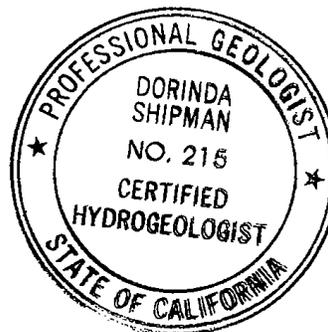

**FEASIBILITY ASSESSMENT
FOR EVALUATING AREAS WITH
RESIDENTIAL LAND USE RESTRICTIONS,
PARCEL G,
HUNTERS POINT NAVAL SHIPYARD
San Francisco, California**

Prepared For:
**Office of Community Investment and Infrastructure
City and County of San Francisco**

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ACRONYMS AND ABBREVIATIONS

Acronym	Definition
AOC	Area of Concern
ARAR	Applicable or relevant and appropriate requirements
bgs	Below ground surface
BOC	Boring of Concern
BRAC	Base Realignment and Closure
CDPH	California Department of Public Health
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
ChaduxTt	A joint venture of St. George Chadux and Tetra Tech EM Inc.
COC	Chemical of concern
COPC	Chemical of potential concern
DTSC	California Environmental Protection Agency Department of Toxic Substances Control
EPA	United States Environmental Protection Agency
EPC	Exposure point concentration
ERRG	Engineering/Remediation Resources Group, Inc.
ESD	Explanation of Significant Differences
FEIR	Final Environmental Impact Report
FFA	Federal Facility Agreement
FS	Feasibility Study
GRA	General Response Action
HHRA	Human Health Risk Assessment
HPAL	Hunters Point Ambient Level
HPNS	Hunters Point Naval Shipyard
IC	Institutional control
ICP-AES	Inductively coupled plasma atomic emission spectroscopy
IR	Installation Restoration

ACRONYMS AND ABBREVIATIONS (CONTINUED)

Acronym	Definition
ITSI	Innovative Technical Solutions, Inc.
LUC	Land Use Control
Navy	United States Department of the Navy
NCP	National Contingency Plan
NPL	National Priorities List
OCII	Office of Community Investment and Infrastructure
PAH	Polycyclic aromatic hydrocarbons
PCB	Polychlorinated biphenyl
QA/QC	Quality control/quality assurance
RACR	Remedial Action Completion Report
RAO	Remedial Action Objective
RBC	Risk-based concentration
RD	Remedial Design
RG	Remediation Goal
RME	Reasonable Maximum Exposure
ROD	Record of Decision
RSL	Regional Screening Level
Sealaska	Sealaska Environmental Services, LLC
SFRA	San Francisco Redevelopment Agency
SI	Site Inspection
SulTech	A joint venture of Sullivan Consulting Group and Tetra Tech EM Inc.
SVOC	Semi-volatile organic compounds
TtEC	Tetra Tech EC, Inc.
VOC	Volatile organic compounds
Water Board	California Regional Water Quality Control Board, San Francisco Bay Region

**FEASIBILITY ASSESSMENT FOR
EVALUATING AREAS WITH RESIDENTIAL LAND USE RESTRICTIONS, PARCEL G
Hunters Point Naval Shipyard
San Francisco, California**

EXECUTIVE SUMMARY

This Feasibility Assessment for Evaluating Areas with Residential Land Use Restrictions (Feasibility Assessment) was prepared to evaluate areas with residential land use restrictions at Parcel G of the former Hunters Point Naval Shipyard (HPNS). The current Redevelopment Plan adopted by the Office of Community Investment and Infrastructure (OCII) as the Successor Agency to the San Francisco Redevelopment Agency (SFRA) designates a mixture of uses, including residential uses, on Parcel G. The technical evaluation in this Feasibility Assessment supports modifications to the areas subject to residential land use restrictions in order to implement the Redevelopment Plan.

This Feasibility Assessment identifies residential Action Levels for chemicals of concern (COCs) in soil as the appropriate levels for identifying areas of Parcel G where current conditions are suitable for residential land use. Based on the technical evaluation provided, this Feasibility Assessment proposes reducing the area currently restricted against residential use in areas where COCs in soil do not exceed the identified residential Action Levels. According to this proposal, the residential land use restriction established in the Final Record of Decision (ROD) would no longer apply. Areas with COCs above residential Action Levels remain restricted against residential use as shown on Figure 8. Modifications to the areas subject to residential land use restrictions will be documented in a separate Explanation of Significant Differences (ESD) to the ROD for Parcel G to be prepared by the United States Department of the Navy (Navy).

To evaluate whether environmental conditions at Parcel G are suitable for residential land use, this Feasibility Assessment identifies Action Levels for comparison to COC concentrations in soil. The Feasibility Assessment identifies residential soil Screening Levels based on the United States Environmental Protection Agency (EPA) Regional Screening Levels (RSLs, 2016), the California Environmental Protection Agency Department of Toxic Substances Control (DTSC) risk-based concentration (RBC) for lead (2011), and Hunters Point Ambient Levels (HPALs) for metals (PRC, 1995). Consistent with soil remedies established at HPNS since 2012, which rely on Action Levels based on five to 10 times remediation goals (RGs) to identify areas requiring excavation, this Feasibility Assessment derives Action Levels by multiplying the health

protective EPA RSLs and the DTSC lead RBC by five; if these levels are below the HPAL, then the HPAL is the Action Level. COCs evaluated in this Feasibility Assessment include: 1) metals, 2) semi-volatile organic compounds (SVOCs), including polycyclic aromatic hydrocarbons (PAHs) and pesticides, 3) polychlorinated biphenyls (PCBs), and 4) volatile organic compounds (VOCs). The technical analysis described by this Feasibility Assessment concludes that the following specific COCs exceed residential soil Action Levels in specific delineated locations (Figure 8): 1) metals, including arsenic, hexavalent chromium, cobalt, lead, and manganese; and 2) PAHs, including benzo(a)anthracene, benzo(a)pyrene, and benzo(b)fluoranthene.

The risk-based approach for developing residential Action Levels is described in Section 3.1.1 of this Feasibility Assessment. For the majority of COCs at Parcel G, residential soil Action Levels are chemical concentrations that generally correspond to a five-in-one million [5×10^{-6}] cancer risk or a non-carcinogenic hazard quotient of five. Following the Navy's accepted risk assessment practices these cancer risks and hazard quotients do not consider the protection provided by several measures already agreed to, such as the durable cover. The cancer risk level that corresponds to residential soil Action Levels (5×10^{-6}) is below the upper bound of the cancer risk management range of 10^{-4} as defined by the National Contingency Plan (NCP). This Feasibility Assessment considered the cumulative impacts of multiple COCs acting on the same organ group.

This Feasibility Assessment evaluated two hypothetical soil excavation alternatives to provide a comparison between: (1) excavation and disposal of soil with COC concentrations above residential Screening Levels; and (2) excavation and disposal of soil with COC concentrations above residential Action Levels. The two hypothetical soil excavation alternatives are based on the ROD Selected Soil Remedy (Soil Alternative S-5), which includes excavation, disposal, covers, and ICs. While both hypothetical soil alternatives are found to be protective of human health under the residential land use scenario, excavation and disposal of soil with COC concentrations above residential Action Levels rates higher based on the results of the comparative cost assessment.

This Feasibility Assessment recommends that areas containing COCs in soil above Action Levels be subject to residential land use restrictions. Figure 8 depicts the areas recommended to remain restricted against residential use. All other areas on Parcel G were evaluated in the Feasibility Assessment and determined to no longer need a restriction against residential use as long as features of the ROD Selected Remedy (e.g., durable cover and ICs with an operation and maintenance plan) remain in place throughout Parcel G.

1.0 INTRODUCTION

Parcel G is a portion of the former HPNS, a Superfund site undergoing remediation in accordance with a Federal Facility Agreement (FFA) between the Navy, EPA, and the State of California through the DTSC and California Regional Water Quality Control Board, San Francisco Bay Region (Water Board). The Final ROD for Parcel G at HPNS was signed on February 18, 2009. The Final ROD based future land use assumptions on the SFRA's 1997 Redevelopment Plan. Under the 1997 Redevelopment Plan, the assumed land uses in Parcel G were residential, industrial or recreational depending on the redevelopment block within the Parcel, with only a portion of Parcel G identified for potential residential use. The Final ROD placed land use restrictions on Parcel G corresponding to those assumed uses without determining, on the basis of available data, whether more sensitive uses would be permissible.

The SFRA amended its 1997 Redevelopment Plan in 2010. The 2010 Redevelopment Plan allows for a mixed-use development (e.g., residential, commercial, retail, institutional, recreational, and open space) throughout the entire Parcel, provided the use is consistent with any land use restrictions imposed on the property through the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) process. Currently, the Final ROD restricts residential use throughout the majority of Parcel G. The City and County of San Francisco's OCII has prepared this Feasibility Assessment to provide a technical basis by which the current boundaries of the residential land use restrictions can be reduced without posing a substantial risk to human health. For purposes of the Feasibility Assessment, the term "residential land use" encompasses the following uses: a. residences, including any mobile homes or factory-built housing, constructed or installed for use as residential human habitation; b. hospitals for humans; c. schools for persons under 21 years of age; and/or d. day care facilities for children.

1.1 Purpose

The purpose of the Feasibility Assessment is to update and refine previous analyses on Parcel G by applying the most updated information about proposed land uses in light of remediated soil conditions. This Feasibility Assessment identifies health-protective residential Screening and Action Levels for COCs in soil to support residential land use in Parcel G. COCs in soil include dispersed ubiquitous metals¹ and isolated concentrations of lead, chromium VI, and organics. To develop land use recommendations, this Feasibility Assessment focuses the list of COCs for those chemicals present at concentrations that exceed soil Screening Levels established by the EPA and DTSC by a multiplication factor of five (Action Levels). Soil areas that may pose risk to human health (i.e., soil with COC concentrations above Action Levels) are recommended to remain restricted against residential use. The remaining soil areas that pose a lower risk to human health (i.e., soil with COC concentrations below Action Levels) will rely on the protectiveness of the durable cover and ICs and are considered safe for residential land use.

1.2 Document Organization

The document consists of the following sections:

- Section 1.0 introduces the Feasibility Assessment and describes the purpose.
- Section 2.0 presents Parcel G background information, describes future land use, summarizes risks for soil, describes the soil remedial action alternatives previously evaluated, ROD Selected Soil Remedy, remediation completed, and memorializes the discussions during the FFA signatory meeting that resulted in preparing this Feasibility Assessment.
- Section 3.0 identifies residential Screening and Action Levels.

¹ Consistent with usage in the Final ROD for Parcel G, this Feasibility Assessment uses the term “ubiquitous metals” to refer to naturally occurring metals in source material used to create HPNS. The Final ROD for Parcel G further clarifies, “The term “ubiquitous” refers to metals that are naturally occurring or are in the same concentration ranges as naturally occurring metals in the source material (including material from the same geologic formations in the San Francisco area) used for filling operations at HPS. The Navy acknowledges that industrial sources of metals exist at HPS and that there is a potential that some concentrations of metals could have sources other than naturally occurring materials. The Navy has worked to remove these sources during the response actions taken to date. The Navy further acknowledges that the regulatory agencies do not agree with the Navy’s position that ubiquitous metals are naturally occurring.”

- Section 4.0 provides a comparative analysis of residential Screening and Action Levels based on the hypothetical cost of soil excavation and disposal for COC concentrations above applicable levels, and presents a detailed analysis of the soil remedy considering the NCP threshold and balancing criteria.
- Section 5.0 evaluates modifications to areas requiring land use restrictions.
- Section 6.0 presents conclusions and recommendations.
- Section 7.0 lists the references cited in this Feasibility Assessment.

2.0 BACKGROUND

Former HPNS is located in southeastern San Francisco, California, on a peninsula that extends east into San Francisco Bay (Figure 1). The Navy significantly expanded HPNS between 1935 and 1975 to its present configuration by depositing fill into the San Francisco Bay to increase the land area (which included Parcel G) from less than 100 acres to about 500 acres. Borrowed fill material was obtained from a variety of sources, including serpentine bedrock, which naturally contain relatively high levels of arsenic, manganese, nickel, and other metals derived from upland areas at HPNS (Navy, 2009).

HPNS was placed on the EPA National Priorities List (NPL) under CERCLA in 1989. The Navy implements the Defense Environmental Restoration Program subject to, and in a manner consistent with, CERCLA and its regulations (the NCP at Title 40 of the Code of Federal Regulations [CFR] Part 300). In September 1990, EPA Region 9, DTSC, the Water Board, and the Navy signed the FFA for HPNS (Navy, 1990), which documents how the Navy intends to meet and implement CERCLA in partnership with EPA, DTSC, and the Water Board. A portion of HPNS (former Parcels A, D-2, UC-1, and UC-2) has been conveyed out of federal ownership. The remainder of HPNS is currently divided into 10 parcels (Figure 2). In accordance with the Final ROD for each parcel, the Navy is responsible for implementing environmental cleanup activities to provide for protection of human health and the environment.

Historically, Parcel G was part of the industrial support area at HPNS and was used for shipping, ship repair, and office and commercial activities. Parcel G was previously a portion of Parcel D, which was later split into Parcels D-1, D-2, G, and UC-1. Parcel G includes approximately 40 acres in the central part of HPNS and is bounded by Parcels UC-1 and UC-2 to the north, Parcels C and D-1 to the east, Parcels D-1 and E to the south, and Parcels E and UC-1 to the

west (Figure 2). Parcel G includes Installation Restoration (IR) Sites 9, 33, 34, 36, 37, 44, 65, 66, 67, and 71. Portions of basewide IR Site 50 (storm drain and sanitary sewer lines), IR Site 51 (former transformer locations), and site inspection (SI) site SI-45 (steam lines) are also within Parcel G.

Contamination at Parcel G is associated with dispersed ubiquitous metals and isolated concentrations of chromium VI, lead, and organics in soil, chromium VI and VOCs in groundwater, and radiologically impacted structures and soil. Assessment of contamination and risk for Parcel G is based on the Final Revised Feasibility Study (FS) for Parcel D, (November 30, 2007) including the revised baseline human health risk assessment (HHRA), and the radiological addendum to the FS. The nature of contaminants in soil and groundwater at Parcel G can mostly be attributed to industrial activities by the Navy or other tenants, except for several metals found at ambient concentrations (SulTech, 2007).

2.1 Future Land Use

The original 1997 redevelopment plan by the former SFRA divided then-Parcel D, which now includes Parcel G, into reuse areas. The reuse areas included educational/cultural, mixed use including residential use, open space, and industrial reuse. The remedy documented in the Final ROD for Parcel G (Navy, 2009) was developed based on land uses defined in the former SFRA's 1997 redevelopment plan. The reuses defined in the SFRA's 1997 redevelopment plan were evaluated in the Final ROD by the following land use receptor exposure scenarios: residential (mixed-use redevelopment blocks), industrial (industrial and educational/cultural redevelopment blocks), and recreational (open space redevelopment block).

In 2010, after many years of community-based planning, the former SFRA and the City and County of San Francisco certified the Final Environmental Impact Report (FEIR) and approved the amendment to the 1997 redevelopment plan for Phase 2 of HPNS, together with Candlestick Point (the "CP-HPS Phase 2 Project"). The 2010 redevelopment plan identified Parcel G within the Shipyard South Multi-Use district and allows a variety of uses including athletic and recreational, office, industrial, retail, residential, and institutional (SFRA, 2010). The northwest corner of Parcel G as defined in the 1997 redevelopment plan and as outlined in the Final ROD is already approved for residential use (Figure 3).

The 2010 redevelopment plan does not introduce any exposure scenarios different from those taken into account by the CERCLA technical analysis that supported selection of the remedy in the Final ROD, though the 2010 redevelopment plan extends the mixed use designation to the entire area within Parcel G. However, because the Navy tailored its remedy to fit the 1997

redevelopment plan, the remedy limits residential reuse to the mixed-use area in the 1997 redevelopment plan (Figure 3). The Final ROD and the Land Use Control Remedial Design (LUC RD; ChaduxTt, 2010) call for enforcement of ICs, through deed restrictions and a covenant to restrict use of property, that restrict residential use outside the 1997 mixed use area unless approved by the FFA Signatories.

The Final ROD provides for modifying the areas that require residential land use restrictions with review and approval by the FFA signatories. To identify additional areas that are suitable for residential land use and facilitate implementation of the 2010 Redevelopment Plan, this Feasibility Assessment develops and evaluates levels of COCs in soil that would allow for residential use and recommends modifications to the areas that require residential land use restrictions.

2.2 Soil Risks

The Navy has conducted extensive soil investigations within Parcel G. Over 850 soil samples were collected and over 50 chemical analytical methods were used to characterize soil at Parcel G (Appendix A, Figures A1 to A5). The Navy's baseline HHRA (SulTech, 2007) evaluated the potential risks to human health posed by the presence of chemical constituents in soil in Parcel G. The baseline HHRA evaluated residential, industrial, recreational, and construction worker risks throughout Parcel G, regardless of the planned reuse.

Chemicals identified by the baseline HHRA as exceeding cancer or non-cancer risk thresholds for residential use, include metals, SVOCs, PAHs, pesticides, and PCBs.

Post-HHRA, the extent of contaminated soil at Parcel G was reduced through a series of soil removal actions (Figure A 6):

- The ROD Selected Soil Remedy included removing approximately 168 cubic yards of soil in areas where concentrations of lead or PAHs exceeded industrial RGs and disposing of soil at an off-site facility (ERRG, 2011).
- The ROD Selected Radiological Remedy included excavating 23,166 linear feet of radiologically impacted storm drain and sanitary sewer lines and removing approximately 50,688 cubic yards of surrounding soil to achieve the removal action cleanup objectives (TtEC, 2011). Approximately 2,828 cubic yards of soil was disposed of off-site as low-level radioactive waste (LLRW).

- Under the Petroleum Program, approximately 520 cubic yards of soil were removed at Areas of Concern (AOCs) 33-A, AOC 33-B, AOC 33-C and AOC 65-A and Boring of Concern (BOC) IR34B023, where COCs in soil exceeded screening criteria (ITSI, 2012).

2.3 Soil Remedy

The Navy has completed the soil remedy called for by the Final ROD, with the exception of implementing post-transfer ICs. The soil remedial action alternatives previously evaluated, ROD Selected Soil Remedy, and remedy completed are summarized below.

2.3.1 Soil Remedial Action Alternatives Previously Evaluated

To address contamination in soil, preliminary screening of General Response Actions (GRAs) and process options was completed to refine the remedy selection process, as detailed in the Revised FS. The remedial action objectives (RAOs) were developed based on the planned future land use in each redevelopment block. Five soil remedial approaches were retained as preliminary remedial alternatives and were evaluated with respect to implementability, effectiveness, and relative cost (high/moderate/low). Detailed cost analysis was not performed as part of this preliminary screening.

Five remedial alternatives for soil were retained for a detailed comparative analysis in accordance with the NCP:

1. Alternative S-1: no action
2. Alternative S-2: ICs and maintained landscaping
3. Alternative S-3: excavation, disposal, maintained landscaping, and ICs
4. Alternative S-4: covers and ICs
5. Alternative S-5: excavation, disposal, covers, and ICs.

The detailed analysis presented in the Revised FS considered the following NCP criteria.

NCP Threshold Criteria:

1. overall protection of human health and the environment and
2. compliance with applicable or relevant and appropriate requirements (ARARs).

NCP Balancing Criteria:

3. long-term effectiveness and permanence,
4. reduction of mobility, toxicity, or volume through treatment,

5. short-term effectiveness,
6. implementability, and
7. cost.

NCP Modifying Criteria:

8. regulatory agency acceptance and
9. community acceptance.

The ROD Selected Remedy for soil is Alternative S-5: excavation, disposal, covers, and ICs. As described in the Final ROD for Parcel G, the Selected Soil Remedy meets the two threshold criteria and is the highest rated alternative for long-term effectiveness and permanence, short-term effectiveness, implementability, state acceptance, and community acceptance. The ROD Selected Soil Remedy is the most expensive alternative. While no change in the ROD Selected Soil Remedy is proposed, this Feasibility Assessment provides an updated evaluation and refinement of the ROD Selected Soil Remedy considering the NCP threshold and balancing criteria, specifically evaluating proposed levels of COCs in soil that would allow for residential use (Section 4.3) and identifying areas of Parcel G that meet those criteria.

2.3.2 ROD Selected Soil Remedy

The Navy, EPA, DTSC, and the Water Board jointly selected the non-radiological soil remedy (Alternative S-5) for Parcel G as defined in the Final ROD. The ROD Selected Soil Remedy included excavation and off-site disposal of soil in areas where COC concentrations exceeded industrial RGs, followed by installation of durable covers across all of Parcel G. Durable covers were installed to act as physical barriers to cut off potential exposure to any residual risks from residual COCs remaining in soil. Excavations targeted soil contaminated with lead or PAH concentrations that exceeded industrial RGs. The remedy for soil incorporated removal and off-site disposal of two soil stockpiles. The remedy also included a soil vapor survey and ICs. ICs include activity and residential land use restrictions, areas that require engineering controls for VOC vapors, and maintenance of the durable cover.

The Final ROD established RAOs based on attainment of regulatory requirements, standards, and guidance; contaminated media (COCs); potential receptors and exposure scenarios; and human health and ecological risks. Planned future land use is an important component in developing RAOs, and the RAOs for Parcel G are based on the former SFRA's 1997 reuse plan. In 2007, the former SFRA and its developer began environmental review of a proposed new development for HPNS. By the time the Final ROD was approved, the former SFRA was in the

process of finalizing a new redevelopment plan (SFRA, 2010). The Final ROD addressed future land use changes, stating that the “application of the RAOs may need to be revisited if there are significant changes in the planned reuse (for example, a recreational use area becomes a residential use area)” (Navy, 2009). The Responsiveness Summary of the ROD indicates that the “planned future land use was used to help develop the RAOs; however, the RAOs are carefully worded so that there is flexibility in whatever reuse is selected.”

The soil RAOs established for all of Parcel G were developed in conjunction with the regulatory agencies and are listed below (Navy, 2009; Arcadis, 2014a).

