date	Author	Recipient	Title of Document
Jun-07	DTSC	Public	*Initial Study, Remedial Action Plan – Baker Beach Disturbed Areas 1 and 2A and 26 other Sites, Presidio of San Francisco*.
Nov-07	CARB	Public	*California 1990 Greenhouse Gas Emissions Level and 2020 Emissions Limit.*
Sep-08	FHWA (Federal Highway Administration) and San Francisco County Transportation Authority (SFCTA)	Public	*Final Environmental Impact Statement/Report and Section r(f) Evaluation, South Access to the Golden Gate Bridge: Doyle Drive.*
Dec-08	CARB	Public	*Climate Change Scoping Plan, Framework for Change, as Approved December 2008, Pursuant to AB32.*
Dec-09	DTSC	Public	*Interim Advisory for Green Remediation.*
Feb-09	John Martini	Golden Gate National Parks Conservancy	*Fort Scott Coastal Trail, Cultural Resources Report.*
Mar-09	CAT	Public	*Draft Biennial Report.*
May-10	Bay Area Air Quality Management District (BAAQMD)	Public	*Proposed Air Quality CEQA Thresholds of Significance.*
Sep-11	AMEC Environment & Infrastructure (AMEC)	Trust	*Technical Memorandum, Updated Human Health Preliminary Remediation Goals for Carcinogenic Polynuclear Aromatic Hydrocarbons in Soil, Presidio of San Francisco, California.*
Jul-11	SF Planning	Public	*Draft Environmental Impact Report: The 34th America's Cup and James R Herman Cruise Terminal and Northeast Wharf Plaza*.
Dec-11	Native American Heritage Commission (NAHC)	DTSC	*Proposed Mountain Lake Project. (Applicable to all of Presidio)*.
Jan-12	AMEC	Trust	*Field Data Report, Data Gaps Investigation, Baker Beach Disturbed Area 2, Presidio of San Francisco, California.*
May-12	AMEC	Trust	*Remedial Investigation Summary Report, Baker Beach Disturbed Area 2, Presidio of San Francisco, California.*
May-12	BAAQMD	Public	*California Environmental Quality Act, Air Quality Guidelines.*
May-12	Kennedy/Jenks Consultants	Trust	*Final Feasibility Study/Remedial Action Plan, Mountain Lake, Presidio of San Francisco, California. May*
Dec-12	AMEC	Trust	*Draft Feasibility Study/Remedial Action Plan (FS/RAP), Baker Beach Disturbed Area 2, Presidio of San Francisco, San Francisco, California.*

APPENDIX F

Statement of Reasons, Including the Non-Binding Preliminary Allocation of Responsibility
(provided in the Final FS/RAP)

APPENDIX G

Project Controls to Minimize Potential Impacts to Human Health and Resources

Table G-1. Project Controls to Minimize Potential Impacts to Human Health and Resources
Baker Beach Disturbed Area 2

Resources [a]	Potential Impacts to Resource from Proposed Remedial Actions [a]	Project Controls to Minimize Potential Impacts to Human Health and Resources [b]
Aesthetics	Removal of vegetation and construction activities will temporarily degrade the existing visual character and quality of the site and surroundings.	Post-remediation site restoration activities will be implemented and are expected to improve the visual character and quality of the site and its surroundings. In the long term, scenic resources will be enhanced by restoration of native habitat west of Magazines 28 and 29.
Air Quality	During the remedial action, dust and diesel exhaust may be emitted from open excavations, construction equipment, from vehicles transporting excavated materials and importing soil for backfill, during grading, and during placement and loading of soil stockpiles.	Access to the site will be restricted to prevent potential public exposure to dust generated during earthwork activities. Further potential exposure of workers and public to dust generated during grading, excavation, and transport activities will be controlled through air quality control measures and Best Management Practices (BMPs). BMPs; including tarping of stockpiled soils, covering of transported materials, watering exposed areas if visible emissions occur, and maintaining and operating minimal construction equipment, as appropriate; will be used to reduce airborne emissions. Air quality monitoring will be performed at the work area perimeter and worker breathing zones, and pollutant or dust-generating activities will be halted if dust concentrations exceed action levels. In addition, truck loads and traffic will be scheduled and coordinated, to the extent possible, to minimize the vehicle loads per day and the times at which they occur.
Biological Resources	Existing vegetation at the Debris Fill Area will be cleared and removed, specifically shrubs, cape ivy, and other invasive species.	Following the remedial action, natural, native habitat will be restored west of the battery earthworks. Removal of vegetation will be coordinated with Presidio natural resource staff to avoid potential disruption to nesting or migrating birds. Every effort will be made to schedule vegetation removal outside the bird nesting season (January 1st-August 15th for raptors and hummingbirds; March 1 – August 15 for songbirds). However, vegetation removal may occur during the bird nesting season provided a nesting survey indicates no disruption to nesting birds (including ground nesting birds) and approval is obtained from Presidio natural resources staff.
Cultural Resources	Historic West Battery Magazines 28 and 29 are located at the eastern boundary of the Debris Fill Area.	During remedial construction activities, project control measures will be implemented including installation of exclusionary fencing around the magazines and earthworks to identify their location and prevent workers or equipment from driving over or digging into the brick and mortar magazines and portions of the earthworks that are not covered by debris fill. Presidio cultural resource specialist(s) will review project plans and, as neccessary, a qualified historical/cultural monitor will be present onsite during remedial activities.
Geology and Soils	After existing vegetation is cleared, soil and fill materials may be susceptible to erosion, down slope movements, and/or landslides as a result of natural processes.	Trees whose root systems provide support structure to the slope on the western portion of the site would be preserved to maintain slope stability. Stabilization practices such as wattles, silt fences, swales, and berms will be employed, as necessary. Earthmoving activities on or adjacent to the bluff and slopes will be conducted in a manner to minimize landslides and maintain stable slopes. Stabilization measures may include locating temporary stockpiles and equipment staging areas at least 10 feet back from the slope and bluff face, selecting temporary fill and cut slope inclinations that are stable in the short term, and selecting finished slope inclinations that are at least as stable as the current slopes. In the long term, the exposed slopes will be stabilized by restoration of native habitat. However, mass wasting is part of natural processes on a coastline environment such as BBDA 2 and landslides, localized rilling, and erosion will continue as part of natural processes that were in effect prior to the remedial action.
		Erosion control measures will be implemented during and after construction for work performed between October 15 and April 15 to minimize runoff from the site. Efforts will be made so that excavation and grading work is not conducted during wet weather and soil disturbance will be limited to work areas. Grading plans will be developed to protect both cultural and natural resources.

Table G-1. Project Controls to Minimize Potential Impacts to Human Health and Resources
Baker Beach Disturbed Area 2

Resources [a]	Potential Impacts to Resource from Proposed Remedial Actions [a]	Project Controls to Minimize Potential Impacts to Human Health and Resources [b]
Hazards and Hazardous Materials	The remedial action will involve excavating, consolidating, handling, transporting, and disposing of debris. Contaminants are not at levels that pose risk to human health.	A Site-Specific Health and Safety Plan (SSHSP) will be prepared according to the applicable requirements of 29 CFR 1910.120 (Federal workers and contractors), and CCR Title 8 General Industrial Safety Order (GISO) 5192 (contractors), for work at hazardous waste sites. The SSHSP will describe the controls and procedures to be implemented to minimize incidents, injury, and health risks associated with remedial activities conducted at the site. The SSHSP will contain, at a minimum, the following elements: a hazard evaluation; names of key personnel and the site safety coordinator; a statement that personnel have completed required training; medical surveillance requirements and personal protective equipment to be used by site personnel; the types and frequency of personal and area air monitoring; instrumentation and sampling techniques for monitoring of health and safety; site control measures, including the designation of work zones and safe work procedures; management of wastes and decontamination procedures for personnel and equipment; noise and dust control procedures and action levels; site transportation procedures; contingency plans including telephone numbers and contact names; and locations of and routes to the nearest emergency and non-emergency medical care facilities.
Hydrology and Water Quality	The remedial action may temporarily increase runoff and erosion.	Because remedial work at BBDA 2 will be conducted over approximately 0.7 acres, the project will include implementation of BMPs for construction site planning and management, erosion and sediment control, and pollution prevention, which will be contained in a Storm Water Pollution Prevention Plan (SWPPP). The SWPPP will include project-specific measures to reduce surface runoff and erosion. Wastewater, if generated during construction. will be discharged to the sanitary sewer under the Trust's existing City and County of San Francisco Sanitary Sewer Discharge Order.
Noise	Excavation, grading, and onsite and offsite transport of imported fill and excavated soil will increase noise levels. Noise generated by remedial activities will be temporary, intermittent, and dispersed.	Control measures may include, but not be limited to, proper tuning of equipment, placement of noisy equipment away from sensitive receptors as practicable, noise-control mufflers, and scheduling noisier operations during periods of low visitor use, to the extent feasible. Within the Presidio, transport of equipment, soils, and fill materials to and from the site will occur along authorized haul routes. Outside of the Presidio, haul routes will generally follow major thoroughfares and signed truck routes.
Recreation	Trails through construction areas will be temporarily closed.	During the period of construction, the site will be fenced to restrict and redirect public access around work zones. The remedial design will include pedestrian and traffic detours designed to keep visitors out of active work areas while permitting use of other park features. Following construction and restoration activities, the site will be re-opened. These restoration activities are not part of the remedial action and accordingly, are not discussed in detail in this FS/RAP.
Traffic and Transportation	The remedial action will temporarily increase traffic and restrict public access in the vicinity of the remedial construction area.	Traffic will be managed with construction signage and flagmen. Truck loads will be restricted to authorized haul routes through the Presidio. To minimize impacts to neighborhoods adjacent to the Presidio and comply with vehicle restrictions on some city streets, in neighborhoods adjacent to the Presidio, no entry or exit of trucks will be allowed via Arguello Blvd., Presidio Blvd., 15th Ave., or 25th Ave. gates. Loading will generally occur between the hours of 5:30 a.m. and 2:00 p.m., thereby minimizing the impact on peak hour traffic conditions.

(a) Potential impacts to resources from the proposed remedial actions are evaluated in detail in the California Environmental Quality Act (CEQA) Initial Study.

(b) The project controls presented in this table will be implemented as part of the remedial actions to reduce the potential impacts to resources to less than significant levels.

APPENDIX H

California Environmental Quality Act (CEQA) Documentation

CALIFORNIA ENVIRONMENTAL QUALITY ACT
NEGATIVE DECLARATION

Department of Toxic Substances Control
Brownfields and Environmental Restoration Program
700 Heinz Avenue
Berkeley, CA 94710-2721

Subject: ☒ DRAFT ☐ FINAL ☐ MITIGATED

Project Title: Remedial Action Plans – Baker Beach Disturbed Areas 1A and 2

State Clearinghouse No.:

Project Location: Presidio of San Francisco

County: San Francisco

Project Description:

The Department of Toxic Substances Control (DTSC) is considering approval of Remedial Action Plans (RAPs) prepared by The Presidio Trust (Trust) for two sites at the Presidio of San Francisco (Presidio). The sites are in close proximity to each other and are known as Baker Beach Disturbed Area 1A (BBDA 1A) and Baker Beach Disturbed Area 2 (BBDA 2), respectively.

For DTSC, the "Project" subject to review under CEQA is the approval of the two RAPs, which would lead to excavation and disposal of contaminated soil and other material found at the sites. The RAPs for the remediation Project are incorporated by reference. They are:

- Draft Feasibility Study and Remedial Action Plan, Baker Beach Disturbed Area 1A, Presidio of San Francisco, San Francisco, California, AMEC Environmental & Infrastructure, Inc. (AMEC), 2012 and
- Draft Feasibility Study and Remedial Action Plan, Baker Beach Disturbed Area 2, Presidio of San Francisco, San Francisco, California, AMEC, 2012.

The proposed remediation activities would occur in the spring and summer of 2013 and would consist of excavation, characterization, transportation, and off-site disposal of excavated material. At BBDA 1A, the action would remove asphalt material and soil contaminated by chemicals of concern (COCs). At BBDA 2, the action would remove debris and fill soil contaminated by COCs. Post-remediation site restoration would occur in the fall at the beginning of the wet season.

Finding Of Significant Effect On Environment: *(An Initial Study supporting this finding is attached.)*

After conducting an Initial Study of the potential environmental impacts of the proposed project, DTSC has determined that implementation of the project will not result in any significant environmental impacts.

Mitigation Measures:

DTSC has determined that no additional mitigation measures would be required beyond those incorporated as part of the project.

Unit Chief Signature		11/29/12 Date
Denise Tsuji Unit Chief Name	Unit Chief Unit Chief Title	(510) 540-3824 Phone #

CALIFORNIA ENVIRONMENTAL QUALITY ACT
INITIAL STUDY

The Department of Toxic Substances Control (DTSC) has completed the following document for this project in accordance with the California Environmental Quality Act (CEQA) [Pub. Resources Code, div. 13, § 21000 et seq] and accompanying Guidelines [Cal. Code Regs., tit. 14, § 15000 et seq].

PROJECT TITLE: Remedial Action Plans – Baker Beach Disturbed Areas 1A and 2, Presidio of San Francisco		CALSTARS CODING: _201239__
PROJECT ADDRESS: Presidio of San Francisco.	CITY: San Francisco	COUNTY: San Francisco
PROJECT SPONSOR: The Presidio Trust	CONTACT: Ms. Eileen Fanelli	PHONE: 415-561-4259

APPROVAL ACTION UNDER CONSIDERATION BY DTSC:

☐ Initial Permit Issuance ☐ Permit Renewal ☐ Permit Modification ☐ Closure Plan
☐ Removal Action Workplan ☒ Remedial Action Plan ☐ Interim Removal ☐ Regulations
☐ Other (specify):

STATUTORY AUTHORITY:

☐ California H&SC, Chap. 6.5 ☒ California H&SC, Chap. 6.8 ☐ Other (specify):

DTSC PROGRAM/ ADDRESS: Brownfields and Environmental Restoration Program 700 Heinz Avenue Berkeley, California 94710-2721	CONTACT: Lori Koch	PHONE: 510-540-3951

PROJECT DESCRIPTION:

The Department of Toxic Substances Control (DTSC) is considering approval of Remedial Action Plans (RAPs) prepared by The Presidio Trust (Trust) for two sites at the Presidio of San Francisco (Presidio). The sites are in close proximity to each other and are known as Baker Beach Disturbed Area 1A (BBDA 1A) and Baker Beach Disturbed Area 2 (BBDA 2), respectively.

For DTSC, the "Project" subject to review under CEQA is the approval of the two RAPs, which would lead to excavation and disposal of contaminated soil and other material found at the sites. The RAPs for the remediation Project are incorporated by reference. They are:

- *Draft Feasibility Study and Remedial Action Plan, Baker Beach Disturbed Area 1A, Presidio of San Francisco, San Francisco, California* (Draft FS/RAP) (AMEC Environmental & Infrastructure, Inc. (AMEC), 2012a) and
- *Draft Feasibility Study and Remedial Action Plan, Baker Beach Disturbed Area 2, Presidio of San Francisco, San Francisco, California* (Draft FS/RAP) (AMEC, 2012b).

(References used in this Initial Study are listed in Attachment A. Abbreviations and acronyms are listed in Attachment B.)

The proposed remediation activities would occur in the spring and summer of 2013 and would consist of excavation, characterization, transportation, and off-site disposal of excavated material. At BBDA 1A, the action would remove asphalt material and soil contaminated by chemicals of concern (COCs). At BBDA 2, the action would remove debris and fill soil contaminated by COCs. Post-remediation site restoration would occur in the fall at the beginning of the wet season.

The Presidio occupies 1,491 acres at the north end of the San Francisco peninsula. Figure 1 indicates the location of the two Project sites within the Presidio; Figure 2 shows the sites in the context of their immediate surroundings. (Figures referenced in the text are in Attachment C to this Initial Study.)

For 146 years, from 1848 through 1994, the Presidio was a U.S. Army (Army) installation. On October 1, 1994,

the Presidio was transferred to the National Park Service (NPS) and became part of the Golden Gate National Recreation Area (GGNRA). In 1998, The Presidio Trust (Trust), a single-purpose federal agency, was granted jurisdiction over 1,168 acres of the Presidio. This area (known as Area B) is managed by the Trust in accordance with the Presidio Trust Management Plan (PTMP)(Trust, 2002a). NPS has jurisdiction over approximately 320 acres, the balance of the Presidio; this acreage is known as Area A and is along the Presidio's shore front. See Figure 1. BBDA 1A and BBDA 2 are in Area A, which is managed according to the General Management Plan Amendment (GMPA) (NPS, 1994). However, the Trust has the authority and responsibility to manage the remediation of contamination throughout the Presidio, in both Trust and NPS jurisdictional areas.

This Initial Study presents an overview of the activities proposed in the RAPs for BBDA 1A and BBDA 2. This is followed by an analysis of the potential impacts of the proposed Project. Cumulative impacts are evaluated assuming a worst-case scenario, where the Project and other planned projects would be implemented concurrently.

The environmental impact analyses and sections of the Initial Study are presented on the following pages:

Site Settings and Future Land Uses

BBDA 1A and BBDA 2 are at the western edge of the Presidio, overlooking the Pacific Ocean south of the Golden Gate Bridge. Figures 1 and 2 show their location within the Presidio. BBDA 1A and BBDA 2 are located within the Presidio of San Francisco National Historic Landmark District (NHLD) and the historic setting of these two sites are contributing elements to the NHLD.

BBDA 1A is situated between Merchant Road and the Pacific Ocean on steep serpentine cliffs and contains contaminated soil and debris dating from the Army's tenure at the Presidio. The site is located on top of earthen structures associated with two historic batteries, Battery Cranston and Battery Marcus Miller. The historic batteries consist of both concrete and earthen structures. See Figure 3a.

At one point in their history, asphalt was installed on the roofs of the two batteries as a sealant and to provide additional protection. Some asphalt roofing material remains on the top of the two batteries. Areas adjacent to and downslope of the batteries contain asphalt pieces, brick fragments, and tar-permeated sand.

BBDA 1A is roughly rectangular in shape, elongated on a north-south axis. It varies from 240 to 350 feet wide and is approximately 900 feet long. The site's northern edge is about 75 feet north of Battery Cranston; its southern edge is about 50 feet south of Battery Marcus Miller. The eastern edge of the site is irregular in shape, following the west side of the exposed concrete surface of the batteries. The western edge of the site is midway downslope from the batteries, where the topography drops sharply toward the beach below. Site elevations range from 150 feet above mean sea level (MSL) on the western edge of the site, where the slope steepens, to 205 feet MSL adjacent to the batteries.

BBDA 2 is located approximately 750 feet south of BBDA 1A situated on the same bluff top and slope above Baker Beach. BBDA 2 is bounded by the Battery Godfrey parking area to the north and west, former Baker Beach Disturbed Area 2A (BBDA 2A) to the north, the slopes above Baker Beach to the west, and Magazines 28 and 29 to the east. Site elevations at BBDA 2 range from approximately 220 feet MSL on the western edge of the site to 260 feet MSL at the Coastal Trail on its eastern edge.

Post-remediation, site restoration would be conducted in those areas disturbed by the Project. This restoration would facilitate habitat and recreational development under the GMPA (NPS, 1994) and Presidio Vegetation Management Plan (VMP; NPS and Trust, 2001). The restored site vegetation will be native species used to recreate the Army's designed historic landscape, which served to blend the earthworks into the surroundings while maintaining an open field of fire. Following restoration, the areas would continue to be used as open space for public gathering and for passive recreating, including hiking the reestablished trail and visiting the historic gun emplacements. The BBDA sites are located in the GMPA Coastal Bluffs Planning Area. In accordance with the

GMPA, *"(t)o protect rare and sensitive plants, visitor access will be confined to developed trails. ...The steep bluff area north of Baker Beach will be treated as a wild coast where people can discover nature's beauty and power. No new interpretive facilities will be developed in this area, except along the Coastal Trail. This trail traverses the length of the bluffs, avoiding areas that are closed to the public to protect rare and endangered species."*

Chemicals of Concern

BBDA 1A:

As part of site investigations at BBDA 1A since 1992, soil samples have been collected and analyzed for chemicals potentially present, based on past site use. By evaluating the analytical data for the soil samples, chemicals of concern (COCs) posing potential human health or ecological risks for BBDA 1A were identified.

COCs Presenting a Potential Human Health Risk – BBDA 1A:

Seven carcinogenic PAHs present at BBDA 1A pose a potential human health risk to recreational receptors:

- benzo(a)anthracene
- benzo(a)pyrene
- benzo(b)fluoranthene
- benzo(k)fluoranthene
- chrysene
- dibenzo(a,h)anthracene
- indeno(1,2,3-cd)pyrene

COCs Presenting a Potential Ecological Risk:

Four metals (copper, lead, silver, and zinc) and one pesticide (4,4'-DDT) are present at concentrations that exceed Presidio preliminary remediation goals (PRGs) for special-status ecological receptors (applied to native plant community zones). Only silver and zinc are present at concentrations that exceed ecological buffer zone PRGs (applicable to landscaped zones).

BBDA 2:

As with BBDA 1A, a number of site investigations have been undertaken at BBDA 2. COCs at BBDA 2 are as follows:

COCs Presenting a Potential Human Health Risk:

Benzo(a)pyrene was identified as a human health COC.

COCs Presenting a Potential Ecological Risk:

Four metals (copper, lead, silver, and zinc) and two pesticides (chlordane and DDT) are present at concentrations that exceed Presidio PRGs for special-status ecological receptors (native plant community zone). Only zinc and silver are present at concentrations that exceed ecological buffer zone PRGs (landscaped areas).

Proposed Remedial Action

BBDA 1A:

Alternative remedial actions evaluated in the Draft FS/RAP for BBDA 1A included:

- Alt 1: Take no action.
- Alt 2: Implement engineered controls and an administrative land use control (LUC) to limit recreational visitor access to trails.
- Alt 3: Excavate and dispose of asphalt source material and COC-impacted soil.
- Alt 4: Remove surface asphalt source material and cover the site; implement engineering controls and LUC and monitoring/maintenance programs.

Of these, the preferred alternative is Alt 3 Excavation. (See Figure 4.) Contaminated soil would be excavated, characterized, and transported to an appropriate off-site disposal facility. Asphalt debris would be recycled, if practicable. As necessary, soil would be imported to backfill the site to stabilize slopes and restore the battery earthworks.

COC-impacted soil at BBDA 1A covers approximately 2 acres to depths of up to 4.5 feet below ground surface (bgs). The estimated extent of COC-impacted soil and debris is shown in Figure 3b. The volume of contaminated soil with concentrations of COCs above cleanup levels is approximately 4,400 cubic yards (cy) *in situ* (AMEC, 2012a). During excavation and handling, the compacted material would loosen or 'fluff', and is expected to expand by about 30% to about 5,720 cy that would be hauled offsite.

BBDA 2:

Alternative remedial actions evaluated in the Draft FS/RAP for BBDA 2 included:

- Alt 1: Take no action.
- Alt 2: Implement a land use control (LUC) to prohibit reuses of the site that would pose a risk to potential

human receptors and notify land managers of the presence and location of debris fill containing COCs at concentrations that pose a potential risk to sensitive ecological receptors.
- Alt 3: Excavate and dispose of debris fill containing COCs at concentrations posing potential risks.
- Alt 4: Place an engineered soil cover over the debris fill; implement a LUC and monitoring/maintenance programs.

For BBDA 2, the preferred alternative is Alt 3 Excavation. (See Figure 6.) Contaminated soil would be excavated, characterized, and transported to an appropriate off-site disposal facility. As necessary, soil would be imported to backfill the site to stabilize slopes.

COC-impacted soil at BBDA 2 covers approximately 0.7 acre to depths ranging up to 12.5 feet bgs. The estimated extent of COC-impacted soil and debris is shown in Figure 5b. The volume of contaminated soil with concentrations of COCs above cleanup levels is approximately 6,700 cy *in situ* (AMEC, 2012b). During excavation and handling, the compacted material is expected to expand to about 8,710 cy that would be hauled offsite.