1. Prevent exposure to organic and inorganic chemicals in soil at concentrations above RGs developed in the HHRA for the following exposure pathways:
 - a. Ingestion of soil, outdoor inhalation of dust, and dermal exposure to surface and subsurface soil;
 - b. Ingestion of homegrown produce by residents in mixed-use blocks.
2. Prevent exposure to VOCs in soil gas at concentrations that would pose unacceptable risk via indoor inhalation of vapors. RGs for VOCs to address exposure via indoor inhalation of vapors have been superseded based on COC identification information from soil gas surveys that were conducted after the ROD was finalized. Action Levels were established for soil gas, which account for vapors from both soil and groundwater, and were calculated based on a cumulative risk level of 1×10^{-6} for a residential future use scenario using the accepted methodology for risk assessments at HPNS.

Given that the baseline HHRA only developed residential RGs for certain COCs corresponding to only a portion of Parcel G, residential soil levels are needed to further evaluate areas suitable for residential use. Following the methodology agreed upon with the FFA signatories, this Feasibility Assessment identifies Screening Levels and develops the Action Levels for COCs in soil that allow residential use (Section 3.0).

2.3.3 Remediation Performed

The Navy has performed the remedy called for by the Final ROD, with the exception of implementing ICs which will occur upon property transfer. Prior to property transfer, the Navy will issue a Finding of Suitability to Transfer for Regulatory Agency approval to document completion of the ROD Selected Remedy. The Final Remedial Action Completion Report (RACR) for Parcel G documenting durable cover installation, groundwater treatment, and the legal mechanisms that will be relied upon to implement IC objectives was submitted in March 2014 (Arcadis, 2014a). EPA, DTSC, and the Water Board have concurred with the final RACR

(EPA, 2014a; DTSC, 2014; Water Board, 2014). The Final RACR for soil excavation and stockpile removals at Parcels B, D-1, and G was submitted in October 2011 (ERRG, 2011) and EPA has concurred with this RACR (EPA, 2014b). Long-term operation and maintenance requirements for the durable covers at Parcel G are detailed in the Final Operation and Maintenance Plan and Amendment (Arcadis, 2014b; Navy, 2015; EPA, 2015; DTSC, 2015). A soil gas survey was completed at Parcel G in 2010 and areas requiring ICs for VOC vapors have been established based on residential land use standards (Sealaska, 2013). The Navy has demonstrated that the groundwater and radiological remedies have met regulatory thresholds appropriate for residential use (Arcadis 2014a; California Department of Public Health [CDPH], 2016). The proposed details for ICs in the form of deed restrictions and a covenant to restrict use of property that will become effective when Parcel G is transferred are detailed in the LUC RD for Parcel G (ChaduxTt, 2010).

2.4 FFA Signatory Meeting

On February 24, 2016, OCII, the developer, and the FFA signatories for HPNS held a meeting in San Francisco, California to discuss opportunities to refine the areas requiring residential land use restrictions (Figure 3) as currently established in the Final ROD (Navy, 2009). This Feasibility Assessment memorializes the technical approach for developing soil Screening and Action Levels for COCs to reduce the areas requiring land use restrictions and support additional residential land use in Parcel G as agreed to among the parties at the meeting.

3.0 RESIDENTIAL SCREENING AND ACTION LEVELS

This Feasibility Assessment identifies Screening and Action Levels for COCs in soil that are health-protective for residential use. This section provides the technical basis for selection of Screening and Action Levels, describes the risk-based approach used, and provides data comparison summaries.

3.1 Residential Screening Levels and Action Levels

For soil Screening Level development that allows for unlimited exposure to COCs, published environmental screening levels or site-specific risk-based levels can be used. Additional site specific factors could include, for example, ambient levels of COCs or laboratory practical quantitation limits. For the Feasibility Assessment, the most updated published soil Screening Levels considered relevant to Parcel G include the EPA's RSLs (2016) and the DTSC's RBC for lead (2011). This Feasibility Assessment identifies residential soil Screening Levels based on EPA RSLs, the DTSC RBC for lead, and HPALs for metals (PRC, 1995).

The COCs above residential soil Screening Levels include dispersed ubiquitous metals and isolated concentrations of chromium VI, lead, three PAHs, and one PCB. To develop land use recommendations, this Feasibility Assessment focuses on the COCs present at concentrations that exceed soil Screening Levels established by the EPA and DTSC and multiplied by five to produce Action Levels. Soil areas that may pose risk to human health (i.e., soil with COC concentrations above Action Levels) are recommended to remain restricted against residential use. The remaining soil areas that pose a lower risk to human health (i.e., soil with COC concentrations below Action Levels) will rely on the protectiveness of the durable cover and ICs with an operation and maintenance plan and are considered safe for residential land use. The basis for residential Screening and Action Levels is provided below:

Residential Screening Levels:	<ul style="list-style-type: none">• EPA RSLs• Lead DTSC RBC• HPALs	Residential Action Levels:	<ul style="list-style-type: none">• Five times EPA RSLs• Five times Lead DTSC RBC• HPALs
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Table 1 summarizes the residential soil Screening and Action Levels for COCs in soil in areas restricted against residential use at Parcel G.

3.1.1. Risk-based Approach

As the primary basis for Screening Levels, EPA RSLs are chemical concentrations that generally correspond to fixed levels of risk, i.e., either a cancer risk of one-in-one million [1×10^{-6}] or a non-carcinogenic hazard quotient of 1. The incremental probability of one-in-one million above the background rate that an individual will develop cancer over a lifetime is understood as the de minimis cancer risk threshold (EPA, 1989). A hazard quotient, or hazard index if additive toxic effects are present, of less than 1 indicates that adverse non-cancer health effects are not expected. For lead, the DTSC RBC is used as the Screening Level. The DTSC RBC for lead is the concentration (80 mg/kg) that corresponds to a threshold blood concentration with a source-specific benchmark dose of 1 microgram lead per deciliter ($\mu\text{g}/\text{dl}$)² The source-specific benchmark dose corresponds to the fetal lead exposure that could have undesirable effects.

² The epidemiological investigations of the health effects of lead are discussed in the Air Quality Criteria for Lead Volumes I-IV (EPA, 1986a) and the 1990 Addendum (EPA, 1990). Based on an assessment of these studies, the EPA concludes that fetal lead exposure could have undesirable effects “on the order of 10 to 15 micrograms per deciliter ($\mu\text{g}/\text{dl}$) [snip] as indexed by maternal or cord blood lead concentrations” (EPA, 1986b). The Navy’s 2007 HHRA evaluated the potential for human health effects from exposure to lead by comparing exposure point concentrations (EPCs) for lead with a site-specific RBC of 155 milligrams per kilograms (mg/kg) for residential receptors. The RBC was developed by the California Office of Environmental Health Hazard Assessment (OEHHA) using the DTSC Leadsread model and the EPA’s Integrated Exposure Uptake Biokinetic Model. The models are designed to predict the soil lead concentration associated with a target blood lead level of 10 $\mu\text{g}/\text{dl}$. In 2011, OEHHA developed a new toxicity evaluation for lead replacing the 10 $\mu\text{g}/\text{dl}$ threshold blood concentration with a source-specific benchmark dose of 1 $\mu\text{g}/\text{dl}$. For residential use scenarios, DTSC implements a RBC of 80 mg/kg for EPCs (DTSC, 2011).

For ambient metals, the larger of the EPA RSL or HPAL for a specific metal is used as the basis for the Screening Level. HPALs are statistically calculated values that represent ambient metal concentrations in soil at HPNS (PRC, 1995) and are not risk-based values. These Screening Levels (i.e., RSLs) were developed using health protective assumptions and are typically used to screen site data to determine if further investigation, risk assessment or action is needed. Per EPA (<https://www.epa.gov/risk/regional-screening-levels-rsls-users-guide-may-2016>), the RSLs are generic rather than site-specific and developed using default exposure parameters and factors that represent Reasonable Maximum Exposure (RME) conditions for long-term/chronic exposures based on the methods outlined in EPA's [Risk Assessment Guidance for Superfund, Part B Manual \(1991\) \(PDF\)](#) and Soil Screening Guidance documents ([1996 \(PDF\)](#) and [2002 \(PDF\)](#)). For example, the RSLs and RBC estimate risks as if no durable cover exists. The RSLs are used early in the process for investigation scoping and screening chemicals of potential concern (COPCs).

RGs in the Revised FS were developed using a similar methodology as Screening Levels. RGs for COCs in soil were selected based on a comparison of the COC-specific RBC, the laboratory practical quantitation limit based on standard EPA analytical methods, and the HPAL (metals only). COC-specific RBCs were calculated based on a target cancer risk level of 1×10^{-6} and target non-cancer hazard index of 1, consistent with the exposure pathways and assumptions used in the HHRA to assess risk. This Feasibility Assessment does not rely on the RBCs calculated by the Navy because of possible updates to toxicity data and prevailing risk assessment practices that may impact interpretation of estimated human-health risks.

Action Levels are derived by multiplying the EPA RSLs and the Lead DTSC RBC by five; if these levels are below the HPAL, then the HPAL is the Action Level. Soil areas that may pose risk to human health (i.e., soil with COC concentrations above Action Levels) are recommended to remain restricted against residential use. The remaining soil areas that pose a lower risk to human health (i.e., soil with COC concentrations below Action Levels) will rely on the protectiveness of the durable cover and are considered safe for residential land use. For the majority of COCs, Action Levels are chemical concentrations that generally correspond to risk in soil corresponding to either a five-in-one million [5×10^{-6}] cancer risk or a non-carcinogenic hazard quotient of five. The cancer risk level that corresponds to residential soil Action Levels (5×10^{-6}) is below the upper bound of the cancer risk management range of 1×10^{-4} as defined by the NCP. For lead, five-times the DTSC RBC is used as the basis for the Action Level. For ambient metals, the larger of five-times the EPA RSL or one-times the HPAL for a specific metal is used as the basis for the Action Level. This Feasibility Assessment considered the

cumulative impacts of multiple COCs acting on the same organ group. Risks and hazards associated with the COCs, including lead and ambient metals found in Parcel G soils, such as arsenic, cobalt, and manganese, will be mitigated by durable covers that eliminate the exposure pathways of concern.

Action Levels are documented in the RODs and have been applied at HPNS at Parcels C, E, E-2, and UC-3 since 2012 (Navy, 2012, 2013; 2014a, and 2014b). Action Levels at these parcels were derived by applying a factor of five to RGs, including those based on HPALs. The use of Action Levels for metals at Parcel G is more conservative than those used elsewhere at HPNS due to the reliance on an HPAL multiplication factor of one versus five. Similar to the proposed use at Parcel G, Action Levels at these other parcels were used to identify the soil areas that may pose risk to human health.

3.2 Soil Data Summary

This Feasibility Assessment compares available soil analytical data to the identified residential Screening and Action Levels that would support residential use at Parcel G. COCs exceeding residential soil Screening or Action Levels include antimony, arsenic, chromium VI, cobalt, copper, iron, lead, and manganese; the PCB – Aroclor-1260; and the PAHs – benzo(a)anthracene, benzo(a)pyrene, and benzo(b)fluoranthene. Table 2 provides a summary of soil samples with COC concentrations above residential Screening and Action Levels. Figures 4 and 5 show the soil sample locations with COC concentrations above residential Screening and Action Levels, respectively.

3.2.1 Data Evaluation Methodology

Soil sample analytical data evaluated in this Feasibility Assessment was obtained from the Revised FS (Sultech, 2007). The data included in the Revised FS is a compilation of the analytical results for soil samples collected at Parcel D of which Parcel G data is a subset. The data evaluated do not include any data rejected during data validation and includes only data that was reviewed by a qualified analytical data validator (Sultech, 2007). Analytical results evaluated in this Feasibility Assessment include soil samples collected between 0 and 10 feet below ground surface (bgs) and from the areas restricted to non-residential use at Parcel G (Figure 3), as documented by the Final ROD. Analytical results for soil samples collected deeper than 10 feet bgs are documented in the Revised FS (Sultech, 2007).

Soil samples excavated during Navy removal actions following completion of the 2007 HHRA were excluded from this evaluation, as follows:

- Soil samples excavated during the Parcel G hotspot removal action as documented in the *RACR for Soil Hotspot Locations at Parcels B, D-1, and G and Soil Stockpiles at Parcels D-1 and G, HPNS, San Francisco, California* (ERRG, 2011).
- Soil samples excavated during the Parcel G storm drain and sanitary sewer systems time-critical removal action as documented in the *Removal Action Completion Report, Parcel G, HPNS, San Francisco, California* (Tetra Tech, 2011).
- Soil samples excavated or approved to remain in place as part of the Petroleum Program as documented in *Final Petroleum Hydrocarbon Site Closeout Report, Parcels D-1, D-2, and G (Former Parcel D), Revision 1, HPNS, San Francisco, California* (ITSI, 2012).

Table A1 and Figure A6 (Appendix A) identify the soil samples with COC concentrations above Screening Levels that were removed or approved to remain in place at Parcel G. Figure A6 also shows the associated hotspot areas, trench survey units, and petroleum areas of concern. Details regarding specific excavations can be found in the documents referenced above.

In addition, essential nutrients (calcium, magnesium, potassium, and sodium) were excluded from this evaluation consistent with the 2007 HHRA. Thallium was excluded from this evaluation based on a high false positive rate (of 99.9%) due to severe matrix effects associated with one of the analytical methods used in the past (ICP-AES) (Office of Technical Standards Alert #2, EPA Region 4, 2001). Historical records do not indicate the likelihood of significant use of thallium at Parcel G (HLA, 1994a and b; PRC et al, 1996). Analytical results for calcium, magnesium, potassium, sodium, and thallium are documented in the Revised FS (Sultech, 2007).

3.2.2 Residential Soil Screening Level Comparison

This Feasibility Assessment compares soil analytical data detected above laboratory reporting limits to Screening Levels. COCs exceeding residential soil Screening Levels include antimony, arsenic, chromium VI, cobalt, copper, iron, lead, manganese, Aroclor-1260, and benzo(a)anthracene, benzo(a)pyrene, and benzo(b)fluoranthene. Over 200 soil samples, from approximately 150 boring locations, have results above residential Screening Levels as summarized in Table A2 (Appendix A). Approximately 86% of soil samples above residential Screening Levels are metals (antimony, arsenic, cobalt, copper, iron, and manganese) likely associated with borrowed fill placed at Parcel G. The borrowed fill was obtained from a variety

of sources, including serpentinite bedrock-derived from upland areas at the shipyard. Serpentinite bedrock and serpentine bedrock derived fill material are comprised of minerals that naturally contain high levels of arsenic, manganese, nickel, and other metals (Sultech, 2007). Figure 4 shows the soil sample locations with results above residential Screening Levels.

3.2.3 Residential Soil Action Level Comparison

This Feasibility Assessment compares soil analytical data detected above laboratory reporting limits to Action Levels. COCs exceeding residential soil Action Levels include arsenic, chromium VI, cobalt, lead, manganese benzo(a)anthracene, benzo(a)pyrene, and benzo(b)fluoranthene. Twenty-three soil samples, from 20 boring locations, have results above residential Action Levels as summarized in Table A3 (Appendix A). Figure 5 shows the soil sample locations with results above residential Action Levels.

4.0 SOIL EXCAVATION ASSESSMENT

To evaluate the potential for residential use in more areas of Parcel G, this Feasibility Assessment evaluates two hypothetical soil excavation alternatives as a refinement of the ROD Selected Soil Remedy: (1) excavation and disposal of soil with COC concentrations above residential Screening Levels; and (2) excavation and disposal of soil with COC concentrations above residential Action Levels. Excavations evaluated are in addition to those excavations described in Section 2.2. Figures 6 and 7 show the hypothetical excavation areas for soil with COC concentrations above residential Screening and Action Levels, respectively. This section details the excavation assumptions used to evaluate each hypothetical alternative, develops a comparative cost analysis, and presents a detailed analysis of the soil remedy considering the NCP threshold and balancing criteria. Applicable chemical-specific ARARs for COCs in soil evaluated under this Feasibility Assessment are included for reference in Appendix B. Table 5 summarizes the excavation cost estimates for the two hypothetical alternatives. Appendix C describes costs related to the two hypothetical excavation alternatives in greater detail, including capital costs and contingency allowances.

The assumptions used in this Feasibility Assessment to evaluate the two hypothetical excavation alternatives were selected based on precedent from the Revised FS (2007) and the Final RACR for soil excavation and stockpile removals (ERRG, 2011). Tables 3 and 4 provide a summary of hypothetical excavation areas and volumes for soil samples that exceed residential Screening and Action Levels, respectively. These tables summarize the target COCs, excavation areas and depths, soil excavation volumes, and confirmation sampling requirements. Table 5 provides a summary of the cost estimates for the hypothetical excavation alternatives.

4.1 Soil Excavation Cost Assumptions

For cost comparison purposes, this Feasibility Assessment develops order-of-magnitude cost estimates for excavating the volumes associated with the two hypothetical soil excavation alternatives adhering to equivalent assumptions for both scenarios. The following assumptions were used based on precedent from the Revised FS (2007) and Final RACR for soil excavation and stockpile removals (ERRG, 2011) for both alternatives:

- It is generally assumed that an areal excavation of a 15 foot square around the sample location where the concentration exceeds the Screening/Action Level would be sufficient for removal of all soils above the cleanup criteria.
- In locations where multiple detections are observed at concentrations above the Screening/Action Level, the detections are combined into a single excavation area.
- Soil excavation depth is estimated as one foot below the deepest sample where the concentration exceeds the Screening/Action Level.
- Sidewall benching at a slope of 1:1 to account for sloping and benching protective systems as-needed to prevent cave-ins.
- A 20% bulking factor to account for an increase in soil volume following excavation.
- No adjustments were made to account for proximity to buildings or utilities.

The costs for pre-excavation sampling are included in the cost estimates and the following rationale is proposed for the sample frequency based on guidelines established in the Final RACR for soil excavation and stockpile removals (ERRG, 2011) for both alternatives:

- Collection of four pre-excavation sidewall samples and one bottom sample to delineate the extent of contamination and limits of the required excavation.
- Collection of samples at the first step-out and step-down if pre-excavation sampling does not result in complete delineation of the extent of contamination and limits of the required excavation. It is assumed that half of the step-out samples will be analyzed, and that the remaining samples are not required based on complete delineation during pre-excavation sampling.
- Secondary and third step-outs are not considered; however, should additional step-outs be required for the hypothetical excavation alternatives, these costs would be accounted for by the project contingency.

The costs for post-excavation confirmation sampling are included in the cost estimates and the following rationale is proposed for the confirmation sample frequency based on guidelines established in the Final RACR for soil excavation and stockpile removals (ERRG, 2011) for both alternatives:

- Collection of sidewall confirmation samples at a rate of one sample per 17 linear feet of sidewall.
- Collection of bottom confirmation samples at a rate of one sample per 500 square feet of bottom area.
- Collection of one additional and deeper sidewall sample for every planned sidewall sample when excavation depth exceeds 7 feet.
- A minimum of four sidewall samples and one bottom sample are assumed to be collected from each excavation.
- Quality control/quality assurance (QA/QC) samples are assumed equal to 10% of the total number of confirmation samples, but will not include soil duplicates.
- Collection of step-out and step-down samples are not considered.

Total volume of soil and number of confirmation samples for each excavation area for soil with concentrations above residential Screening and Action Levels are provided in Tables 3 and 4, respectively.

4.2 Cost Comparison

Table 5 provides a summary of the cost estimates for the hypothetical excavation alternatives. Excavation to Action Levels is estimated at approximately \$620,000. Excavation to Screening Levels would be approximately six times the cost of excavation to Action Levels. At an estimated cost of approximately \$3.9 million, the cost to excavate soil exceeding Screening Levels is not commensurate with the reduction in risk achieved.

Detailed cost estimates are provided in Appendix C and include capital costs and contingency allowances. Capital costs include direct and indirect costs. Direct costs considered include equipment, material, and labor costs during development and implementation of the excavations, confirmation sampling and laboratory analysis, backfill and compaction, and transportation and offsite disposal of excavated soil. Indirect costs considered include health and safety, site supervision, engineering and project management, and reporting. Overhead and profit are included in the unit costs presented in Appendix C. A contingency factor of 30% was

applied to capital costs to account for unknowns, unforeseen circumstances, and/or unanticipated conditions (Appendix C).

4.3 Detailed Analysis of Soil Remedy

This Feasibility Assessment evaluates two hypothetical soil excavation alternatives which are based on the ROD Selected Soil Remedy (Soil Alternative S-5) to define the proposed levels of COCs in soil that would allow for residential use and determine whether the proposed reduction in residential land use restrictions is health-protective considering the NCP threshold and balancing criteria. The excavation options evaluated for soil concentrations above Screening and Action Levels are hypothetical and are included for the sole purpose of determining the areas currently restricted against residential use where soil concentrations would be suitable for residential use. While both alternatives are protective of human health, excavation and disposal of soil with COC concentrations above residential Action Levels rates higher based on the results of the comparative cost assessment.

4.3.1 Overall Protection of Human Health and Environment

“The [ROD] Selected Remedy for soil will protect human health and the environment through excavation of contaminated soil, preventing exposure to remaining metals by installing durable covers, and the implementation of ICs” (Navy, 2009). Preserving the durable cover and implementing ICs will reduce risk from potential contamination in soil to de minimis levels by eliminating exposure pathways such as incidental ingestion of soil, dermal exposure to soil, and inhalation of fugitive dust. Both soil excavation alternatives would rely on the durable cover and ICs to cut off potential exposure to ubiquitous metals in soil. Excavation and disposal of soil with COC concentrations above residential Action Levels would further rely on the durable cover to cut off potential exposure to residual chromium VI, lead, PAHs and PCBs below Action Levels. The two soil excavation alternatives assessed are protective of human health and the environment based on reliance on the durable cover and ICs.

4.3.2 Compliance with ARARs

The ROD Selected Remedy for soil meets the chemical-specific, location-specific, and action-specific ARARs summarized in Attachment 1 of the Final ROD for Parcel G (Navy, 2009). We have reviewed the applicable chemical-specific ARARs from the Final ROD for Parcel G (Navy, 2009) for COCs in soil evaluated under this Feasibility Assessment. No updates were identified; however, applicable chemical-specific ARARs for COCs in soil evaluated under this Feasibility Assessment are included for reference in Appendix B.

4.3.3 Long Term Effectiveness and Permanence

The ROD Selected Remedy for soil includes the effective and permanent removal and disposal off site. "The factors evaluated under long-term effectiveness and permanence include the magnitude of residual risks and adequacy and reliability of controls" (Sultech, 2007). The two soil excavation alternatives would achieve equivalent magnitudes of residual risks for ubiquitous metals based on the reliance on the durable cover and ICs. Soils with the highest concentrations of COCs would be removed in both scenarios (including soils with lead, PAHs and other COCs). As noted above, excavation and disposal of soil with COC concentrations above residential Action Levels would further rely on the durable cover to cut off potential exposure to residual chromium VI, lead, PAHs and PCBs (in addition to ubiquitous metals). For both alternatives, risks from residual COCs will be mitigated through the use of covers or access restrictions that prevent the exposure pathways. The ICs require monitoring, inspections, and reporting to ensure compliance with land use or activity restrictions as outlined in the LUC RD. The Navy will rely on proprietary controls in the form of environmental restrictive covenants that will be outlined in Quitclaim Deeds from the Navy to the property recipient, and restrictive covenants included in one or more "Covenant to Restrict Use of Property" entered into by the Navy and DTSC and consistent with the substantive provisions of California Code of Regulations (Cal. Code Regs.) tit. 22 § 67391.1 (Navy, 2009).

4.3.4 Reduction of Toxicity, Mobility, or Volume through Treatment

The ROD Selected Remedy for soil and the two hypothetical soil excavation alternatives considered in the Feasibility Assessment would not reduce the mobility toxicity or volume of hazardous substances through treatment.

4.3.5 Short Term Effectiveness

The ROD Selected Remedy for soil achieves short-term effectiveness in protecting human health and the environment during the construction and implementation phase. However, excavation to Screening Levels achieves a lower short-term effectiveness rating than excavation to Action Levels. The Revised FS considered four factors in evaluating short term effectiveness: (1) protection of the community during remedial actions, (2) protection of workers during remedial actions, (3) environmental impacts resulting from construction and implementation of the alternative, and (4) time required to implement the remedy (Sultech, 2007). The Revised FS identified potential risks to the community through "excavating and transporting contaminated soil off site" and "increased construction traffic," to workers through "excavating and hauling soil and repairing covers over known contaminated soil," and to the environment through "disrupting soil and causing fugitive dust." As stated in the Revised

FS, short-term risks and adverse effects may be mitigated; however, excavation to Screening Levels would represent a greater risk given the greater volumes of soil being removed, handled, and transported. The time to complete the soil excavations and repairs to the durable covers is approximately 11 months for excavation to Screening Levels and approximately three months for excavation to Action Levels.

4.3.6 Implementability

The ROD Selected Remedy for soil and the two hypothetical soil excavation alternatives considered in this Feasibility Assessment are technically and administratively feasible regardless of the soil excavation alternative selected. Excavating and hauling soil and repairing the existing durable cover are technically feasible and easily implemented with conventional and commonplace technologies. In addition, the ICs are administrative tasks that are feasible to implement.

4.3.7 Cost

A detailed assessment of the cost criterion under the NCP is provided in Section 4.2 and Appendix C. Excavation to Screening Levels would be approximately six times the cost of excavation to Action Levels. At an estimated cost of approximately \$3.9 million, the cost of excavation to Screening Levels is not commensurate with the reduction in risk achieved. Excavation to Action Levels is estimated at approximately \$620,000.

4.3.8 Modifying Criteria

State involvement and regulatory agency acceptance has been solicited as described in Section 2.4. Community input on any related changes to the remedy may also be solicited.

5.0 MODIFICATION TO AREAS REQUIRING LAND USE RESTRICTIONS

This Feasibility Assessment compared historical soil data to residential soil Screening Levels and residential soil Action Levels. Those portions of Parcel G that exceed the residential soil Action Levels are proposed to remain designated as restricted to non-residential land use. However, the restriction is recommended to be removed for the portions of Parcel G previously restricted and not containing soil with COC concentrations above the residential soil Action Levels. In areas proposed to remain designated as restricted and areas proposed to allow residential land use alike, preserving the durable cover and implementing ICs will reduce risk from potential contamination in soil to de minimis levels by eliminating exposure pathways such as incidental ingestion of soil, dermal exposure to soil, and inhalation of fugitive dust.

This Feasibility Assessment identifies soil areas requiring land use restrictions according to 2,500-square-foot exposure areas – “residential risk grids.” Residential risk grids have historically been employed at HPNS to identify the soil areas that may pose a risk to human health or otherwise contain no recognized environmental conditions. This process is described for Parcel G in the 2000 Risk Management Review Process (Tetra Tech, 2000) and the HHRA included in the 2007 Revised FS (SulTech, 2007). The Risk Management Review Process and the Revised FS summarize the Navy’s conclusions with respect to the nature and extent of soil contamination and specific chemicals driving the risk to human health at Parcel G. In the Risk Management Review Process (Tetra Tech, 2000), regulatory agencies and the Navy evaluated individual residential risk grids based on historical uses and available data assuming potential future residential use. Since that time the Navy has conducted a basewide Historical Radiological Assessment (Navy, 2004), further sampling and analysis, soil excavations, and other work that updates the understanding of risks associated with each residential risk grid. The boundary selection process for areas requiring restricted land use is presented in Appendix D.

This Feasibility Assessment proposes that all residential risk grids with COCs in soil above residential Action Levels remain restricted against residential use. Soil areas requiring land use restrictions are identified according to 2,500-square-foot exposure areas – “residential risk grids.” In certain instances, COCs above Action Levels are fully delineated; in such cases, the delineated area is proposed for restricted land use rather than the whole of the affected grid.

The recommended boundaries for areas requiring restricted land use were selected considering COC delineation data, the distance between the sample with COCs above Action Levels and the nearest sample with COCs below Action Levels or nearest grid boundary, and conclusions of the Risk Management Review Process and the Revised FS. Additional residential risk grids are also proposed to be subject to residential land use restrictions based on uncertain sample delineation and other considerations. Proposed areas with restricted land use are shown on Figure 8. Supporting information for boundary selection for areas requiring restricted land use is provided in Appendix D.

6.0 CONCLUSIONS AND RECOMMENDATIONS

This Feasibility Assessment presents relevant information that supports the use of residential Action Levels for COCs in soil to identify areas of Parcel G where current conditions are safe for residential land use. COCs in soil include dispersed ubiquitous metals and isolated concentrations of lead, chromium VI, and organic compounds. Parcel G areas with COCs

present at concentrations that exceed soil Action Levels may represent a risk to human health if unrestricted use is allowed. This Feasibility Assessment proposes that areas with COCs above residential Action Levels remain restricted against residential use. Based on the technical evaluation provided, this Feasibility Assessment proposes reducing the area currently restricted against residential use in areas where COCs in soil do not exceed the identified residential Action Levels. According to this proposal, residential land use would be allowed as long as features of the ROD Selected Remedy (e.g., durable cover and ICs with an operation and maintenance plan) remain in place. The areas where residential land use restrictions are recommended to remain are shown on Figure 8.

To provide information regarding the proposal for using Action Levels to refine the areas subject to a residential use restriction, this Feasibility Assessment evaluated two hypothetical soil excavation alternatives: (1) excavation and disposal of soil with COC concentrations above residential Screening Levels and (2) excavation and disposal of soil with COC concentrations above residential Action Levels. While both alternatives are protective of human health, excavation alternative (2) rates higher based on the results of a comparative cost assessment. Therefore, the evaluation supports use of Action Levels to refine the areas subject to a residential use restriction.

The soil remedy is protective of residential land use throughout Parcel G. Through installation of a durable cover (i.e., hardscape or two feet of clean imported fill) and implementation of ICs, the Navy's remedy will reduce risk from potential contamination in soil to de minimis levels by eliminating exposure pathways such as incidental ingestion of soil, dermal exposure to soil, and inhalation of fugitive dust by maintaining the durable cover. Residential land use restrictions are proposed to remain in Parcel G areas with residual COCs in soil above the residential Action Levels.

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TABLES

Table 1
Residential Screening and Action Levels
Parcel G Feasibility Assessment
Hunters Point Naval Shipyard

Exposure Scenario	Chemical of Concern	Screening Level (mg/kg)	Basis for Screening Level	Action Level (mg/kg)	Basis for Action Level
Residential	antimony	31	RSL	155	5x RSL
	arsenic	11.1	HPAL	11.1	HPAL
	chromium VI	0.3	RSL	1.5	5x RSL
	cobalt	23 or HPAL	RSL or HPAL	115 or HPAL	5x RSL or HPAL
	copper	3,100	RSL	15,500	5x RSL
	iron	58,000	HPAL	275,000	5x RSL
	lead	80	Lead DTSC RBC	400	5x Lead DTSC RBC
	manganese	1,800	RSL	9000	5x RSL
	Aroclor-1260	0.24	RSL	1.2	5x RSL
	benzo(a)anthracene	0.16	RSL	0.8	5x RSL
	benzo(a)pyrene	0.016	RSL	0.08	5x RSL
	benzo(b)fluoranthene	0.16	RSL	0.8	5x RSL

Notes:

1. HPALs for cobalt were calculated on a sample-specific basis using the regression approach detailed in the "Draft Calculation of Hunters Point Ambient Levels, Hunters Point Annex, San Francisco, California" (PRC, 1995). Sample-specific HPALs for cobalt range from 9 mg/kg to 89 mg/kg. The cobalt Screening Level is equal to the RSL (23 mg/kg) or sample-specific HPAL (maximum value). The cobalt Action Level is equal to 5x RSL or sample-specific HPAL (maximum value).

DTSC RBC = Department of Toxic Substances Control (DTSC) risk-based soil concentration (RBC) for lead for residential use (2011)

HPAL = Hunters Point ambient level for metals (PRC, 1995)

mg/kg = milligrams per kilogram

RSL = USEPA Regional Screening Level, Resident Soil Table (TR=1E-06, HQ=1), May 2016

5x = five times (multiplier)

Table 2
Soil Sample Results Above Residential Screening Levels and Action Levels
Parcel G Feasibility Assessment
Hunters Point Naval Shipyard

Chemical of Concern	Number of Samples Analyzed	Number of Chemical Detections	Percent Detected	Comparison of Reporting Limits to Screening Levels				Concentration Summary								
				Minimum Reporting Limit (mg/kg)	Maximum Reporting Limit (mg/kg)	Residential Screening Level (mg/kg)	Residential Action Level (mg/kg)	Minimum Detected (mg/kg)	Maximum Detected (mg/kg)	Average Detected (mg/kg)	Median Detected (mg/kg)	Standard Deviation of Detected (mg/kg)	Percent Detect > Residential Screening Level	Percent Nondetect > Residential Screening Level	Percent Detect > Residential Action Level	Percent Nondetect > Residential Action Level
antimony	341	108	31.7%	0.10	9.6	31	155	0.34	62.4	4.29	2.2	6.84	0.93%	0.43%	0.00%	0.00%
arsenic	374	251	67.1%	0.2	2.6	11.1	11.1	0.34	47.2	3.76	2.9	3.95	2.79%	0.00%	2.79%	0.00%
chromium VI	141	23	16.3%	0.05	1.2	0.3	1.5	0.056	4.9	0.78	0.18	2.32	43.48%	4.24%	13.04%	0.85%
cobalt	345	337	97.7%	0.075	13	23 or HPAL ⁹	115 or HPAL ⁹	1.8	383	40.39	32.9	33.13	50.74%	0.00%	1.78%	0.00%
copper	345	332	96.2%	0.09	2.9	3,100	15,500	1.8	238	49.33	42.15	42.31	0.30%	0.00%	0.00%	0.00%
iron	344	343	99.7%	1.0	4.6	58,000	275,000	12,400	138,000	38,093	36,500	22,553	2.92%	0.00%	0.00%	0.00%
lead	345	316	91.6%	0.1	7.3	80	400	0.34	559	18.43	5.95	56.19	5.06%	0.00%	0.63%	0.00%
manganese	413	412	99.8%	0.02	3.9	1,800	9,000	29.3	11,900	1,242.40	923.5	1,216	14.56%	0.00%	0.49%	0.00%
Aroclor-1260	323	21	6.5%	0.019	0.34	0.24	1.2	0.014	0.345	0.10	0.068	0.097	14.29%	3.31%	0.00%	0.66%
benzo(a)anthracene	333	13	3.9%	0.33	0.73	0.16	0.8	0.025	0.81	0.19	0.1	0.23	15.38%	97.19%	7.69%	6.56%
benzo(a)pyrene	327	13	4.0%	0.033	1.7	0.016	0.08	0.021	0.49	0.16	0.1	0.15	53.85%	100.00%	23.08%	97.45%
benzo(b)fluoranthene	327	23	7.0%	0.33	1.7	0.16	0.8	0.025	1.0	0.14	0.063	0.21	13.04%	97.04%	4.35%	6.58%

Notes:

- All soil sample analytical data obtained from the "Revised Final Feasibility Study for Parcel D, Hunters Point Shipyard, San Francisco, California" (Sultech, 2007).
- Soil samples include those collected between 0 and 10 feet below ground surface (bgs).
- The area where residential use is allowed was excluded from this evaluation as documented in the "Record of Decision for Parcel G, Hunters Point Shipyard, San Francisco, California" (Navy, 2009).
- Essential nutrients (calcium, magnesium, potassium, and sodium) were excluded from this evaluation.
- Thallium was excluded from this evaluation based on a high false positive rate (of 99.9%) due to severe matrix effects associated with one of the analytical methods used in the past (ICP-AES) (Office of Technical Standards Alert #2, EPA Region 4, 2001).
- Soil samples excavated during the Parcel G hotspot removal action as documented in the "Remedial Action Completion Report for Soil Hotspot Locations at Parcels B, D-1, and G and Soil Stockpiles at Parcels D-1 and G, Hunters Point Naval Shipyard, San Francisco, California" (Engineering/Remediation Resources Group, Inc., 2011) were excluded from this evaluation. See Table A3.
- Soil samples excavated during the Parcel G storm drain and sanitary sewer systems time-critical removal action as documented in the "Removal Action Completion Report, Parcel G, Hunters Point Naval Shipyard, San Francisco, California" (Tetra Tech, 2011) were excluded from this evaluation. See Table A3.
- Soil samples excavated as part of the Petroleum Program as documented in "Final Petroleum Hydrocarbon Site Closeout Report, Parcels D-1, D-2, and G (Former Parcel D), Revision 1, Hunters Point Shipyard, San Francisco, California" (Innovative Technical Solutions, Inc., 2012) were excluded from this evaluation. See Table A3.
- HPALs for cobalt were calculated on a sample-specific basis using the regression approach detailed in the "Draft Calculation of Hunters Point Ambient Levels, Hunters Point Annex, San Francisco, California" (PRC, 1995). Sample-specific HPALs for cobalt range from 9 mg/kg to 89 mg/kg. The cobalt Screening Level is equal to RSL (23 mg/kg) or sample-specific HPAL (maximum value). The cobalt Action Level is equal to 5x RSL or sample-specific HPAL (maximum value).

> = greater than

HPAL = Hunters Point ambient level for metals (PRC, 1995)

mg/kg = milligrams per kilograms

RSL = USEPA Regional Screening Level, Resident Soil Table (TR=1E-06, HQ=1), May 2016

Table 3
Excavation Areas and Volumes for Soil Samples with Results Above
Residential Screening Levels
Parcel G Feasibility Assessment
Hunters Point Naval Shipyard

Excavation Basis	Excavation ID	Target Borings	Target Samples	Sample Top Depth	Sample Bottom Depth	Chemical(s) of Concern Above Residential Screening Levels	Area (square feet)	Depth of Excavation (feet bgs)	Total Volume (bank cubic yards with 1:1 benching)	Total Volume with 20% Bulking Factor (cubic yards)	Excavation Perimeter (feet)	Quantity of Confirmation Samples	Quantity of Perimeter Samples	Quantity of Bottom Samples	Quantity of QC Samples	Quantity of Confirmation Samples		
Soil Samples with Results Above Residential Screening Levels	EXEE1203	EE1203	EE1203	4.00	4.00	cobalt	225	5.00	79	94	60	6	4	1	1	6		
	EXIR09B002	IR09B002	8939E001	0.75	0.75	cobalt, iron, manganese	225	1.75	18	22	60	6	4	1	1	6		
	EXIR09B003	IR09B003	8939G001	1.75	1.75	cobalt	225	6.75	130	156	60	6	4	1	1	6		
			8939G003	5.75	5.75	cobalt, iron												
	EXIR09B008	IR09B008	8939E003	1.25	1.25	chromium VI	225	2.25	25	30	60	6	4	1	1	6		
	EXIR09B012	IR09B012	8941G075	1.25	1.25	cobalt, manganese	225	6.75	130	156	60	6	6	4	1	1	6	
			8941G076	3.25	3.25	cobalt												
			8941G077	5.75	5.75	cobalt												
	EXIR09B013	IR09B013	8939E024	1.75	1.75	manganese	225	6.25	114	136	60	6	6	4	1	1	6	
			8939E026	5.25	5.25	cobalt												
	EXIR09B014	IR09B014	8941F004	5.75	5.75	cobalt	225	6.75	130	156	60	6	4	1	1	6		
	EXIR09B016	IR09B016	8939E054	1.25	1.25	benzo(a)pyrene	225	6.25	114	136	60	60	6	6	4	1	1	6
			8939E055	3.25	3.25	cobalt												
			8939E056	5.25	5.25	cobalt												
	EXIR09B017	IR09B017	8939E059	1.25	1.25	arsenic	225	6.25	114	136	60	60	6	4	1	1	6	
			8939E061	5.25	5.25	cobalt												
	EXIR09B019	IR09B019	8939E051	5.75	5.75	cobalt	225	6.75	130	156	60	6	4	1	1	6		
	EXIR09B020	IR09B020	8943G110	1.25	1.25	lead, manganese	225	6.25	114	136	60	60	6	6	4	1	1	6
			8943G111	2.75	2.75	lead												
			8943G107	5.25	5.25	cobalt												
	EXIR09B028	IR09B028	9013G164	0.75	0.75	lead	225	6.25	114	136	60	60	6	6	4	1	1	6
			9013G165	2.75	2.75	cobalt												
			9013G166	5.25	5.25	cobalt												
	EXIR09B032	IR09B032	9014H078	5.25	5.25	cobalt	225	6.25	114	136	60	6	4	1	1	6		
	EXIR09B033	IR09B033	9014H086	0.75	0.75	lead	225	6.25	114	136	60	60	6	6	4	1	1	6
			9014H088	5.25	5.25	benzo(a)pyrene, lead												
	EXIR09MW31A	IR09MW31A	9013F020	0.75	0.75	cobalt, manganese	225	6.25	114	136	60	60	6	6	4	1	1	6
			9013F021	5.25	5.25	cobalt												
EXIR09MW35A	IR09MW35A	9015H091	1.25	1.25	manganese	225	2.25	25	30	60	6	4	1	1	6			
EXIR09MW37A	IR09MW37A	9013G153	2.75	2.75	cobalt	225	3.75	51	61	60	6	4	1	1	6			
EXIR22B017	IR22B017	9320A020	1.75	1.75	cobalt	225	7.75	166	199	60	60	10	8	1	1	10		
		9320A021	3.75	3.75	chromium VI, cobalt													
		9320A022	6.75	6.75	cobalt													
EXIR22B027	IR22B027	9605G063	7.50	8.50	cobalt	225	9.50	243	291	60	10	8	1	1	10			
EXIR33B060B	IR33B060B	9423R230	6.25	6.25	benzo(a)pyrene	225	7.25	147	176	60	10	8	1	1	10			
EXIR33B061	IR33B061	9415A789	2.75	2.75	cobalt, manganese	225	8.75	208	249	60	60	10	8	1	1	10		
		9415A790	7.75	7.75	cobalt, manganese													
EXIR33B062	IR33B062	9414H569	2.25	2.25	arsenic, cobalt, manganese	225	8.75	208	249	60	10	8	1	1	10			