The proposed Project provides a high level of protection to human health and the environment, is implementable, can be readily maintained and monitored, meets a significant number of green remediation goals established by DTSC (DTSC, 2009), and is cost-effective to implement. Remediation allows site restoration and development at the sites in accordance with the GMPA (NPS, 1994), VMP (NPS and Trust, 2001), and site-specific restoration plans to be developed.

Proposed Project Activities

Proposed remediation activities are similar under both the BBDA 1A RAP and BBDA 2 RAP. These entail removing existing vegetation, excavating and stockpiling excavated material, characterizing the excavated material, hauling the excavated material off-site to an appropriate licensed landfill, and restoring areas disturbed by Project activities.

The Trust would undertake the remediation work in spring and summer 2013. The contractor (or contractors) would mobilize equipment and workers to the sites, which would be fenced to exclude the public. Access to the remediation sites and staging areas would be established. During excavation, samples of the soil would be taken to ensure that a sufficient depth of soil has been removed to achieve cleanup levels. The temporarily stockpiled excavated material would be loaded onto haul trucks and taken to a landfill facility licensed to accept the material. Depending on the rate of production from the excavation, the hauling phase of the Project is expected to commence before excavation is complete. The land surface would be contoured and clean soil placed as needed to re-establish earthworks at the batteries and to stabilize site slopes. Appropriate erosion prevention controls would prevent erosion until the sites are restored and replanted.

The staging area for BBDA 1A would be at or near the Merchant Road parking lot. Access to the area slated for excavation would be established by installing a temporary bridge over Battery Marcus Miller, between the site and the Merchant Road parking lot. This would provide for vehicle and equipment access and for a conveyor system. Material excavated from the site would be trucked and conveyed to the staging area for stockpiling pending characterization and hauling away.

Off-site hauling would be by way of public highways, beginning at U.S. Highway 101 near the Golden Gate Bridge. Within the Presidio, the haul route for both sites to Highway 101 is less than 1/3-mile. From BBDA 1A, any northbound trucks would travel east on Merchant Road and north on Lincoln Blvd to the northbound ramp to Highway 101, a distance of approximately 2,000 feet from where trucks first entered Merchant Road. Southbound trucks exiting the site would follow Merchant Road north for approximately 700 feet and enter southbound Highway 101.

The BBDA 2 staging area potentially would be in either the unpaved parking area immediately west of Battery Godfrey or in parking area south of Langdon Court. The haul route from BBDA 2 would be by way of Langdon Court to Lincoln Blvd. On Lincoln Blvd., the route to Highway 101 would be similar to that for BBDA 1A – using Lincoln Blvd and Merchant Road to access Highway 101 southbound (1,800 feet from the BBDA 2 site) or Lincoln Blvd to access Highway 101 northbound (2,300 feet from the BBDA 2 site).

Site restoration would be conducted in areas disturbed by the Project to stabilize the sites. This restoration would facilitate habitat and recreational development under the GMPA (NPS, 1994) and VMP (NPS and Trust, 2001).

Construction activities associated with the proposed remedial actions would consist of the following:

Remediation Construction:

Excavation
- Mobilization
- Preparation of access for equipment

- Site preparation and additional clearing and grubbing, as needed
- Excavation and stockpiling of material
- Hauling excavated material to approved landfills
- Re-grading the excavated surface and backfilling as needed.

Environmental Protection and Public Safety

- Installation of engineering controls in accordance with Best Management Practices (BMPs) used at the Presidio, including surface water runoff and erosion controls and means of keeping soil off paved roads.
- Installation of temporary exclusion fencing around the active work areas and closed trails and batteries
- Establishment of traffic control signage and devices as needed at points of entry to public roadways.

Sampling and Testing

- Sampling and testing of the soil during excavation to confirm that remediation goals are attained.
- Sampling stockpiles of excavated material for disposal.

Site Restoration:

- Restoration (seeding and planting) of areas disturbed by Project activities consistent with the GMPA (NPS, 1994), NHPA, and VMP (NPS and Trust, 2001)

Specific Project construction activities are detailed below.

Site Preparation and Clearing: Vegetation would be removed from each site outside of bird nesting season. Mobilization would begin thereafter. The work areas would be fenced and posted for no entry. The existing trail and batteries would be closed, with the trail temporarily rerouted around the work areas. A staging area and stockpile location would be established at each site.

Contractor Mobilization: The construction contractor for each site would mobilize its equipment to the work site. Equipment would remain at each site as long as needed to complete the remediation, haul the excavated material from the site, grade the excavated area, and install erosion control measures.

Site Access: Access would be established from the Merchant Road parking lot for BBDA 1A and from Langdon Court for BBDA 2. Rumble strips or a tire washing facility would be established to ensure that vehicles leaving a site do not carry soil onto public roads.

Standard stormwater pollution prevention plan (SWPPP) BMPs used at the Presidio would be implemented to prevent erosion of disturbed areas and movement of sediment to areas outside the work area. These practices include but are not limited to soil tracking controls such as tire sweeping/washing and road sweeping; erosion controls such as silt fencing and straw wattles in disturbed areas; dust control including vehicle speed restrictions and the use of water on access routes; and drainage inlet protection as needed, including sand bags around drainage inlets and filter fabric within inlets that could be affected. Other soil stabilization measures may include use of binders, straw, biodegradable mats, and other methods as necessary, taking into consideration the soil conditions, slope, natural habitat, and future planting activities.

Excavation: At BBDA 1A, approximately 4,400 cy of in situ soil would be excavated. This would yield a volume of approximately 5,720 cy to be hauled. At BBDA 2, approximately 6,700 cy of in situ material would be excavated. This would yield a volume of approximately 8,710 cy to be hauled off site. For both remediation sites, confirmation sampling during excavation would ensure that remediation goals are met and the soil with COCs in excess of remediation standards is removed. Excavation would be accomplished using frontloaders or backhoes in level or nearly level locations on the sites and by long-reach backhoe excavaters in steeper areas. The excavated material would be stockpiled prior to transport off site.

Characterization, Transport, and Disposal of Excavated Soil and Asphalt: Front loaders would be used to transfer material from the stockpiles to the haul trucks. It is assumed that 18 cy capacity trucks would be used.

At BBDA 1A, excavation is estimated to take 3 weeks and yield about 5,720 cy of material to be hauled off site to a landfill licensed to receive the material. An estimated 350 cy of the material to be hauled is asphalt source material. Asphalt debris will be recycled as practicable. At BBDA 2, excavation would occur over a 4 week period, resulting result in about 8,710 cy of material to be hauled offsite.

Prior to hauling off site, the excavated material would be characterized for purposes of selecting appropriate landfills for disposal. The Trust currently is planning to dispose of Class I non-RCRA waste from the sites at Buttonwillow Landfill in Kern County, and Class II and Class III waste at Potrero Hills Landfill in Solano County. If additional or alternate landfills are selected for off-site disposal after a contractor has been selected for the remedial action, the Trust would notify DTSC of the alternate landfill prior to transport of material offsite.

Recontouring, Soil Stabilization, and Site Restoration: Excavation would alter the current site topography at both locations and result in changes to slopes. Following excavation, each site would be graded and backfilled with imported soil to create a stable area for revegetation, as needed. For the two sites combined, an estimated total of 11,600 cy of imported fill would be required to establish the desired final surface for restoration. The earthworks in front of the batteries at BBDA 1A would be backfilled and graded. Soil on disturbed and backfilled areas would be stabilized in accordance with the final site design. Measures to stabilize the soil would include using binders, straw, biodegradable mats, and other methods as necessary, taking into account the nature of the soil and slope.

Following the remediation activity, site restoration would establish an improved open space habitat. The batteries and trail would be accessible to the public. According to the GMPA, *"(t)o protect rare and sensitive plants, visitor access will be confined to developed trails."* Revegetation would include use of native plant species and landscape vegetation appropriate to the site's future uses and the cultural landscape in compliance with NHPA.

Schedule For BBDA 1A, the remediation contractor is scheduled to mobilize to the site in March or April 2013, with the remedial action work expected to require approximately 15 weeks and be complete by June or July 2013. At BBDA 2, mobilization would occur in March or April 2013 and the work would be completed 18 weeks later, by July or August 2013. The anticipated schedule of remediation activities, in terms of work duration, is presented below.

Construction Activity Duration *(weeks)*	***BBDA 1A***	***BBDA 2***
Preconstruction Activities	1 to 3	1 to 3
Mobilization	1 to 3	1 to 3
Excavation	3 to 6	3 to 7
Confirmation Sampling and Hauling Offsite	6 to 10	7 to 11
Backfilling and Grading, Site Stabilization	9 to 14	11 to 17
Demobilization	15	17 to 18
Overall	**15 weeks**	**18 weeks**

With stabilization, the Project sites would be ready for revegetation consistent with the VMP and GMPA. Revegetation of the sites would occur at the start of the rainy season, in November 2013, so as to improve plant survival success. The revegetation work (seeding and planting) would take approximately 3 weeks and is in addition to the 15 and 18 weeks noted above.

Cumulative Impacts CEQA requires consideration of the cumulative impacts of a proposed project in combination with impacts of other projects or activities that have the potential to combine with impacts of a proposed project. Although impacts of each project may be less than significant, the cumulative effect of all projects may be significant.

America's Cup: Major sailing regattas are planned to take place on San Francisco Bay in the period between July 4 and September 23, 2013, with the America's Cup Finals taking place in September. However, specific dates and times for all races are subject to change and the races will not occur every day. The greatest spectator attendance is expected on weekends, outside the normal work week. As with other major regional events, such as New Year's Eve, 4th of July, and Fleet Week, roadways may become highly congested, particularly arteries and streets near the waterfront. For sailing events that took place in 2012, local transit agencies provided additional and extended service to waterfront viewing venues near the course. This also will be the case in 2013. Based on the overall race schedule and the Project construction schedules, the BBDA remediation work has the potential to overlap with the race events.

The BBDA 1A and BBDA 2 remediation schedule anticipates 2.5 weeks and 3.5 weeks of hauling material from the sites, respectively, in 2013. During this period, any necessary backfill would be delivered to the sites as well. If work begins in March 2013 as planned, hauling could be completed by May or June. If work begins in April 2013, hauling could be completed in June or July. Depending on when hauling occurs and how it is scheduled, it would be possible to avoid race-related periods of high traffic congestion. Contractors typically schedule hauling to make the most efficient use of drivers and trucks. Therefore, it is reasonable that a contractor would schedule around congested periods when trucks could be caught in traffic. In the event that material from both sites is hauled away in the same period, a maximum of 20 truck one-way trips (10 round trips) per hour would occur. This number of trucks is small compared to normal traffic volumes on U.S. Highway 101.

Given the uncertain racing schedule, the scheduling of the Cup Finals in September (when hauling would be over) and the fact that the hauling schedule can be adjusted or delayed to minimize its contribution to congestion, the Project is expected to have a less than significant contribution to traffic during race events. Therefore, the races are not considered in the cumulative analysis.

Cumulative Scenario: Known projects planned for 2013 that would occur on or near the Presidio may overlap with the Project's schedule. These locations are shown on Figure 7. They include the ongoing Doyle Drive (Presidio

Parkway) replacement project, continuing Presidio Main Post Update projects, remedial dredging at Mountain Lake, and soil removal at the Barnard Avenue Protected Range (BAPR). With the exception of the ongoing Doyle Drive project, these projects are a considerable distance from the BBDA 1A and 2 sites.

The Doyle Drive project is a multi-year project involving replacement of the US 101 corridor through the Presidio. This corridor is the Project haul route through the Presidio to reach disposal sites to the south. Construction began in late 2009 and will be complete in 2015. Detours and road closures are required during the duration of the Doyle Drive work, and change from time to time as the work progresses. The Doyle Drive project Final Environmental Impact Statement/Environmental Impact Report (EIS/EIR) concluded that implementation of the Transportation Management Plan for that project would ensure that there are no significant transportation/traffic related impacts (FHWA & SFCTA, 2008). Although the BBDAs 1A and 2 Project was not considered during the analysis of the Doyle Drive project, the number of truck trips and the period over which they would occur are minor as compared to the Doyle Drive project. They would not contribute to a worsening of traffic conditions below the Level of Service (LOS) attributable to the Doyle Drive work. LOS is used to describe delay at intersections due to traffic volume and other conditions. In 2011, the LOS at intersections on Lombard Street (US 101) during weekday peak hours was LOS C at Lombard St/Divisadero St and Lombard St/ Fillmore St and LOS D at Lombard St/ Van Ness Ave. (San Francisco Planning Department, 2011). These levels include any Doyle Drive related construction traffic. LOS C is described by traffic engineers as "acceptable delays"; LOS D as "tolerable delays". It is assumed that the contribution of construction-related traffic from the Doyle Drive project would remain similar in 2013 to what is was in 2011.

Staging of trucks hauling excavated materials from Project sites would be accommodated within the individual staging areas and not on roadways. The only instance in which the BBDA 1A and BBDA 2 work could contribute to a cumulative effect is in its use of trucks and equipment during construction and when hauling material off site. These aspects of the project have the potential to contribute to a cumulative impact on traffic congestion and on air quality. All other potential impacts identified for the work at BBDA 1A and BBDA 2 are specific to the sites or the immediate vicinity. All impacts from the Project are short-term and associated with construction. There are no ongoing Project-related impacts once construction is finished. Consequently, the only resource topics for which cumulative impacts are considered in detail are Air Quality and Traffic/Transportation.

In addition to the larger projects noted, the NPS and Trust regularly undertake smaller projects and improvements across the Presidio. During 2013, these are expected to include projects in the general vicinity of the Baker Beach remediation Project; namely, improvements to the Bay Trail east of the Golden Gate Bridge, work at Battery East Parking and Vista Point, work on the Coastal Trail, and ongoing vegetation management and stewardship work along local trail corridors and in natural area zones. These would not generate substantial truck traffic and would not be long duration. Any unanticipated delays in the remediation Project schedule would be coordinated with the trail and stewardship work so these other projects are not adversely affected.

ENVIRONMENTAL IMPACT ANALYSIS:

1. Aesthetics

Project Activities Likely to Create an Impact:

- Presence of equipment, fencing, and temporary stockpiles.
- Excavation and grading

Description of Baseline Environmental Conditions:

BBDA 1A and BBDA 2 are located along the Presidio's western coastline in the portion of the Presidio administered by the National Park Service. The sites are situated on the bluff and slope overlooking the Pacific Ocean. At BBDA 1A, Golden Gate Bridge Highway and Transportation District (GGBHTD) administrative and maintenance facilities are to the north and east of the site, and Merchant Road is to the east. To the south is the previously remediated and recently restored BBDA 1 site. BBDA 1A includes Batteries Cranston and Marcus Miller at its eastern edge; the balance of the site is open space that slopes down to Baker Beach. BBDA 2 is immediately southeast of Battery Godfrey and approximately 750 feet south of BBDA 1A. BBDA 2 is accessed from the east by way of Langdon Court, which connects Lincoln Blvd to Dove Loop and a parking lot on the ocean side of Battery Godfrey. As with BBDA 1A, the BBDA 2 site is situated on the bluff above steep slopes leading down to the beach below.

The Coastal Trail, a popular hiking trail, runs along the top of the bluff and passes through the length of BBDA 1A. A number of non-maintained hiking trails also traverse the area. Under the GMPA (NPS, 2004), visitor access in the future would be confined to developed trails to protect rare and endangered species and to maintain the post-remediation

restored area in accordance with the VMP (NPS and Trust, 2001). At BBDA 2, the Coastal Trail is immediately east of the site, but does not traverse it. The Battery to Bluffs Trail is south of BBDA 2 and connects to the Coastal Trail.

Vegetation in the area of BBDA 1A is generally well developed except on the steeper cliff and beach areas, and consists of grasses and low shrubs. The site is vegetated primarily with non-native, invasive species. Vegetation at BBDA 2 is also well developed and includes grasses, shrubs, and trees.

The sites offer panoramic views to the west and northwest. The historic fortifications at each site are an important part of the historic fabric of the Presidio.

Scenic vistas from BBDA 1A and BBDA 2 are available to pedestrians using the trail through the sites or visitors at the batteries. The bridge and headlands are visible from BBDA 1A. Depending on weather conditions, the Farallon Islands may be visible 27 miles distant from both sites.

Analysis as to whether or not project activities would:

a. Have a substantial adverse effect on a scenic vista.

Impact Analysis:

Potential effects on a scenic vista would occur during the short-term construction period for the Project and in the mid-term period after construction, while vegetation is being reestablished. Long-term visual effects on the scenic vista would be improved after the bluffs and disturbed areas are restored in accordance with the VMP (NPS and Trust, 2001).

During implementation of the remediation and restoration, temporary visual changes would occur within the sites including equipment use, removal of vegetation (primarily non-native, invasive species), stockpiling of debris and soil, and general worker activity. The construction activities would be spatially limited and temporary. Pre-construction and remediation activities at BBDA 1A would be performed over a period of approximately 15 weeks. At BBDA 2, work would occur for approximately 18 weeks. Restoration work following remediation would take approximately 3 weeks. These schedules limit the duration of aesthetic impacts from construction activities along the coastal bluffs. With completion of the remediation and subsequent restoration, the foreground of scenic views from the site would be enhanced. The background views would remain unchanged.

The most sensitive viewers of the site would be trail users and visitors to the batteries, both of which would be off-limits during construction. The trail through BBDA 1A would be closed temporarily and a detour provided; depending on final site layout for work areas, the trail may also be closed adjacent to BBDA 2. Visual effects (e.g., evidence of equipment use and activities, vegetation removal, the presence of a stockpile) would be temporary and relatively indiscernible from the Marin Headlands two miles to the north. Southbound motorists on the bridge and cyclists using the west walkway of the bridge would look directly at the BBDA 1A site as they descend toward the toll plaza. However, the site would be seen within of the larger context of the Presidio landscape and would be below the skyline.

The post-construction effects of Project would result in noticeable positive changes to the visual appearance of the site when viewed from nearby, most notably in the native vegetation to be established subsequent to remediation. Views from more distant locations would be nominally altered but would be largely unnoticed in the broader sweep of the landscape as seen from the Marin Headlands. In addition to potential additional vegetation removal, visitors to the immediate areas would notice re-grading of portions of the bluff and slope. With vegetation replanting, the foreground of the scenic views would be enhanced in accordance with the GMPA and VMP. Native plants would be restored, but would take a number of years to grow to maturity. Site visitors would be confined to the relocated trail, from which they would be able to observe the maturation of the vegetation over time.

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☒ Less Than Significant Impact
☐ No Impact

b. Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings and historic buildings within a state scenic highway.

Impact Analysis:

The proposed Project would not damage any scenic resources, including, but not limited to rock outcroppings, and historic buildings within a designated state scenic highway. Vegetation on site would have been cleared prior to excavation. Vegetation removal and restoration is consistent with the VMP. In addition, there are no known officially designated state scenic highways with views of the project area. Highway 1 over the Golden Gate Bridge is eligible for designation, but has not been so designated.

Although minor impacts may occur, they would be temporary in nature and in the long term, the scenic resources would be enhanced by the restoration of the sites. Because the proposed actions are expected to retain or improve existing visual qualities, and would not have a lasting visual effect, there would be a less than significant impact on scenic resources. Also, see 1.a, above.

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☒ Less Than Significant Impact
☐ No Impact

c. Substantially degrade the existing visual character or quality of the site and its surroundings.

Impact Analysis:

There would be short-term impacts that would degrade the existing visual character or quality of the sites and their immediate surroundings due to construction activities and the presence of needed equipment, fencing, and safety devices. These impacts would not be substantial because they are temporary in nature and limited in geographic extent. Restoration activities would improve the visual character and quality of the site and its surroundings. Impacts on the visual character and quality of the site would be less than significant.

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☒ Less Than Significant Impact
☐ No Impact

d. Create a new source of substantial light or glare that would adversely affect day or nighttime views in the area.

Impact Analysis:

Construction activities would be performed during daylight hours. However, if night work is necessary, it would be performed in accordance with applicable or relevant and appropriate requirements (ARARs) detailed in the Project RAPs. During night work, the Project would produce light and glare from nighttime use of equipment and site lighting. During the day, glare may be visible as a reflection from glass and metal surfaces on equipment. However, light and glare would cause less than significant impacts because of the temporary and short-term duration of the Project and the nature of the effects. Because construction vehicles would be constantly moving, any glare that might occur from vehicles would be momentary and transitory for viewers.

At BBDA 1A, viewers traveling along Merchant Road are not expected to experience light and glare from the site because it would be screened from the road by existing vegetation, structures, and topography. Daytime glare may be visible to visitors on the Marin Headlands two miles away. However, the glare would appear relatively minor and insignificant. Views from the Golden Gate Bridge would not be subjected to significant adverse glare, because of the lower topographic position of the site relative to the bridge.

At BBDA 2, site work would be screened on the east by vegetation and existing structures and would not be visible from offsite. Because of its topographic location, the site would not be visible from the Golden Gate Bridge, but would be visible from portions of the Marin Headlands, similar to BBDA 1A.

Any light or glare would be transitory and temporary. The potential for people offsite to observe light or glare is very limited. As a result of the duration and limited nature of the effects, the Project would not produce new sources of light or glare that would adversely affect day or nighttime views; therefore it would have a less-than-significant impact.

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☒ Less Than Significant Impact
☐ No Impact

References Used:

1. AMEC (AMEC Environment and Infrastructure), 2012a. *Draft Feasibility Study/Remedial Action Plan (FS/RAP), Baker Beach Disturbed Area 1A, Presidio of San Francisco, San Francisco, California.* September
2. _____, 2012b. *Draft Feasibility Study/Remedial Action Plan (FS/RAP), Baker Beach Disturbed Area 2, Presidio of San Francisco, San Francisco, California.* September

3. _____, 2007. *Draft Remedial Action Plan: Baker Beach Disturbed Areas 1 and 2A & Twenty-Six Other Sites for the Presidio of San Francisco, California.* May.
4. *NPS, 1993a. National Register of Historic Places Registration Form for the Presidio of San Francisco. March.*
5. *_____, 1993b. National Historic Landmark District Update, The Presidio of San Francisco, San Francisco, California.*
6. *_____, 1994. Creating a Park for the 21st Century, from Military Post to National Park - Final General Management Plan Amendment, Presidio of San Francisco, Golden Gate National Park Recreation Area, California. July.*
7. NPS and Trust, 2003. *Presidio Trails and Bikeways Master Plan and Environmental Assessment.* July.
8. Royston, Hanamoto, Alley, and Abbey (RHAA), 2004. *Presidio Coastal Trail Master Plan.*
9. Trust and NPS, 2001. *Vegetation Management Plan and Environmental Assessment for the Presidio of San Francisco.* May.

2. Agricultural Resources

Project Activities Likely to Create an Impact:

- None.

Description of Baseline Environmental Conditions:

Neither farmlands nor areas zoned as forest land or timber land occur within the Presidio; therefore, there is no impact and this topic is not evaluated further for BBDA 1A and BBDA 2.

Analysis as to whether or not project activities would:

a. Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland) as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use.

Impact Analysis:

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☐ Less Than Significant Impact
☒ No Impact

b. Conflict with existing zoning or agriculture use, or Williamson Act contract.

Impact Analysis:

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☐ Less Than Significant Impact
☒ No Impact

c. Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural uses.

Impact Analysis:

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☐ Less Than Significant Impact
☒ No Impact

References Used:

1. AMEC (AMEC Environment and Infrastructure), 2012a. *Draft Feasibility Study/Remedial Action Plan (FS/RAP), Baker Beach Disturbed Area 1A, Presidio of San Francisco, San Francisco, California.* September
2. _____, 2012b. *Draft Feasibility Study/Remedial Action Plan (FS/RAP), Baker Beach Disturbed Area 2, Presidio of San Francisco, San Francisco, California.* September
3. *NPS, 1994. Creating a Park for the 21st Century, from Military Post to National Park - Final General Management Plan Amendment, Presidio of San Francisco, Golden Gate National Park Recreation Area, California. July.*

4. Trust and NPS, 2001. *Vegetation Management Plan and Environmental Assessment for the Presidio of San Francisco.* May.

3. Air Quality

Project Activities Likely to Create an Impact:

- Use of heavy equipment, trucks, and other vehicles during vegetation removal,
- Excavation of contaminated soil and loading excavated soil onto dump trucks,
- Stockpiling and offsite transport of materials
- Site re-grading.