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Excavation Basis	Excavation ID	Target Borings	Target Samples	Sample Top Depth	Sample Bottom Depth	Chemical(s) of Concern Above Residential Screening Levels	Area (square feet)	Depth of Excavation (feet bgs)	Total Volume (bank cubic yards with 1:1 benching)	Total Volume with 20% Bulking Factor (cubic yards)	Excavation Perimeter (feet)	Quantity of Confirmation Samples	Quantity of Perimeter Samples	Quantity of Bottom Samples	Quantity of QC Samples	Quantity of Confirmation Samples
Soil Samples with Results Above Residential Screening Levels			9414H570	7.75	7.75	cobalt, manganese										
	EXIR33B067	IR33B067	9420R130	6.25	6.25	cobalt	225	7.25	147	176	60	10	8	1	1	10
	EXIR33B078	IR33B078	9414A748	1.75	1.75	arsenic, benzo(a)pyrene	225	2.75	33	39	60	6	4	1	1	6
	EXIR33B079	IR33B079	9434K051	6.25	6.25	cobalt	225	7.25	147	176	60	10	8	1	1	10
	EXIR33B083	IR33B083	9413L177	6.25	6.25	cobalt, iron, manganese	225	7.25	147	176	60	10	8	1	1	10
	EXIR33B086	IR33B086	9413A718	2.25	2.25	cobalt	225	7.25	147	176	60	10	8	1	1	10
			9413A719	6.25	6.25	cobalt										
	EXIR33B087	IR33B087	9413L193	1.25	1.25	cobalt	225	7.25	147	176	60	10	8	1	1	10
			9413L194	6.25	6.25	cobalt										
	EXIR33B089	IR33B089	9413L163	1.25	1.25	cobalt	225	7.25	147	176	60	10	8	1	1	10
			9413L164	6.25	6.25	cobalt										
	EXIR33B091	IR33B091	9413L171	6.25	6.25	cobalt, manganese	225	7.25	147	176	60	10	8	1	1	10
	EXIR33B096	IR33B096	9607J866	1.50	2.00	copper, lead	225	8.00	176	211	60	10	8	1	1	10
			9607J867	6.00	7.00	antimony, benzo(a)anthracene, benzo(b)fluoranthene, lead										
	EXIR33B114	IR33B114	9531C070	6.00	6.50	cobalt	225	7.50	156	187	60	10	8	1	1	10
	EXIR33B117	IR33B117	9532G038	0.50	1.00	cobalt	225	10.00	268	322	60	10	8	1	1	10
			9532G040	4.00	4.50	cobalt										
			9532G041	9.00	9.50	cobalt										
	EXIR33B118	IR33B118	9543W088	0.00	1.00	cobalt	225	2.00	22	26	60	6	4	1	1	6
	EXIR33MW116A	IR33MW116A	9531C061	1.00	1.50	cobalt	225	2.50	29	35	60	6	4	1	1	6
	EXIR34B017	IR34B017	9413L201	6.25	6.25	cobalt	225	7.25	147	176	60	10	8	1	1	10
	EXIR34B018	IR34B018	9432A030	7.25	7.25	cobalt	225	8.25	186	223	60	10	4	1	1	6
	EXIR34B019	IR34B019	9414L218	1.25	1.25	cobalt	225	7.25	147	176	60	10	8	1	1	10
			9414L219	6.25	6.25	cobalt, manganese										
	EXIR34B020	IR34B020	9427R385	6.25	6.25	cobalt	225	10.00	310	372	60	10	4	1	1	6
9427R386			9.75	9.75	cobalt											
EXIR34B021	IR34B021	9414L228	1.25	1.25	cobalt	420	7.25	196	235	89	15	12	1	2	15	
		9414L229	6.25	6.25	cobalt, manganese											
EXIR34B022	IR34B022	9427R379	7.75	7.75	cobalt	225	8.75	208	249	60	10	8	1	1	10	
EXIR34B025	IR34B025	9414L257	1.25	1.25	cobalt	225	7.25	147	176	60	10	8	1	1	10	
		9414L258	6.25	6.25	cobalt											
EXIR34B026	IR34B026	9434R617	6.25	6.25	cobalt	225	7.25	147	176	60	10	8	1	1	10	
EXIR34B028	IR34B028	9427R373	6.25	6.25	cobalt, manganese	225	7.25	147	176	60	10	8	1	1	10	
EXIR34B029	IR34B029	9434R623	6.25	6.25	cobalt	225	7.25	147	176	60	10	8	1	1	10	
EXIR34B027	IR34B027	9413L210	1.25	1.25	cobalt	225	7.25	147	176	60	10	8	1	1	10	

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Excavation Basis	Excavation ID	Target Borings	Target Samples	Sample Top Depth	Sample Bottom Depth	Chemical(s) of Concern Above Residential Screening Levels	Area (square feet)	Depth of Excavation (feet bgs)	Total Volume (bank cubic yards with 1:1 benching)	Total Volume with 20% Bulking Factor (cubic yards)	Excavation Perimeter (feet)	Quantity of Confirmation Samples	Quantity of Perimeter Samples	Quantity of Bottom Samples	Quantity of QC Samples	Quantity of Confirmation Samples	
Soil Samples with Results Above Residential Screening Levels			9413L211	6.25	6.25	cobalt											
	EXIR34B030	IR34B030	9434R598	1.25	1.25	cobalt	225	7.25	147	176	60	10	8	1	1	10	
			9434R599	6.25	6.25	cobalt											
	EXIR34B031	IR34B031	9434R609	6.25	6.25	cobalt	225	7.25	147	176	60	10	8	1	1	10	
	EXIR34B033	IR34B033	9438A073	6.25	6.25	cobalt	225	7.25	147	176	60	10	8	1	1	10	
	EXIR37B011	IR37B011	9415C147	5.75	5.75	cobalt	225	6.75	130	156	60	6	4	1	1	6	
	EXIR37B019	IR37B019	9537J245	0.50	1.00	cobalt	225	4.00	56	67	60	6	4	4	1	1	6
			9537J246	2.50	3.00	cobalt, iron											
	EXIR44B007	IR44B007	9545J577	0.50	1.00	cobalt	225	10.00	268	322	60	10	8	1	1	10	
			9545J578	5.00	6.00	cobalt											
			9545J579	8.50	9.00	cobalt											
	EXIR45TA21	IR45TA21	9437A061	4.75	4.75	lead	225	6.75	130	156	60	6	4	1	1	6	
			9437A062	5.75	5.75	cobalt, manganese											
	EXIR45TA22	IR45TA22	9437A065	5.75	5.75	cobalt	225	6.75	130	156	60	6	4	1	1	6	
	EXIR50B016	IR50B016	9422R210	1.75	1.75	cobalt	225	7.25	147	176	60	10	8	1	1	10	
			9422R211	6.25	6.25	cobalt											
	EXIR50B022	IR50B022	9422R216	1.75	1.75	cobalt, manganese	225	6.75	130	156	60	6	4	1	1	6	
			9422R217	5.75	5.75	benzo(a)pyrene											
	EXIR66B001	IR66B001	9533S102	1.00	1.50	cobalt	225	2.50	29	35	60	6	4	1	1	6	
	EXIR67B002	IR67B002	9534D029	0.50	1.00	manganese	225	7.00	138	166	60	6	4	1	1	6	
			9534D030	5.50	6.00	manganese											
	EXIR71B002	IR71B002	9533C119	5.50	6.00	cobalt	225	7.00	138	166	60	6	4	1	1	6	
	EXIR71B004	IR71B004	9533D001	3.00	3.50	cobalt	225	7.00	138	166	60	6	4	1	1	6	
			9533D002	5.50	6.00	cobalt											
	EXIR71B006A	IR71B006A	9535J119	0.50	1.00	cobalt	225	4.00	56	67	60	6	4	1	1	6	
			9535J120	2.00	3.00	cobalt											
	EXIR71B007	IR71B007	9535J121	0.00	0.50	cobalt	225	6.50	121	146	60	6	4	1	1	6	
			9535J125	1.50	2.50	cobalt											
			9535J126	4.50	5.50	cobalt											
	EXIR71B008	IR71B008	9535J128	0.00	0.50	cobalt, lead	225	6.00	106	127	60	6	4	1	1	6	
9535J129			2.00	3.00	cobalt												
9535J130			4.50	5.00	cobalt												
EXIR71B009	IR71B009	9535J132	0.00	0.50	cobalt	225	6.50	121	146	60	6	4	1	1	6		
		9535J133	2.00	3.00	cobalt												
		9535J134	5.00	5.50	cobalt												

Table 3
Excavation Areas and Volumes for Soil Samples with Results Above
Residential Screening Levels
Parcel G Feasibility Assessment
Hunters Point Naval Shipyard

Excavation Basis	Excavation ID	Target Borings	Target Samples	Sample Top Depth	Sample Bottom Depth	Chemical(s) of Concern Above Residential Screening Levels	Area (square feet)	Depth of Excavation (feet bgs)	Total Volume (bank cubic yards with 1:1 benching)	Total Volume with 20% Bulking Factor (cubic yards)	Excavation Perimeter (feet)	Quantity of Confirmation Samples	Quantity of Perimeter Samples	Quantity of Bottom Samples	Quantity of QC Samples	Quantity of Confirmation Samples		
Soil Samples with Results Above Residential Screening Levels	EXIR71B010	IR71B010	9605G046	1.25	2.00	cobalt	225	6.50	121	146	60	6	4	1	1	6		
			9605G047	4.50	5.50	cobalt												
	EXIR71B011	IR71B011	9604J792	0.50	1.50	cobalt	225	7.00	138	166	60	6	4	1	1	6		
			9604J793	3.00	4.00	cobalt												
			9604J794	5.50	6.00	cobalt, manganese												
	EXIR71MW03A	IR71MW03A	9533G047	9.50	10.50	cobalt	225	10.00	268	322	60	10	8	1	1	10		
	EXMULTI001	3701BC01	3701BC01_4	3701E1B	4.00	4.50	Aroclor-1260	2,894	8.00	1,236	1,484	379	32	23	6	3	32	
				3701E1B_2	2.00	2.50	manganese											
				3701E2A	3701E2A_2	2.00	2.50											manganese
				3701N1C	3701N1C_2	2.00	3.00											manganese
				3701S1C	3701S1C_2	2.00	2.50											manganese
				3701W2B	3701W2B_2	2.00	2.50											manganese
				6671N2A	6671N2A_1	1.00	1.50											manganese
				6671N3A	6671N3A_2	1.00	2.00											manganese
					6671N3A_X	1.00	2.00											manganese
				6671N3B	6671N3B_1	1.00	1.50											manganese
				6671W2A	6671W2A_2	1.50	2.00											manganese
				6671W3A	6671W3A_1	1.00	1.50											manganese
				6671W3B	6671W3B_2	1.00	2.00											manganese
					6671W3B_X	1.00	2.00											manganese
				6771B01	6771B01_3	3.00	3.50											manganese
				6771B02	6771B02_1	1.00	1.50											manganese
				E1405	EE1405	1.50	1.50											manganese
				IR09MW62A	0413T026	5.00	7.00											chromium VI, cobalt
				IR37B014	9423C267	5.75	5.75											cobalt
				IR37B015	9423C264	6.25	6.25											cobalt
				IR37B016	9423C261	5.75	5.75											cobalt
IR37B017				9424C270	5.75	5.75	cobalt											
IR37B018				9537J241	0.50	1.00	cobalt											
	9537J243	6.00	6.50	cobalt														
IR37B020	9538J291	6.00	6.50	cobalt														
IR37B021	9545J582	0.50	1.00	cobalt, manganese														
	9545J584	5.00	6.00	cobalt														
IR37B026	0018D006	3.50	4.00	cobalt, manganese														
	0018D008	5.50	6.00	cobalt														
IR37B027	0018D003	3.50	4.00	cobalt														
	0018D005	5.50	6.00	cobalt														

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Hunters Point Naval Shipyard

Excavation Basis	Excavation ID	Target Borings	Target Samples	Sample Top Depth	Sample Bottom Depth	Chemical(s) of Concern Above Residential Screening Levels	Area (square feet)	Depth of Excavation (feet bgs)	Total Volume (bank cubic yards with 1:1 benching)	Total Volume with 20% Bulking Factor (cubic yards)	Excavation Perimeter (feet)	Quantity of Confirmation Samples	Quantity of Perimeter Samples	Quantity of Bottom Samples	Quantity of QC Samples	Quantity of Confirmation Samples		
Soil Samples with Results Above Residential Screening Levels		IR37SS22	9605J797	0.00	0.00	cobalt, lead												
		IR37SS23	9605J798	0.00	0.00	lead												
		PA37SS08	9310J389	1.25	1.25	cobalt, manganese												
	EXMULTI002		6965B02	6965B02_6	5.50	6.00	chromium VI	237	7.00	137	164	62	6	4	1	1	6	
			IR09B006	8939E017	3.25	3.25	cobalt											
				8939E018	5.75	5.75	cobalt, iron, manganese											
	EXMULTI003		PA33SS47	9310J370	0.75	0.75	manganese	637	2.00	77	92	120	11	8	2	1	11	
			U302-1-SC006	91-U302-1-SC006	1.00	1.00	cobalt											
			U302-3-SC008	91-U302-3-SC008	1.00	1.00	Aroclor-1260, cobalt, manganese											
			U302-SC008	91-U302-SC008	1.00	1.00	lead											
	EXMULTI004		IR33B063	9414H565	1.75	1.75	cobalt, manganese	484	8.00	285	342	100	15	12	1	2	15	
				9414H566	6.25	6.25	cobalt, manganese											
			IR33B090	9431R494	1.75	1.75	cobalt, manganese											
				9431R495	6.25	6.25	cobalt, manganese											
	EXMULTI005		IR33B109	0018D032	5.50	7.00	cobalt, iron, manganese	396	7.25	211	253	88	15	12	1	2	15	
			PA33B013	9313N182	1.75	1.75	cobalt, manganese											
	EXMULTI006			9313N183	6.25	6.25	cobalt, manganese	519	8.00	294	352	99	16	12	2	2	2	16
			IR33B064	9420C233	6.25	6.25	cobalt, manganese											
			6967B02	6967B02_5	5.00	5.50	chromium VI											
			6967E1A	6967E1A_5	5.00	5.50	chromium VI											
			6967E1B	6967E1B_1.5	1.50	2.00	arsenic											
			6967N1B	6967N1B_0.5	0.50	1.00	chromium VI											
			6967S1A	6967S1A_7	6.50	7.00	chromium VI											
			6967W1A	6967W1A_5	5.00	5.50	chromium VI											
	EXMULTI007		IR09B007	8939E012	1.25	1.25	arsenic	417	6.75	201	242	97	8	6	1	1	8	
				8939E013	5.25	5.25	chromium VI											
			IR09B011	8941G081	1.25	1.25	cobalt, manganese											
EXMULTI008			8941G083	5.75	5.75	cobalt	585	7.75	320	383	125	20	16	2	2	20		
		IR09MW38A	9015G177	2.75	2.75	cobalt, iron												
			9015G178	5.25	5.25	cobalt												
EXMULTI008		IR34B015	9414L243	1.25	1.25	cobalt	585	7.75	320	383	125	20	16	2	2	20		
		IR34B016	9414L250	1.25	1.25	cobalt												

**Table 3
Excavation Areas and Volumes for Soil Samples with Results Above
Residential Screening Levels
Parcel G Feasibility Assessment
Hunters Point Naval Shipyard**

Excavation Basis	Excavation ID	Target Borings	Target Samples	Sample Top Depth	Sample Bottom Depth	Chemical(s) of Concern Above Residential Screening Levels	Area (square feet)	Depth of Excavation (feet bgs)	Total Volume (bank cubic yards with 1:1 benching)	Total Volume with 20% Bulking Factor (cubic yards)	Excavation Perimeter (feet)	Quantity of Confirmation Samples	Quantity of Perimeter Samples	Quantity of Bottom Samples	Quantity of QC Samples	Quantity of Confirmation Samples	
Soil Samples with Results Above Residential Screening Levels		PA34B011	9414L251	6.25	6.25	cobalt											
			9309A680	1.75	1.75	cobalt											
			9309A681	6.75	6.75	cobalt											
	EXMULTI009	IR34B032	PA34SS14	9441A135	1.75	1.75	cobalt	447	7.25	243	292	107	17	14	1	2	17
				9441A136	6.25	6.25	cobalt										
				9312A696	1.25	1.25	cobalt										
	EXMULTI010	PA33SS57	IR33B095	9310J394	5.25	5.25	cobalt, iron	367	6.25	157	188	83	7	5	1	1	7
				9607J869	1.10	2.10	cobalt										
	EXMULTI011	IR65B001	PA33B058	9536J151	0.50	1.00	Aroclor-1260	804	6.50	311	374	136	13	9	2	2	13
				9536J152	5.00	5.50	cobalt										
		IR65B003	9604J754	0.50	1.50	cobalt											
			9604J755	2.50	3.50	cobalt											
			9604J756	4.50	5.50	cobalt											
		IR65B004	9604J757	0.50	1.50	arsenic, cobalt											
			9604J758	2.50	3.50	cobalt											
			9604J759	4.50	5.50	cobalt											
		IR65B005	9604J760	0.50	1.50	cobalt											
			9604J761	2.50	3.50	cobalt											
			9604J762	4.50	5.50	cobalt											
	EXMULTI012	IR65B002	PA45TA13	9604J764	2.50	3.50	cobalt	374	10.00	346	415	84	13	10	1	2	13
				9604J765	4.50	5.50	cobalt										
		SLO2A		SLO2A_10	9.50	10.00	cobalt										
	EXMULTI013	IR33B094	PA33B058	9545J591	6.50	7.00	arsenic, manganese	568	8.00	321	385	108	18	14	2	2	18
				IR33B092	9606J855	1.00	1.50										
		9606J856			4.00	5.00	benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, lead										
		9311N180		3.75	3.75	cobalt											
	EXPA33B018	PA33B018	9309A651	2.25	2.25	iron, manganese	225	7.75	166	199	60	10	8	1	1	10	
9309A652			6.75	6.75	iron, manganese												
EXPA33B035	PA33B035	9308D074	2.25	2.25	cobalt	225	7.75	166	199	60	10	8	1	1	10		
		9308D075	6.75	6.75	cobalt												
EXPA33B038	PA33B038	9308D071	2.25	2.25	cobalt	225	7.75	166	199	60	10	8	1	1	10		
		9308D072	6.75	6.75	cobalt, manganese												
EXPA33B039	PA33B039	9308D068	2.25	2.25	cobalt	225	7.75	166	199	60	10	8	1	1	10		
		9308D069	6.75	6.75	cobalt												

Table 3
Excavation Areas and Volumes for Soil Samples with Results Above
Residential Screening Levels
Parcel G Feasibility Assessment
Hunters Point Naval Shipyard

Excavation Basis	Excavation ID	Target Borings	Target Samples	Sample Top Depth	Sample Bottom Depth	Chemical(s) of Concern Above Residential Screening Levels	Area (square feet)	Depth of Excavation (feet bgs)	Total Volume (bank cubic yards with 1:1 benching)	Total Volume with 20% Bulking Factor (cubic yards)	Excavation Perimeter (feet)	Quantity of Confirmation Samples	Quantity of Perimeter Samples	Quantity of Bottom Samples	Quantity of QC Samples	Quantity of Confirmation Samples
Soil Samples with Results Above Residential Screening Levels	EXPA33SS42	PA33SS42	9310J386	1.85	1.85	cobalt	225	2.85	34	41	60	6	4	1	1	6
	EXPA33SS43	PA33SS43	9310J379	1.45	1.45	cobalt, manganese	225	2.45	28	34	60	6	4	1	1	6
	EXPA33B051	PA33B051	9342G750	7.25	7.25	cobalt	225	8.25	186	223	60	10	8	1	1	10
	EXPA33SS52	PA33SS52	9310J393	4.50	4.50	cobalt	225	5.50	92	110	60	6	4	1	1	6
	EXPA33B053	PA33B053	9311N177	9.75	9.75	lead	225	10.00	268	322	60	10	8	1	1	10
	EXPA33B055	PA33B055	9311N176	9.25	9.25	lead	225	10.00	268	322	60	10	8	1	1	10
	EXPA33B056	PA33B056	9313N181	7.25	7.25	cobalt	225	8.25	186	223	60	10	8	1	1	10
	EXPA33SS59	PA33SS59	9310J388	1.25	1.25	cobalt, manganese	225	2.25	25	30	60	6	4	1	1	6
	EXPA34SS03	PA34SS03	9310J398	2.75	2.75	cobalt	225	3.75	51	61	60	6	4	1	1	6
	EXPA34SS04	PA34SS04	9310J397	1.75	1.75	cobalt	225	2.75	33	39	60	6	4	1	1	6
	EXPA34B009	PA34B009	9308D079	2.25	2.25	cobalt	225	7.75	166	199	60	10	8	1	1	10
			9308D080	6.75	6.75	cobalt, manganese										
	EXPA37SS04	PA37SS04	PA37SS04_1	1.00	1.50	manganese	225	2.50	29	35	60	6	4	1	1	6
	EXPA45TA08	PA45TA08	9322P222	5.75	5.75	cobalt	225	6.75	130	156	60	6	4	1	1	6
	EXSLO1A	SLO1A	SLO1A_9	9.00	9.50	cobalt	225	10.00	268	322	60	10	8	1	1	10
									15,612	18,734	6,714	874	649	108	109	866

Notes:

- The number of samples was calculated based on the sampling frequency stated below:
 - collect sidewall confirmation samples at rate of one sample per 17 linear feet of sidewall.
 - collect bottom confirmation samples at a rate of one sample per 500 square feet of bottom area.
 - collect one additional sidewall sample at a different depth for every planned sidewall sample when excavation depth exceeds 7 feet.
 - a minimum of four sidewall samples and one bottom sample assumed to be collected from each excavation.
 - quality control/quality assurance (QA/QC) samples assumed equal to 10% of the total number of confirmation samples.
- Assumes depth of excavation at 1 foot below maximum sampling depth with exceedence.

bgs = below ground surface

Table 4
Excavation Areas and Volumes for Soil Samples with Results Above
Residential Action Levels
Parcel G Feasibility Assessment
Hunters Point Naval Shipyard

Excavation Basis	Excavation ID	Target Borings	Target Samples	Sample Top Depth	Sample Bottom Depth	Chemical(s) of Concern Above Residential Action Levels	Area (square feet)	Depth of Excavation (feet bgs)	Total Volume (bank cubic yards with 1:1 benching)	Total Volume (bank cubic yards with 1:1 benching)	Excavation Perimeter (feet)	Quantity of Confirmation Samples	
Soil Samples with Results Above Residential Action Levels	EX3701S1C	3701S1C	3701S1C_2	2.00	2.50	manganese	225	3.50	46	55	60	6	
	EX6671N2A	6671N2A	6671N2A_1	1.00	1.50	manganese	225	2.50	29	35	60	6	
	EXIR09B003	IR09B003	8939G003	5.75	5.75	cobalt	225	6.75	130	156	79	13	
	EXIR09B006	IR09B006	8939E017	3.25	3.25	cobalt	225	6.75	130	156	60	6	
			8939E018	5.75	5.75	cobalt							
	EXIR09B012	IR09B012	8941G077	5.75	5.75	cobalt	225	6.75	130	156	60	6	
	EXIR09B016	IR09B016	8939E054	1.25	1.25	benzo(a)pyrene	225	2.25	25	30	60	6	
	EXIR09B017	IR09B017	8939E059	1.25	1.25	arsenic	225	2.25	25	30	60	6	
	EXIR09MW62A	IR09MW62A	0413T026	5.00	7.00	cobalt	225	8.00	176	211	60	6	
	EXIR33B062	IR33B062	9414H569	2.25	2.25	arsenic	225	2.25	25	30	60	6	
	EXIR33B078	IR33B078	9414A748	1.75	1.75	arsenic	225	2.75	33	39	60	6	
	EXIR33B096	IR33B096	9607J866	1.50	2.00	lead	225	8.00	176	211	60	10	
			9607J867	6.00	7.00	benzo(a)anthracene, benzo(b)fluoranthene							
	EXIR65B004	IR65B004	9604J757	0.50	1.50	arsenic	225	2.50	29	35	60	6	
	EXMULTI001		6967W1A	6967W1A_5	5.00	5.50	chromium VI	366	6.50	165	198	79	7
			6967B02	6967B02_5	5.00	5.50	chromium VI						
			6967E1A	6967E1A_5	5.00	5.50	chromium VI						
			6967E1B	6967E1B_1.5	1.50	2.00	arsenic						
			IR09B007	8939E012	1.25	1.25	arsenic						
	EXMULTI002	IR33B092	9606J855	1.00	1.50	benzo(a)pyrene, lead	431	8.00	269	323	97	8	
9606J856			4.00	5.00	benzo(a)pyrene								
IR33B094			9545J591	6.5	7.00	arsenic							
EXPA33SS57	PA33SS57	9310J394	5.25	5.25	cobalt	225	6.25	114	136	60	6		
									1,500	1,800	975	104	

Notes:

- The number of samples was calculated based on the sampling frequency stated below:
 - collect sidewall confirmation samples at rate of one sample per 17 linear feet of sidewall.
 - collect bottom confirmation samples at a rate of one sample per 500 square feet of bottom area.
 - collect one additional sidewall sample at a lower depth for every planned sidewall sample when excavation depth exceeds 7 feet.
 - a minimum of four sidewall samples and one bottom sample assumed to be collected from each excavation.
 - quality control/quality assurance (QA/QC) samples assumed equal to 10% of the total number of confirmation samples.