Description of Baseline Environmental Conditions:

The Presidio is in the nine-county San Francisco Bay Area air basin, which is under the jurisdiction of the Bay Area Air Quality Management District (BAAQMD). Table 3-1 shows each of the ambient air quality standards and the attainment designation of the BAAQMD with respect to each standard. Air circulation in the vicinity of the site is excellent, as it is located in close proximity to air flow from San Francisco Bay and the Pacific Ocean.

The State CEQA Guidelines allow lead agencies, to rely on criteria recommended by the local air district in making determinations of significance for air quality impacts. The BAAQMD does not presently recommend thresholds as a generally applicable measure of significance.[1] However, in the past (2010) the BAAQMD developed and proposed thresholds of significance that are relevant to the Project.

Table 3-1. National and California Ambient Air Quality Standards

Pollutant	Averaging Time	California Standards	State-Level Attainment Status	National Standards	Federal Attainment Status
Ozone	1-hour	0.09 ppm	Nonattainment	—	
	8-hour	0.070 ppm	Nonattainment	0.075 ppm	Nonattainment
Respirable Particulate Matter (PM10)	24-hour	50 µg/m^3	Nonattainment	150 µg/m^3	Unclassified
	Annual Mean	20 µg/m^3	Nonattainment	—	
Fine Particulate Matter (PM2.5)	24-hour	—		35 µg/m^3	Nonattainment
	Annual Mean	12 µg/m^3	Nonattainment	15 µg/m^3	Attainment
Carbon Monoxide (CO)	1-hour	20 ppm	Attainment	35 ppm	Attainment
	8-hour	9.0 ppm	Attainment	9.0 ppm	Attainment
Nitrogen Dioxide (NO_2)	1-hour	0.18 ppm	Attainment	0.100 ppm	Unclassified
	Annual Mean	0.030 ppm	Attainment	0.053 ppm	Attainment
Sulfur Dioxide (SO_2)	1-hour	0.25 ppm	Attainment	0.075 ppm	Attainment
	24-hour	0.04 ppm	Attainment	0.14 ppm	Attainment
	Annual Mean	—		0.03 ppm	Attainment
Lead	30-day Average	1.5 µg/m^3	Unclassified	—	
	Calendar Quarter	—		1.5 µg/m^3	Attainment

Notes: ppm=parts per million; µg/m^3= micrograms per cubic meter; "—" =no standard
Source: BAAQMD, 2012; http://hank.baaqmd.gov/pln/air_quality/ambient_air_quality.htm.

The BAAQMD developed standard measures to reduce impacts to air quality resulting from construction activities (BAAQMD, 2012). For PM10 and PM2.5 related to construction fugitive dust, rather than achieve specific emissions thresholds, projects may avoid causing a dust impact if they include best management practices. The BAAQMD proposed thresholds for criteria air pollutant emissions (BAAQMD, 2010) indicate that a project during construction may cause a significant impact if it would:

- Emit more than 54 pounds per day (lb/day) of reactive organic gases (ROG);
- Emit more than 54 lb/day of nitrogen oxides (NOx);
- Emit more than 82 lb/day of PM10 from exhaust; or
- Emit more than 52 lb/day of PM2.5 from exhaust.

The BAAQMD proposed thresholds for community risk and hazards (BAAQMD, 2010) indicate that a project may cause a significant impact if the emissions create:

[1] The BAAQMD describes the status of its CEQA Guidelines at: http://www.baaqmd.gov/Divisions/Planning-and-Research/CEQA-GUIDELINES/Updated-CEQA-Guidelines.aspx. The 2010 proposal can also be found here.

- Increased incremental cancer risk greater than 10.0 in a million;
- Increased non-cancer hazard greater than 1.0 Hazard Index for chronic or acute hazards;
- Incremental increase of annual average PM2.5 concentration greater than 0.3 $\mu g/m^3$ from a single source.

In terms of air quality, sensitive receptors are located at facilities such as schools, hospitals, and nursing facilities. The closest receptor is the USF Presidio Building at 920 Mason Street, adjacent to Crissy Field. It is over 0.5 mile east of BBDA 1A and BBDA 2 and is an adult education facility.

The remediation sites are readily accessible from Highway 101 by way of entrance/exit ramps near the bridge toll plaza. Southbound traffic on Highway 101 would exit and enter at Merchant Road. Northbound U.S. Highway 101 traffic would exit and enter the Presidio by way of ramps connecting with Lincoln Blvd.

For BBDA 1A, off-site transport of 5,720 cy of excavated material would generate up to 318 truck round-trips per day during a 2.5 week period. This would average 10 trips per hour (5 outbound, 5 inbound). The number of personal vehicles from Project workers would be negligible compared to the existing traffic levels in the Presidio and nearby streets.

Material hauled from the sites is expected to go to Solano County or Kern County. The volume of material shipped to these landfill sites would depend on the final characterization of the material.

To reach the Potrero Hills landfill (for Class II and III material), trucks would enter southbound Highway 101 by way of Merchant Road near the Golden Gate Bridge toll plaza. Trucks would traverse San Francisco on Highway 101, which is coincident with Lombard Street and Van Ness Ave through the city. Once on the freeway again, the trucks would follow Interstate 80 east across the Bay Bridge to State Route 12 east, which leads to the Potrero Hills landfill. Class I material going to Kern County would use a similar local route, but would use Interstates 880, 680, and 5 once across the bridge. Empty trucks would reverse these routes. If an alternate landfill is identified to the north of the Presidio, trucks would proceed onto northbound Highway 101 via the on ramp at the east side of the toll plaza.

For BBDA 2, the estimated 8,710 cy to be hauled would require approximately 485 truck round trips over approximately 3.5 weeks. This would average 10 trips per hour (5 outbound, 5 inbound). As with BBDA 1A, the number of personal vehicles from Project workers would be negligible. For both sites, a small number of additional truck round trips would occur to deliver equipment, fencing, and other materials to the sites.

In addition, when the site is being rough contoured, approximately 11,600 cy of imported fill may be needed to stabilize areas and prepare the sites for restoration. This would require about 130 deliveries divided between the sites. It is assumed that these deliveries would occur after the excavated material has be hauled offsite, thereby providing space to stockpile the imported fill that would then be placed on the excavations.

For both sites, excavated material is expected to be hauled to either Potrero Hills Landfill, near Suisun City in Solano County, 61 miles distant, or Buttonwillow Landfill in Kern County, 266 miles distant.

Analysis as to whether or not project activities would:

a. Conflict with or obstruct implementation of the applicable air quality plan.

   Impact Analysis:

   Measures to address potential air emissions and control dust and odors would be incorporated into the remediation construction designs, consistent with BAAQMD standards and requirements. Dust control measures would be implemented wherever the soil is exposed (e.g., exposed surfaces watered two times per day). Best Available Control Technologies (BACTs) would be adopted to maintain the site and operate equipment in a manner that would minimize air emissions. Typical BACTs include measures such as keeping equipment tuned and in good working order, limiting idling times to 5 minutes or less, using equipment that has lower emissions (e.g., off-road diesel equipment certified to achieve Tier 3 standards), providing gravel access ramps to paved roads, and not operating equipment at times that would exacerbate wind erosion. Over the course of activity, the average daily emissions caused by the construction and remediation would be minor and at a level that would be a fraction of proposed thresholds for construction-phase emissions (BAAQMD, 2010). The 2010 Proposed Thresholds are listed on the BAAQMD website; however, the newer 2012 CEQA guidelines do not generally specify use of the thresholds. Quantification of construction related emissions is no longer mandatory.

   Samples collected at nearby previously remediated BBDAs contained soil and rock with naturally-occurring asbestos. Therefore, an asbestos dust management plan (ADMP) would be prepared and implemented. During the remedial actions, dust may be emitted from open excavations, soil stockpiles, and vehicles transporting excavated materials. There may be a temporary increase in asbestos dust when serpentine soil and bedrock are first exposed. The ADMP would be followed, and some BMPs that would be used onsite include tarp or plastic covering of stockpiled soils, covering of transported materials, and watering exposed areas if visible emissions occur.

Due to the limited spatial and temporal extent of the activities and the implementation of control measures into the construction and remediation design, the remediation Project would not conflict with or obstruct implementation of the applicable air quality plan. This impact would be less than significant.

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☒ Less Than Significant Impact
☐ No Impact

b. Violate any air quality standard or contribute substantially to an existing or projected air quality violation.

Impact Analysis:

During the remedial actions, dust may be emitted from open excavations, soil stockpiles, and vehicles transporting excavated materials. There may be a temporary increase in naturally-occurring asbestos dust when serpentine soil and bedrock are first exposed. The ADMP would be followed to address asbestos, and BACTs would be used to reduce dust emissions, including watering all exposed surfaces as required, covering materials during transport, and minimizing construction equipment usage at all times, including shutting off idle equipment, as appropriate. The BAAQMD reports that these types of management practices are effective at reducing dust emissions to levels that would not be expected to violate or contribute substantially to an air quality violation (BAAQMD, 2010), and the resulting impact would be less than significant.

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☒ Less Than Significant Impact
☐ No Impact

c. Result in cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors).

Impact Analysis:

Excavation equipment and trucks would be used to implement the project, resulting in vehicular emissions from heavy equipment, trucks and other vehicles for the duration of activities at the sites. An estimated total of about 14,430 cy of material would be removed from the sites. It is anticipated that about 803 truck round trips would be required to haul material offsite. Approximately 5 empty trucks would enter and 5 full trucks leave each site per hour during hauling. This would result in approximately 40 round trips per day per site, or 80 round trips daily if the sites were hauling at the same time. This frequency of heavy duty truck loads would be limited to 2.5 weeks and 3.5 weeks for BBDA 1A and BBDA 2, respectively. Approximately 130 truckloads of fill may be imported to the Project sites. When this would occur has not been established, but is expected to be near the end of the landfill hauling or after that is completed.

This level of on-road traffic activity is nominal when compared to traffic on U.S. Highway 101 through the Presidio and nearby roadways. Thus, a detailed air quality analysis is not required and vehicular emissions would be considered less than significant. In addition, the proposed work is not expected to significantly impact ozone levels.

BBDA 1A and BBDA 2 remediation is scheduled for 2013. During this time, other unrelated construction projects also would occur in the area. These include the Doyle Drive replacement project on the north side of the Presidio near the remediation Project, the Presidio's Main Post upgrade project, and remediation work at Mountain Lake and the Barnard Avenue Protected Range (BAPR). These are shown in Figure 7.

- According to the Doyle Drive project EIS/EIR (FHWA & SFCTA, 2008), vehicles involved in Doyle Drive construction would include trucks hauling debris and delivering construction materials and supplies, commuter vehicles driven by construction workers, and vehicles used for construction such as graders and heavy earthmoving and paving equipment. Travel volumes would vary depending on the specific construction activity and schedule. Truck trips generated by the BBDA 1A and BBDA 2 Project would be a very small fraction of the daily traffic on Doyle Drive.
- Main Post upgrade project includes reconstruction of existing buildings, structural improvements and seismic work, roadway and utility upgrades, and other infrastructure enhancements. The Supplement to the Draft EIS for the Main Post update indicates that construction vehicle traffic would vary depending on the specific construction activity and schedule (Trust, 2009). Construction vehicles for the Main Post would generally enter the Presidio via Richardson Avenue (Gorgas or Lombard Gates) or the Golden Gate bridge toll plaza (Lincoln Blvd) (Trust, 2009).
- Mountain Lake remediation work would occur in approximately the same period as BBDA 1A and BBDA 2 work. The Mountain Lake site is over a mile south-southeast of BBDA 2. Trucks hauling dredged dewatered material

from the site would eventually be on Highway 101, entering either at Lincoln Blvd or at Lombard St, on the east side of the Presidio. The Mountain Lake project is estimated to generate approximately 25 truck round trips per day over a 4 to 8 week period. The timing of these would depend on the rate of dredging and dewatering (Kennedy/Jenks, 2012).

- The BAPR involves removal of 1,300 cy of contaminated soil by excavation. Work is expected to occur in early 2013 before BBDA 1A and BBDA 2 work. The BAPR is over one mile southeast of the sites. Trucks hauling soil material from the BAPR would eventually be on Highway 101, entering either at Lincoln Blvd or at Lombard St, on the east side of the Presidio. The BAPR project is estimated to generate only 100 total truck loads from the site over a 1 to 2 week period (Geosyntec, 2012).

A number of other smaller projects and improvements are planned for 2013 in the vicinity. These include trail improvements, an overlook, and vegetation management. None of these will require extensive off-site truck traffic and will not have long construction schedules. They are typical of activity that is ongoing on the Presidio from year to year and are not expected to contribute significantly to air quality or traffic impacts.

BBDA 1A and BBDA 2 remediation would occur in 2013 and would result in emissions from equipment and vehicles. Measures to address emissions and control dust and odors would be incorporated into the remedial designs as BACTs. Additionally, construction-related emissions of ozone precursors and other criteria pollutants would be short term and are included in the emissions inventory that is the basis for regional air quality plans. Based on these factors, the Project activities would not result in cumulatively considerable net increase of any criteria pollutant for which the region is non-attainment under an applicable federal or state ambient air quality standard (including emissions that exceed quantitative thresholds for ozone precursors).

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☒ Less Than Significant Impact
☐ No Impact

d. Expose sensitive receptors to substantial pollutant concentrations.

Impact Analysis:

There are no sensitive receptors within or adjacent to the Project sites. The Coastal Trail, a popular hiking trail, runs along the top of the bluff and passes through BBDA 1A and near BBDA 2. Prior to remedial activities, this section of the Coastal Trail would be closed and rerouted around work areas. Access to the work sites would be restricted. Dust control measures and an ADMP would be implemented to reduce potential air quality impacts to site workers and visitors to the Presidio to less than significant levels.

In addition, the work area perimeter would be monitored for dust. Additional monitoring may be performed in the work area and worker breathing zones, if specified in the site-specific Health and Safety Plan (HSP). Due to the temporary nature of impacts and the implementation of air quality BACTs, Project activities are not anticipated to expose sensitive receptors to substantial pollutant concentrations.

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☒ Less Than Significant Impact
☐ No Impact

e. Create objectionable odors affecting a substantial number of people.

Impact Analysis:

The remedial actions at BBDA 1A and BBDA 2 are not expected to produce objectionable odors. Airborne particles that potentially carry odor would be minimized by dust abatement measures. Diesel vapors created by equipment onsite would be minimal and would not affect sensitive receptors due to the temporary nature of construction, the limited work area, and the limited number of daily truck trips necessary to transport equipment and material. All diesel equipment would use ultra-low sulfur diesel fuel as it is mandatory in California. Impacts related to odors would be less than significant.

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☒ Less Than Significant Impact
☐ No Impact

f. Result in human exposure to Naturally Occurring Asbestos (see also Geology and Soils, f.).

Impact Analysis:

During site investigations, and previous remediation projects in the area, up to 10% chrysotile asbestos was quantified in serpentinite soil samples. Based on the presence of asbestos in serpentinite soils, an ADMP would be prepared and implemented for remedial activities at the two sites (CARB, 2001). In addition, asbestos-containing materials would be handled in accordance with a site-specific HSP that would be prepared prior to remedial activities. Because it is not anticipated that serpentine soils/rock will be excavated during the remedial action, they will not be subject to significant disturbance; this will limit the amount of asbestos dust generated at the sites. However, to mitigate potential exposures, the remediation contractor will visually monitor excavation activities daily for the generation of fugitive dust. If dust is being generated, the contractor will deploy BMPs to control fugitive dust emissions. If serpentinite soil is disturbed, significant exposure to asbestos fibers is not expected because previous asbestos exposure assessment for personnel conducting revegetation in serpentine soils containing asbestos (<1% to 10%) in the vicinity of the BBDA 1 and 2A sites, reported non detectable asbestos concentrations in 15 of 16 air samples (*Treadwell and Rollo, 2005*). Asbestos was reported in one sample at a concentration of 0.021 fibers per cubic centimeter (f/cc), which is well below the permissible exposure limit of 0.1 f/cc and short term exposure limit of 1.0 f/cc. If serpentine is excavated or disturbed, air samples will be collected to assess the presence of asbestos fibers in fugitive dust. During previous removal actions at BBDA 1 and BBDA 2A, in an area that contains serpentine outcrops, dust emissions were monitored in consultation with the BAAQMD and no significant levels of asbestos were detected. If serpentinite rock is excavated it will be stockpiled separately for separate profiling and disposal.

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☒ Less Than Significant Impact
☐ No Impact

References Used:

1. AMEC (AMEC Environment and Infrastructure), 2012a. *Draft Feasibility Study/Remedial Action Plan (FS/RAP), Baker Beach Disturbed Area 1A, Presidio of San Francisco, San Francisco, California.* September
2. _____, 2012b. *Draft Feasibility Study/Remedial Action Plan (FS/RAP), Baker Beach Disturbed Area 2, Presidio of San Francisco, San Francisco, California.* September
3. BAAQMD (Bay Area Air Quality Management District), 2012. *California Environmental Quality Act, Air Quality Guidelines.* May.
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4. Biological Resources

Project Activities Likely to Create an Impact:
- Removal of vegetation
- Physical disturbance to natural communities
- Excavation of debris
- Site grading

Description of Baseline Environmental Conditions:

BBDA 1A and BBDA 2 are open space natural areas located on the coastal bluffs overlooking the Pacific Ocean. The vegetation on the sites largely consists of invasive, non-native plants, which would be removed prior to excavation and

debris removal. The predominant vegetation is grass and shrubs. Site BBDA 1A has very few trees; a number of cypress trees are within BBDA 2 remedial limits. The most recent rare plant survey was conducted in 2011.

Table 4-1 lists special-status species protected under the Federal or California Endangered Species Act that have been recorded as casual visitors to the Presidio and vicinity, or have been identified at various locations at the Presidio. The table also shows whether the species have been documented at BBDA 1A or BBDA 2 in wildlife inventories.

Table 4-1: Special-Status Species Known to Occur at the Presidio

Species	Status*	Documented at BBDA 1A or BBDA 2A in Inventories?
Marbled murrulet (bird)	FT, CE	No
Snowy plover (bird)	FT	No
Bald eagle (bird)	CE	No
Willow flycatcher (bird)	CE	No
Raven's Manzanita (plant)	FE, CE	No; BBDA 1A in recovery area
Presidio clarkia (plant)	FE, CE	Observed proximate to the BBDAs 1A and 2 remedial areas; BBDA 1A in recovery area
Marin dwarf flax (plant)	FT, CT	No; BBDA 1A in recovery area
San Francisco lessingia (plant)	FE, CE	No
Franciscan manzanita (plant)	FE	No; BBDA 1A and 2 are within proposed critical habitat

*FE – Federally endangered; FT – Federally threatened; CE – California endangered; CT – California threatened
Sources: BBDA 1A and 2 RAP ARARs tables (MACTEC 2012a, 2012b), California Natural Diversity Database (CNDDB) search (DTSC, 2011).

On July 23, 2002, the U.S. Fish and Wildlife Service (USFWS) issued a Formal Consultation for four projects at the Presidio (which included the various BBDA remediation sites) to analyze impacts to the special status species and associated recovery unit plans within the remedial areas. The resulting 2002 Biological Opinion (BO) contained the USFWS determination that the remedial activities at the BBDAs are unlikely to jeopardize the continued existence of listed species or critical habitat, provided such activities are conducted in compliance with Applicable, Relevant and Appropriate Requirements (ARARs) listed in the RAP.

On September 5, 2012, the U.S. Fish and Wildlife Service published a final rule listing Franciscan manzanita (Arctostaphylos franciscana) as endangered and announced a proposal to designate over 300 acres in San Francisco as critical habitat, including the Baker Beach bluffs. All of BBDA 2 and most of BBDA 1A fall within the area proposed for designation as critical habitat. In accordance with section 7(a)(4) of the Endangered Species Act, federal agencies will confer with U.S. Fish and Wildlife Service on any agency action at this site which is likely to jeopardize the continued existence of any species proposed to be listed or result in the destruction or adverse modification of critical habitat proposed to be designated. The proposed remediation Project will remove debris fill and help to restore historic soil conditions that could support the Franciscan manzanita and other native plants. As such, the proposed critical habitat will benefit from the cleanup of the sites and will continue to serve its intended conservation role for the species.

In addition to the listed species identified above, four rare plant species are known to occur in the vicinity based on the 2011 rare plant survey. These are:

- San Francisco wallflower (*Erysium franciscanum*), (Federal Species of Concern; California Native Plant Society (CNPS) California Rare Plant Rank 4.2 [limited distribution/fairly threated in California]); Note: In spring 2011, CNPS changed the name "CNPS List" to "California Rare Plant Rank" The definitions of ranks and the ranking system have not changed.(http://www.cnps.org/cnps/rareplants/ranking.php)
- Coast rockcress (*Arabis blepharophylla*), (Federal Species of Local Concern; CNPS California Rare Plant Rank 4.3 [limited distribution/not very threatened in California]);
- San Francisco gumplant (*Grindelia hirsutula* var. *maritima*), (Federal Species of Concern; CNPS California Rare Plant Rank 3.2 [plants about which we need more information – a review list/fairly threated in California]; and
- Franciscan thistle *(Cirsium andrewsii)*, (Federal Specials of Concern; CNPS California Rare Plant Rank 1B.2 [rare, threatened, or endangered in California but more common elsewhere/fairly threatened in California]).

Following excavation activities, the sites would be protected to prevent erosion and soil loss until the sites are restored. Site restoration would be conducted in areas disturbed by the Project to stabilize the sites. This restoration would facilitate habitat and recreational development under the GMPA (NPS, 1994) and VMP (NPS and Trust, 2001). Native plant species would be planted and the trail through the area reestablished. The plantings would be compatible with the cultural fabric of the sites, but would not reestablish prehistoric conditions. At BBDA 1A, the trail would not necessarily be at its current location and likely would be located further east. Post-remediation site restoration would not restore the pre-Endicott Period battery natural site conditions. Rather, the Endicott Period battery earthworks would be restored using soils and plants compatible with the culturally significant historic fabric of the area.

Analysis as to whether or not project activities would:

a. Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service.

Impact Analysis:

Several rare and special status plant species occur in the Project vicinity. While rare plant individuals are known to occur within and proximate to the remediation sites, it is not expected that the remedial activities would impact plant populations. If they are impacted, they would be restored as part of the site re-vegetation plan. The Presidio's 2002 Biological Opinion (BO) contained the USFWS determination that the remedial activities at the BBDAs are unlikely to jeopardize the continued existence of listed species or critical habitat, provided such activities are conducted in compliance with ARARs listed in the RAPs.

Vegetation removal would be coordinated with NPS natural resource staff to avoid potential disruption to nesting or migrating birds. Specifically, vegetation removal would be scheduled to occur outside of bird nesting season (January 1st - August 15th for raptors and hummingbirds; March 1 - August 15th for songbirds), as dictated by the GMPA and NPS policies, and in compliance with the Migratory Bird Treaty Act. If tree removal work were required between January and March, raptor nesting surveys would be performed prior to the start of work. Vegetation removal can occur during bird nesting season provided a nesting survey indicates no disruption to nesting birds (including ground nesting birds) and approval is obtained from NPS natural resource staff. Based on the implementation of the project schedules and safeguards, songbirds, ground nesting birds, and other migratory birds would not be disturbed during their nesting season.

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☒ Less Than Significant Impact
☐ No Impact

b. Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service.

Impact Analysis:

By removing non-native plant populations and by providing soil conditions conducive to native plant restoration, remedial activities would provide a net benefit for ecological restoration of these areas. Herbicides may be used in conformance with current pest and vegetation management practices at the Presidio. Subsequent to remediation, the sites would be restored and revegetated with native species and, possibly, selected landscape plants. Therefore, Project activities would not substantially affect any sensitive natural community identified in local or regional plans, policies, regulations, or by the CDFG or USFWS. There is no riparian habitat on or near the sites.

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☒ Less Than Significant Impact
☐ No Impact

c. Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means.

Impact Analysis:

There are no wetlands known to be present on the remedial sites. Based on preliminary observations during a July 2011 site visit, a small area between Magazines 28 and 29, located outside the remediation area at BBDA 2, may meet USACE criteria for wetlands (e.g., evidence of water inundation, presence of plants that evolved to grow in wet areas, and soils that show evidence of water saturation). This area will not be affected by BBDA 2 remediation. In addition, since construction at the sites would be conducted under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), no permits would be required from the USACE (EPA OSWER Directive 9355.7-03).

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☒ Less Than Significant Impact
☐ No Impact

d. Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites.

Impact Analysis:

Federal and state-listed bird species have been known to migrate throughout the Presidio. As stated in Section 4.a., vegetation removal would be scheduled to occur outside of bird nesting season. Vegetation removal can occur during bird nesting season provided a nesting survey indicates no disruption to nesting birds (including ground nesting birds) and approval is obtained from NPS natural resource staff. Based on the implementation of this schedule and safeguards, songbirds, ground nesting birds, and other migratory birds would not be disturbed during their nesting season. Therefore, no substantial interference is anticipated to occur as a result of the project activities and potential impacts to bird species are considered less than significant.

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☒ Less Than Significant Impact
☐ No Impact

e. Conflict with local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance.

Impact Analysis:

The remedial action would not conflict with provisions of any local policies or ordinances regarding biological resources at the Presidio. All vegetation removal activities would occur in compliance with the VMP objectives; therefore, there is no impact and no further analysis is required.

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☐ Less Than Significant Impact
☒ No Impact

f. Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan.

Impact Analysis:

The remedial action plan would consistent with the VMP, USFWS BO, and the GMPA. The remedial action would not conflict with provisions of any adopted plan regarding biological resources at the Presidio. There is no Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan that covers this area. There is no impact and no further analysis is required.

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☐ Less Than Significant Impact
☒ No Impact

References Used:

1. AMEC (AMEC Environment and Infrastructure), 2012a. *Draft Feasibility Study/Remedial Action Plan (FS/RAP), Baker Beach Disturbed Area 1A, Presidio of San Francisco, San Francisco, California.* September
2. _____, 2012b. *Draft Feasibility Study/Remedial Action Plan (FS/RAP), Baker Beach Disturbed Area 2, Presidio of San Francisco, San Francisco, California.* September
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10. U.S. Department of the Interior Fish and Wildlife Service (USFWS), 2002. *Formal Consultation on Four Projects at the Presidio of San Francisco and Golden Gate National Recreation Area, San Francisco, California.* File No. 1-1-02-F-0228. July 23.
11. USFWS, 2002. *Formal Consultation on Four Projects at the Presidio of San Francisco and Golden Gate National Recreation Area, San Francisco, California.* File No. 1-1-02-F-0228. July 23.
12. _____, 2005. *Amendment to the Biological Opinion for the Modification of Three Environmental Remediation Sites, and the Presidio Trails and Bikeways Management Plan, The Presidio, San Francisco, California (USFWS file 1-1-02-F-0228).* August 31.

5. Cultural Resources

Project Activities Likely to Create an Impact:

- Removal of existing vegetation
- Excavation, transportation of excavated material
- Re-grading

Description of Baseline Environmental Conditions:

BBDA 1A and BBDA 2 are located within the boundaries of the Presidio of San Francisco National Historic Landmark District (NHLD), managed by both the NPS and the Presidio Trust. The sites are adjacent to, and historically associated with, the Fort Point Historic Monument and the Golden Gate Bridge National Historic Landmark.

A cultural resource investigation (CRI) was conducted in 2005 to provide a description of the physical and cultural setting and a comprehensive assessment of cultural resources at the BBDAs. The CRI included historical research, and trenching and mapping in the vicinity of identified cultural resources. Following implementation of the CRI, URS Corporation, NPS personnel, and John Martini jointly prepared *a Cultural Resources Baseline and Impact Assessment for the Baker Beach Disturbed Areas (BBDAs) 1, 1A, 2, and 2A Remedial Action.* This document was presented as Appendix B of MACTEC, 2006 and provided specific information regarding cultural resources present at the BBDAs, an impact assessment, and treatment recommendations to protect cultural resources during remediation.

Beginning at the Golden Gate Bridge and extending southward along the bluff are five seacoast defense batteries. Two of these are within the BBDA 1A site, at its eastern edge. These are Battery Cranston and Battery Marcus Miller, which were constructed in 1897-1898. Battery Cranston was named in honor of Lieutenant Arthur Cranston, who was killed in 1873 during the Modoc Indian War in northeastern California. Battery Cranston's guns were removed in 1943 as obsolete. Today the Golden Gate Bridge, Highway and Transportation District (GGBHTD) uses Battery Cranston as a storage area, which is fenced off from public access. For many years, Battery Marcus Miller was called Battery Cranston 2. In 1907, the three emplacements of Cranston 2 were designated as a separate battery and named in honor of Brigadier General Marcus Miller, a West Point graduate who was a veteran of the Civil War and the Modoc and Nez Perce Indian Wars and who served as Commander of the Presidio. A succession of construction activities established and expanded facilities at this location. These included gun emplacements, earthworks, concrete emplacements, buildings, and other structures. This battery was regarded as obsolete and its guns were removed in 1918 (Chapell, 2011a and 2011b). BBDA 1A includes historic earthworks associated with the two batteries. Given the substantial landform modifications resulting from the construction of the batteries, it is unlikely that there is any surviving evidence of prehistoric activities within the area.

Historic Battery Godfrey is immediately north of the BBDA 2 site. The battery was completed in 1895 and was named in honor of Captain George J. Godfrey, who was killed in action in the Philippine Islands in 1899. The three 12-inch guns mounted at the battery were salvaged in 1943, along with 12 others considered obsolete. Magazines 28 and 29, which are remnants of the 1870s-era West Battery fortification, are located at the western limits of BBDA 2. Magazines 28 and 29 are enveloped by protective earthen mounds covered with non-native vegetation.

Behind the line of gun pits and traverse magazines was a road that was originally constructed in the early 1870s to serve gun emplacements at West Battery and is referred to as a "Covered Way," based on the assumption that it was constructed with high sides to protect it from enemy fire. However, the road was not originally constructed as a feature below the surrounding ground level. When it was originally built, the road was at approximately the same elevation as the surrounding landscape.

Based on review of historical photographs and maps, a secondary road, later named Dove Court, made a circular loop in the vicinity of BBDA 2. A secondary access road is also evident west of Magazine 28 and 29 earthworks in a 1961 photograph of the site. This photograph also shows a graded area north of BBDA 2 in the current location of the Battery Godfrey parking area (Martini, 2009).

As a federal agency, the NPS is required to comply with the National Historic Preservation Act (NHPA). The Programmatic Agreement for the Presidio among the NPS, the State Historic Preservation Officer (SHPO), and the Advisory Council on Historic Preservation (ACHP), dated August 31, 1994, states that the Presidio of San Francisco shall manage and preserve its historic properties consistent with good historic preservation management and stewardship and sets forth the procedures to implement the historic compliance process of Section 106 of the NHPA. Key to that process is identification of historic resources that may be affected by an action. As the PA recognizes, numerous surveys and evaluations have been conducted to identify National Register eligible and NHLD contributing properties for the entire Presidio landmark district.

Native people today referred to as Ohlone/Costanoans were the earliest human inhabitants of the area now known as the Presidio. On December 12, 2011, the Native American Heritage Commission (NAHC) provided to DTSC the results of the Sacred Land file search for the San Francisco Presidio project area. The NAHC did not locate resources in the Sacred Land file; however, the NAHC provided a list of Native American contacts who may have an interest in the project. The tribal contacts would receive the Initial Study and Negative Declaration for review during the public comment period for this Project.

Analysis as to whether or not project activities would:

a. Cause a substantial adverse change in the significance of a historical resource as defined in 15064.5.

Impact Analysis:

At BBDA 1A, contractor staging and loading areas would be located east of the site, in or adjacent to the Merchant Road parking lot. The batteries and earthworks are historical resources. The contaminated soil in the earthworks would be removed along with asphalt debris on the earthworks. This would remove the historic fabric of the earthworks (soil), which would be replaced with a similar material and the historic earthworks reestablished. Monitoring by cultural resources staff would be required during soil removal to minimize damage to the earthworks where soil is not being removed. Post-remediation measures would include reconfiguring of the ground surface in a manner that conforms to the historic earthwork surfaces.

The work area for the remediation effort at BBDA 1A would comprise the area around the contaminated soil and debris and the equipment staging and stockpile areas at the Merchant Road parking lot east of the site. Cliff-side soil and debris excavation at BBDA 1A would be based on final site conditions and the engineering design and may include use of specialty construction equipment such as small bulldozers and walking excavators ("spyder excavators"). A temporary bridge would be built between the parking lot and the site to allow for the movement of equipment and material between the site and the staging area. A loader would transfer the soil and debris stockpile in the staging area into trucks.

At BBDA 2, the remediation excavation would not disturb any historic features, including earthworks. As with BBDA 1A, work at BBDA 2 would be based on site conditions and excavation equipment would be selected appropriate to conditions. Excavated material would be stockpiled either in the parking lot in front of Battery Godfrey or in the parking area south of Langdon Court.

If human skeletal remains are encountered, protocols under federal law would apply. All work would stop in the vicinity of the discovery, and the find would be secured and protected in place. The San Francisco County coroner and Trust and NPS cultural resource specialists would be immediately notified. If a determination finds that the remains are Native American, and that no further coroner investigation of the cause of death is required, the coroner would contact the NAHC (pursuant to Section 7050.5[c] of the California Health and Safety Code) and the County Coordinator of Indian Affairs for informational purposes only. Disposition of the human remains would be treated in accordance with the Native American Graves Protection and Repatriation Regulations at 43 CFR 10.4 (Inadvertent discoveries).

The remedial activities proposed at BBDA 1A and BBDA 2 would not produce substantial adverse changes to historical resources. The historic battery earthworks would be reestablished with similar soil material as was used in the construction of the earthworks. The work would be conducted in accordance with the regulations governing cultural resources, including the National Historic Preservation Act, the Archaeological Resources Protection Act, the Archaeological and Historic Preservation Act, and the Native American Graves Protection and Repatriation Act, and is not expected to cause a substantial adverse change in the significance of a historical resource. Trained archaeologists would monitor the remediation and reconfiguration activities to ensure that the expected subsurface condition is consistent with the profiles known to exist previously and that no damage occurs to unknown resources.

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☒ Less Than Significant Impact
☐ No Impact

b. Cause a substantial adverse change in the significance of an archeological resource pursuant to 15064.5.

Impact Analysis:

Based on the extent of archaeological resources identified at the Presidio in the National Register of Historic Places document, the proposed remediation would not produce substantial adverse changes to archaeological resources. The measures discussed above in Section 5a would be implemented to reduce the impact of the remediation Project to less-than-significant.

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☒ Less Than Significant Impact
☐ No Impact

c. Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature.

Impact Analysis:

Based on the extent of paleontological resources identified at the Presidio in the National Register of Historic Places document, it is highly unlikely that the remedial action would encounter a unique paleontological resource or site or a unique geologic feature. The measures discussed above in Section 5a would be implemented to reduce the impact of the Project on unique paleontological resources to less-than-significant.

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☒ Less Than Significant Impact
☐ No Impact

d. Disturb any human remains, including those interred outside of formal cemeteries.

Impact Analysis:

Based on the extent of human remains identified at the Presidio in the NPS National Register of Historic Places document, it is highly unlikely that the project would disturb any human remains, including those interred outside of formal cemeteries. Although there is a very low risk of encountering human remains at this site, if human skeletal remains are encountered, protocols under federal law would apply. All work would stop in the vicinity of the discovery, and the find would be secured and protected in place. The San Francisco County coroner and Trust and NPS archaeologists would be notified immediately. If a determination finds that the remains are Native American, and that no further coroner investigation of the cause of death is required, the coroner would contact the NAHC (pursuant to Section 7050.5[c] of the California Health and Safety Code) and the County Coordinator of Indian Affairs for informational purposes only. Disposition of the human remains would be treated in accordance with the Native American Graves Protection and Repatriation Regulations at 43 CFR 10.4 (Inadvertent discoveries).

Because of the limited potential to encounter human remains or associated artifacts, and the degree of oversight being provided at these sites, it is unlikely that the proposed Project would disturb any human remains, including those interred outside of formal cemeteries.

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☒ Less Than Significant Impact
☐ No Impact

References Used:

1. AMEC (AMEC Environment and Infrastructure), 2012a. *Draft Feasibility Study/Remedial Action Plan (FS/RAP), Baker Beach Disturbed Area 1A, Presidio of San Francisco, San Francisco, California.* September

2. _____, 2012b. *Draft Feasibility Study/Remedial Action Plan (FS/RAP), Baker Beach Disturbed Area 2, Presidio of San Francisco, San Francisco, California.* September

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6. Geology and Soils

Project Activities Likely to Create an Impact:

- Removal of existing vegetation
- Excavation of debris
- Re-grading

Description of Baseline Environmental Conditions:

The Presidio is located in the San Francisco Bay area, a region with a high degree of tectonic activity. Major faults within a 25-mile radius of the Presidio include the San Andreas Fault, the Hayward Fault, and the Calaveras Fault. The BBDA 1A site is in part located on a steep slope that extends from the top of the bluff to the beach. Surface drainage is to the west, toward the Pacific Ocean.

Soil and rock units present at the site consist of soil used in construction of the earthworks. These earthworks locally overlie native Colma formation and/or serpentinite bedrock. Serpentinite bedrock is present on the bluff slopes west of the site (AMEC 2012). The Presidio bedrock consists of altered volcanic rocks, basalt, chert and sandstone, which originated as ancient sea floor sediments. These can best be seen as outcrops along the irregular, eroded coastal bluffs. Serpentinite, with its green color and soft, slippery appearance, along with associated soils and habitat, is a sensitive natural feature of the Presidio. Serpentine soils can be found along the northern and western coastal bluffs of the Presidio.

Site elevations at BBDA 1A range from 150 feet MSL on the western edge of the site, where the slope steepens, to 205 feet MSL adjacent to the batteries. Surface deposits in the vicinity of BBDA 1A vary from sediments of the Franciscan Complex that are overlain by landslide deposits in the northern portion of the area, to predominantly Quaternary dune sand south of the site. Exposures of the Franciscan Complex in the area consist primarily of Cretaceous serpentinite and minor amounts of Jurassic to Cretaceous sandstones, shales, and cherts. The overlying landslide deposits are of Quaternary age and generally consist of unstratified mixtures of bedrock fragments, sand, silt and clay. The surface soil on the site itself is part of the earthworks in front of the batteries. Debris on the site consists predominantly of fragments of asphalt, brick, and tar in a matrix of silt with sand or sandy silt (DTSC, 2008).

Site elevations at BBDA 2 range from approximately 260 feet MSL at the Coastal Trail to 220 feet MSL on the western edge of the site. Surface drainage is to the west toward the Pacific Ocean. Soil and rock units present at the site consist of fill, Colma formation, and serpentinite residual soil and bedrock. Landslide material has also been identified in test pits and mapped in the site vicinity. Groundwater and surface water have not been encountered during investigation activities at the site. Debris fill at BBDA 2 extends to depths ranging from 2 to 12.5 feet bgs. Debris fill observed in the test pits and cultural resources trenches at BBDA 2 is generally composed of coarse and fine grained soils including sandy silt, sandy clay, silty sand, sandy gravel, and clayey gravel. Construction debris (asphalt, bricks, cobbles, concrete, ceramics, waste rock [including chert and slate]), landscape debris (pockets of tree-trimmings), and refuse (automotive parts, tire, cans, bottles, chain-link fence, fence posts, wire, sheet metal, piping, wood, plastic, paper, and glass) are present in the debris fill. Fill without debris (generally underlies, but at some locations overlies), debris fill and includes historic fill that was part of construction of the batteries and the access road east of the batteries. This fill material consists of sandy silt, sand, silty sand, clay, sandy clay, sandy gravel, and clayey gravel and does not contain refuse material. The gravel generally comprises crushed or broken serpentinite, chert, and shale rock fragments.

Analysis as to whether or not project activities would:

a. Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:

- Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault. (Refer to Division of Mines and Geology Special Publication 42).
- Strong seismic ground shaking.
- Seismic-related ground failure, including liquefaction.
- Landslides.

Impact Analysis:

The proposed remedial action would be limited in scope and of relative short duration so that the geologic/seismic hazard at the sites or exposure of people and/or structures to adverse impacts related to geologic and seismic hazards would be less than significant. There has been no reported historic activity on a potential fault located near BBDA 1A or BBDA 2.

No known active faults cross through the project sites (*Hart, 1999*). Fault ground rupture is normally associated with zones of active faulting and/or planes of weakness adjacent to active fault zones. The closest active fault is the offshore section of the San Andreas Fault, located 12.1 km (7.6 miles) to the west. Because recognized active faults neither cross through, nor are adjacent to the site, the fault rupture hazard at the site is considered to be negligible.

The geological and seismic environments are not anticipated to expose people or structures to significant strong seismic ground shaking. The excavation activities at the sites would be of relatively short duration, limited in nature, and involve few workers. Therefore, the proposed activities are unlikely to be affected by the geological and seismic conditions, including potential seismic ground shaking.

Liquefaction is the phenomenon in which loose, saturated, granular materials experience a sudden loss of shear strength due to seismic shaking. Soil liquefaction can induce sand boils, differential settlement, lateral spread, and ground failure. The Susceptibility Map of the San Francisco Bay Area shows the Project area to have a Low potential for liquefaction (USGS, 2005).

Bluff top areas underlain by shallow bedrock are not susceptible to liquefaction or settlement, and associated differential settlement and lateral spread within the area of existing batteries and other structures is considered very low. Although the lower beach cliffs are relatively steep, these are composed primarily of Franciscan mélange, or sandstone and shale bedrock, and therefore not considered susceptible to liquefaction and lateral spreading.

Liquefaction could occur at the Project sites under conditions where seeps are observed. This condition can be controlled by dewatering the fill area prior to and during excavation, if necessary. Based on the shallowness of the soil, this is not expected to present a problem.

Pervasively weak bedrock materials, steep slopes, exposure to rainfall, and undercutting by wave action have all contributed to the inherent instability of slope materials. Less common causes of landslide in the general area are adverse bedding, localized discharge of surface runoff, and dumping of waste. Since the 1960s, the growth of vegetation appears to have provided some stabilization of the slopes.

Soil and bedrock materials in the Baker Beach bluff area are susceptible to erosion, downslope movements, and landslides as a result of natural processes. It would be expected that natural processes would periodically move rock and saturated soil from the bluff top and slope face onto the beach. The hard, more competent serpentinite cliffs occasionally shed variable size rock fragments due to jointing in the intact rock. These landslides are indicative of the overall slope instability in the area. The risks of additional movement of materials down the slope are greatest during winter rains and during earthquakes.

Excavation plans and post-construction grading plans would be reviewed by a geotechnical engineer and a geotechnical engineer and/or engineering geologist would be on call and inspect the site periodically during excavation and during post-excavation grading work. Also, excavations requiring soil and debris removal would be designed so they do not significantly increase the risk of slope instability that could affect significant resources (earthworks and batteries). Stabilization measures may include dewatering of areas to be excavated, if needed, locating temporary stockpiles and equipment staging areas at least 10 feet back from the slope face, sequencing the soil and debris removal from the top of slope to the bottom of the slope, selecting temporary fill and cut slope inclinations that are stable in the short term, and selecting finished slope inclinations that are at least as stable as the current natural bluff slopes.

City and County of San Francisco excavation permits are not required because the excavation work is taking place on Federal property. After site excavation is complete, the site would be graded to reestablish the earthworks. The remedial design would include provisions for restoring slope stability and safety to natural conditions. In accordance

with the erosion control plan in the remedial design, erosion control measures would be implemented as necessary. Examples of stabilization measures might include: installation of wattles, stabilization matting, fabric, and blankets on newly exposed soil and after work is completed on short, steep, and/or sparsely vegetated slopes.

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☒ Less Than Significant Impact
☐ No Impact

b. Result in substantial soil erosion or the loss of topsoil.

Impact Analysis:

Erosion control measures would be implemented to minimize runoff from the sites in substantial compliance with the California General Construction Permit. In land disturbed by equipment, erosion control measures would be implemented during and after construction. Project control measures include stabilization practices such as wattles, silt fences, berms, and temporary outlet protection. The method chosen would depend on the planned activities and erosion potential of the area in question. By implementing the prescribed erosion and stabilization measures, the potential for substantial soil erosion or the loss of topsoil is considered less than significant.

Project control measures include:

- *Exposed cut and fill slopes:* Stabilization practices such as wattles, silt fences, berms, and temporary outlet protection may be employed, if needed. The method chosen would depend on the planned activities and erosion potential of the area in question.
- *Excavated soil:* Areas where soil has been excavated may be graded such that storm water runoff would be minimized from the area until the exposed soils are removed.
- *Wet season construction:* Downslope work would not be scheduled during the wet season to the extent practicable.

The final shape and appearance of the slopes would be addressed in the final remedial design. Activities would be closely supervised to ensure that excavation and removal of native soil and bedrock would be minimized or eliminated to preserve in-place serpentinite bedrock and serpentinite-derived residual and colluvial soils to the greatest extent practicable. After the site is re-graded, the slopes in the remediated area may experience localized erosion and dislodgement, particularly during heavy rains. These movements of surface soils are consistent with natural processes found in coastal bluff environments at the Presidio and are characteristic of the Pacific coastline.

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☒ Less Than Significant Impact
☐ No Impact

c. Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on or off-site landslide, lateral spreading, subsidence, liquefaction or collapse.

Impact Analysis:

Soil and bedrock materials in the Baker Beach bluff areas are susceptible to erosion, downslope movements, and landslides as a result of natural processes. Based on slope stability analysis performed as part of a geotechnical evaluation for multiple remediation projects in the Baker Beach bluff area (MACTEC, 2006), the removal of the soil is feasible, provided that geotechnical recommendations are incorporated into the remedial design. It is noted that the evaluation for BBDA 1A presented in MACTEC 2006 was based on a much smaller area of soil and debris removal (200 to 400 cy) than is currently planned. .

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☒ Less Than Significant Impact
☐ No Impact

d. Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property.

Impact Analysis:

Although there are weathered (soil-like) portions of the serpentinite within the project area that could be considered expansive, in general the rock is quite strong and is not considered an expansive soil that could create substantial risk to life or property. Project activities would not place structures on expansive soils. Therefore the remedial activities would not create any risk to life or property as a result of being located on expansive soils.

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☒ Less Than Significant Impact
☐ No Impact

e. Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of water.

Impact Analysis:

The Project would not involve the installation of septic tanks or alternative wastewater disposal systems. Portable toilets would be used during construction. There is no impact and no further analysis is required.

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☐ Less Than Significant Impact
☒ No Impact

f. Be located in an area containing naturally occurring asbestos (see also Air Quality, f.).

Impact Analysis:

Serpentinite bedrock in the Presidio is known to contain asbestos in some areas. An ADMP would be prepared for remedial activities at BBDA 1A and BBDA 2 prior to implementation of remedial actions at the sites. Asbestos materials would be handled in accordance with the site-specific HSP and associated Asbestos Dust Mitigation Plan and all applicable laws and regulations as described in Section 3 above.

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☒ Less Than Significant Impact
☐ No Impact

References Used:

1. AMEC (AMEC Environment and Infrastructure), 2012a. *Draft Feasibility Study/Remedial Action Plan (FS/RAP), Baker Beach Disturbed Area 1A, Presidio of San Francisco, San Francisco, California.* September
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7. Greenhouse Gas Emissions

Project Activities Likely to Create an Impact:

- Emissions from use of heavy equipment, trucks, and other vehicles.

Description of Baseline Environmental Conditions:

The setting for climate change and the analysis of greenhouse gas (GHG) emissions is defined by world-wide emissions and their global effects. The baseline conditions include the natural and anthropogenic drivers of global climate change, such as world-wide GHG emissions from human activities that have grown more than 70 percent between 1970 and 2004 (IPCC, 2007). The State of California is leading the nation in managing GHG emissions. Accordingly, the impact analysis relies on guidelines, analyses, policy, and plans for reducing GHG emissions established by the California Air Resources Board (CARB). This is a cumulative impact assessment because, by their nature, any GHG emissions contribute to the adverse environmental impacts of global climate change on a cumulative basis.