2. Assumes depth of excavation at 1 foot below maximum sampling depth with exceedence.

bgs = below ground surface

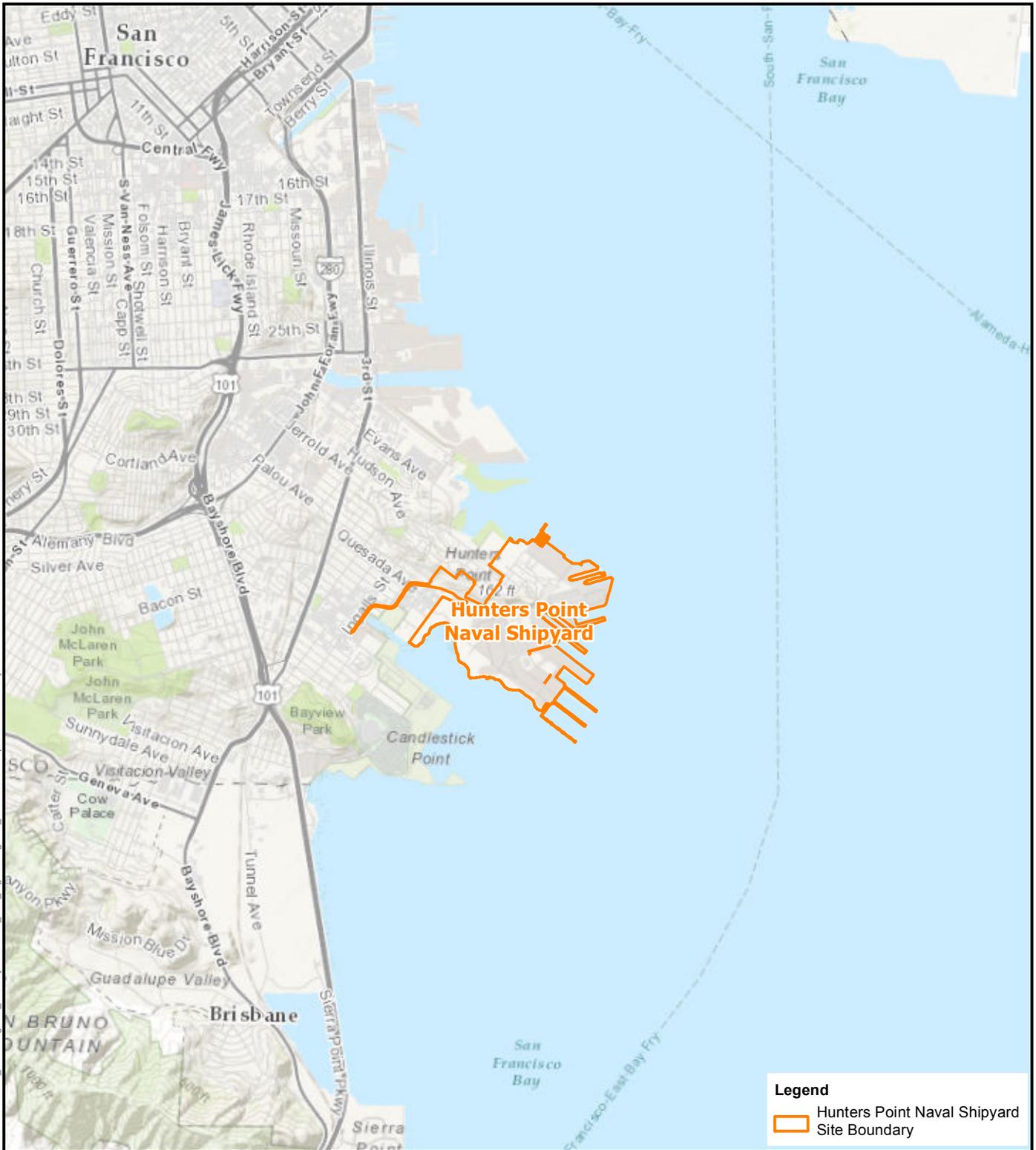
Table 5
Soil Excavation Cost Summary
Parcel G Feasibility Assessment
Hunters Point Naval Shipyard

Excavation Task Breakdown	Excavation to Residential Action Levels	Excavation to Residential Screening Levels
1.0 Planning, Pre-Construction Work and Oversight	\$ 125,560	\$ 302,620
2.0 Pre-excavation Sampling, Excavation, Confirmation Sampling, Profiling and Off-haul	\$ 287,640	\$ 2,341,280
3.0 Backfill	\$ 45,000	\$ 335,900
4.0 Reporting	\$ 16,000	\$ 16,000
Subtotal	\$ 474,200	\$ 2,995,800
30% Contingency	\$ 142,300	\$ 898,700
Total (rounded to nearest \$100)	\$ 616,500	\$ 3,894,500

Notes

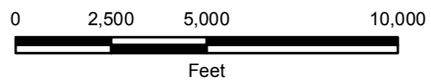
1. Cost information summarized from Appendix C of the Feasibility Assessment.

FIGURES



Notes:

1. ArcGIS software licensing and ArcGIS online. Source of aerial imagery is Microsoft from 2011. Credits: Esri, Digital Globe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, and the GIS User community.
2. Map displayed in California State Plane Coordinate System, Zone III, North American Datum of 1983 (NAD83), US Survey Feet.



HUNTERS POINT NAVAL SHIPYARD
San Francisco, California

SITE LOCATION MAP



Date 11/16/2016

Project 731609901

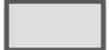
Figure 1

\langan.com\data\SF\0\data\731609901\ArcGIS\ArcMap_Documents\ParcelC_Result\Figures_January2016\Main_Text_Figures\Figure1_SiteLocationMap.mxd User: bsaybr

\\langan.com\data\SF\data\731609901\ArcGIS\Map_Documents\ParcelG_Map_Figures\Figure2_ParcelMap.mxd User: barrington

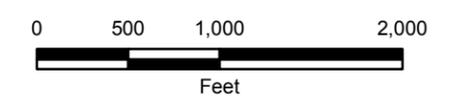


Legend

-  Parcel G Boundary
-  Transferred Parcel
-  Navy Parcel
-  San Francisco Bay
-  Roads

Notes:

1. Parcel boundaries are considered to be approximate; updated July 2014.
2. Data and information provided by San Francisco Department of Public Health and Kleinfelder.
3. Map displayed in California State Plane Coordinate System, Zone III, North American Datum of 1983 (NAD83), US Survey Feet.
4. World aerial imagery basemap is provided through Langan's Esri ArcGIS software licensing and ArcGIS online. Source of aerial imagery is Microsoft from 2011. Credits: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, and the GIS User community.

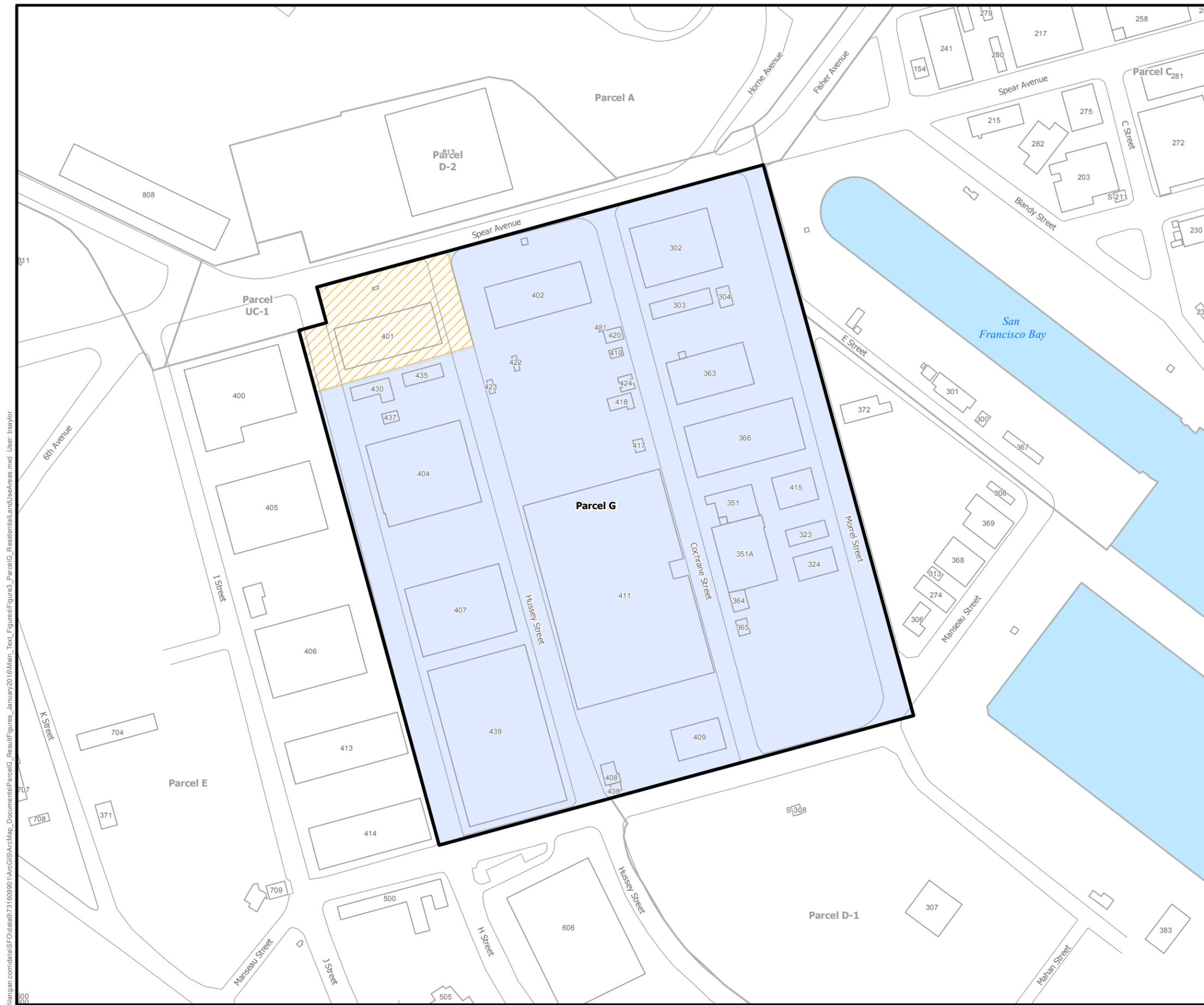


HUNTERS POINT NAVAL SHIPYARD
San Francisco, California

PARCEL MAP

Date 11/16/2016	Project 731609901	Figure 2
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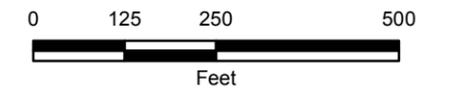


Legend

-  Parcel G Boundary
-  Existing Building
-  Roads
-  San Francisco Bay
-  Residential Use Allowed per Record of Decision
-  Residential Use Restricted per Record of Decision

Notes:

1. Parcels boundaries are considered to be approximate; updated December 2014.
2. Data and information provided by San Francisco Department of Public Health and Kleinfelder.
3. Navy, 2009. Final Record of Decision for Parcel G, Hunters Point Shipyard, San Francisco, California, February 18.
4. Map displayed in California State Plane Coordinate System, Zone III, North American Datum of 1983 (NAD83), US Survey Feet.



HUNTERS POINT NAVAL SHIPYARD
San Francisco, California

PARCEL G
CURRENT STATUS OF RESIDENTIAL
LAND USE RESTRICTIONS

Date: 11/16/2016

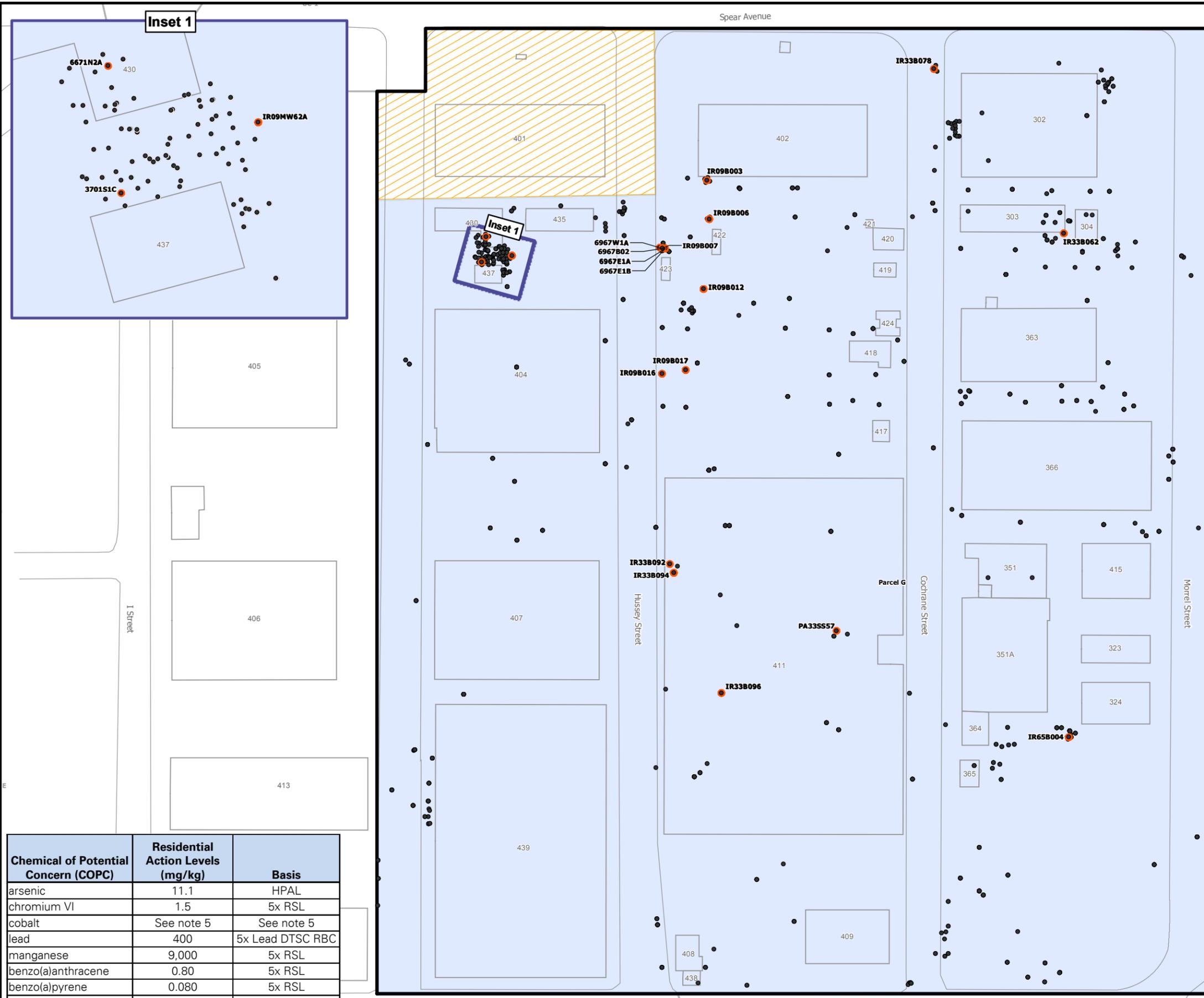
Project 731609901

Figure 3

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Legend

- Soil Sample Location with Results Above Residential Action Levels
- Existing Soil Sample Location
- Parcel G Boundary
- Existing Building
- Roads
- Residential Use Allowed per Record of Decision
- Area Proposed for Residential Use

DTSC RBC = Department of Toxic Substances Control (DTSC) risk-based soil concentration for lead for residential use (2011).
HPAL = Hunters Point ambient level
RSL = USEPA Regional Screening Level, Resident Soil Table (TR=1E-06, HQ=1), November 2015

Notes:

1. Only detected concentrations above laboratory reporting limits were included in this evaluation.
2. Samples include those collected between 0 and 10 feet below ground surface.
3. Essential nutrients (calcium, magnesium, potassium, and sodium) were excluded from this evaluation.
4. Thallium was excluded from this evaluation based on a high false positive rate (of 99.9%) due to severe matrix effects associated with one of the analytical methods used in the past (ICP-AES) (Office of Technical Standards Alert #2, EPA Region 4, 2001).
5. HPALs for cobalt were calculated on a sample-specific basis using the regression approach detailed in PRC (1995).
6. The California Regional Water Quality Control Board, San Francisco Bay Region, issued no further action status for unrestricted land use at petroleum sites at Parcel G (2011). Residual concentrations of petroleum compounds approved to remain in place are excluded from this evaluation.
7. The area with residential use allowed per the Record of Decision was excluded from this evaluation (Navy, 2009).
8. Navy, 2009. Final Record of Decision for Parcel G, Hunters Point Shipyard, San Francisco, California. February 18.
9. Navy, 2007. Final Revised Feasibility Study for Parcel D, Hunters Point Shipyard, San Francisco, California. November 30.
10. PRC, 1995. Draft Calculation of Hunters Point Ambient Levels, Hunters Point Annex, San Francisco, California, August 17.
11. Map displayed in California State Plane Coordinate System, Zone III, North American Datum of 1983 (NAD83), US Survey Feet.

0 75 150 300

 Feet

Chemical of Potential Concern (COPC)	Residential Action Levels (mg/kg)	Basis
arsenic	11.1	HPAL
chromium VI	1.5	5x RSL
cobalt	See note 5	See note 5
lead	400	5x Lead DTSC RBC
manganese	9,000	5x RSL
benzo(a)anthracene	0.80	5x RSL
benzo(a)pyrene	0.080	5x RSL
benzo(b)fluoranthene	0.80	5x RSL

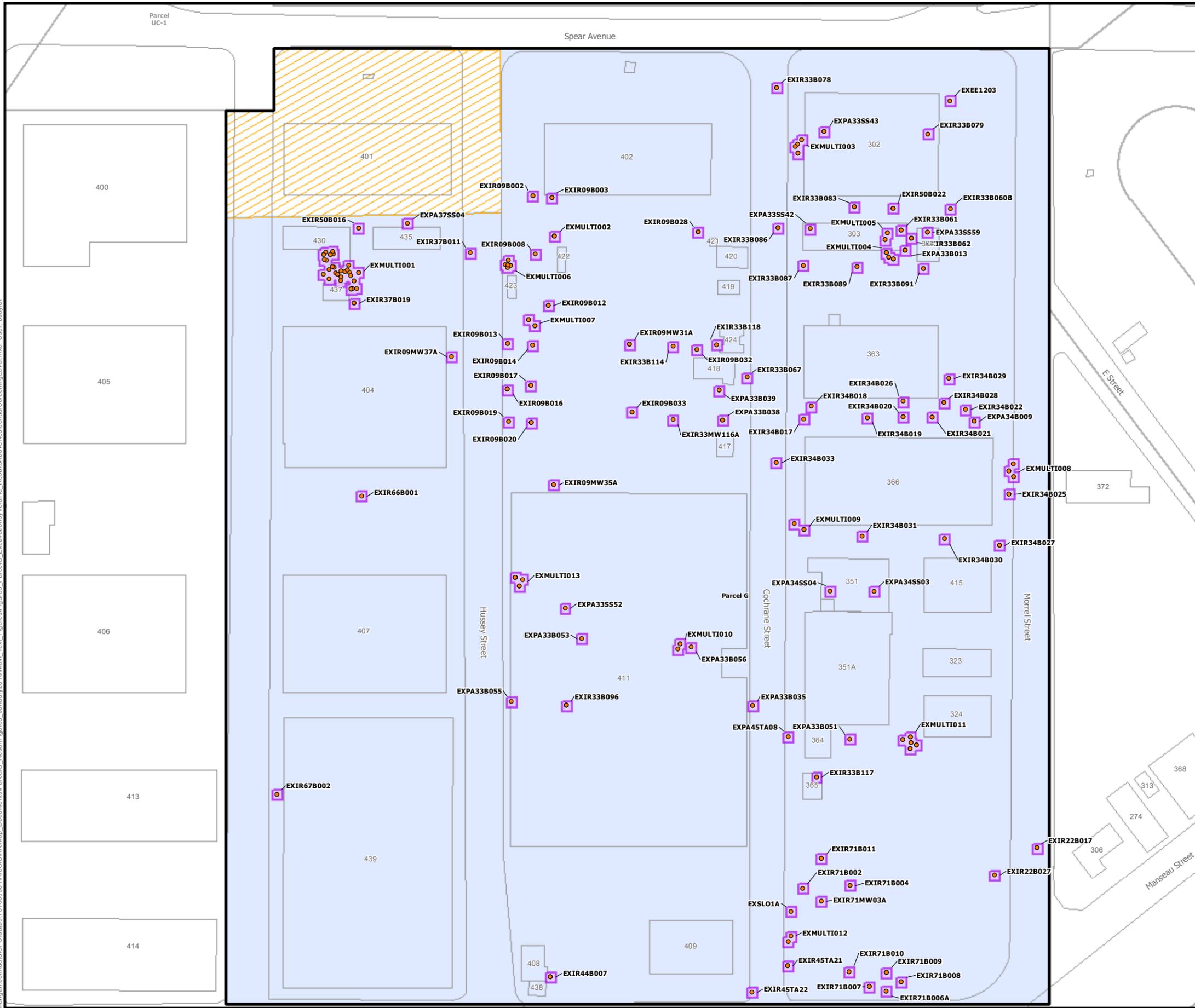
HUNTERS POINT NAVAL SHIPYARD
San Francisco, California

PARCEL G
SOIL SAMPLE LOCATIONS WITH RESULTS ABOVE RESIDENTIAL ACTION LEVELS

Date 11/16/2016	Project 731609901	Figure 5
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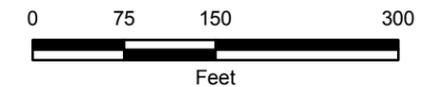


Legend

- Soil Sample Locations with Results Above Residential Screening Levels
- Potential Excavation Area used for screening level evaluation purposes only
- Parcel G Boundary
- Parcel Boundary
- Existing Building
- Roads
- Residential Use Restricted per Record of Decision
- Area Proposed for Residential Use

Notes:

1. Navy, 2009. Final Record of Decision for Parcel G, Hunters Point Shipyard, San Francisco, California. February 18.
2. Map displayed in California State Plane Coordinate System, Zone III, North American Datum of 1983 (NAD83), US Survey Feet.