Globally, temperatures, precipitation, sea levels, ocean currents, wind patterns, and storm activity are all affected by the presence of GHGs. The global climate depends on the presence of GHGs to naturally provide the "greenhouse effect." The greenhouse effect is driven mainly by water vapor, aerosols, carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and other GHGs that trap heat radiated from the Earth's surface. The global surface temperature would be about 34°C (61°F) colder than it is now if it were not for the natural heat trapping effect of natural climate change pollutants (CAT, 2006).

California currently emits approximately 500 million metric tonnes of CO_2 equivalent (500 MMTCO2e) each year, or between one and two percent of about 49,000 MMTCO2e emitted globally (CARB, 2007). The California Global Warming Solutions Act of 2006, Assembly Bill 32 (AB 32), requires that California's GHG emissions be reduced to 1990 levels by 2020. The reduction would be accomplished through an enforceable statewide cap on global warming emissions covering major industrial facilities beginning with 2013 emissions. AB 32 directs the CARB to develop regulations and a mandatory reporting system to track and monitor global warming emissions levels (AB 32, Chapter 488, Statutes of 2006). The CARB Climate Change Scoping Plan, approved December 2008, provides the framework for achieving California's goals.

In passing AB 32, the California Legislature found that:

"Global warming poses a serious threat to the economic well-being, public health, natural resources, and the environment of California. The potential adverse impacts of global warming include the exacerbation of air quality problems, a reduction in the quality and supply of water to the state from the Sierra snowpack, a rise in sea levels resulting in the displacement of thousands of coastal businesses and residences, damage to marine ecosystems and the natural environment, and an increase in the incidences of infectious diseases, asthma, and other human health-related problems."

The regulations implementing AB 32 are being developed in phases. Implementation of the AB 32 Climate Change Scoping Plan requires careful coordination of the State's energy and transportation policies. The Scoping Plan provides strong support for reducing emissions from all manners of vehicle and air travel, because travel is a large portion of California GHG emissions.

Determining significance of GHG emissions relies upon available guidelines from State or local air quality management agencies, where available. The effects of Project-related direct and indirect GHG emissions are characterized against a GHG emissions level of 10,000 metric tonnes per year (10,000 MTCO2e/yr) developed as a proposed threshold for stationary sources, with construction activities not being subject to any quantitative threshold (BAAQMD, 2010). At a level of less than 10,000 MTCO2e/yr, an industrial project would not be expected to substantially conflict with existing California legislation adopted to reduce statewide GHG emissions. Global climate change is a cumulative impact that would be affected by GHG emissions. However, relatively small scale projects, if found to be less than significant, would not be anticipated to result in cumulatively considerable GHG emissions.

Analysis as to whether or not project activities would:

a. Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment.

Impact Analysis:

The construction and remediation would generate GHG emissions through the use of vehicles and equipment during construction and remediation. The period of construction and remedial action would be short-term. Construction-phase GHG emissions would occur directly from the off-road heavy-duty equipment and the on-road trucks and motor vehicles needed to transport materials, including debris, mobilize crews, and bring equipment to and from the site.

In addition to other equipment and vehicle activity, if hauling from the two sites overlaps, the remediation activity would generate an average of 5 heavy-duty truck round trips per hour per site, or 80 round trips per day over 2.5 weeks. This would include trips for both hauling material of site and for delivery of any backfill required. Construction-related air quality BACTs would minimize unnecessary equipment use and reduce GHG emissions. Emissions caused over the short term of the construction and remediation would be a fraction of 10,000 MTCO2e, although construction activities would not be subject to any quantitative threshold (BAAQMD, 2010). In summary, levels of GHG emissions caused by construction equipment use would not occur in significant quantities. The GHG emissions due to construction and remedial action would be less than significant.

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☒ Less Than Significant Impact
☐ No Impact

b. Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases.

Impact Analysis:

The Project would be consistent with the CARB Climate Change Scoping Plan. The Climate Change Scoping Plan depends on coordinating energy and transportation policies, with a focus on reducing emissions from all manners of motor vehicle travel. The planned construction and remedial action would include air quality BACTs to minimize unnecessary equipment use. As such, the Project activities would not conflict with plans, policies, or regulations adopted for the purpose of reducing GHG emissions and no further analysis is required.

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☐ Less Than Significant Impact
☒ No Impact

References Used:

1. AMEC (AMEC Environment and Infrastructure), 2012a. *Draft Feasibility Study/Remedial Action Plan (FS/RAP), Baker Beach Disturbed Area 1A, Presidio of San Francisco, San Francisco, California.* September
2. _____, 2012b. *Draft Feasibility Study/Remedial Action Plan (FS/RAP), Baker Beach Disturbed Area 2, Presidio of San Francisco, San Francisco, California.* September
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5. _____. 2007. California 1990 Greenhouse Gas Emissions Level and 2020 Emissions Limit. November.
6. CAT (Climate Action Team). 2009. Draft Biennial Report. March.
7. _____. 2006. Climate Action Team and California Environmental Protection Agency. Climate Action Team Report to Governor Schwarzenegger and the Legislature. March.
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8. Hazards and Hazardous Materials

Project Activities Likely to Create an Impact:

- Excavation
- Recycling
- Transport of debris offsite

Description of Baseline Environmental Conditions:

BBDA 1A:

As part of site investigations performed at BBDA 1A since 1992, soil samples were collected and analyzed for chemicals potentially present based on past site use. Based on evaluation of the analytical data for soil samples collected from BBDA 1A, COCs posing potential human health or potential ecological risks for BBDA 1A were identified. These are:

- COCs Presenting a Potential Human Health Risk:
  Seven carcinogenic PAHs present at the BBDA 1A site pose a potential human health risk to recreational receptors:
  - benzo(a)anthracene
  - benzo(a)pyrene
  - benzo(b)fluoranthene
  - benzo(k)fluoranthene
  - chrysene
  - dibenzo(a,h)anthracene
  - indeno(1,2,3-cd)pyrene
- COCs Presenting a Potential Ecological Risk:
- Metals (copper, lead, silver, and zinc) and one pesticide (4,4'-DDT) are present in soil at concentrations that exceed Presidio preliminary remediation goals (PRGs) for special-status ecological receptors (applied to native plant community zones). Only silver and zinc are present at concentrations that exceed ecological buffer zone PRGs (applicable to landscaped zones).

The maximum detected concentrations and site specific cleanup levels for BBDA 1A COCs are provided below.

COCs	Maximum Detected Concentration	Site-Specific Cleanup Level		
		Ecological Buffer Zone	Ecological Special Status Species Zone	
			Serpentinite	Colma Formation
	mg/kg	mg/kg	mg/kg	mg/kg
METALS				
Copper	95	120	85	49
Lead	560	300	160	160
Silver	3.1	2	2	2
Zinc	460	160	160	60
POLYNUCLEAR AROMATIC HYDROCARBONS				
Benzo(a)anthracene	62	2.5	2.5	2.5
Benzo(a)pyrene	69	0.25	0.25	0.25
Benzo(b)fluoranthene	87	2.5	2.5	2.5
Benzo(k)fluoranthene	27	25	25	25
Chrysene	100	40	30	30
Dibenzo(a,h)anthracene	9.4	0.25	0.25	0.25
Indeno(1,2,3-cd)pyrene	30	2.5	2.5	2.5
PESTICIDES				
4,4'-DDT	0.081	0.53	0.0082	0.0082

BBDA 2:

As with BBDA 1A, a number of site investigations have been undertaken at BBDA 2. COCs in soil at BBDA 2 are as follows:

- COCs Presenting a Potential Human Health Risk:
- Benzo(a)pyrene was identified as a human health COC..
- COCs Presenting a Potential Ecological Risk:

Four metals (copper, lead, silver, and zinc) are present at concentrations that exceed Presidio PRGs for special-status ecological receptors (native plant community zone). Only silver and zinc are present at concentrations that exceed ecological buffer zone PRGs (landscaped areas).

The maximum detected concentrations and site specific cleanup levels for BBDA 2 COCs are provided below.

COCs	Maximum Detected Concentration	Cleanup Level
	mg/kg	mg/kg
Metals		
Copper	220	85
Lead	330	160
Silver	14	2
Zinc	1200	160
Organochlorine Pesticides		
Total-Chlordane	0.141	0.009
4,4'-DDT	0.15	0.0082
Polycyclic Aromatic Hydrocarbons (PAHs)		
Benzo(a)pyrene	0.8	0.11

Analysis as to whether or not project activities would:

a. Create a significant hazard to the public or the environment throughout the routine transport, use or disposal of hazardous materials.

Impact Analysis:

The proposed remedial action is designed to permanently remove soil and debris containing COCs above cleanup levels from BBDA 1A (See Figure 4) and BBDA 2 (See Figure 6), expose underlying uncontaminated soil, recycle the debris where possible, and relocate the contaminated soil and debris to an offsite facility designed to manage the waste. Project implementation would not require the transport, use, or disposal of hazardous materials, except for excavated material that would be hauled offsite. The work would be conducted in accordance with the RAPs and a list of federal and state regulations identified in the RAPs (see ARARs Section of the RAPs).

During remediation activities, access to the sites would be restricted to prevent potential public exposure to health or safety risks. Potential exposure of workers and public to contaminated materials during excavation and stockpiling activities would be controlled through the air quality, dust, and runoff control measures. All hazardous wastes generated in the excavation of the site would be properly stored, handled, and transported in accordance with state and federal laws and regulations. The Trust would comply with requirements for proper recordkeeping. Workers implementing the remedial activities would have appropriate training and would use personal protective equipment as necessary to minimize exposure to contaminants.

Transport of excavated materials would occur along authorized haul routes within the Presidio and along major thoroughfares outside the Presidio. No approval is required from the City and County of San Francisco or other agency for transport along major thoroughfares and signed truck routes.

Based on the implementation of the Project measures identified above, the Project would not create a significant hazard to the public.

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☒ Less Than Significant Impact
☐ No Impact

b. Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment.

Impact Analysis:

The excavated wastes would be solid, non-flammable, non-corrosive and non-explosive and the unlikely event of a spill of such materials during transport would not present a significant health risk or environmental threat. Approximately 803 truckloads would be necessary to haul off the excavated material for the sites. The active work, stockpile, and staging areas would be enclosed with temporary construction fencing. The contaminated soil would be transported in accordance with state and federal requirements for the handling and transportation of hazardous wastes. Transport would occur along authorized haul routes within the Presidio and along major thoroughfares outside the Presidio. No approval is required from the City and County of San Francisco or other agency for transport along major thoroughfares and signed truck routes.

Material removed during excavation would be limited to that which has been identified as being contaminated and requiring remediation. Such material would be handled and stockpiled consistent with applicable regulations and Presidio BMPs, and would not present a significant health risk or environmental threat. Therefore, the Project would not create a significant hazard to the public due to foreseeable conditions resulting in a release of hazardous substances.

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☒ Less Than Significant Impact
☐ No Impact

c. Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances or waste within one-quarter mile of an existing or proposed school.

Impact Analysis:

Excavation would not occur within one-quarter mile of an existing or proposed school. Transport would occur along authorized haul routes. These routes may come within one-quarter mile of existing or proposed schools, but would not pose a significant hazard. Although hazardous materials would be excavated and transported to offsite disposal facilities, these projects are not expected to release significant quantities of hazardous emissions.

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☒ Less Than Significant Impact
☐ No Impact

d. Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to public or the environment.

Impact Analysis:

The Presidio of San Francisco is not on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 because it is owned by the Federal government.[2] However, the proposed remedial action is designed to reduce long-term hazards to human health and the environment and would not create a significant

[2] DTSC's sites listed pursuant to HSC § 25356 are subject to listing under the Government Code Section 65962.5. However, sites owned by the Federal Government are excluded from listing. The implementing regulations provide that sites may be listed pursuant to HSC § 25356 if (a) they are not owned by the Federal Government and (b) a release or threatened release of hazardous substances has been confirmed by on-site sampling. (California Code of Regulations, Title 22, Section 67400.1). The BBDA 1A and BBDA 2 remediation sites also do not meet other requirements for listing under Government Code Section 65962.5.

hazard to the public or the environment. Short-term hazards during construction would be controlled by the engineering and dust control measures identified above in 7a.

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☒ Less Than Significant Impact
☐ No Impact

e. Impair implementation of, or physically interfere with, an adopted emergency response plan or emergency evacuation plan.

Impact Analysis:

No road closures or modifications would be required to implement the Project. Parking areas would be temporarily usurped by the project during implementation. Execution of the RAPs, including intermittent hauling of soil and debris from the sites along established truck routes, would not impair implementation of or physically interfere with emergency response or evacuation plans. To ensure safety, a site-specific HSP would be prepared. The HSP describes the controls and procedures to be implemented to minimize the incidents, injury, and health risks associated with the activities to be conducted at the site. The HSP would be prepared according to the applicable requirements of 29 CFR 1910.120 (Federal workers and contractors), and CCR Title 8 General Industrial Safety Order (GISO) 5192 (contractors), for work at hazardous waste sites. The HSP would contain, at a minimum, the following elements:

- A hazard evaluation;
- Names of key personnel and the site safety coordinator;
- A statement that personnel have completed required training;
- Medical surveillance requirements and personal protective equipment to be used by site personnel;
- The types and frequency of personal and area air monitoring, instrumentation and sampling techniques for monitoring of health and safety;
- Site control measures, including the designation of work zones (e.g., exclusion, contamination-reduction and support zones) and safe work procedures for work near structures or topographic breaks, slopes, wall, etc;
- Management of wastes and decontamination procedures for personnel and equipment;
- Noise and dust control procedures and action levels;
- Site transportation procedures;
- Contingency plans including telephone numbers and contact names; and
- Location and routes to the nearest emergency and non-emergency medical care facilities.

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☒ Less Than Significant Impact
☐ No Impact

References Used:

1. AMEC (AMEC Environment and Infrastructure), 2012a. *Draft Feasibility Study/Remedial Action Plan (FS/RAP), Baker Beach Disturbed Area 1A, Presidio of San Francisco, San Francisco, California.* September
2. _____, 2012b. *Draft Feasibility Study/Remedial Action Plan (FS/RAP), Baker Beach Disturbed Area 2, Presidio of San Francisco, San Francisco, California.* September
3. NPS, 1994. Creating a Park for the 21st Century, from Military Post to National Park - Final General Management Plan Amendment, Presidio

9. Hydrology and Water Quality

Project Activities Likely to Create an Impact:

- Topographic changes from excavation and site grading

Description of Baseline Environmental Conditions:

Groundwater in the area is part of the Coastal Bluffs Groundwater Basin, and is not currently used as an active drinking water source. Groundwater and surface water were not encountered during investigation activities at BBDA 1A and BBDA 2 (AMEC 2012a and b). Excavation would occur during the dry season, so it is not expected that the Project would encounter ground water or surface water.

Analysis as to whether or not project activities would:

a. Violate any water quality standards or waste discharge requirements.

Impact Analysis:

The proposed Project would not violate water quality standards or waste discharge requirements. For disturbed areas greater than one acre, the Water Board has prepared a National Pollution Discharge Elimination System (NPDES) General Permit for Construction Activity. As a CERCLA project, the Project is exempt from acquiring a permit from the Water Board (EPA OSWER Directive 9355.7-03). However, the work would be conducted pursuant to the substantive requirements of the General Permit for Construction Activity. The Project would include implementation of BMPs for construction site planning and management, erosion and sediment control, and pollution prevention, which would be contained in the Storm Water Pollution Prevention Plan (SWPPP) document. The SWPPP would include Project specific measures to reduce surface runoff and erosion. To uphold water quality standards that are presented in the Clean Water Act and administered by the Water Board, the remedial design plans for the Project would include an erosion control plan to address onsite erosion, sedimentation, and pollution control concerns. With the implementation and maintenance of these sedimentation and pollution control measures, the Project would not violate any water quality standards.

With the implementation and maintenance of the sedimentation and pollution control measures described below, the Project would not violate any water quality standards.

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☒ Less Than Significant Impact
☐ No Impact

b. Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted).

Impact Analysis:

The remediation project would not involve pumping or removal of groundwater. The Project would not install impervious materials that would affect recharge. Therefore, the Project will not substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficient in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted).

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☐ Less Than Significant Impact
☒ No Impact

c. Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on or off-site.

Impact Analysis:

During excavation, existing local surface drainage patterns would be altered. In accordance with the erosion control plan in the remedial design, post-construction erosion monitoring and erosion control measures would be implemented as necessary. Examples of stabilization measures might include: installation of wattles, stabilization matting, fabric, and blankets on newly exposed soil and after work is completed on short, steep, and/or sparsely vegetated slopes. With the implementation of these controls, the proposed remedial actions would not substantively alter or adversely affect the existing drainage pattern of the sites and would not result in substantial erosion or siltation on or off-site.

The Project would not affect existing storm water drainage facilities. The Project would not increase surface water runoff. After the sites are re-graded, the slopes in the remediated areas may experience localized erosion and dislodgement, particularly during heavy rains. Movement of surface soils is consistent with natural processes found in coastal bluff environments at the Presidio and is characteristic of the Pacific coastline. No streams or rivers would be affected by the remedial action.

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☒ Less Than Significant Impact
☐ No Impact

d. Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on or off-site.

Impact Analysis:

The rate or amount of surface runoff could potentially increase slightly following excavation and grading activities; however, these activities would occur during the dry season. The temporary drainage conditions would be managed with engineering controls included in the remedial design. See 9c above. The remediation project would have no significant long-term impact on local drainage. No streams or rivers would be affected by the remedial action. The proposed remedial action would not alter the existing drainage pattern of the site in a manner which would result in flooding on or off site.

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☒ Less Than Significant Impact
☐ No Impact

e. Create or contribute runoff water which would exceed the capacity of existing or planned storm water drainage systems or provide substantial additional sources of polluted runoff.

Impact Analysis:

The Project would not require use of storm water drainage systems, nor would it result in substantial additional sources of polluted runoff. Drainage is overland to the ocean. Therefore, the Project would not exceed the capacity of existing or planned storm water drainage systems or provide substantial additional sources of polluted runoff.

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☐ Less Than Significant Impact
☒ No Impact

f. Otherwise substantially degrade water quality.

Impact Analysis:

The proposed Project would beneficially impact water quality at the Project sites because potential sources of future surface or groundwater contamination would be removed. The excavation, recycling and offsite transfer of contaminated soil and debris would not significantly impact current groundwater conditions.

The excavation area would be graded to provide proper drainage and protected with erosion and weed control measures. The final shape and appearance of the slopes would be addressed in the final remedial designs but would reestablish the historic earthwork profiles. Once the natural site topography is restored, the slopes in the remediated areas may experience localized erosion and dislodgement, particularly during heavy rains. These movements of surface soils are expected to be consistent with natural processes found in coastal bluff environments at the Presidio and are characteristic of the Pacific coastline. Surface drainage and erosion control features would be installed at the sites as appropriate in accordance with the SWPPP. These control features would be observed as part of routine maintenance activities.

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☒ Less Than Significant Impact
☐ No Impact

g. Place within a 100-year flood hazard area structures which would impede or redirect flood flows.

Impact Analysis:

The sites are not within a 100-year flood hazard area and would not install structures that would impede or redirect flood flows.

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☐ Less Than Significant Impact
☒ No Impact

h. Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam.

Impact Analysis:

There are no levees or dams as part of the Project. None of the proposed activities would expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam.

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☐ Less Than Significant Impact
☒ No Impact

i. Inundation by sieche, tsunami or mudflow.

Impact Analysis:

None of the remedial actions, performed singularly of concurrently, would cause inundation by sieche, tsunami or mudflow. Based on the geographic elevation of the project sites, it is unlikely that the project would be interrupted by the occurrence of a sieche or tsunami. Localized mudslides could occur in unconsolidated soils overlying bedrock on the bluff slopes. Because the work would be performed during the dry season, the potential for mudflows in native materials is negligible.

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☒ Less Than Significant Impact
☐ No Impact

References Used:

1. AMEC (AMEC Environment and Infrastructure), 2012a. *Draft Feasibility Study/Remedial Action Plan (FS/RAP), Baker Beach Disturbed Area 1A, Presidio of San Francisco, San Francisco, California.* September
2. _____, 2012b. *Draft Feasibility Study/Remedial Action Plan (FS/RAP), Baker Beach Disturbed Area 2, Presidio of San Francisco, San Francisco, California.* September
3. NPS, 1994. Creating a Park for the 21st Century, from Military Post to National Park - Final General Management Plan Amendment, Presidio of San Francisco, Golden Gate National Park Recreation Area, California. July.

10. Land Use and Planning

Project Activities Likely to Create an Impact:

- Closure of hiking trails and barring site access.

Description of Baseline Environmental Conditions:

BBDA 1A and BBDA 2 are located on the western edge of the Presidio within the Coastal Bluffs Planning Area in Area A of the Presidio (GMPA 1994, page 108), and subject to land uses identified in the GMPA. Current and planned land use at BBDA 1A and BBDA 2 is recreational. The Coastal Trail, a popular hiking trail, passes north-south through the area. A number of non-maintained, social trails also traverse the area. The newly constructed Golden Gate overlook is just south of BBDA 1A.

U.S. Highway 101 passes through the bridge toll plaza east of the sites. BBDA 1A is accessed via Merchant Road, the nearest public road. This road connects southbound Highway 101 to Lincoln Boulevard. BBDA 2 is south of BBDA 1A and is accessed via Lincoln Boulevard. There is pedestrian but no vehicle access to both sites. Lincoln Blvd provides access to northbound Highway 101 by way of an onramp located on the east side of the bridge toll plaza.

The only occupied structures in the area are GGBHTD maintenance and office facilities. The nearest residence is 1,000 feet away, east of Highway 101. To the southeast, the nearest residence is 1,500 feet away on Storey Avenue. The Fort

Windfield Scott baseball field is located 1,000 feet southeast of the site. The beach west of the site is 500 feet away, at the foot of a steep slope.

The work areas would be fenced and closed to public access during excavation, hauling, and restoration so as to not put the public at risk.

Analysis as to whether or not project activities would:

a. Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect.

Impact Analysis:

The proposed Project would improve the environmental conditions at the sites. The remedial activity would temporarily alter or preclude existing and proposed land uses by limiting access to the portion of the hiking trail on the sites and the historic batteries. However, the planned remedial activity would not conflict with any applicable land use plan, policy, or regulation, especially those related to land use and habitat/community conservation. Recreational cleanup levels, in addition to ecological special-status cleanup levels, would be used as soil cleanup levels.

The remediated sites would be restored for future use in accordance with the VMP and site-specific plans to be developed. The proposed remedial action would improve the environmental conditions at the sites and would be in keeping with long-term plans for the area.

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☐ Less Than Significant Impact
☒ No Impact

b. Conflict with any applicable habitat conservation plan or natural community conservation plan.

Impact Analysis:

None of the remediation activities would conflict with any habitat conservation plan or natural community conservation plan as there are no habitat conservation plans or natural community conservation plans that cover this area.

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☐ Less Than Significant Impact
☒ No Impact

References Used:

1. AMEC (AMEC Environment and Infrastructure), 2012a. *Draft Feasibility Study/Remedial Action Plan (FS/RAP), Baker Beach Disturbed Area 1A, Presidio of San Francisco, San Francisco, California.* September
2. _____, 2012b. *Draft Feasibility Study/Remedial Action Plan (FS/RAP), Baker Beach Disturbed Area 2, Presidio of San Francisco, San Francisco, California.* September
3. City and County of San Francisco, 2010. San Francisco Zoning Map, http://www.sf-planning.org/ftp/files/publications_reports/SF_Citywide_Zoning_Map_2-2010.pdf
4. NPS, 1994. Creating a Park for the 21st Century, from Military Post to National Park - Final General Management Plan Amendment, Presidio of San Francisco, Golden Gate National Park Recreation Area, California. July.
5. NPS and Trust, 2003. *Presidio Trails and Bikeways Master Plan and Environmental Assessment.* July.
6. Presidio Trust and NPS, 2001. Vegetation Management Plan and Environmental Assessment for the Presidio of San Francisco. May

11. Mineral Resources

Project Activities Likely to Create an Impact:

- None

Description of Baseline Environmental Conditions:

There are no know significant occurrences of mineral resources at the Presidio, therefore this topic will not be analyzed further for Sites BBDA 1A and BBDA 2.

Analysis as to whether or not project activities would:

a. Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state.

Impact Analysis:

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☐ Less Than Significant Impact
☒ No Impact

b. Result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan.

Impact Analysis:

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☐ Less Than Significant Impact
☒ No Impact

References Used:

1. AMEC (AMEC Environment and Infrastructure), 2012a. *Draft Feasibility Study/Remedial Action Plan (FS/RAP), Baker Beach Disturbed Area 1A, Presidio of San Francisco, San Francisco, California.* September
2. _____, 2012b. *Draft Feasibility Study/Remedial Action Plan (FS/RAP), Baker Beach Disturbed Area 2, Presidio of San Francisco, San Francisco, California.* September

12. Noise

Project Activities Likely to Create an Impact:

- Noise from heavy equipment, trucks, and other vehicles

Description of Baseline Environmental Conditions:

No hospitals, schools, or residential areas are located in the immediate vicinity of BBDA 1A or BBDA 2. The Coastal Trail crossing BBDA 1A and adjacent to BBDA 2 is considered a noise-sensitive area due to its natural environment and frequent use by park visitors. The aural environment at the sites is dominated the sound of surf at the beach below the sites and by traffic on the bridge and Highway 101, which tends to be focused toward the sites as vehicles descend from the bridge roadbed's high point at center span and traverse the metal road surface.

The noise environment within and outside the Presidio is largely a function of the proximity to motor vehicle traffic, with the quietest areas located farthest from major transportation corridors such as Doyle Drive (Highway 101) and Park Presidio Boulevard (Highway 1). In the vicinity of Highway 1 and U.S. Highway 101 (including Doyle Drive and Richardson Avenue), existing traffic noise levels commonly are above 67 dBA (A-weighted decibels), which is the Federal Highway Administration (FHWA) Noise Abatement Criterion (NAC) for recreation areas, parks, and residences. Because the existing trail through the site would be closed during remediation, and there are no nearby recreational facilities, there are no noise sensitive areas within the Presidio that could be affected by the planned construction and remediation. The nearest residences at BBDA 1A are 1,000 feet to the east, beyond Highway 101 and 1,500 feet to the southeast in Fort Winfield Scott. At BBDA 2, the nearest residences are 1,500 feet to the east, in Fort Winfield Scott east of the playfields. The nearest recreational area is the beach below the sites, where the sound of surf would dominate the noise environment.

As a matter of policy, the Presidio Trust endeavors to meet local standards when feasible. The San Francisco Noise Ordinance (Article 29 of the San Francisco Police Code, 1994) addresses noise in the community. The noise ordinance regulates construction noise, fixed-source noise, and unnecessary, excessive, or offensive noise disturbances within the City. The construction noise regulations in Sections 2907 and 2908 of the San Francisco Police Code provide that:

1. Construction noise is limited to 80 A-weighted decibels (dBA) at 100 feet from the equipment during daytime hours (7 a.m. to 8 p.m.). Impact tools are exempt provided that they are equipped with intake and exhaust mufflers, and
2. Nighttime construction (8 p.m. to 7 a.m.) that would increase ambient noise levels by 5 dBA or more at the Presidio of San Francisco property line is prohibited unless a permit is granted by the Director of Public Works.

The NPS would enforce applicable rules of 36 CFR 2.12 (audio disturbances) to manage use of motorized equipment or machinery that exceeds 60 dBA at 50 feet. Additionally, the NPS protects the natural soundscape wherever possible by monitoring human activities in and near its jurisdictional area, identifying what types of unnatural sound are acceptable in the park, and taking action where needed to implement the NPS Soundscape Management Policy (NPS 2006). Noise levels are generally considered low when below 45 dBA, moderate in the 45 to 60 dBA range, and high above 60 dBA. For comparison, levels around 75 dBA are common in busy urban areas and levels up to 85 dBA occur near major freeways and airports.

Analysis as to whether or not project activities would result in:

a. Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies.

Impact Analysis:

Noise generated by excavation and hauling activities would be temporary, intermittent, and dispersed within BBDA 1A and BBDA 2. Control measures may include, but not be limited to, proper tuning of equipment (BACTs), placement of noisy equipment away from sensitive receptors as practicable, and scheduling noisier operations during periods of low visitor use, to the extent feasible. Because of these controls, the temporary, intermittent and dispersed nature of noise-generating activities would not result in long-term or significant noise increases. There are no residential areas in close proximity to the sites. Noise impacts would be generally limited to intermittent users, such as trail hikers, and other transitory visitors during daylight hours. However, with closure of the trails at these locations, hikers would not be affected. Because the area is not residential, there are no expected noise impacts during evening and early morning hours. In addition, haul routes would generally follow major thoroughfares and signed truck routes. Thus, activities related to the project would not generate unusual or excessive noise or vibration offsite.

Noise generated by the planned remediation activities would be intermittent and spread over 15 weeks at BBDA 1A and 18 weeks at BBDA 2. Noise impacts generally are limited to nearby sensitive receptors (residents), intermittent users, such as trail hikers and park users, and other transitory visitors during daylight hours. Because of the planned site closures and the location of the receptors relative to the two remediation areas, none of these classes of sensitive receptors would be close enough to the Project sites to be affected.

The proposed Project would temporarily increase daytime noise levels from use of equipment and vehicles for site preparation, excavating, stockpiling, and off-hauling of contaminated material. Most construction activities are capable of causing routine noise levels of approximately 79 to 84 dBA measured 100 feet from the activity if noise control is not used, or 69 to 74 dBA with noise control. The following table shows typical noise levels of typical construction equipment, based on the Federal Highway Administration (FHWA) Roadway Construction Noise Model. Noise levels in this inventory are expressed in terms of maximum instantaneous levels (Lmax) with a usage factor for the intermittent nature of construction. The acoustical usage factor estimates the fraction of time each piece of construction equipment might operate at full power (i.e., its loudest condition) while in use.

Noise Levels and Usage Factors for Construction Equipment

Equipment	Acoustical Usage Factor (%)	Measured Lmax (dBA at 50 feet)
Auger Drill Rig	20	84
Backhoe	40	78
Compactor (ground)	20	83
Compressor (air)	40	78
Concrete Mixer Truck	40	79
Concrete Pump Truck	20	81
Crane	16	81
Dozer	40	82
Drill Rig Truck	20	79
Drum Mixer	50	80
Dump Truck	40	76
Excavator	40	81
Flat Bed Truck	40	74
Front End Loader	40	79
Generator	50	81
Grader	40	85
Pickup Truck	40	75
Pneumatic Tools	50	85
Pump	50	81

Noise Levels and Usage Factors for Construction Equipment

Equipment	Acoustical Usage Factor (%)	Measured Lmax (dBA at 50 feet)
Welder/Torch	40	74

Source: FHWA, 2006.
Notes: Lmax – maximum A-weighted sound level

Noise would be generated by equipment needed to prepare the site, conduct the excavation, load trucks, and haul the material off site. This noise would be generated during daylight hours and in close proximity to heavily used Highway 101 and the ocean. At its closest, the work would occur over 1,000 feet from the nearest residence and would be separated from that location by Highway 101 and intervening vegetation.

During excavation, loading, and hauling, noise levels at the sites would be about 78 to 81 dBA for excavators, backhoes, and front loaders. The large dump trucks used to transport the soil and debris would be the primary source of noise off site. As noted, there are no sensitive receptors near the site, and the surrounding environment is affected by noise from roadways, in particular Highway 101 and Lincoln Blvd. Because sound levels reduce with distance, the noise from the remediation work would not be significant if perceived by sensitive receptors.

Construction trucks generate peak noise levels of about 80 dBA, and at 100 feet, distance would attenuate the level to about 74 dBA. Inside buildings, noise from outside sources is reduced by about 15 to 20 dBA due to the attenuating effect of the structural components of the dwelling. Once on public highways, the trucks would be a minor part of existing traffic and the resulting noise environment. Noise contributed by haul trucks along this route would occur only during the day, when people are less sensitive to noise (as compared to night), and would be intermittent rather than constant.

The Trust has the authority and responsibility to manage the remediation of contamination throughout the Presidio, in both Trust and NPS jurisdictional areas. As warranted, NPS would implement the appropriate Soundscape Management Policy to minimize the magnitude and duration of the construction noise while protecting other park resources and values. Examples of actions to prevent noise include erecting barriers around construction sites and stationary construction equipment such as compressors; this would reduce noise by as much as 5 dBA. To further reduce noise impacts, the construction sites could be temporarily closed to park users.

Reasonable and feasible noise abatement features measures would be implemented to manage construction noise. As appropriate, control measures would include, but not be limited to, proper maintenance and tuning of equipment, placement of noisy equipment away from sensitive receptors as practicable, noise-control mufflers, and scheduling noisier operations during periods of low visitor use (weekdays), to the extent feasible. In addition, construction would be scheduled to limit impacts on wildlife and bird nesting activity in consultation with natural resource specialists. Within the Presidio, transport of equipment and soil and debris would occur along routes approved by the NPS (see Section 15). Outside of the Presidio, haul routes would follow major thoroughfares and signed routes approved for truck traffic. Because of these controls, the activities would not result in exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies.

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☒ Less Than Significant Impact
☐ No Impact

b. Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels.

Impact Analysis:

Although soil excavation and earthwork are anticipated to generate minor to moderate amounts of groundborne vibration groundborne noise, none of the activities are anticipated to generate excessive amounts. Vibration in the ground dies out rapidly with distance from the source. Planned remediation activities would result in a total of 15 weeks of noise-related activities (preconstruction and construction activities) at BBDA 1A and 18 weeks at BBDA 2.

The work associated with remedial actions at BBDA 1A and BBDA 2 would be temporary. The work would occur at the edge of the park and in an area remote for heavily used park facilities. Park visitors would not be significantly impacted by the work to be performed because of its temporary nature.

Vibration from equipment would be perceptible in the immediate vicinity of the equipment or activity. Tamping of ground surfaces and the passing of heavy trucks on uneven surfaces would create perceptible vibration in the immediate vicinity of the activity. The level of groundborne vibration that could reach sensitive receptors depends on the distance to the receptor, the equipment creating vibration, and the soil conditions surrounding the construction site. The impact from construction-related groundborne vibration would be short-term and confined to only the

immediate area around the activity (within about 25 feet). Because the remediation work would not be near residences, no excessive groundborne vibration or noise level would occur at the residences. Because vibration related to remediation and transportation of soil and debris would be temporary, intermittent, and far from residences and other receptors, impacts related to groundborne vibration and noise would be less than significant.

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☒ Less Than Significant Impact
☐ No Impact

c. A substantial permanent increase in ambient noise levels in the vicinity above levels existing without the project.

Impact Analysis:

The work associated with remedial actions throughout the Presidio would be temporary and would therefore not result in a permanent increase in noise levels in the area. Noise impacts would generally be limited to interim users, such as hikers, and other visitors during daylight hours. Activity and increased ambient noise levels would occur intermittently over 15 weeks for BBDA 1A and 18 weeks for BBDA 2. Upon completing the work, no permanent noise source would remain. Because the noise would be limited to the duration of activity, the Project would not result in a permanent increase in noise levels in the vicinity of the two sites.

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☐ Less Than Significant Impact
☒ No Impact

d. A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project.

Impact Analysis:

Temporary and periodic increases in ambient noise levels in the Project vicinity would occur above existing levels. Excavation and hauling would be limited to during daylight hours, when receptors are less sensitive. As appropriate, construction activities would employ noise control measures to ensure that the increase in noise would not be substantial (described in Section 12a), such as placement of noisy equipment away from sensitive receptors as practicable and using noise-control mufflers. As a consequence, temporary increases in the ambient noise level would not be substantial and would be less than significant.

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☒ Less Than Significant Impact
☐ No Impact

References Used:

1. AMEC (AMEC Environment and Infrastructure), 2012a. *Draft Feasibility Study/Remedial Action Plan (FS/RAP), Baker Beach Disturbed Area 1A, Presidio of San Francisco, San Francisco, California.* September
2. _____, 2012b. *Draft Feasibility Study/Remedial Action Plan (FS/RAP), Baker Beach Disturbed Area 2, Presidio of San Francisco, San Francisco, California.* September
3. FHWA (Federal Highway Administration). 2006. FHWA Highway Construction Noise Handbook. (FHWA-HEP 06 015; DOT VNTSC FHWA 06 02). August. http://www.fhwa.dot.gov/environment/noise/handbook/index.htm.
4. NPS, 1994. Creating a Park for the 21st Century, from Military Post to National Park - Final General Management Plan
5. _____, 2006. Management Policies 2006, *Soundscape Management 4.9.*

13. Population and Housing

Project Activities Likely to Create an Impact:

- None.

Description of Baseline Environmental Conditions:

The Presidio currently has over 1,000 occupied multifamily and single-family housing units and a residential population of just under 3,000 persons. The Project would not create a demand for housing nor increase local population. Construction workers, equipment operators, and truck drivers would be from the local labor pool and would maintain their current residences. The Project does not require the removal of any housing. Therefore, this topic is not analyzed further for Sites BBDA 1A and BBDA 2.

Analysis as to whether or not project activities would:

a. Induce substantial population growth in area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure).

Impact Analysis:

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☐ Less Than Significant Impact
☒ No Impact

b. Displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere.

Impact Analysis:

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☐ Less Than Significant Impact
☒ No Impact

c. Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere.

Impact Analysis:

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☐ Less Than Significant Impact
☒ No Impact

References Used:

1. AMEC (AMEC Environment and Infrastructure), 2012a. *Draft Feasibility Study/Remedial Action Plan (FS/RAP), Baker Beach Disturbed Area 1A, Presidio of San Francisco, San Francisco, California.* September
2. _____, 2012b. *Draft Feasibility Study/Remedial Action Plan (FS/RAP), Baker Beach Disturbed Area 2, Presidio of San Francisco, San Francisco California.* September

14. Public Services

Project Activities Likely to Create an Impact:

- None.

Description of Baseline Environmental Conditions:

The Presidio is jointly administered by the NPS and the Trust. Police services are provided by the Park Service Police. Fire and emergency response services are provided by the San Francisco Fire Department. Project excavation would occur in an area where there are no public roads and would not affect emergency access to the vicinity. The Project would not increase population or the use of public services. Therefore, this topic is not analyzed further for BBDA 1A and BBDA 2.

Analysis as to whether or not project activities would:

a. Result in substantial adverse physical impacts associated with the provision of new or physically altered government facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the following public services:

- Fire protection
- Police protection
- Schools
- Parks
- Other public facilities

Impact Analysis:

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☐ Less Than Significant Impact
☒ No Impact

References Used:

1. AMEC (AMEC Environment and Infrastructure), 2012a. *Draft Feasibility Study/Remedial Action Plan (FS/RAP), Baker Beach Disturbed Area 1A, Presidio of San Francisco, San Francisco, California.* September
2. _____, 2012b. *Draft Feasibility Study/Remedial Action Plan (FS/RAP), Baker Beach Disturbed Area 2, Presidio of San Francisco, San Francisco, California.* September

15. Recreation

Project Activities Likely to Create an Impact:

- Closing trails and barring access to sites

Description of Baseline Environmental Conditions:

The Presidio is a National Park, and provides recreational, residential, and office-type land uses, in addition to natural areas and zones of non-native forest. Recreational uses of the Presidio vary from passive activities, such as walking and bird watching, to active sports such as baseball, tennis, and bicycling. The Juan Bautista de Anza National Historic Trail, California Coastal Trail, and the Bay Area Ridge Trail (herein collectively referenced as the Coastal Trail or trail) share a common path through Project area. The Coastal Trail, a popular hiking trail, runs along the top of the bluff and passes through center of BBDA 1A and to the east of BBDA 2. A number of non-maintained, social trails also traverse through the area. Activities associated with both sites are primarily trail walking, nature observation, and visiting the batteries on site.

Analysis as to whether or not project activities would:

a. Increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated.

   Impact Analysis:

   The active construction areas would be fenced as needed to restrict and redirect public access. The existing Coastal Trail would be temporarily rerouted around the work areas to keep park visitors away from heavy equipment operations and staging/stockpiling areas. Excavation would remove the existing trail and many of the unofficial social trails within the area. During site restoration, at BBDA 1A, the Coastal Trail would be reestablished. Social trails would be permanently closed and the land restored, consistent with the Presidio Trails and Bikeways Master Plan and Environmental Assessment. Under the GMPA, *"(t)o protect rare and sensitive plants, visitor access will be confined to developed trails. ...The steep bluff area north of Baker Beach will be treated as a wild coast where people can discover nature's beauty and power. No new interpretive facilities will be developed in this area, except along the Coastal Trail. This trail traverses the length of the bluffs, avoiding areas that are closed to the public to protect rare and endangered species."*

   To protect the public during construction, access to the beach below BBDA 2 would be closed while the project is implemented. The remedial design would include pedestrian and traffic detours designed to keep visitors out of active work areas while permitting full use of other park features.

   Although some passive recreational use of the Presidio would be diverted during construction, the proposed remedial action would not increase the use of existing parks or recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated. Temporary and permanent effects upon recreational facilities would be less than significant.

   Conclusion:

☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☒ Less Than Significant Impact
☐ No Impact

b. Include recreational facilities or require construction or expansion of recreational facilities which might have an adverse physical effect on the environment.

Impact Analysis:

Following remediation, according to the GMPA, *"(t)o protect rare and sensitive plants, visitor access will be confined to developed trails."* This would decrease somewhat the current recreational use of the sites by eliminating social trails. This is not of a magnitude that could require the expansion or construction of recreational facilities elsewhere to compensate for site restrictions. Recreation and the scenic and biological quality of the site would be enhanced due to the remediation efforts.

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☒ Less Than Significant Impact
☐ No Impact

References Used:

1. AMEC (AMEC Environment and Infrastructure), 2012a. *Draft Feasibility Study/Remedial Action Plan (FS/RAP), Baker Beach Disturbed Area 1A, Presidio of San Francisco, San Francisco, California.* September
2. _____, 2012b. *Draft Feasibility Study/Remedial Action Plan (FS/RAP), Baker Beach Disturbed Area 2, Presidio of San Francisco, San Francisco, California.* September
3. NPS, 1994. Creating a Park for the 21st Century, from Military Post to National Park - Final General Management Plan Amendment, Presidio of San Francisco, Golden Gate National Park Recreation Area, California. July.
4. NPS and Trust, 2003. *Presidio Trails and Bikeways Master Plan and Environmental Assessment.* July.
5. Trust and NPS, 2001. *Vegetation Management Plan and Environmental Assessment for the Presidio of San Francisco.* May.

16. Transportation and Traffic

Project Activities Likely to Create an Impact:

- Delivering equipment and materials to the remediation site
- Daily worker traffic
- Hauling excavated material from the site
- Delivering backfill and plant material

Description of Baseline Environmental Conditions:

The Presidio is a National Park site, and includes recreational, residential, and office-type land uses, in addition to natural areas and zones of non-native forest. The Presidio is a heavily visited facility, with some areas having considerably greater visitation than others. With the exception of two regional highways (U.S. Highway 101 and Route 1) maintained by the California Department of Transportation, roads within the Presidio are maintained by the federal government, and serve local traffic within or through the Presidio. Except at the bridge toll plaza and gates on the east side of the Presidio, these highways are not readily accessible from the Presidio. Within the Presidio, traffic speeds are low. Congestion occurs intermittently at principal (four-way stop sign controlled) intersections. Traffic in city neighborhoods surrounding the Presidio varies from very light (in residential neighborhoods), to heavy (along Lombard Street, for example). The Project sites would be accessed from Merchant Road (BBDA 1A) or from Lincoln Blvd (BBDA 2) within the Presidio.

Because they are important to understanding Air Quality impacts, transportation and traffic have been described in Section 3. Air Quality, in this Initial Study. That information is not repeated here.

Analysis as to whether or not project activities would:

a. Cause an increase in traffic which is substantial in relation to the existing traffic load and capacity of the street system (i.e., result in a substantial increase in either the number of vehicle trips, the volume to capacity ratio on roads, or congestion at intersections).

Impact Analysis:

Trucks required at the site would travel to off-site destinations via Highway 101. This route is consistent with the Freight Traffic Routes identified in the *Transportation Element of the General Plan of the City and County of San Francisco*. Vehicle traffic (employee vehicles and haul trucks) would not cause a significant increase in traffic in relation to the existing traffic load and the capacity of the street system. Based on the number of trucks required and established routes, no substantial increase in traffic is expected

Vehicles entering and exiting the BBDA 1A site would use Merchant Road. Depending on their final destination, vehicles exiting BBDA 1A would leave the site on Merchant Road and go north for 700 feet to Highway 101 southbound, or use Merchant Road to reach Lincoln Blvd, which leads to northbound Highway 101. Trucks would then travel either south on Highway 101 or north across the Golden Gate Bridge, depending on the location of the disposal site. Based on current plans to haul to Solano County and to the transshipment facility in southeast San Francisco, it is expected that the Merchant Road to southbound Highway 101 route would be used.

During an 8-hour work day, a maximum of 40 truck round-trips per day would use this route from BBDA 1A. This would result in about 5 trucks per hour in each direction (full departing, empty returning). This low volume would have a less than significant impact on local traffic and on designated truck routes outside the Presidio.

At BBDA 2, vehicles would enter and exit the site via Langdon Court off Lincoln Blvd. Exiting vehicles would reach Highway 101 by the same routes as described for BBDA 1A, with the probable route being along Merchant Road to southbound Highway 101. During an 8-hour work day, a maximum of 40 truck round-trips per day would use this route from BBDA 2. This would result in about 5 trucks per hour in each direction. This low volume would have a less than significant impact on local traffic and on designated truck routes outside the Presidio.

It is possible that both sites would have coincident hauling schedules. This would have the effect of combining their overall traffic impacts. If coincident hauling was to occur, then a maximum of 200 truck round-trips per day would occur. This would result in about 20 trucks per hour in each direction for the combined BBDA 1A and BBDA 2 hauling. Loaded trucks would use Merchant Road to the highway; returning empty trucks would use the highway to the Lincoln Blvd exit and continue to their respective sites off Merchant Road (BBDA 1A) or Langdon Court (BBDA 2).

Although impacts of each project may be less than significant, the cumulative effect of all projects may be significant. Therefore, CEQA requires consideration of the impacts of a proposed project in combination with impacts of other projects or activities, where there is a potential for there to be a cumulative effect from the projects when viewed in combination.

CEQA requires consideration of the cumulative impacts of a proposed project in combination with impacts of other projects or activities that have the potential to combine with impacts of the proposed project. Although impacts of each project may be less than significant, the cumulative effect of all projects may be significant.

Cumulative Scenario: There are known projects on or near the Presidio that would or may overlap with the BBDA work in 2013. Their locations are shown on Figure 7. These include: the ongoing Doyle Drive (Presidio Parkway) replacement project; continuing Presidio Main Post update projects; remedial dredging of Mountain Lake, and remediation of soil from the Barnard Avenue Protected Range.

With the exception of the ongoing Doyle Drive project, these projects are a considerable distance from the BBDA 1A and 2 sites. Detours and road closures are required during the duration of the Doyle Drive work and change from time to time as work progresses. The Doyle Drive project EIS/EIR concluded that implementation of the Transportation Management Plan for that project would ensure that there are no significant transportation/traffic related impacts (FHWA & SFCTA, 2008). In most respects, the BBDA 1A and BBDA 2 sites are isolated from the other projects in terms of the potential to contribute to cumulative effects. The only case in which the BBDA 1A and BBDA 2 work could contribute to a cumulative effect is in its use of trucks and equipment during construction and when hauling material off site. Truck staging during hauling would be accommodated within the staging areas and not on roadways. There are no ongoing project-related impacts once construction is finished.

Level of Service (LOS) is used to describe delay at intersections due to traffic volume and other conditions. Table 16-1 shows existing LOS at intersections along the haul route in the City of San Francisco before trucks merge with traffic on major highways.