HUNTERS POINT NAVAL SHIPYARD
San Francisco, California

PARCEL G
POTENTIAL EXCAVATION AREAS FOR SOIL SAMPLES
WITH RESULTS ABOVE RESIDENTIAL SCREENING LEVELS

Date 11/16/2016

Project 731609901

Figure 6

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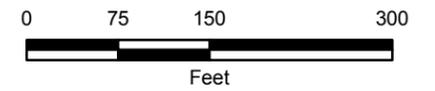


Legend

-  Soil Sample Location with Results Above Residential Action Levels
-  Potential Excavation Area used for action level evaluation purposes only
-  Parcel G Boundary
-  Existing Building
-  Roads
-  Residential Use Restricted per Record of Decision
-  Area Proposed for Residential Use

Notes:

1. Navy, 2009. Final Record of Decision for Parcel G, Hunters Point Shipyard, San Francisco, California. February 18.
2. Map displayed in California State Plane Coordinate System , Zone III, North American Datum of 1983 (NAD83) , US Survey Feet .



HUNTERS POINT NAVAL SHIPYARD
San Francisco, California

**PARCEL G
POTENTIAL EXCAVATION AREAS FOR SOIL SAMPLES
WITH RESULTS ABOVE RESIDENTIAL ACTION LEVELS**

Date 11/16/2016	Project 731609901	Figure 7
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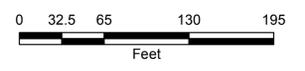




Legend

- Delineating Soil Sample Location Below Action Levels
- Soil Sample Location Above Action Levels
- 071066 Proposed Area with Restricted Land Use
- Residential Risk Grid²⁺
- Parcel G Boundary

- Notes:**
1. Navy, 2009. Final Record of Decision for Parcel G, Hunters Point Shipyard, San Francisco, California. February 18.
 2. Navy, 2007. Final Revised Feasibility Study for Parcel D, Hunters Point Shipyard, San Francisco, California. November 30.
 3. Tetra Tech EM Inc., 2000. Draft Final Parcel D Risk Management Review Process, Hunters Point Shipyard, San Francisco, California. Volumes I and II. June 20.
 4. Aerial imagery provided through Langan's subscription to nearmap.com. Aerial imagery flown on February 1, 2016.
 5. Map displayed in California State Plane Coordinate System, Zone III, North American Datum of 1983 (NAD83), US Survey Feet.



HUNTERS POINT NAVAL SHIPYARD
San Francisco, California

PARCEL G
PROPOSED AREAS WITH
RESTRICTED LAND USE

Date 11/16/2016 Project 731609901 Figure 8



APPENDIX A
SOIL ANALYTICAL RESULTS

TABLES

Table A1
Soil Samples with Results Above Screening Levels Excluded From Feasibility Assessment
Parcel G Feasibility Assessment
Hunters Point Naval Shipyard

Area ID	Status	IR Site	Point ID	Sample ID	Sample Date	Top Depth	Bottom Depth	Chemical of Potential Concern	Result	Q1	Q2	Unit	Reporting Limit	
Soil Hotspot Removal Action¹														
AT22	Excavated	09	IR09B030	9013G167	03/30/90	1.25	1.25	lead	920			mg/kg	7.1	
AV20	Excavated	33	IR33B091	9413L170	03/29/94	1.25	1.25	benzo(a)pyrene	0.49	J		mg/kg	1.7	
	Excavated	33	IR33B091	9413L170	03/29/94	1.25	1.25	benzo(b)fluoranthene	0.34	J		mg/kg	1.7	
Storm Drain and Sanitary Sewer Systems Removal Action²														
Trench Unit 70	Excavated	34	IR34B023	9414L235	04/05/94	6.25	6.25	cobalt	30			mg/kg	0.1	
	Excavated	34	IR34B034	9551J727	12/20/95	0.50	1.00	cobalt	32.2			mg/kg	0.09	
	Excavated	34	IR34B034	9551J728	12/20/95	5.50	6.50	cobalt	34.9			mg/kg	0.09	
	Excavated	34	IR34B034	9551J729	12/20/95	9.50	10.00	cobalt	34.4			mg/kg	0.09	
	Excavated	34	IR50B018	9422R213	06/02/94	3.75	3.75	cobalt	42.3			mg/kg	0.1	
	Excavated	34	IR50B018	9422R213	06/02/94	3.75	3.75	manganese	2,060	J	34	mg/kg	0.042	
	Excavated	34	IR50B018	9422R214	06/02/94	6.25	6.25	cobalt	37.6			mg/kg	0.1	
	Excavated	34	IR50B018	9422R214	06/02/94	6.25	6.25	iron	70,800	J	4	mg/kg	2.1	
	Excavated	34	IR50B018	9422R214	06/02/94	6.25	6.25	manganese	3,200	J	34	mg/kg	0.4	
	Excavated	34	PA34B006	9308D089	02/26/93	6.75	6.75	cobalt	33			mg/kg	0.46	
Trench Unit 71	Excavated	34	PA34B008	9308D083	02/26/93	6.75	6.75	cobalt	36.6	J	4	mg/kg	0.49	
	Excavated	34	IR50B019	9422R218	06/02/94	1.75	1.75	cobalt	30			mg/kg	0.1	
	Excavated	34	IR50B019	9422R219	06/02/94	6.25	6.25	cobalt	39.4			mg/kg	0.1	
	Excavated	34	IR50B019	9422R219	06/02/94	6.25	6.25	manganese	2,190	J	34	mg/kg	0.3	
	Trench Unit 80	Excavated	09	IR09B023	8941G070	10/11/89	0.75	0.75	cobalt	25.6			mg/kg	3.1
		Excavated	09	IR09B023	8941G071	10/11/89	3.25	3.25	chromium VI	0.35			mg/kg	0.055
		Excavated	09	IR09B023	8941G071	10/11/89	3.25	3.25	cobalt	84.6			mg/kg	3.1
	Trench Unit 81	Excavated	37	IR09B010	8941F012	10/11/89	3.25	3.25	cobalt	116			mg/kg	3.4
		Excavated	37	IR09B010	8941F013	10/11/89	5.75	5.75	cobalt	34.6			mg/kg	3.3
	Trench Unit 84	Excavated	09	IR09B025	8941F007	10/11/89	1.25	1.25	cobalt	88.2			mg/kg	3.2
Excavated		09	IR09B025	8941F009	10/11/89	5.75	5.75	cobalt	60.5			mg/kg	3.2	
Excavated		09	IR09B025	8941F007	10/11/89	1.25	1.25	lead	91.6			mg/kg	2.3	
Trench Unit 85	Excavated	09	IR09B029	9013F025	03/29/90	2.75	2.75	cobalt	64.4			mg/kg	1.8	
	Excavated	09	IR09B030	9013G169	03/30/90	5.25	5.25	cobalt	78.6			mg/kg	1.6	
Trench Unit 86	Excavated	09	IR09B018	8939E034	09/27/89	1.25	1.25	lead	455	J	2	mg/kg	6.1	
	Excavated	09	IR09B018	8939E036	09/27/89	5.75	5.75	cobalt	87.8			mg/kg	4.2	
	Excavated	09	IR09B021	8939E040	09/28/89	3.25	3.25	cobalt	94.7			mg/kg	3.8	
Trench Unit 87	Excavated	09	IR09B024	8939E045	09/28/89	3.25	3.25	cobalt	89.5			mg/kg	3.7	
	Excavated	44	IR50B020	9421R186	05/26/94	6.25	6.25	arsenic	15.2			mg/kg	0.43	
Trench Unit 99	Excavated	45	IR45TA19	9437A055	09/13/94	4.75	4.75	cobalt	33.5			mg/kg	0.15	
	Excavated	-	PA50TA09	9327P235	07/08/93	9.75	9.75	cobalt	33.8			mg/kg	0.67	
Trench Unit 114	Excavated	09	IR09B005	8939E006	09/26/89	0.75	0.75	cobalt	27.9			mg/kg	3.6	
	Excavated	09	IR09B005	8939E007	09/26/89	2.75	2.75	chromium VI	0.57			mg/kg	0.12	
	Excavated	09	IR09B005	8939E007	09/26/89	2.75	2.75	cobalt	44.7			mg/kg	3.8	
	Excavated	09	IR09B005	8939E008	09/26/89	5.75	5.75	chromium VI	1.4			mg/kg	0.12	
	Excavated	09	IR09B005	8939E008	09/26/89	5.75	5.75	cobalt	34.6			mg/kg	3.9	

Table A1
Soil Samples with Results Above Screening Levels Excluded From Feasibility Assessment
Parcel G Feasibility Assessment
Hunters Point Naval Shipyard

Area ID	Status	IR Site	Point ID	Sample ID	Sample Date	Top Depth	Bottom Depth	Chemical of Potential Concern	Result	Q1	Q2	Unit	Reporting Limit
Trench Unit 116	Excavated	44	PA44B005	9310A691	03/10/93	5.25	5.25	cobalt	35.1			mg/kg	0.68
	Excavated	44	PA44B005	9310A691	03/10/93	5.25	5.25	manganese	2,790	J	3	mg/kg	0.18
Trench Unit 118	Excavated	65	IR65B002	9604J763	01/25/96	0.50	1.50	cobalt	25.4			mg/kg	0.09
Trench Unit 120	Excavated	33	IR33B070	9415C127	04/12/94	6.25	6.25	cobalt	36	J	3	mg/kg	0.1
	Excavated	33	IR33B070	9415C127	04/12/94	6.25	6.25	iron	58,300			mg/kg	1.7
Trench Unit 121	Excavated	33	PA33SS48	9310J371	03/08/93	0.75	0.75	lead	130	J	2	mg/kg	2.6
Trench Unit 129	Excavated	37	IR37B013	9421R180	05/25/94	1.25	1.25	benzo(a)pyrene	0.10	J		mg/kg	0.37
	Excavated	37	IR37B013	9421R181	05/25/94	5.25	5.25	benzo(a)pyrene	0.06	J	0	mg/kg	0.38
Trench Unit 151	Excavated	09	IR09B015	8939E031	09/27/89	5.75	5.75	cobalt	72.7			mg/kg	3.2
Petroleum Program³													
AOC 33-B	Remains in Place	33	IR33B069	9419L438	05/11/94	6.25	6.25	benzo(a)anthracene	0.48	J		mg/kg	0.73
	Remains in Place	33	IR33B069	9419L438	05/11/94	6.25	6.25	benzo(a)pyrene	0.33	J		mg/kg	0.73
	Remains in Place	33	IR33B069	9419L438	05/11/94	6.25	6.25	benzo(b)fluoranthene	0.23	J		mg/kg	0.73
	Excavated	33	IR33B091	9413L170	03/29/94	1.25	1.25	benzo(a)pyrene	0.49	J		mg/kg	1.7
	Excavated	33	IR33B091	9413L170	03/29/94	1.25	1.25	benzo(b)fluoranthene	0.34	J		mg/kg	1.7
AOC 33-C ⁴	Remains in Place	33	IR33B065	9420C240	05/19/94	0.75	0.75	benzo(a)pyrene	0.02	J		mg/kg	0.35
	Remains in Place	33	U302-1-SC005	91-U302-1-SC005RE	11/14/00	1.00	1.00	benzo(a)pyrene	0.24	J		mg/kg	0.37
	Remains in Place	33	U302-1-SC005	91-U302-1-SC005RE	11/14/00	1.00	1.00	benzo(b)fluoranthene	0.30	J		mg/kg	0.37
	Remains in Place	33	U302-1-SC005	91-U302-1-SC005RE	11/14/00	1.00	1.00	dibenz(a,h)anthracene	0.07	J		mg/kg	0.37
	Remains in Place	33	U302-1-SC005	91-U302-1-SC005RE	11/14/00	1.00	1.00	indeno(1,2,3-c,d)pyrene	0.18	J		mg/kg	0.37
	Remains in Place	33	U302-SC008	91-U302-SC008	11/14/00	1.00	1.00	benzo(a)pyrene	0.06	J		mg/kg	0.37
AOC 45D-A	Remains in Place	45	IR45TA22	9437A065	09/14/94	5.75	5.75	benzo(a)pyrene	0.10	J		mg/kg	0.36
	Remains in Place	71	IR71B002	9533C118	08/17/95	0.50	1.00	benzo(a)anthracene	0.30	J		mg/kg	0.35
	Remains in Place	33	U302-1-SC005	91-U302-1-SC005RE	11/14/00	1.00	1.00	benzo(a)anthracene	0.17	J		mg/kg	0.37
BOC IR34B023	Excavated	34	IR34B023	9414L234	04/05/94	1.25	1.25	benzo(a)anthracene	0.69			mg/kg	0.34
	Excavated	34	IR34B023	9414L234	04/05/94	1.25	1.25	benzo(a)pyrene	0.27	J		mg/kg	0.34
	Excavated	34	IR34B023	9414L234	04/05/94	1.25	1.25	benzo(b)fluoranthene	0.44			mg/kg	0.34
	Excavated	34	IR34B023	9414L234	04/05/94	1.25	1.25	dibenz(a,h)anthracene	0.08	J		mg/kg	0.34
	Excavated	34	IR34B023	9414L234	04/05/94	1.25	1.25	indeno(1,2,3-c,d)pyrene	0.17	J		mg/kg	0.34

Notes:

- Soil samples excavated during the Parcel G hotspot removal action were excluded from this evaluation as documented in the "Remedial Action Completion Report for Soil Hotspot Locations at Parcels B, D-1, and G and Soil Stockpiles at Parcels D-1 and G, Hunters Point Naval Shipyard, San Francisco, California" (Engineering/Remediation Resources Group, Inc., 2011).
- Soil samples excavated during the Parcel G storm drain and sanitary sewer systems time-critical removal action were excluded from this evaluation as documented in the "Removal Action Completion Report, Parcel G, Hunters Point Naval Shipyard, San Francisco, California" (Tetra Tech, 2011).
- Soil samples excavated or approved to remain in place as part of the Petroleum Program were excluded from this evaluation as documented in "Final Petroleum Hydrocarbon Site Closeout Report, Parcels D-1, D-2, and G (Former Parcel D), Revision 1, Hunters Point Shipyard, San Francisco, California" (Innovative Technical Solutions, Inc., 2012).
- The benzo(a)pyrene detection above its Action Level at boring U302-1-SC005 in AOC 33-C is bounded by numerous clean samples. While non-detect (U-flagged) values of nearby clean samples are elevated above the Action Level, the accuracy of these non-detect values are not considered reliable due to the limits of the laboratory analytical method used. The Records of Decision (RODs) for nearby Parcels B and E established the residential Remediation Goal (RG) for benzo(a)pyrene as 0.33 mg/kg, which is noted as the practical quantitation limit (PQL). PQLs are considered the lowest concentrations that can be accurately measured. The maximum concentration of benzo(a)pyrene detected at AOC 33-C of 0.24 J mg/kg is below the RG established at Parcels B and E.

J = estimated detected result that is greater than the detection limit but less than the reporting limit (Navy, 2007)
 J0 = estimated detected result based on internal standards (Navy, 2007)
 J2 = estimated detected result based on matrix duplicate (Navy, 2007)

J3 = estimated detected result due to inaccuracies from a blank spike, surrogate spike, or matrix spike (Navy, 2007)
 J4 = estimated detected result due to serial dilution (Navy, 2007)
 mg/kg = milligrams per kilograms

Table A2
Analytical Data: Soil Samples with Results above Residential Screening Levels
Parcel G Feasibility Assessment
Hunters Point Naval Shipyard

Chemical of Potential Concern	IR Site	Point ID	Sample ID	Sample Date	Top Depth	Bottom Depth	Result	Q1	Q2	Unit	Reporting Limit	Residential Screening Level	
												RSL	HPAL
antimony	33	IR33B096	9607J867	02/13/96	6	7	62.4	J	2	MG/KG	0.36	RSL	31
Aroclor-1260	37	3701BC01	3701BC01_4	04/18/01	4	4.5	0.27			MG/KG	0.019	RSL	0.24
Aroclor-1260		IR65B001	9536J151	09/06/95	0.5	1	0.25	J		MG/KG	0.34	RSL	0.24
Aroclor-1260	33	U302-3-SC008	91-U302-3-SC008	11/14/00	1	1	0.345			MG/KG	0.037	RSL	0.24
arsenic	09	6967E1B	6967E1B_1.5	03/12/01	1.5	2	15			MG/KG	0.27	HPAL	11.1
arsenic	09	IR09B007	8939E012	09/26/89	1.25	1.25	12.7			MG/KG	0.28	HPAL	11.1
arsenic	09	IR09B017	8939E059	09/29/89	1.25	1.25	14.2			MG/KG	0.31	HPAL	11.1
arsenic	33	IR33B062	9414H569	04/06/94	2.25	2.25	24	J	3	MG/KG	0.28	HPAL	11.1
arsenic	33	IR33B078	9414A748	04/05/94	1.75	1.75	12.5	J	3	MG/KG	0.3	HPAL	11.1
arsenic	33	IR33B094	9545J591	11/07/95	6.5	7	11.3			MG/KG	0.65	HPAL	11.1
arsenic		IR65B004	9604J757	01/25/96	0.5	1.5	47.2			MG/KG	0.31	HPAL	11.1
benzo(a)anthracene	33	IR33B092	9606J856	02/07/96	4	5	0.2	J		MG/KG	0.33	RSL	0.16
benzo(a)anthracene	33	IR33B096	9607J867	02/13/96	6	7	0.81	J	5	MG/KG	0.38	RSL	0.16
benzo(a)pyrene	9	IR09B016	8939E054	09/29/89	1.25	1.25	0.3	J		MG/KG	0.33	RSL	0.016
benzo(a)pyrene	9	IR09B033	9014H088	04/02/90	5.25	5.25	0.072	J		MG/KG	0.35	RSL	0.016
benzo(a)pyrene		IR33B060B	9423R230	06/06/94	6.25	6.25	0.03	J		MG/KG	0.36	RSL	0.016
benzo(a)pyrene	33	IR33B078	9414A748	04/05/94	1.75	1.75	0.033	J		MG/KG	0.35	RSL	0.016
benzo(a)pyrene	33	IR33B092	9606J855	02/07/96	1	1.5	0.13	J		MG/KG	0.35	RSL	0.016
benzo(a)pyrene	33	IR33B092	9606J856	02/07/96	4	5	0.19	J		MG/KG	0.33	RSL	0.016
benzo(a)pyrene	33	IR50B022	9422R217	06/02/94	5.75	5.75	0.033	J		MG/KG	0.35	RSL	0.016
benzo(b)fluoranthene	33	IR33B092	9606J855	02/07/96	1	1.5	0.19	J		MG/KG	0.35	RSL	0.16
benzo(b)fluoranthene	33	IR33B092	9606J856	02/07/96	4	5	0.32	J		MG/KG	0.33	RSL	0.16
benzo(b)fluoranthene	33	IR33B096	9607J867	02/13/96	6	7	1.0	J	5	MG/KG	0.38	RSL	0.16
chromium VI	09	6965B02	6965B02_6	12/20/00	5.5	6	0.48	J	3	MG/KG	0.1	RSL	0.3
chromium VI	09	6967B02	6967B02_5	12/20/00	5	5.5	4.9	J	3	MG/KG	0.06	RSL	0.3
chromium VI	09	6967E1A	6967E1A_5	12/14/00	5	5.5	1.7			MG/KG	0.06	RSL	0.3
chromium VI	09	6967N1B	6967N1B_0.5	03/12/01	0.5	1	0.33	J	53	MG/KG	0.05	RSL	0.3
chromium VI	09	6967S1A	6967S1A_7	12/14/00	6.5	7	1.3			MG/KG	0.05	RSL	0.3
chromium VI	09	6967W1A	6967W1A_5	12/13/00	5	5.5	4.9			MG/KG	0.06	RSL	0.3
chromium VI	09	IR09B007	8939E013	09/26/89	5.25	5.25	0.62			MG/KG	0.12	RSL	0.3
chromium VI	09	IR09B008	8939E003	09/26/89	1.25	1.25	0.44			MG/KG	0.11	RSL	0.3
chromium VI	37	IR09MW62A	0413T026	03/24/04	5	7	1.2	J	3	MG/KG	1.2	RSL	0.3
chromium VI		IR22B017	9320A021	05/19/93	3.75	3.75	0.57			MG/KG	0.23	RSL	0.3

Table A2
Analytical Data: Soil Samples with Results above Residential Screening Levels
Parcel G Feasibility Assessment
Hunters Point Naval Shipyard

Chemical of Potential Concern	IR Site	Point ID	Sample ID	Sample Date	Top Depth	Bottom Depth	Result	Q1	Q2	Unit	Reporting Limit	Residential Screening Level
cobalt		IR09B002	8939E001	09/25/89	0.75	0.75	55.1			MG/KG	4.3	See note
cobalt	09	IR09B006	8939E017	09/26/89	3.25	3.25	167			MG/KG	4	See note
cobalt	09	IR09B006	8939E018	09/26/89	5.75	5.75	383			MG/KG	6.2	See note
cobalt	09	IR09B013	8939E026	09/27/89	5.25	5.25	70.4			MG/KG	4	See note
cobalt	09	IR09B019	8939E051	09/28/89	5.75	5.75	110			MG/KG	4	See note
cobalt	09	IR09B016	8939E055	09/29/89	3.25	3.25	42			MG/KG	3.5	See note
cobalt	09	IR09B016	8939E056	09/29/89	5.25	5.25	74			MG/KG	4	See note
cobalt	09	IR09B017	8939E061	09/29/89	5.25	5.25	114			MG/KG	4.3	See note
cobalt	37	IR37B027	0018D003	05/09/00	3.5	4	87.3			MG/KG	0.11	See note
cobalt	37	IR37B027	0018D005	05/09/00	5.5	6	103			MG/KG	0.12	See note
cobalt	37	IR37B026	0018D006	05/09/00	3.5	4	51.4			MG/KG	0.11	See note
cobalt	37	IR37B026	0018D008	05/09/00	5.5	6	94.4			MG/KG	0.12	See note
cobalt	33	IR33B109	0018D032	05/09/00	5.5	7	61.3	J	9	MG/KG	0.11	See note
cobalt	37	IR09MW62A	0413T026	03/24/04	5	7	124			MG/KG	0.7	See note
cobalt	09	IR09B003	8939G001	09/25/89	1.75	1.75	26.6			MG/KG	3.7	See note
cobalt	09	IR09B003	8939G003	09/25/89	5.75	5.75	201			MG/KG	5.4	See note
cobalt	09	IR09B014	8941F004	10/10/89	5.75	5.75	56.1			MG/KG	3.5	See note
cobalt	09	IR09B012	8941G075	10/11/89	1.25	1.25	31.3			MG/KG	3.1	See note
cobalt	09	IR09B012	8941G076	10/11/89	3.25	3.25	64			MG/KG	3.1	See note
cobalt	09	IR09B012	8941G077	10/11/89	5.75	5.75	122			MG/KG	4.2	See note
cobalt	09	IR09B011	8941G081	10/12/89	1.25	1.25	34.5			MG/KG	3.1	See note
cobalt	09	IR09B011	8941G083	10/12/89	5.75	5.75	106			MG/KG	3.9	See note
cobalt	09	IR09B020	8943G107	10/27/89	5.25	5.25	90.7			MG/KG	3.3	See note
cobalt	09	IR09MW31A	9013F020	03/28/90	0.75	0.75	35.9			MG/KG	1.8	See note
cobalt	09	IR09MW31A	9013F021	03/28/90	5.25	5.25	77.4			MG/KG	1.9	See note
cobalt		IR09MW37A	9013G153	03/29/90	2.75	2.75	94.6			MG/KG	1.9	See note
cobalt	09	IR09B028	9013G165	03/30/90	2.75	2.75	89			MG/KG	1.9	See note
cobalt	09	IR09B028	9013G166	03/30/90	5.25	5.25	79.4			MG/KG	1.9	See note
cobalt	09	IR09B032	9014H078	04/02/90	5.25	5.25	60.8			MG/KG	1.6	See note
cobalt	09	IR09MW38A	9015G177	04/10/90	2.75	2.75	93.6			MG/KG	1.7	See note
cobalt	09	IR09MW38A	9015G178	04/10/90	5.25	5.25	63.3			MG/KG	1.7	See note
cobalt	33	U302-1-SC006	91-U302-1-SC006	11/14/00	1	1	27.9			MG/KG	0.076	See note
cobalt	33	U302-3-SC008	91-U302-3-SC008	11/14/00	1	1	42.6			MG/KG	0.078	See note
cobalt	33	PA33B039	9308D068	02/25/93	2.25	2.25	37.7			MG/KG	0.67	See note
cobalt	33	PA33B039	9308D069	02/25/93	6.75	6.75	37			MG/KG	0.67	See note
cobalt	33	PA33B038	9308D071	02/25/93	2.25	2.25	34			MG/KG	0.66	See note
cobalt	33	PA33B038	9308D072	02/25/93	6.75	6.75	44.1			MG/KG	0.65	See note

Table A2
Analytical Data: Soil Samples with Results above Residential Screening Levels
Parcel G Feasibility Assessment
Hunters Point Naval Shipyard

Chemical of Potential Concern	IR Site	Point ID	Sample ID	Sample Date	Top Depth	Bottom Depth	Result	Q1	Q2	Unit	Reporting Limit	Residential Screening Level
cobalt	33	PA33B035	9308D074	02/25/93	2.25	2.25	45.6			MG/KG	0.67	See note
cobalt	33	PA33B035	9308D075	02/25/93	6.75	6.75	48			MG/KG	0.68	See note
cobalt		PA34B009	9308D079	02/26/93	2.25	2.25	30.7	J	4	MG/KG	0.46	See note
cobalt		PA34B009	9308D080	02/26/93	6.75	6.75	27.5	J	4	MG/KG	0.46	See note
cobalt	34	PA34B011	9309A680	03/05/93	1.75	1.75	32.6	J	4	MG/KG	0.45	See note
cobalt	34	PA34B011	9309A681	03/05/93	6.75	6.75	27.2	J	4	MG/KG	0.44	See note
cobalt	33	PA33SS43	9310J379	03/10/93	1.45	1.45	44.6			MG/KG	0.73	See note
cobalt	33	PA33SS42	9310J386	03/10/93	1.85	1.85	60.6			MG/KG	0.68	See note
cobalt	33	PA33SS59	9310J388	03/11/93	1.25	1.25	47.6			MG/KG	0.7	See note
cobalt	37	PA37SS08	9310J389	03/11/93	1.25	1.25	27.5			MG/KG	0.66	See note
cobalt	33	PA33SS52	9310J393	03/12/93	4.5	4.5	47.2			MG/KG	0.71	See note
cobalt	33	PA33SS57	9310J394	03/12/93	5.25	5.25	134			MG/KG	0.86	See note
cobalt	34	PA34SS04	9310J397	03/12/93	1.75	1.75	33.1			MG/KG	0.7	See note
cobalt	34	PA34SS03	9310J398	03/12/93	2.75	2.75	41.8			MG/KG	0.73	See note
cobalt	33	PA33B058	9311N180	03/19/93	3.75	3.75	35.9			MG/KG	0.69	See note
cobalt	34	PA34SS14	9312A696	03/22/93	1.25	1.25	23.7			MG/KG	0.68	See note
cobalt	33	PA33B056	9313N181	04/01/93	7.25	7.25	40.2			MG/KG	0.68	See note
cobalt	33	PA33B013	9313N182	04/01/93	1.75	1.75	47			MG/KG	0.66	See note
cobalt	33	PA33B013	9313N183	04/01/93	6.25	6.25	41.9			MG/KG	0.68	See note
cobalt		IR22B017	9320A020	05/19/93	1.75	1.75	28.8			MG/KG	0.6	See note
cobalt		IR22B017	9320A021	05/19/93	3.75	3.75	32.4			MG/KG	0.65	See note
cobalt		IR22B017	9320A022	05/19/93	6.75	6.75	34.1			MG/KG	0.7	See note
cobalt	33	PA45TA08	9322P222	06/03/93	5.75	5.75	41.2			MG/KG	0.74	See note
cobalt		PA45TA13	9325A058	06/21/93	2.25	2.25	24.8			MG/KG	0.78	See note
cobalt		PA33B051	9342G750	10/18/93	7.25	7.25	32			MG/KG	0.52	See note
cobalt	33	IR33B086	9413A718	03/31/94	2.25	2.25	63.3			MG/KG	0.21	See note
cobalt	33	IR33B086	9413A719	03/31/94	6.25	6.25	85.8			MG/KG	0.25	See note
cobalt	33	IR33B089	9413L163	03/28/94	1.25	1.25	27			MG/KG	0.1	See note
cobalt	33	IR33B089	9413L164	03/28/94	6.25	6.25	30.2			MG/KG	0.1	See note
cobalt	33	IR33B091	9413L171	03/29/94	6.25	6.25	35			MG/KG	0.1	See note
cobalt	33	IR33B083	9413L177	03/29/94	6.25	6.25	37.7	J	3	MG/KG	0.1	See note
cobalt	33	IR33B087	9413L193	03/30/94	1.25	1.25	85.7			MG/KG	0.23	See note
cobalt	33	IR33B087	9413L194	03/30/94	6.25	6.25	80.7			MG/KG	0.24	See note
cobalt		IR34B017	9413L201	03/31/94	6.25	6.25	25.3			MG/KG	0.21	See note
cobalt	34	IR34B027	9413L210	04/01/94	1.25	1.25	25.6			MG/KG	0.22	See note
cobalt	34	IR34B027	9413L211	04/01/94	6.25	6.25	32.4			MG/KG	0.22	See note
cobalt	33	IR33B063	9414H565	04/06/94	1.75	1.75	40.6			MG/KG	0.23	See note

Table A2
Analytical Data: Soil Samples with Results above Residential Screening Levels
Parcel G Feasibility Assessment
Hunters Point Naval Shipyard

Chemical of Potential Concern	IR Site	Point ID	Sample ID	Sample Date	Top Depth	Bottom Depth	Result	Q1	Q2	Unit	Reporting Limit	Residential Screening Level
cobalt	33	IR33B063	9414H566	04/06/94	6.25	6.25	42.8			MG/KG	0.23	See note
cobalt	33	IR33B062	9414H569	04/06/94	2.25	2.25	24.3			MG/KG	0.21	See note
cobalt	33	IR33B062	9414H570	04/06/94	7.75	7.75	33.9			MG/KG	0.21	See note
cobalt		IR34B019	9414L218	04/04/94	1.25	1.25	38.8	J	3	MG/KG	0.1	See note
cobalt		IR34B019	9414L219	04/04/94	6.25	6.25	41.8	J	3	MG/KG	0.1	See note
cobalt		IR34B021	9414L228	04/04/94	1.25	1.25	29.7	J	3	MG/KG	0.1	See note
cobalt		IR34B021	9414L229	04/04/94	6.25	6.25	32.3			MG/KG	0.1	See note
cobalt		IR34B015	9414L243	04/05/94	1.25	1.25	32.7			MG/KG	0.1	See note
cobalt		IR34B016	9414L250	04/06/94	1.25	1.25	33.3			MG/KG	0.21	See note
cobalt		IR34B016	9414L251	04/06/94	6.25	6.25	28.8			MG/KG	0.22	See note
cobalt	34	IR34B025	9414L257	04/06/94	1.25	1.25	28.3			MG/KG	0.21	See note
cobalt	34	IR34B025	9414L258	04/06/94	6.25	6.25	28.7			MG/KG	0.22	See note
cobalt	33	IR33B061	9415A789	04/14/94	2.75	2.75	33.6			MG/KG	0.21	See note
cobalt	33	IR33B061	9415A790	04/14/94	7.75	7.75	23.6			MG/KG	0.22	See note
cobalt		IR37B011	9415C147	04/14/94	5.75	5.75	114			MG/KG	0.27	See note
cobalt	33	IR33B064	9420C233	05/18/94	6.25	6.25	32.7			MG/KG	0.1	See note
cobalt	33	IR33B067	9420R130	05/16/94	6.25	6.25	32.2			MG/KG	0.1	See note
cobalt	37	IR50B016	9422R210	06/01/94	1.75	1.75	76.4			MG/KG	0.1	See note
cobalt	37	IR50B016	9422R211	06/01/94	6.25	6.25	98.7			MG/KG	0.1	See note
cobalt	33	IR50B022	9422R216	06/02/94	1.75	1.75	36.2			MG/KG	0.1	See note
cobalt	37	IR37B016	9423C261	06/09/94	5.75	5.75	87.8			MG/KG	0.23	See note
cobalt	37	IR37B015	9423C264	06/10/94	6.25	6.25	81.8			MG/KG	0.23	See note
cobalt	37	IR37B014	9423C267	06/10/94	5.75	5.75	83.5			MG/KG	0.24	See note
cobalt	37	IR37B017	9424C270	06/13/94	5.75	5.75	92.3			MG/KG	0.1	See note
cobalt		IR34B028	9427R373	07/06/94	6.25	6.25	34.6			MG/KG	0.16	See note
cobalt		IR34B022	9427R379	07/06/94	7.75	7.75	37.9			MG/KG	0.16	See note
cobalt		IR34B020	9427R385	07/06/94	6.25	6.25	27.3			MG/KG	0.16	See note
cobalt		IR34B020	9427R386	07/06/94	9.75	9.75	33.4			MG/KG	0.15	See note
cobalt	33	IR33B090	9431R494	08/04/94	1.75	1.75	58			MG/KG	0.16	See note
cobalt	33	IR33B090	9431R495	08/04/94	6.25	6.25	34.2			MG/KG	0.16	See note
cobalt		IR34B018	9432A030	08/12/94	7.25	7.25	31.4			MG/KG	0.16	See note
cobalt	33	IR33B079	9434K051	08/27/94	6.25	6.25	79.9			MG/KG	0.16	See note
cobalt	34	IR34B030	9434R598	08/24/94	1.25	1.25	27.4			MG/KG	0.15	See note
cobalt	34	IR34B030	9434R599	08/24/94	6.25	6.25	31.9			MG/KG	0.15	See note
cobalt	34	IR34B031	9434R609	08/25/94	6.25	6.25	29.3			MG/KG	0.15	See note
cobalt		IR34B026	9434R617	08/25/94	6.25	6.25	38			MG/KG	0.15	See note
cobalt		IR34B029	9434R623	08/26/94	6.25	6.25	32.3			MG/KG	0.16	See note

Table A2
Analytical Data: Soil Samples with Results above Residential Screening Levels
Parcel G Feasibility Assessment
Hunters Point Naval Shipyard

Chemical of Potential Concern	IR Site	Point ID	Sample ID	Sample Date	Top Depth	Bottom Depth	Result	Q1	Q2	Unit	Reporting Limit	Residential Screening Level
cobalt		IR45TA21	9437A062	09/13/94	5.75	5.75	40.4			MG/KG	0.15	See note
cobalt		IR45TA22	9437A065	09/14/94	5.75	5.75	30.1			MG/KG	0.15	See note
cobalt	33	IR34B033	9438A073	09/20/94	6.25	6.25	41.9			MG/KG	0.16	See note
cobalt	34	IR34B032	9441A135	10/12/94	1.75	1.75	32.6			MG/KG	0.15	See note
cobalt	34	IR34B032	9441A136	10/12/94	6.25	6.25	33.3			MG/KG	0.15	See note
cobalt	09	IR33MW116A	9531C061	07/31/95	1	1.5	43.3			MG/KG	0.11	See note
cobalt	09	IR33B114	9531C070	08/02/95	6	6.5	100			MG/KG	0.12	See note
cobalt		IR33B117	9532G038	08/09/95	0.5	1	29.4			MG/KG	0.1	See note
cobalt		IR33B117	9532G040	08/09/95	4	4.5	42.5			MG/KG	0.1	See note
cobalt		IR33B117	9532G041	08/09/95	9	9.5	41.7			MG/KG	0.11	See note
cobalt	71	IR71B002	9533C119	08/17/95	5.5	6	28.6			MG/KG	0.1	See note
cobalt	71	IR71B004	9533D001	08/18/95	3	3.5	30.8			MG/KG	0.11	See note
cobalt	71	IR71B004	9533D002	08/18/95	5.5	6	24.6			MG/KG	0.1	See note
cobalt		IR71MW03A	9533G047	08/17/95	9.5	10.5	29			MG/KG	0.12	See note
cobalt	66	IR66B001	9533S102	08/15/95	1	1.5	33.4			MG/KG	0.11	See note
cobalt		IR71B006A	9535J119	08/31/95	0.5	1	39.3			MG/KG	0.11	See note
cobalt		IR71B006A	9535J120	08/31/95	2	3	37.6			MG/KG	0.1	See note
cobalt	71	IR71B007	9535J121	08/31/95	0	0.5	31			MG/KG	0.1	See note
cobalt	71	IR71B007	9535J125	08/31/95	1.5	2.5	36.5			MG/KG	0.11	See note
cobalt	71	IR71B007	9535J126	08/31/95	4.5	5.5	33.6			MG/KG	0.11	See note
cobalt	71	IR71B008	9535J128	08/31/95	0	0.5	27.9			MG/KG	0.11	See note
cobalt	71	IR71B008	9535J129	08/31/95	2	3	44.6			MG/KG	0.11	See note
cobalt	71	IR71B008	9535J130	08/31/95	4.5	5	46.9			MG/KG	0.11	See note
cobalt	71	IR71B009	9535J132	08/31/95	0	0.5	28.3			MG/KG	0.1	See note
cobalt	71	IR71B009	9535J133	08/31/95	2	3	35.7			MG/KG	0.11	See note
cobalt	71	IR71B009	9535J134	08/31/95	5	5.5	39.4			MG/KG	0.11	See note
cobalt		IR65B001	9536J152	09/06/95	5	5.5	35.1			MG/KG	0.11	See note
cobalt	37	IR37B018	9537J241	09/15/95	0.5	1	29.8			MG/KG	0.1	See note
cobalt	37	IR37B018	9537J243	09/15/95	6	6.5	108			MG/KG	0.12	See note
cobalt	37	IR37B019	9537J245	09/15/95	0.5	1	30.1			MG/KG	0.11	See note
cobalt	37	IR37B019	9537J246	09/15/95	2.5	3	34.8			MG/KG	0.11	See note
cobalt	37	IR37B020	9538J291	09/21/95	6	6.5	108			MG/KG	0.12	See note
cobalt	33	IR33B118	9543W088	10/26/95	0	1	52.9			MG/KG	0.11	See note
cobalt	44	IR44B007	9545J577	11/06/95	0.5	1	39.9			MG/KG	0.11	See note
cobalt	44	IR44B007	9545J578	11/06/95	5	6	36.2			MG/KG	0.11	See note
cobalt	44	IR44B007	9545J579	11/06/95	8.5	9	30.6			MG/KG	0.12	See note
cobalt	37	IR37B021	9545J582	11/06/95	0.5	1	34.2			MG/KG	0.11	See note

Table A2
Analytical Data: Soil Samples with Results above Residential Screening Levels
Parcel G Feasibility Assessment
Hunters Point Naval Shipyard

Chemical of Potential Concern	IR Site	Point ID	Sample ID	Sample Date	Top Depth	Bottom Depth	Result	Q1	Q2	Unit	Reporting Limit	Residential Screening Level	
cobalt	37	IR37B021	9545J584	11/06/95	5	6	114			MG/KG	0.13	See note	
cobalt		IR65B003	9604J754	01/25/96	0.5	1.5	33			MG/KG	0.09	See note	
cobalt		IR65B003	9604J755	01/25/96	2.5	3.5	32			MG/KG	0.09	See note	
cobalt		IR65B003	9604J756	01/25/96	4.5	5.5	36.6			MG/KG	0.09	See note	
cobalt		IR65B004	9604J757	01/25/96	0.5	1.5	39.3			MG/KG	0.09	See note	
cobalt		IR65B004	9604J758	01/25/96	2.5	3.5	36.6			MG/KG	0.09	See note	
cobalt		IR65B004	9604J759	01/25/96	4.5	5.5	34.4			MG/KG	0.09	See note	
cobalt		IR65B005	9604J760	01/25/96	0.5	1.5	33.5			MG/KG	0.09	See note	
cobalt		IR65B005	9604J761	01/25/96	2.5	3.5	45.2			MG/KG	0.09	See note	
cobalt		IR65B005	9604J762	01/25/96	4.5	5.5	35.6			MG/KG	0.09	See note	
cobalt		IR65B002	9604J764	01/25/96	2.5	3.5	37.7			MG/KG	0.09	See note	
cobalt		IR65B002	9604J765	01/25/96	4.5	5.5	39.4			MG/KG	0.1	See note	
cobalt		IR71B011	9604J792	01/26/96	0.5	1.5	41.3			MG/KG	0.09	See note	
cobalt		IR71B011	9604J793	01/26/96	3	4	34.5			MG/KG	0.09	See note	
cobalt		IR71B011	9604J794	01/26/96	5.5	6	42.1			MG/KG	0.09	See note	
cobalt		IR71B010	9605G046	01/31/96	1.25	2	25.3			MG/KG	0.08	See note	
cobalt		IR71B010	9605G047	01/31/96	4.5	5.5	41.5			MG/KG	0.09	See note	
cobalt		IR22B027	9605G063	02/02/96	7.5	8.5	33.6			MG/KG	0.1	See note	
cobalt	37	IR37SS22	9605J797	01/29/96	0	0	27.2			MG/KG	0.09	See note	
cobalt	33	IR33B095	9607J869	02/13/96	1.1	2.1	37.8			MG/KG	0.09	See note	
cobalt	33	EE1203	EE1203	11/22/96	4	4	80.3			MG/KG	0.12	See note	
cobalt		SLO1A	SLO1A_9	05/02/01	9	9.5	30			MG/KG	12	See note	
cobalt		SLO2A	SLO2A_10	05/02/01	9.5	10	36			MG/KG	13	See note	
copper	33	IR33B096	9607J866	02/13/96	1.5	2	3,630			MG/KG	0.11	RSL	3,100
iron		IR09B002	8939E001	09/25/89	0.75	0.75	80,100			MG/KG	1.3	HPAL	58,000
iron	09	IR09B003	8939G003	09/25/89	5.75	5.75	91,000			MG/KG	1.7	HPAL	58,000
iron	09	IR09B006	8939E018	09/26/89	5.75	5.75	138,000			MG/KG	1.9	HPAL	58,000
iron	09	IR09MW38A	9015G177	04/10/90	2.75	2.75	61,100			MG/KG	5.2	HPAL	58,000
iron	33	IR33B083	9413L177	03/29/94	6.25	6.25	59,900			MG/KG	1.3	HPAL	58,000
iron	33	IR33B109	0018D032	05/09/00	5.5	7	59,000			MG/KG	0.83	HPAL	58,000
iron	37	IR37B019	9537J246	09/15/95	2.5	3	70,800			MG/KG	3	HPAL	58,000
iron	33	PA33B018	9309A651	03/03/93	2.25	2.25	62,100			MG/KG	1.4	HPAL	58,000
iron	33	PA33B018	9309A652	03/03/93	6.75	6.75	74,500			MG/KG	1.5	HPAL	58,000
iron	33	PA33SS57	9310J394	03/12/93	5.25	5.25	58,700			MG/KG	4.9	HPAL	58,000
lead	09	IR09B020	8943G110	10/27/89	1.25	1.25	206			MG/KG	4.4	DTSC RBC	80
lead	09	IR09B020	8943G111	10/27/89	2.75	2.75	128			MG/KG	4.6	DTSC RBC	80
lead	09	IR09B028	9013G164	03/30/90	0.75	0.75	134			MG/KG	6.8	DTSC RBC	80