Table 16-1: Haul Route Intersection Level of Service

Existing (2011) Intersection Level of Service	Traffic Control	Level of Service (LOS)
Lombard St./Divisadero St.	Signal	C
Lombard St./Fillmore St.	Signal	C
Lombard St./Van Ness Ave.	Signal	D

Source: San Francisco Planning Department, 2011

The levels shown in Table 16-1 include any Doyle Drive related construction traffic. LOS C is described by traffic engineers as "acceptable delays"; LOS D as "tolerable delays". It is assumed that the contribution of construction-

related traffic from the Doyle Drive project would remain similar in 2013 to what is was in 2011. The cumulative impact of Project-related truck traffic in 2013 would not change the existing LOS.

In addition, the NPS and Trust regularly undertake smaller projects and improvements on the Presidio. In 2013, these are expected to include projects in the general vicinity of the Baker Beach remediation Project: improvements to the Bay Trail east of the Golden Gate Bridge, work at Battery East Parking and Vista Point, work on the Coastal Trail, and ongoing vegetation management and stewardship work along local trail corridors and in natural area zones.

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☒ Less Than Significant Impact
☐ No Impact

b. Exceed, either individually or cumulatively, a level of service standard established by the country congestion management agency for designated roads or highway.

Impact Analysis:

Due to the close proximity of BDDA 1A to Merchant Road and the number vehicle trips expected for the project, neither schedule, employee vehicles, nor disposal trips would cause traffic volumes to exceed the level of service (LOS) along found along the haul route. Through vehicular traffic on Merchant Road would not interfere with trucks loading in the staging area located west of Merchant Road.

The nearest intersections, namely Lincoln Boulevard and Merchant Road, currently operate at LOS C (acceptable delay) or better during the a.m. peak hour (typically between 7:30 a.m. and 8:30 a.m.) and p.m. peak hour (typically between 4:30 p.m. and 5:30 p.m.). Loading would generally occur between the hours of 5:30 a.m. and 2:00 p.m., thereby minimizing the impact on peak hour traffic conditions.

The trucks would be loaded from a stockpile at BBDA 1A. The truck staging area would be closed and would not affect local traffic. Access to designated haul routes would be specified in remedial design documents.

Multiple projects at the Presidio may occur during remedial activities at BBDA 1A and BBDA 2. Although several projects may occur simultaneously, construction would not result in a significant impact in traffic. The majority of these construction activities would use Merchant Road and Lincoln Boulevard for haul routes to access Highway 101 near the toll plaza. The cumulative traffic impacts from these projects are not expected to increase the LOS for Lincoln Boulevard. Refer also to the responses to item 16 a.

The level of traffic generated by the Project would be low. Hauling excavated material off site would require about 80 truck round trips per day. During rush hours, when the level of service (LOS) on roads at its lowest, the Project would add about 20 heavy-duty trucks per hour to traffic on Lombard Street and Van Ness Street (i.e., Highway 101). Truck operators would tend to avoid travel during morning and evening peak hours. This level of travel demand would not cause the current LOS to change, would not conflict with any applicable congestion management plan, and would be less than significant.

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☒ Less Than Significant Impact
☐ No Impact

c. Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment).

Impact Analysis:

The staging areas would be located onsite or nearby and would not increase any hazard due to a design feature or incompatible uses. The designated truck routes are designed to minimize traffic hazards (sharp curves or dangerous intersections). Traffic plans would be developed to minimize interaction between park visitors and project traffic. If required, traffic control would be in place at the intersection of the site entrance with Merchant Road and/or the intersection of Merchant Road and Lincoln Blvd when trucks are entering or exiting the site.

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☐ Less Than Significant Impact
☒ No Impact

d. Result in inadequate emergency access.

Impact Analysis:

The remedial action would not result in inadequate emergency access. Project equipment would be stored onsite and would not obstruct any transportation route used for emergency access vehicles. Emergency access to the Project would be unimpeded.

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☐ Less Than Significant Impact
☒ No Impact

e. Result in inadequate parking capacity.

Impact Analysis:

During project construction, public parking at both BBDA 1A and BBDA 2 would be reduced, as part of the parking areas would be within the closed project sites and be used for staging and/or stockpiling. Haul trucks would travel to the job site from remote locations and would not require parking on site or could be parked elsewhere on the Presidio and brought to the sites as needed. Personnel private vehicles and some equipment would require parking, which would be adequate within the closed areas on the sites. A limited number of contractor employees are expected to be working at the Project site and would park in designated areas on the site. Impacts on parking capacity would not be considered significant due to the temporary nature of the activities and the availability of adequate parking nearby.

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☒ Less Than Significant Impact
☐ No Impact

f. Conflict with adopted policies, plans, or programs supporting alternative transportation (e.g., bus turnouts, bicycle racks).

Impact Analysis:

The Project would not significantly alter local traffic patterns in ways conflicting with adopted policies, plans, or programs that support alternative transportation. Because the work area would be temporarily closed during construction, pedestrians (hikers), birdwatchers, and other recreationalists would be temporarily detoured. No bicycle routes would be affected. The effects are not considered significant because of the relatively short duration of the Project and the availability of alternate trails within the Presidio.

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☒ Less Than Significant Impact
☐ No Impact

References Used:

1. AMEC (AMEC Environment and Infrastructure), 2012a. *Draft Feasibility Study/Remedial Action Plan (FS/RAP), Baker Beach Disturbed Area 1A, Presidio of San Francisco, San Francisco, California.* September
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5. San Francisco (City and County of) Planning Department, 1995. *Transportation: An Element of the General Plan of the City and County of San Francisco.*
6. _____, 2011. *Draft Environmental Impact Report: The 34th America's Cup and James R Herman Cruise Terminal and Northeast Wharf Plaza.* July.

17. Utilities and Service Systems

Project Activities Likely to Create an Impact:

- Soil excavation and grading.

Description of Baseline Environmental Conditions:

Electric, water supply, and communications are provided by the Trust. Gas is provided by PG&E. The Trust's Permit No. 05-0246 from the San Francisco Public Utilities Commission allows water to be tested and discharged to the sanitary sewer. However, none of these services would be required for the project. Any water required for dust control would be obtained from an existing hydrant at the Presidio. Excavated material would be transported to a licensed facility to accept the material. .

Analysis as to whether or not project activities would:

a. Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board.

Impact Analysis:

The Project would have no wastewater treatment needs.

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☐ Less Than Significant Impact
☒ No Impact

b. Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects.

Impact Analysis:

The proposed activities would not require new wastewater treatment facilities. The Project would not increase or significantly change the amount of rainwater or runoff entering or leaving the Project site.

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☐ Less Than Significant Impact
☒ No Impact

c. Require or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects.

Impact Analysis:

The proposed activities would not require an expansion of existing facilities. Erosion control measures would be used to minimize onsite runoff (see Section 9).

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☐ Less Than Significant Impact
☒ No Impact

d. Have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed.

Impact Analysis:

No new or expanded water services would be required during or following remediation. Only minor amounts of water would be used for dust control during Project implementation.

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☐ Less Than Significant Impact
☒ No Impact

e. Result in determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the projects projected demand in addition to the providers existing commitments.

Impact Analysis:

The Project would have no wastewater treatment needs.

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☐ Less Than Significant Impact
☒ No Impact

f. Be served by a landfill with sufficient permitted capacity to accommodate the projects solid waste disposal needs.

Impact Analysis:

Excavated material would be transported off site to an appropriately permitted facility designed to manage the solid waste. For the two sites, approximately 11,100 cy of *in situ* material would be excavated, resulting in 14,430 cy of material be hauled offsite. The landfill selected would have sufficient permitted capacity to accommodate the material. Two facilities are under consideration. The current remaining capacity at Buttonwillow Landfill in Kern County is over 10 million cy. The Potrero Hills Landfill in Solano County is expanding its capacity from 21.5 million to 83.1 million cy.

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☒ Less Than Significant Impact
☐ No Impact

g. Comply with federal, state, and local statutes and regulations related to solid waste.

Impact Analysis:

The remediation activities would be conducted in accordance with federal, State, and local statutes and regulations related to solid waste.

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☐ Less Than Significant Impact
☒ No Impact

References Used:

1. AMEC (AMEC Environment and Infrastructure), 2012a. *Draft Feasibility Study/Remedial Action Plan (FS/RAP), Baker Beach Disturbed Area 1A, Presidio of San Francisco, San Francisco, California.* September
2. _____, 2012b. *Draft Feasibility Study/Remedial Action Plan (FS/RAP), Baker Beach Disturbed Area 2, Presidio of San Francisco, San Francisco, California.* September
3. NPS, 1994. Creating a Park for the 21st Century, from Military Post to National Park - Final General Management Plan Amendment, Presidio of San Francisco, Golden Gate National Park Recreation Area, California. July.

Mandatory Findings of Significance

Based on evidence provided in this Initial Study, DTSC makes the following findings:

a. The project ☐ has ☒ does not have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal, or eliminate important examples of the major periods of California history or prehistory.

b. The project ☐ has ☒ does not have impacts that are individually limited but cumulatively considerable. "Cumulatively considerable" means that the incremental effects of an individual project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects.

c. The project ☐ has ☒ does not have environmental effects that will cause substantial adverse effects on human beings, either directly or indirectly.

Determination of Appropriate Environmental Document:

Based on evidence provided in this Initial Study, DTSC makes the following determination:

☒ The proposed project COULD NOT HAVE a significant effect on the environment. A **Negative Declaration** will be prepared.

☐ The proposed project COULD HAVE a significant effect on the environment. However, there will not be a significant effect in this case because revisions in the project have been made by or agreed to by the project proponent. A **Mitigated Negative Declaration** will be prepared.

☐ The proposed project MAY HAVE a significant effect on the environment. An **Environmental Impact Report** is required.

☐ The proposed project MAY HAVE a "potentially significant impact" or "potentially significant unless mitigated" impact on the environment, but at least one effect 1) has been adequately analyzed in an earlier document pursuant to applicable legal standards, and 2) has been addressed by mitigation measures based on the earlier analysis as described on attached sheets. An **Environmental Impact Report** is required, but it must analyze only the effects that remain to be addressed.

☐ The proposed project COULD HAVE a significant effect on the environment. However, all potentially significant effects (a) have been analyzed adequately in an earlier Environmental Impact Report or Negative Declaration pursuant to applicable standards, and (b) have been avoided or mitigated pursuant to that earlier Environmental Impact Report or Negative Declaration, including revisions or mitigation measures that are imposed upon the proposed project. Therefore, nothing further is required.

Certification:

I hereby certify that the statements furnished above and in the attached exhibits, present the data and information required for this initial study evaluation to the best of my ability and that the facts, statements and information presented are true and correct to the best of my knowledge and belief.

Preparer's Signature	Date
Lori Koch	11/29/2012

Preparer's Name	Preparer's Title	Phone #
Lori Koch	Project Manager	(510) 540-3951

Branch or Unit Chief Signature	Date
	11/29/12

Branch or Unit Chief Name	Branch or Unit Chief Title	Phone #
Denise Tsuji	Unit Chief	(510) 540-3824

ATTACHMENT A: REFERENCES

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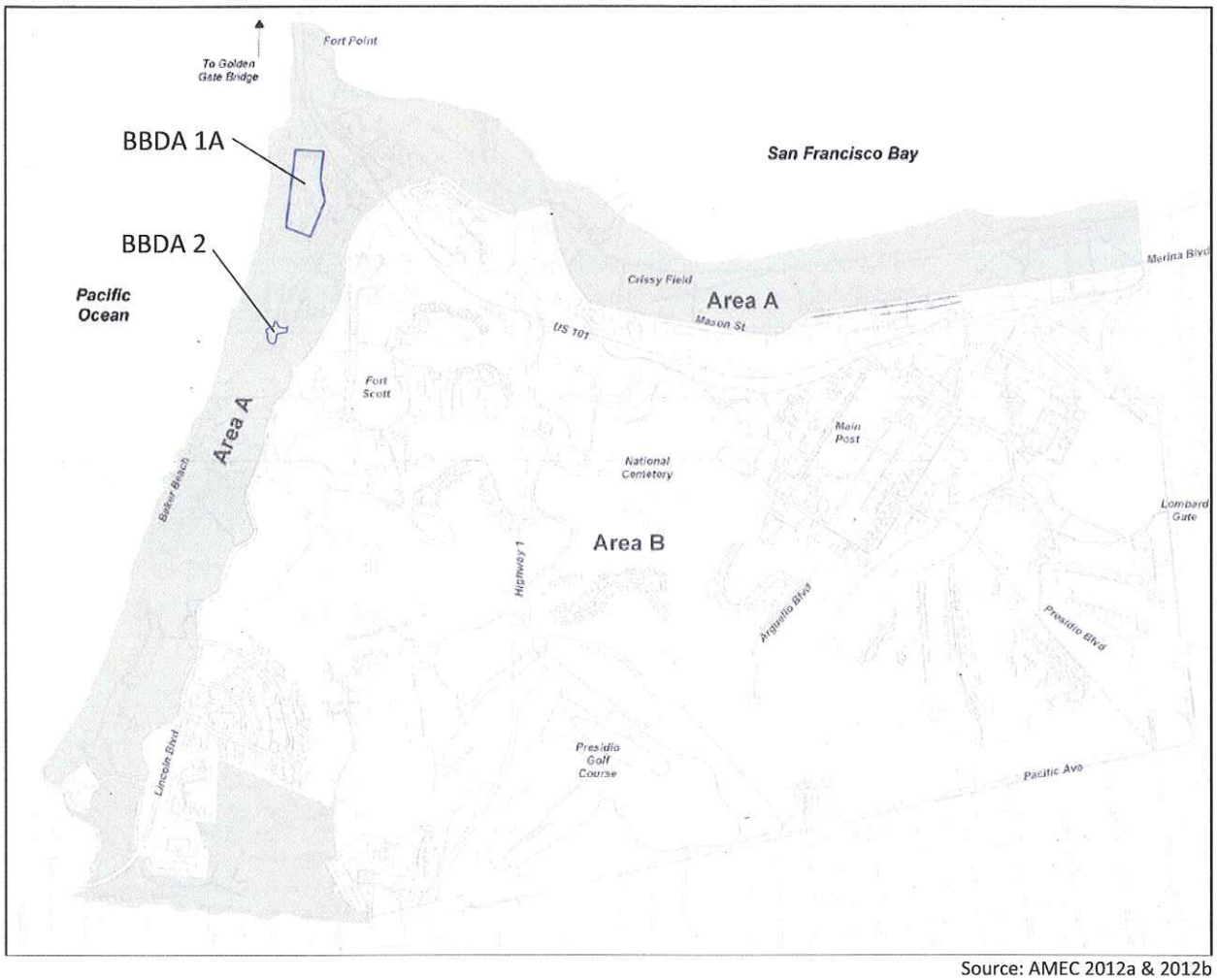
ATTACHMENT B: ABBREVIATIONS AND ACRONYMS

ACHP	Advisory Council on Historic Preservation
ADMP	asbestos dust management plan
AMEC	AMEC Environmental & Infrastructure, Inc.
ARARs	Applicable, Relevant and Appropriate Requirements
BAAQMD	Bay Area Air Quality Management District
BACTs	Best Available Control Technologies
BBDAs	Baker Beach Disturbed Areas
BMPs	Best Management Practices
BO	Biological Opinion
CARB	California Air Resources Board
CEQA	California Environmental Quality Act
CERCLA	Environmental Response, Compensation, and Liability Act
CH4	(CO2), methane
CNPS	California Native Plant Society
CO2	carbon dioxide
COCs	contaminated by chemicals of concern
CRI	cultural resource investigation
DTSC	Department of Toxic Substances Control
EIS/EIR	Environmental Impact Statement/Environmental Impact Report
EKI	Erler & Kalinowski, Inc
FHWA	Federal Highway Administration
FS/RAP	Feasibility Study/Remedial Action Plan
GGBHTD	Golden Gate Bridge Highway and Transportation District
GGNPC	Golden Gate National Parks Conservancy
GGNRA	Golden Gate National Recreation Area
GHG	greenhouse gas
GISO	General Industrial Safety Order
GMPA	General Management Plan Amendment
HSP	Health and Safety Plan
LOS	level of service
LUN	land use notification
MACTEC	MACTEC Engineering and Consulting
MSL	mean sea level
N2O	nitrous oxide
NAC	Noise Abatement Criterion
NAHC	Native American Heritage Commission
NHLD	National Historic Landmark District
NHPA	National Historic Preservation Act
NPDES	National Pollution Discharge Elimination System
NPS	National Park Service
NR	National Register
PA	programmatic agreement
PAHs	polynuclear aromatic hydrocarbons
PCBs	pesticides, polychlorinated biphenyls
PM10	particulate matter 10 microns or less in diameter
PM2.5	particulate matter less than 2.5 microns in diameter
PRGs	preliminary remediation goals
PTMP	Presidio Trust Management Plan
RAPs	Remedial Action Plans
RHAA	Royston, Hanamoto, Alley, and Abbey
SFCTA	San Francisco County Transportation Authority
SHPO	State Historic Preservation Office
SWPPP	Standard stormwater pollution prevention plan
TPH	total petroleum hydrocarbons
URS	URS Corporation
USFWS	U.S. Fish and Wildlife Service
VOCs	volatile organic compounds

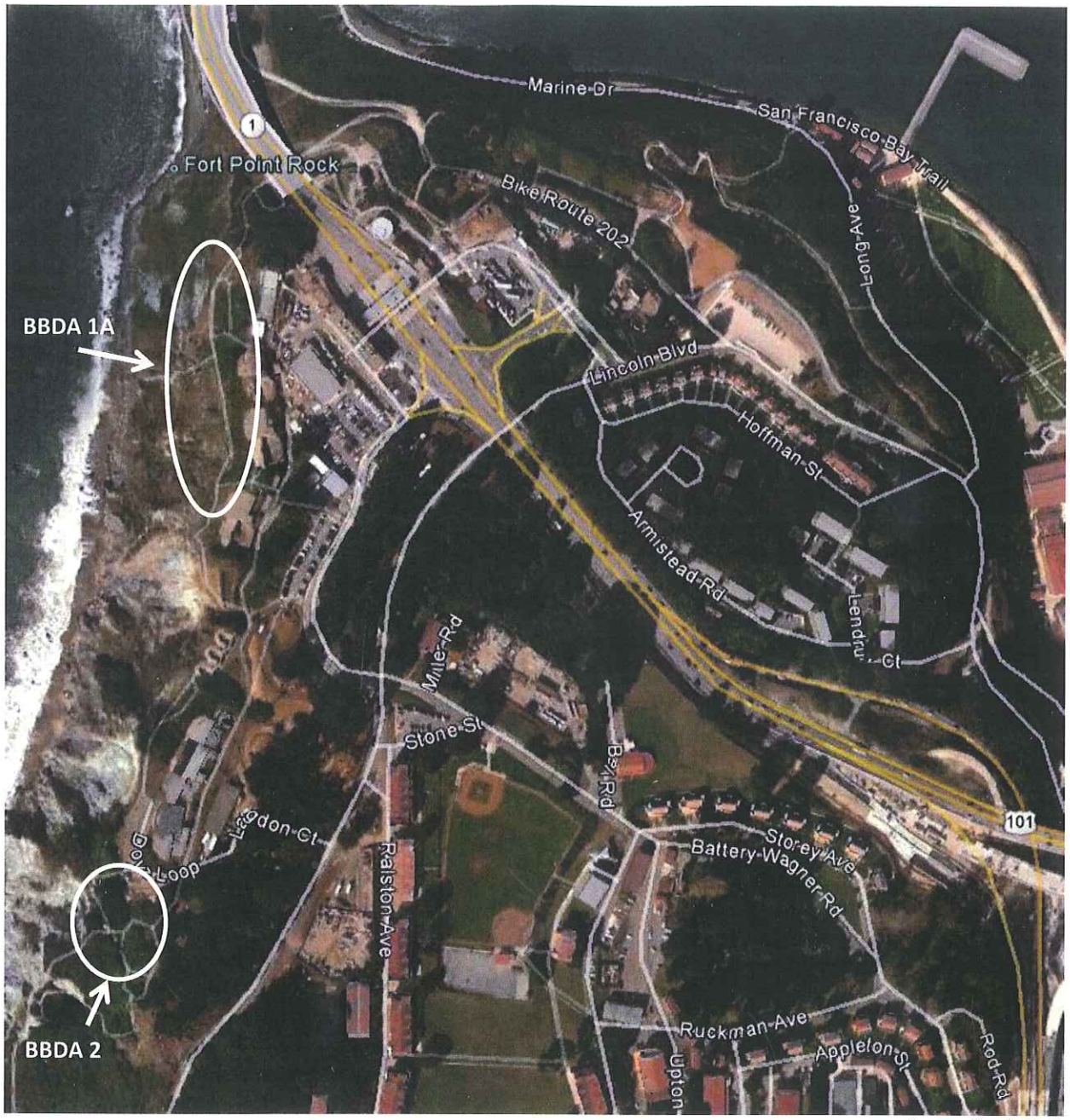
ATTACHMENT C: FIGURES

Appendix C: Figures



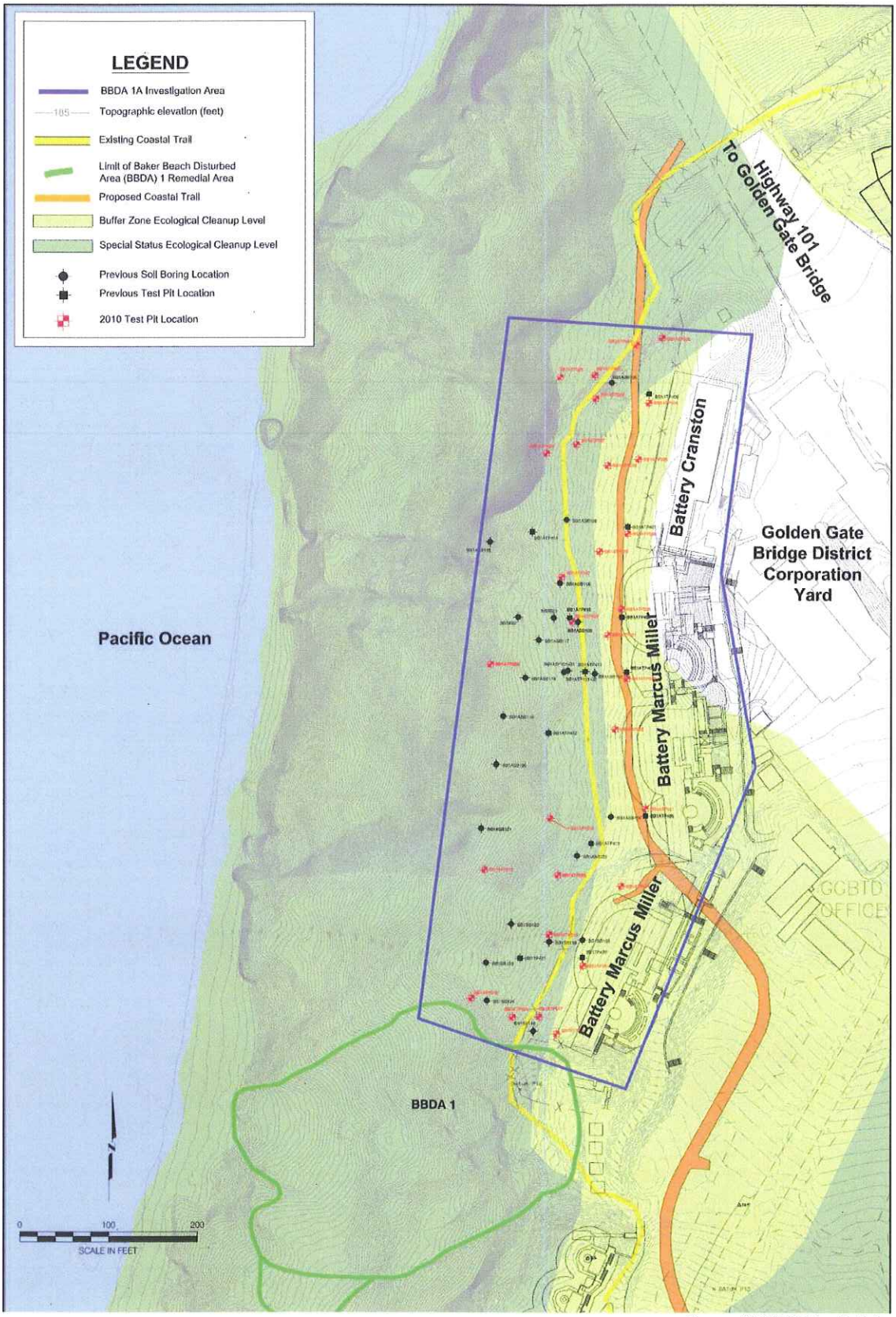
Source: AMEC 2012a & 2012b

Figure 1: Location of BBDA 1A and BBDA 2 Project Sites within the Presidio



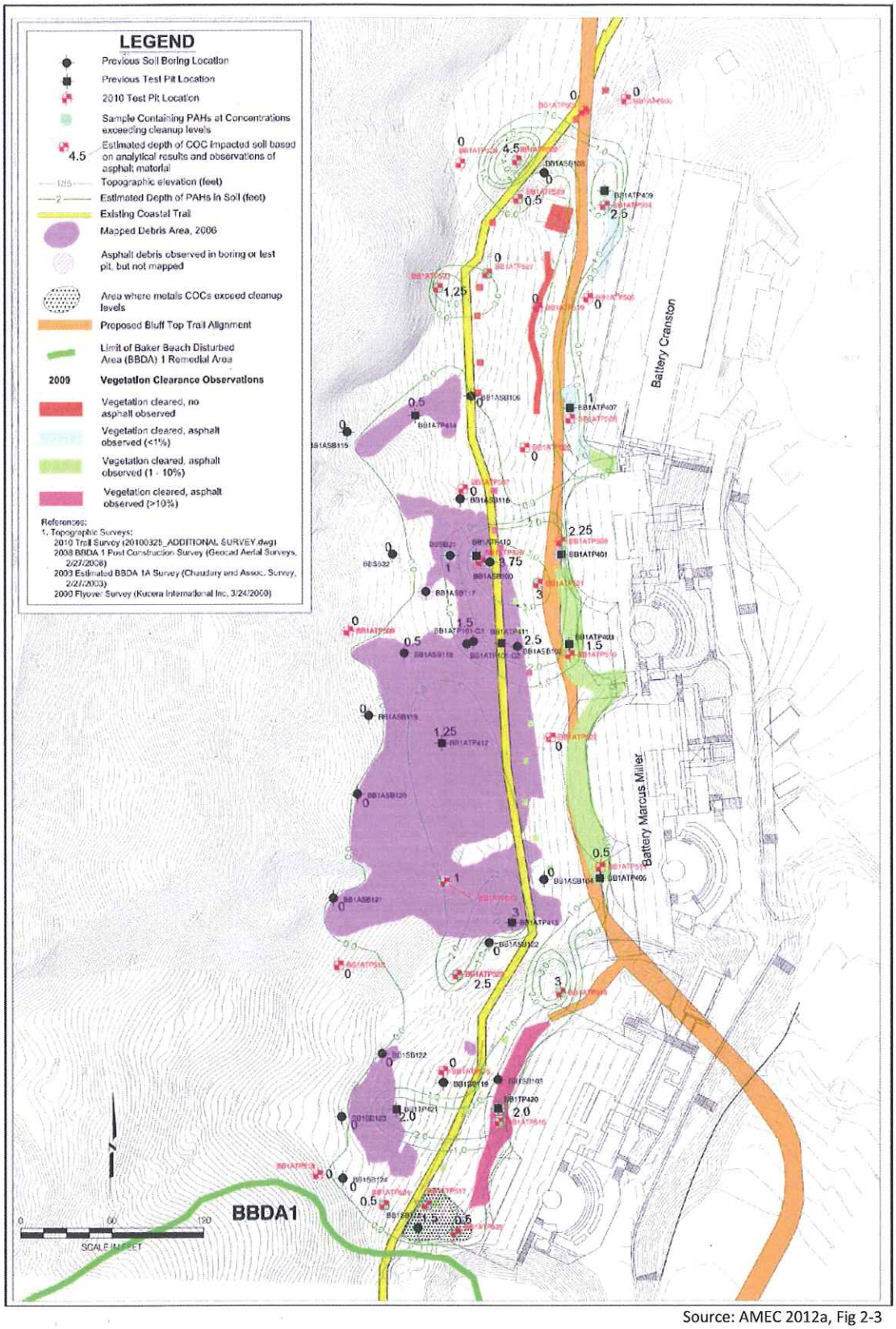
Source: Google Earth

Figure 2: Project Vicinity



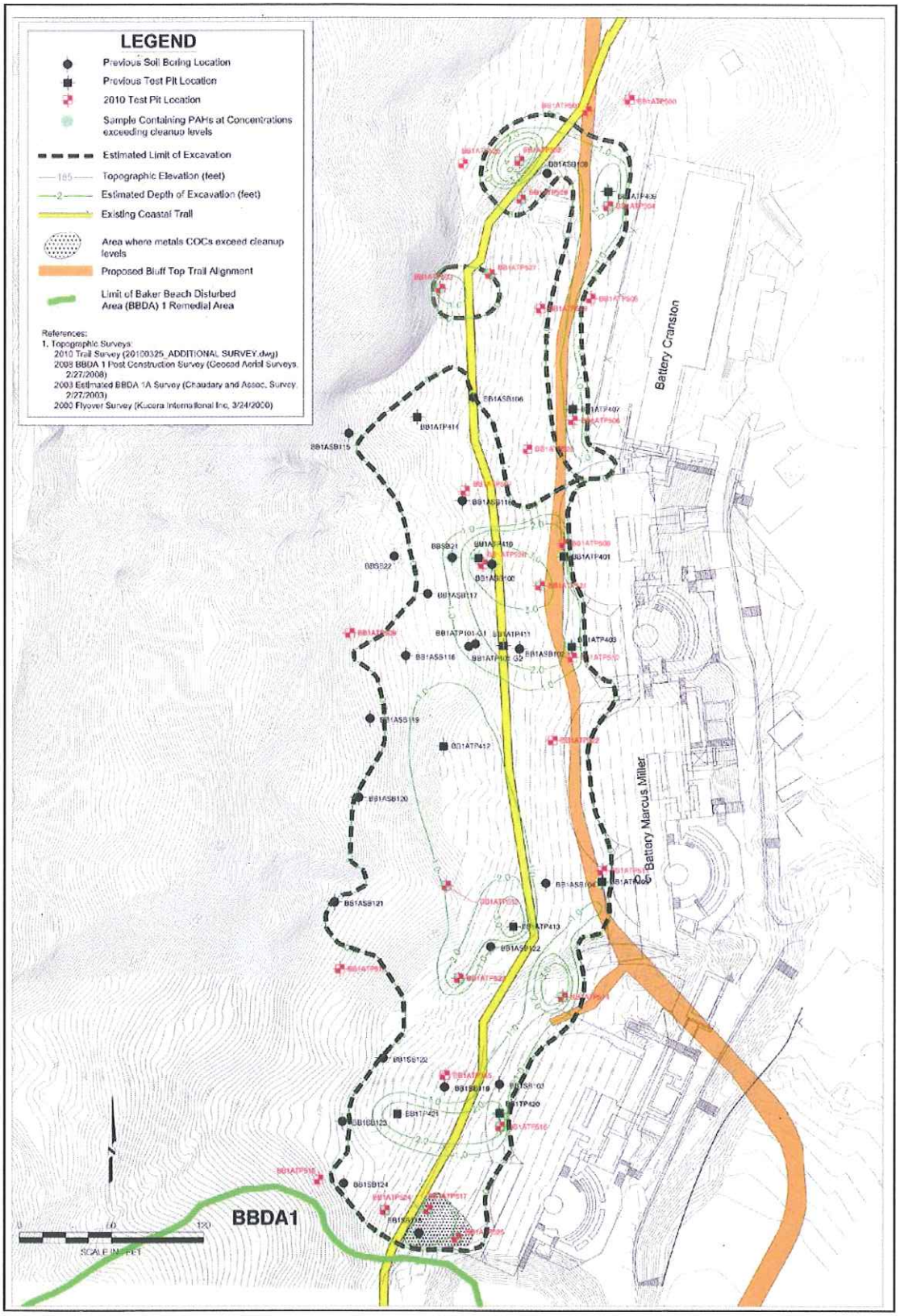
Source: AMEC 2012a, Fig 2-2

Figure 3a: BBDA 1A Sample Locations



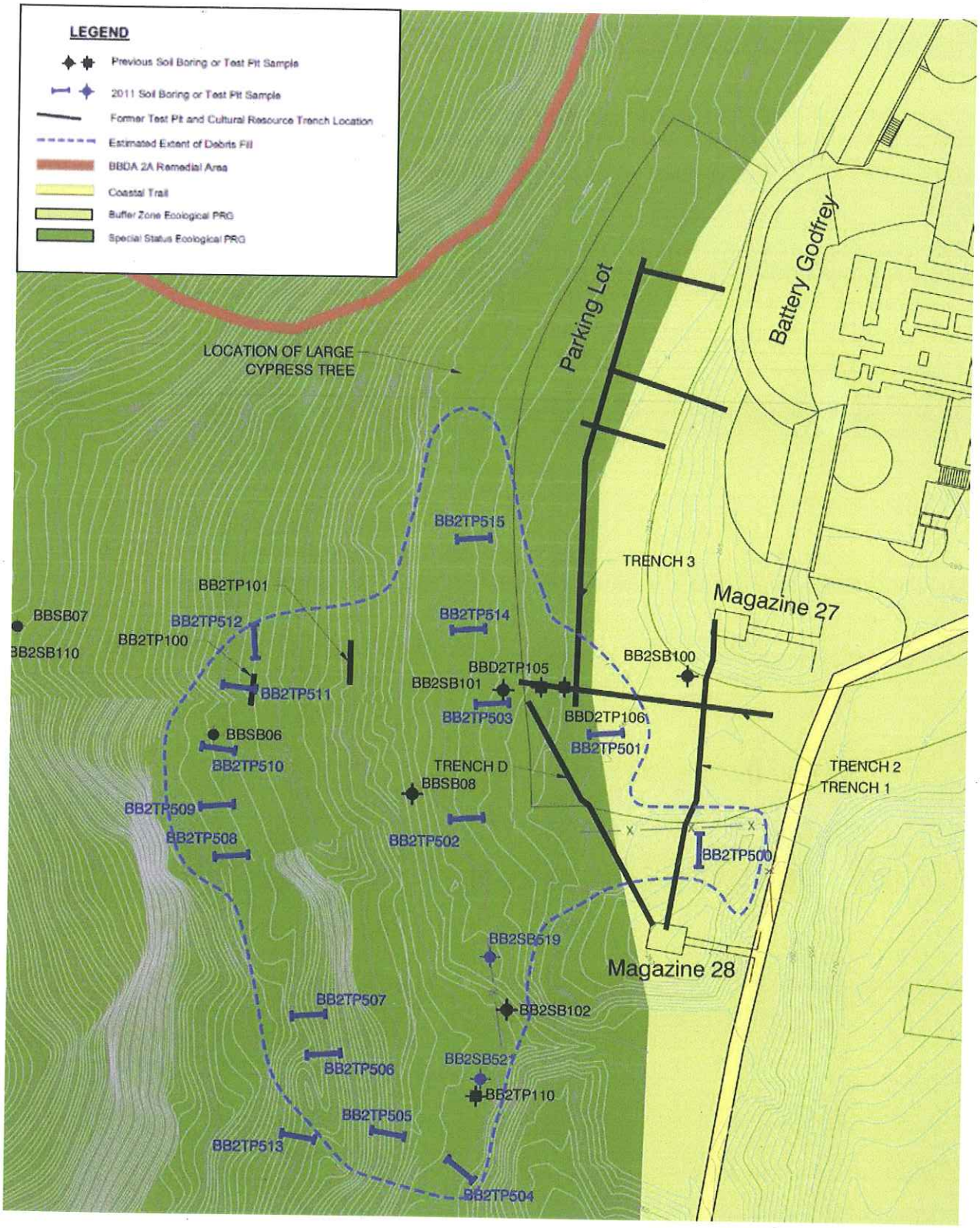
Source: AMEC 2012a, Fig 2-3

Figure 3b: Estimated Horizontal and Vertical Extent of Soil and Debris to be Removed at Site BBDA 1A



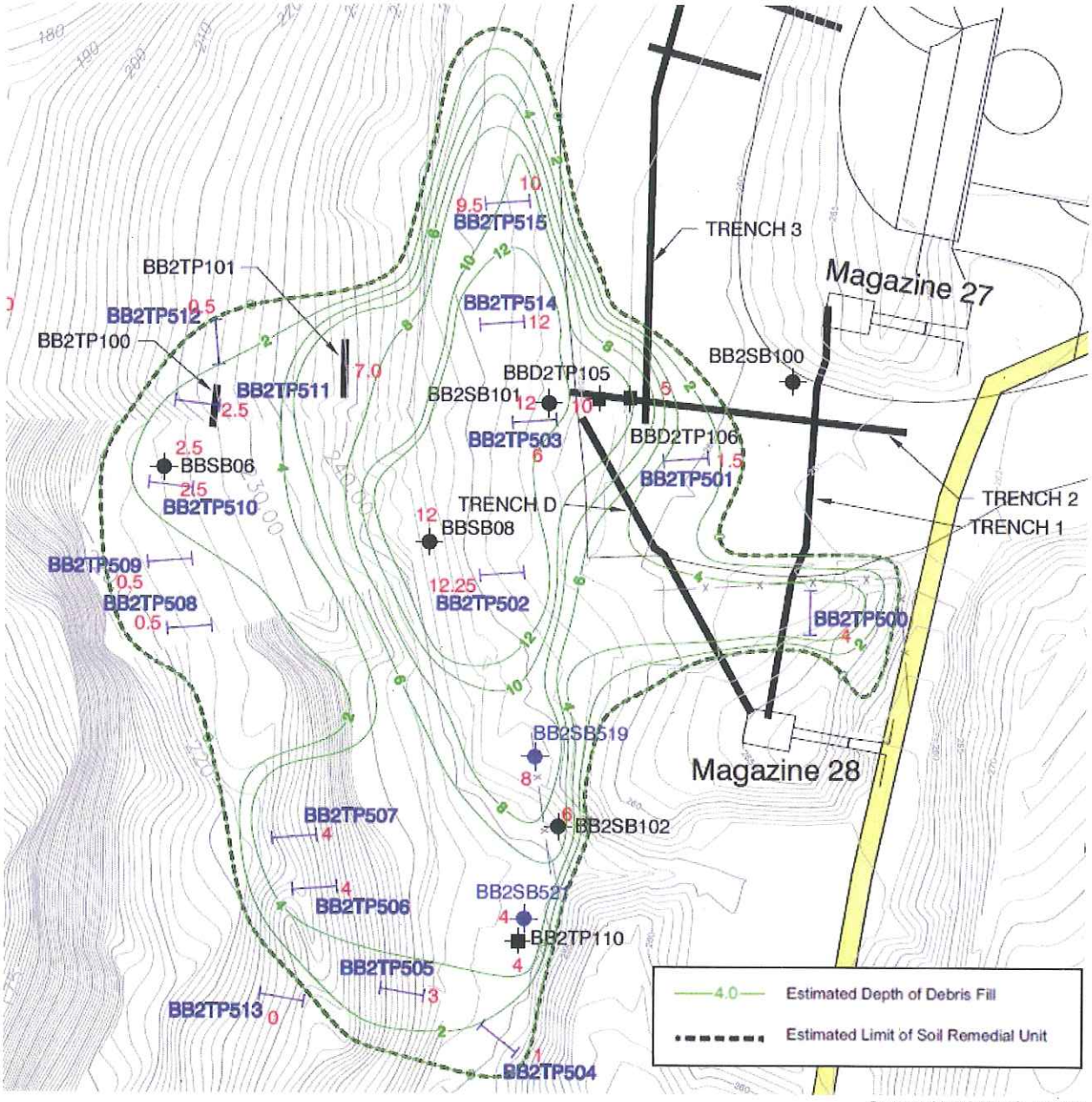
Source: AMEC 2012a, Fig 6-2

Figure 4: Preferred Remedial Alternative Site BBDA 1A (Excavation)



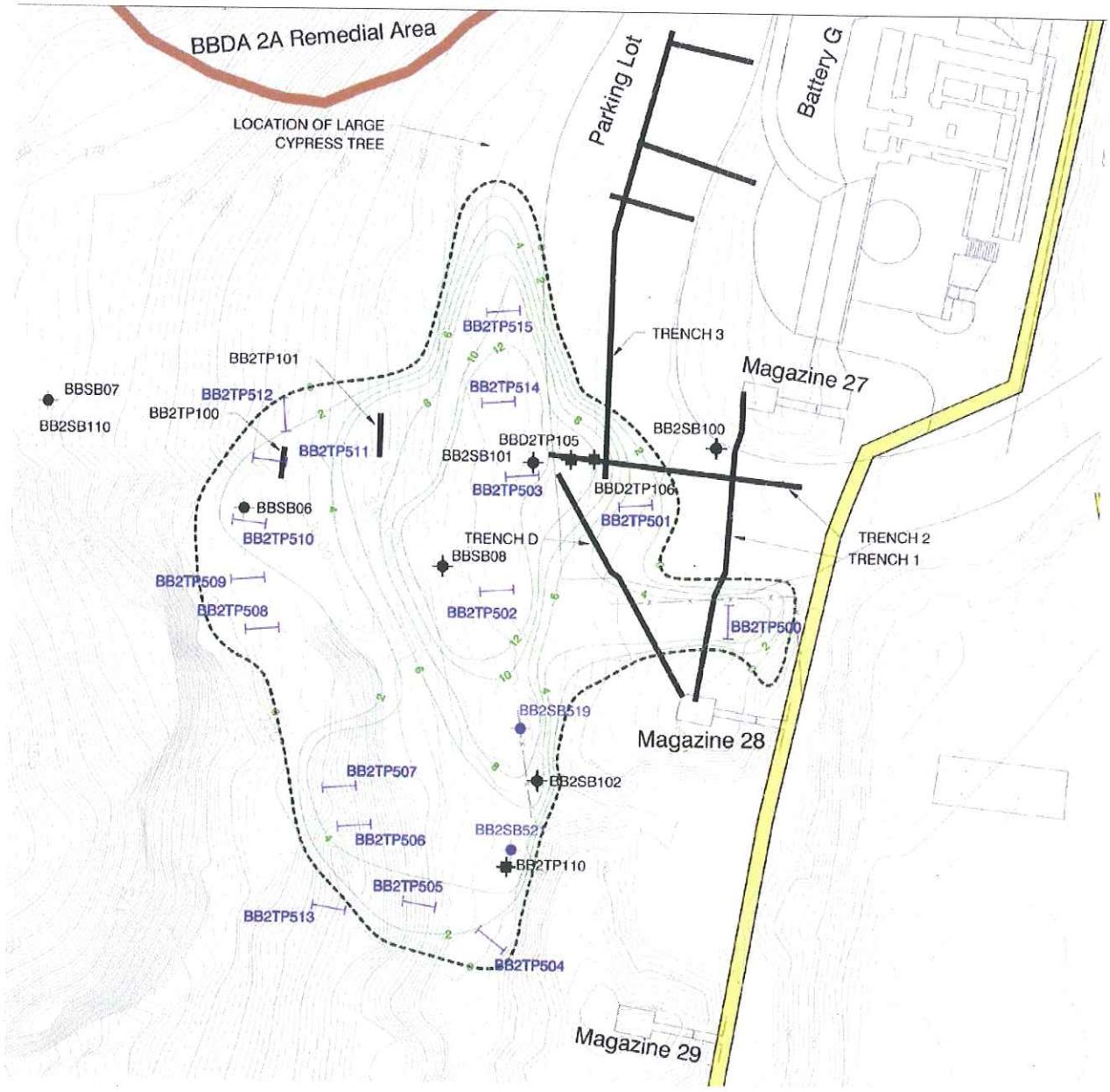
Source: AMEC 2012b, Fig 1-3

Figures 5a: BBDA 2 Sample Locations



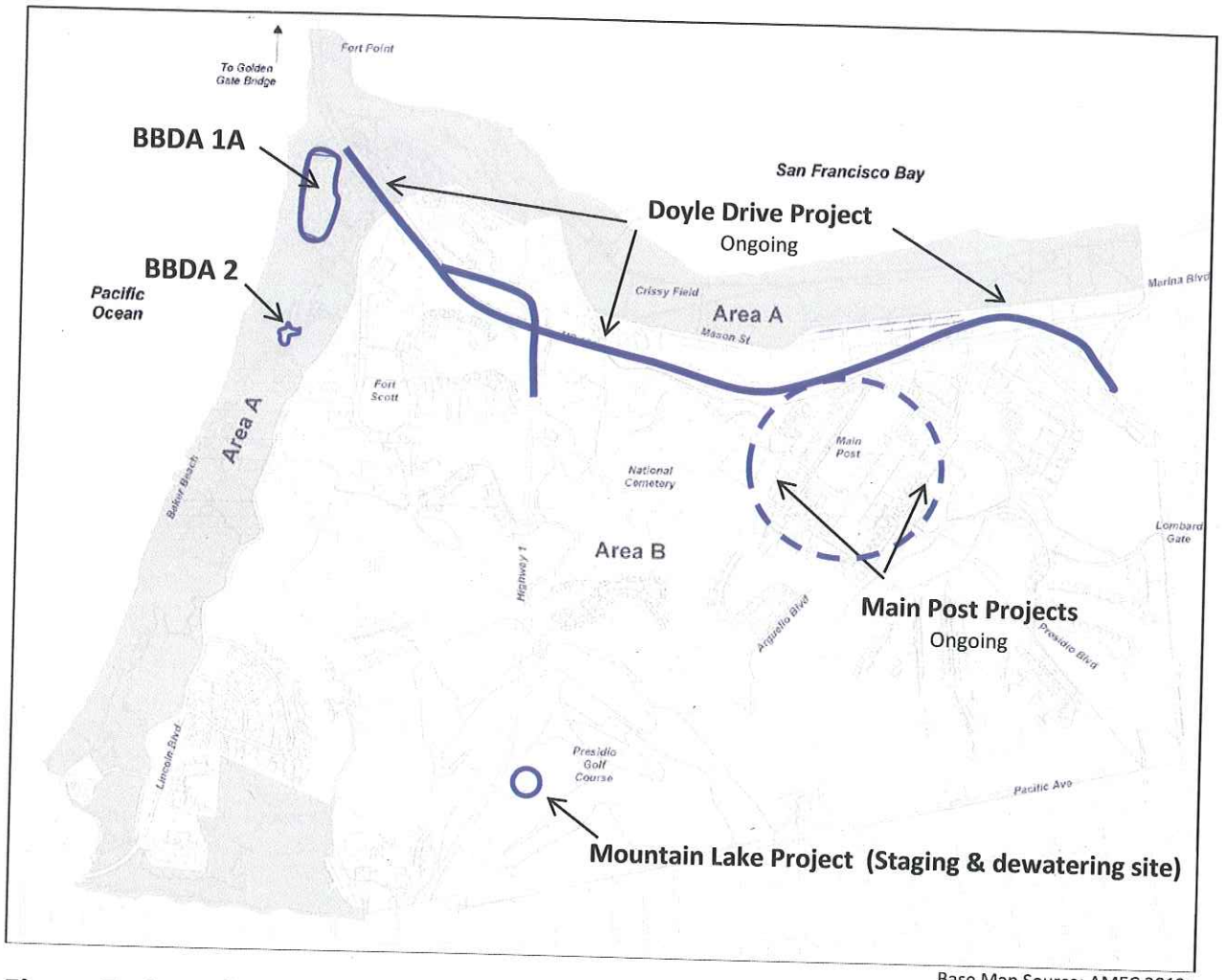
Source: AMEC 2012b, Fig 3-2

Figure 5b: Estimated Horizontal and Vertical Extent of Soil and Debris to be Removed at Site BBDA 2



Source: AMEC 2011b, Fig 6-1

Figure 6: Preferred Remedial Alternative Site BBDA 2 (Excavation)



Base Map Source: AMEC 2012a

Figure 7: Cumulative Projects 2013

APPENDIX I

Responsiveness Summary (provided in the Final FS/RAP)