Table A2
Analytical Data: Soil Samples with Results above Residential Screening Levels
Parcel G Feasibility Assessment
Hunters Point Naval Shipyard

Chemical of Potential Concern	IR Site	Point ID	Sample ID	Sample Date	Top Depth	Bottom Depth	Result	Q1	Q2	Unit	Reporting Limit	Residential Screening Level	
lead	09	IR09B033	9014H086	04/02/90	0.75	0.75	111			MG/KG	7.3	DTSC RBC	80
lead	09	IR09B033	9014H088	04/02/90	5.25	5.25	113			MG/KG	7.1	DTSC RBC	80
lead	33	IR33B092	9606J855	02/07/96	1	1.5	451			MG/KG	0.17	DTSC RBC	80
lead	33	IR33B092	9606J856	02/07/96	4	5	325			MG/KG	0.16	DTSC RBC	80
lead	33	IR33B096	9607J866	02/13/96	1.5	2	559	J	2	MG/KG	0.17	DTSC RBC	80
lead	33	IR33B096	9607J867	02/13/96	6	7	191	J	2	MG/KG	0.18	DTSC RBC	80
lead	37	IR37SS22	9605J797	01/29/96	0	0	82.4			MG/KG	0.17	DTSC RBC	80
lead	37	IR37SS23	9605J798	01/29/96	0	0	128			MG/KG	0.17	DTSC RBC	80
lead		IR45TA21	9437A061	09/13/94	4.75	4.75	93.1			MG/KG	0.22	DTSC RBC	80
lead	71	IR71B008	9535J128	08/31/95	0	0.5	83.7			MG/KG	0.32	DTSC RBC	80
lead	33	PA33B053	9311N177	03/19/93	9.75	9.75	343	J	2	MG/KG	0.28	DTSC RBC	80
lead	33	PA33B055	9311N176	03/19/93	9.25	9.25	367	J	2	MG/KG	0.3	DTSC RBC	80
lead	33	U302-SC008	91-U302-SC008	11/14/00	1	1	82.5			MG/KG	0.25	DTSC RBC	80
manganese	37	3701E1B	3701E1B_2	12/18/00	2	2.5	2,480			MG/KG	0.097	RSL	1,800
manganese	37	3701E2A	3701E2A_2	01/16/01	2	2.5	2,010			MG/KG	0.095	RSL	1,800
manganese	37	3701N1C	3701N1C_2	01/17/01	2	3	2,770			MG/KG	0.097	RSL	1,800
manganese	37	3701S1C	3701S1C_2	01/16/01	2	2.5	11,000	J	2	MG/KG	1.5	RSL	1,800
manganese	37	3701W2B	3701W2B_2	01/17/01	2	2.5	7,420			MG/KG	0.47	RSL	1,800
manganese	37	6671N2A	6671N2A_1	01/18/01	1	1.5	11,900	J	4	MG/KG	1.1	RSL	1,800
manganese	37	6671N3A	6671N3A_2	01/18/01	1	2	4,830	J	2	MG/KG	1.4	RSL	1,800
manganese	37	6671N3A	6671N3A_X	01/18/01	1	2	5,290	J	2	MG/KG	1.3	RSL	1,800
manganese	37	6671N3B	6671N3B_1	01/17/01	1	1.5	2,390	J	2	MG/KG	1.4	RSL	1,800
manganese	37	6671W2A	6671W2A_2	01/17/01	1.5	2	3,710	J	4	MG/KG	0.096	RSL	1,800
manganese	37	6671W3A	6671W3A_1	01/17/01	1	1.5	2,360	J	2	MG/KG	1.4	RSL	1,800
manganese	37	6671W3B	6671W3B_2	01/17/01	1	2	2,610	J	2	MG/KG	1.4	RSL	1,800
manganese	37	6671W3B	6671W3B_X	01/17/01	1	2	5,080	J	2	MG/KG	1.4	RSL	1,800
manganese	37	6771B01	6771B01_3	12/04/00	3	3.5	1,940			MG/KG	0.1	RSL	1,800
manganese	37	6771B02	6771B02_1	12/19/00	1	1.5	7,020			MG/KG	0.99	RSL	1,800
manganese	37	EE1405	EE1405	08/16/96	1.5	1.5	6,920	J	2	MG/KG	0.11	RSL	1800
manganese		IR09B002	8939E001	09/25/89	0.75	0.75	2,220			MG/KG	0.16	RSL	1800
manganese	09	IR09B006	8939E018	09/26/89	5.75	5.75	3,400			MG/KG	0.23	RSL	1,800
manganese	09	IR09B011	8941G081	10/12/89	1.25	1.25	1,900			MG/KG	0.16	RSL	1,800
manganese	09	IR09B012	8941G075	10/11/89	1.25	1.25	2,210			MG/KG	0.15	RSL	1,800
manganese	09	IR09B013	8939E024	09/27/89	1.75	1.75	3,190	J	9	MG/KG	0.13	RSL	1,800
manganese	09	IR09B020	8943G110	10/27/89	1.25	1.25	2,570			MG/KG	0.15	RSL	1,800
manganese	09	IR09MW31A	9013F020	03/28/90	0.75	0.75	2,440			MG/KG	0.29	RSL	1,800
manganese	09	IR09MW35A	9015H091	04/10/90	1.25	1.25	1,940			MG/KG	0.12	RSL	1,800

Table A2
Analytical Data: Soil Samples with Results above Residential Screening Levels
Parcel G Feasibility Assessment
Hunters Point Naval Shipyard

Chemical of Potential Concern	IR Site	Point ID	Sample ID	Sample Date	Top Depth	Bottom Depth	Result	Q1	Q2	Unit	Reporting Limit	Residential Screening Level	
												RSL	1,800
manganese	33	IR33B061	9415A789	04/14/94	2.75	2.75	2,160			MG/KG	0.11	RSL	1,800
manganese	33	IR33B061	9415A790	04/14/94	7.75	7.75	2,810			MG/KG	0.11	RSL	1,800
manganese	33	IR33B062	9414H569	04/06/94	2.25	2.25	8,770			MG/KG	0.11	RSL	1,800
manganese	33	IR33B062	9414H570	04/06/94	7.75	7.75	2,430			MG/KG	0.11	RSL	1,800
manganese	33	IR33B063	9414H565	04/06/94	1.75	1.75	2,510			MG/KG	0.11	RSL	1,800
manganese	33	IR33B063	9414H566	04/06/94	6.25	6.25	2,670			MG/KG	0.12	RSL	1,800
manganese	33	IR33B064	9420C233	05/18/94	6.25	6.25	3,560			MG/KG	0.8	RSL	1,800
manganese	33	IR33B083	9413L177	03/29/94	6.25	6.25	2,000	J	4	MG/KG	0.7	RSL	1,800
manganese	33	IR33B090	9431R494	08/04/94	1.75	1.75	2,570			MG/KG	0.07	RSL	1,800
manganese	33	IR33B090	9431R495	08/04/94	6.25	6.25	2,200			MG/KG	0.07	RSL	1,800
manganese	33	IR33B091	9413L171	03/29/94	6.25	6.25	2,270			MG/KG	0.9	RSL	1,800
manganese	33	IR33B094	9545J591	11/07/95	6.5	7	2,940			MG/KG	0.07	RSL	1,800
manganese	33	IR33B109	0018D032	05/09/00	5.5	7	3,650	J	3	MG/KG	0.14	RSL	1,800
manganese		IR34B019	9414L219	04/04/94	6.25	6.25	2,530	J	4	MG/KG	0.8	RSL	1,800
manganese		IR34B021	9414L229	04/04/94	6.25	6.25	2,490	J	3	MG/KG	0.8	RSL	1,800
manganese		IR34B028	9427R373	07/06/94	6.25	6.25	2,020			MG/KG	0.07	RSL	1,800
manganese	37	IR37B021	9545J582	11/06/95	0.5	1	2,640			MG/KG	0.06	RSL	1,800
manganese	37	IR37B026	0018D006	05/09/00	3.5	4	3,300	J	3	MG/KG	0.14	RSL	1,800
manganese		IR45TA21	9437A062	09/13/94	5.75	5.75	1,890			MG/KG	0.06	RSL	1,800
manganese	33	IR50B022	9422R216	06/02/94	1.75	1.75	2,200	J	34	MG/KG	0.3	RSL	1,800
manganese	67	IR67B002	9534D029	08/22/95	0.5	1	1,820			MG/KG	0.13	RSL	1,800
manganese	67	IR67B002	9534D030	08/22/95	5.5	6	2,240			MG/KG	0.13	RSL	1,800
manganese		IR71B011	9604J794	01/26/96	5.5	6	2,780	J	3	MG/KG	0.02	RSL	1,800
manganese	33	PA33B013	9313N182	04/01/93	1.75	1.75	2,000			MG/KG	0.14	RSL	1,800
manganese	33	PA33B013	9313N183	04/01/93	6.25	6.25	2,420			MG/KG	0.14	RSL	1,800
manganese	33	PA33B018	9309A651	03/03/93	2.25	2.25	2,020			MG/KG	0.28	RSL	1,800
manganese	33	PA33B018	9309A652	03/03/93	6.75	6.75	2,170			MG/KG	0.29	RSL	1,800
manganese	33	PA33B038	9308D072	02/25/93	6.75	6.75	4,450			MG/KG	0.17	RSL	1,800
manganese	33	PA33SS43	9310J379	03/10/93	1.45	1.45	3,010	J	3	MG/KG	0.19	RSL	1,800
manganese	33	PA33SS47	9310J370	03/08/93	0.75	0.75	3,130			MG/KG	0.18	RSL	1,800
manganese	33	PA33SS59	9310J388	03/11/93	1.25	1.25	4,050	J	3	MG/KG	0.19	RSL	1,800
manganese		PA34B009	9308D080	02/26/93	6.75	6.75	1,840	J	4	MG/KG	0.23	RSL	1,800

Table A2
Analytical Data: Soil Samples with Results above Residential Screening Levels
Parcel G Feasibility Assessment
Hunters Point Naval Shipyard

Chemical of Potential Concern	IR Site	Point ID	Sample ID	Sample Date	Top Depth	Bottom Depth	Result	Q1	Q2	Unit	Reporting Limit	Residential Screening Level	
												RSL	1,800
manganese	37	PA37SS04	PA37SS04_1	12/14/00	1	1.5	2,020			MG/KG	0.099	RSL	1,800
manganese	37	PA37SS08	9310J389	03/11/93	1.25	1.25	2,440	J	3	MG/KG	0.18	RSL	1,800
manganese	33	U302-3-SC008	91-U302-3-SC008	11/14/00	1	1	3,420			MG/KG	0.31	RSL	1,800

Notes:

- All soil sample analytical data obtained from the "Revised Final Feasibility Study for Parcel D, Hunters Point Shipyard, San Francisco, California" (Sultech, 2007).
- Only detected concentrations above laboratory reporting limits were included in this evaluation.
- Samples include those collected between 0 and 10 feet below ground surface (bgs).
- The area with residential use allowed was excluded from this evaluation as documented in the "Record of Decision for Parcel G, Hunters Point Shipyard, San Francisco, California" (Navy, 2009).
- Essential nutrients (calcium, magnesium, potassium, and sodium) were excluded from this evaluation.
- Thallium data were excluded from this evaluation due to a high false positive rate (of 99.9%) due to severe matrix effects associated with one of the analytical methods used in the past (ICP-AES) (Office of Technical Standards Alert #2, EPA Region 4, 2001).
- HPALs for cobalt were calculated on a sample-specific basis using the regression approach detailed in the "Draft Calculation of Hunters Point Ambient Levels, Hunters Point Annex, San Francisco, California" (PRC, 1995). The cobalt Screening Level is equal to RSL or sample-specific HPAL (maximum value).
- Soil samples excavated during the Parcel G hotspot removal action were excluded from this evaluation as documented in the "Remedial Action Completion Report for Soil Hotspot Locations at Parcels B, D-1, and G and Soil Stockpiles at Parcels D-1 and G, Hunters Point Naval Shipyard, San Francisco, California" (Engineering/Remediation Resources Group, Inc., 2011).
- Soil samples excavated during the Parcel G storm drain and sanitary sewer systems time-critical removal action were excluded from this evaluation as documented in the "Removal Action Completion Report, Parcel G, Hunters Point Naval Shipyard, San Francisco, California" (Tetra Tech, 2011).
- Soil samples excavated or approved to remain in place as part of the Petroleum Program were excluded from this evaluation as documented in "Final Petroleum Hydrocarbon Site Closeout Report, Parcels D-1, D-2, and G (Former Parcel D), Revision 1, Hunters Point Shipyard, San Francisco, California" (Innovative Technical Solutions, Inc., 2012).

DTSC RBC = Department of Toxic Substances Control (DTSC) risk-based soil concentration for lead for residential use (2011)

HPAL = Hunters Point ambient level (PRC, 1995)

IR = installation restoration

J = estimated detected result that is greater than the detection limit but less than the reporting limit (Navy, 2007)

J2 = estimated detected result based on matrix duplicate (Navy, 2007)

J3 = estimated detected result due to inaccuracies from a blank spike, surrogate spike, or matrix spike (Navy, 2007)

J4 = estimated detected result due to serial dilution (Navy, 2007)

J5 = estimated detected result due to holding time (Navy, 2007)

J9 = estimated detected result due to interference check sample in metals, and due to percent detected between columns in organics. (Navy, 2007)

mg/kg = milligrams per kilogram

RSL = USEPA Regional Screening Level, Resident Soil Table (TR=1E-06, HQ=1), May 2016

Q = qualifier

Table A3
Analytical Data: Soil Samples with Results above Residential Action Levels
Parcel G Feasibility Assessment
Hunters Point Naval Shipyard

Chemical of Potential Concern	IR Site	Point ID	Sample ID	Sample Date	Top Depth	Bottom Depth	Result	Q1	Q2	Unit	Reporting Limit	Residential Action Level
arsenic	09	6967E1B	6967E1B_1.5	03/12/01	1.5	2	15			MG/KG	0.27	HPAL 11.1
arsenic	09	IR09B007	8939E012	09/26/89	1.25	1.25	12.7			MG/KG	0.28	HPAL 11.1
arsenic	09	IR09B017	8939E059	09/29/89	1.25	1.25	14.2			MG/KG	0.31	HPAL 11.1
arsenic	33	IR33B062	9414H569	04/06/94	2.25	2.25	24	J	3	MG/KG	0.28	HPAL 11.1
arsenic	33	IR33B078	9414A748	04/05/94	1.75	1.75	12.5	J	3	MG/KG	0.3	HPAL 11.1
arsenic	33	IR33B094	9545J591	11/07/95	6.5	7	11.3			MG/KG	0.65	HPAL 11.1
arsenic		IR65B004	9604J757	01/25/96	0.5	1.5	47.2			MG/KG	0.31	HPAL 11.1
benzo(a)anthracene	33	IR33B096	9607J867	02/13/96	6	7	0.81	J	5	MG/KG	0.38	5x RSL 0.80
benzo(a)pyrene	9	IR09B016	8939E054	09/29/89	1.25	1.25	0.3	J		MG/KG	0.33	5x RSL 0.080
benzo(a)pyrene	33	IR33B092	9606J855	02/07/96	1	1.5	0.13	J		MG/KG	0.35	5x RSL 0.080
benzo(a)pyrene	33	IR33B092	9606J856	02/07/96	4	5	0.190	J		MG/KG	0.33	5x RSL 0.080
benzo(b)fluoranthene	33	IR33B096	9607J867	02/13/96	6	7	1.0	J	5	MG/KG	0.38	5x RSL 0.80
chromium VI	09	6967B02	6967B02_5	12/20/00	5	5.5	4.90	J	3	MG/KG	0.06	5x RSL 1.5
chromium VI	09	6967E1A	6967E1A_5	12/14/00	5	5.5	1.7			MG/KG	0.06	5x RSL 1.5
chromium VI	09	6967W1A	6967W1A_5	12/13/00	5	5.5	4.9			MG/KG	0.06	5x RSL 1.5
cobalt	09	IR09B006	8939E017	09/26/89	3.25	3.25	167			MG/KG	4	See note 7
cobalt	09	IR09B006	8939E018	09/26/89	5.75	5.75	383			MG/KG	6.2	See note 7
cobalt	09	IR09B003	8939G003	09/25/89	5.75	5.75	201			MG/KG	5.4	See note 7
cobalt	33	PA33SS57	9310J394	03/12/93	5.25	5.25	134			MG/KG	1	See note 7
cobalt	37	IR09MW62A	0413T026	03/24/04	5	7	124			MG/KG	1	See note 7
cobalt	9	IR09B012	8941G077	10/11/89	5.75	5.75	122			MG/KG	4	See note 7
lead	33	IR33B092	9606J855	02/07/96	1	1.5	451			MG/KG	0.17	5x DTSC RBC 400
lead	33	IR33B096	9607J866	02/13/96	1.5	2	559	J	2	MG/KG	0	5x DTSC RBC 400
manganese	37	3701S1C	3701S1C_2	01/16/01	2	2.5	11,000	J	2	MG/KG	2	5x RSL 9,000
manganese	37	6671N2A	6671N2A_1	01/18/01	1	1.5	11,900	J	4	MG/KG	1.1	5x RSL 9,000

Notes:

- All soil sample analytical data obtained from the "Revised Final Feasibility Study for Parcel D, Hunters Point Shipyard, San Francisco, California" (Sultech, 2007).
- Only detected concentrations above laboratory reporting limits were included in this evaluation.
- Samples include those collected between 0 and 10 feet below ground surface (bgs).
- The area with residential use allowed was excluded from this evaluation as documented in the "Record of Decision for Parcel G, Hunters Point Shipyard, San Francisco, California" (Navy, 2009).
- Essential nutrients (calcium, magnesium, potassium, and sodium) were excluded from this evaluation.
- Thallium data were excluded from this evaluation due to a high false positive rate (of 99.9%) due to severe matrix effects associated with one of the analytical methods used in the past (ICP-AES) (Office of Technical Standards Alert #2, EPA Region 4, 2001).
- HPALs for cobalt were calculated on a sample-specific basis using the regression approach detailed in the "Draft Calculation of Hunters Point Ambient Levels, Hunters Point Annex, San Francisco, California" (PRC, 1995). The cobalt Action Level is equal to 5x RSL or sample-specific HPAL (maximum value).
- Soil samples excavated during the Parcel G hotspot removal action were excluded from this evaluation as documented in the "Remedial Action Completion Report for Soil Hotspot Locations at Parcels B, D-1, and G and Soil Stockpiles at Parcels D-1 and G, Hunters Point Naval Shipyard, San Francisco, California" (Engineering/Remediation Resources Group, Inc., 2011).
- Soil samples excavated during the Parcel G storm drain and sanitary sewer systems time-critical removal action were excluded from this evaluation as documented in the "Removal Action Completion Report, Parcel G, Hunters Point Naval Shipyard, San Francisco, California" (Tetra Tech, 2011).

Table A3
Analytical Data: Soil Samples with Results above Residential Action Levels
Parcel G Feasibility Assessment
Hunters Point Naval Shipyard

Notes (continued):

10. Soil samples excavated or approved to remain in place as part of the Petroleum Program were excluded from this evaluation as documented in "Final Petroleum Hydrocarbon Site Closeout Report, Parcels D-1, D-2, and G (Former Parcel D), Revision 1, Hunters Point Shipyard, San Francisco, California" (Innovative Technical Solutions, Inc., 2012).

DTSC RBC = Department of Toxic Substances Control (DTSC) risk-based soil concentration for lead for residential use (2011)

HPAL = Hunters Point ambient level (PRC, 1995)

IR = installation restoration

J = estimated detected result that is greater than the detection limit but less than the reporting limit (Navy, 2007)

J2 = estimated detected result based on matrix duplicate (Navy, 2007)

J3 = estimated detected result due to inaccuracies from a blank spike, surrogate spike, or matrix spike (Navy, 2007)

J4 = estimated detected result due to serial dilution (Navy, 2007)

J5 = estimated detected result due to holding time (Navy, 2007)

mg/kg = milligrams per kilogram

RSL = USEPA Regional Screening Level, Resident Soil Table (TR=1E-06, HQ=1), May 2016

Q = qualifier

FIGURES

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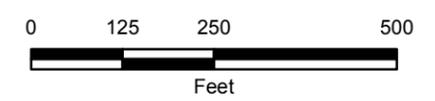


Legend

- x Sample Location Removed
- Existing Soil Sample Location
- Soil Sample Extent Grid (Extents shown on Figures A2-A5)
- Parcel G Boundary
- Existing Building
- Roads
- San Francisco Bay
- Residential Use Allowed per Record of Decision
- Area Proposed for Residential Use

Notes:

1. Parcels boundaries are considered to be approximate; updated December 2014.
2. Data and information provided by San Francisco Department of Public Health and Kleinfelder.
3. Navy, 2009. Final Record of Decision for Parcel G, Hunters Point Shipyard, San Francisco, California, February 18.
4. Map displayed in California State Plane Coordinate System , Zone III, North American Datum of 1983 (NAD83) , US Survey Feet.

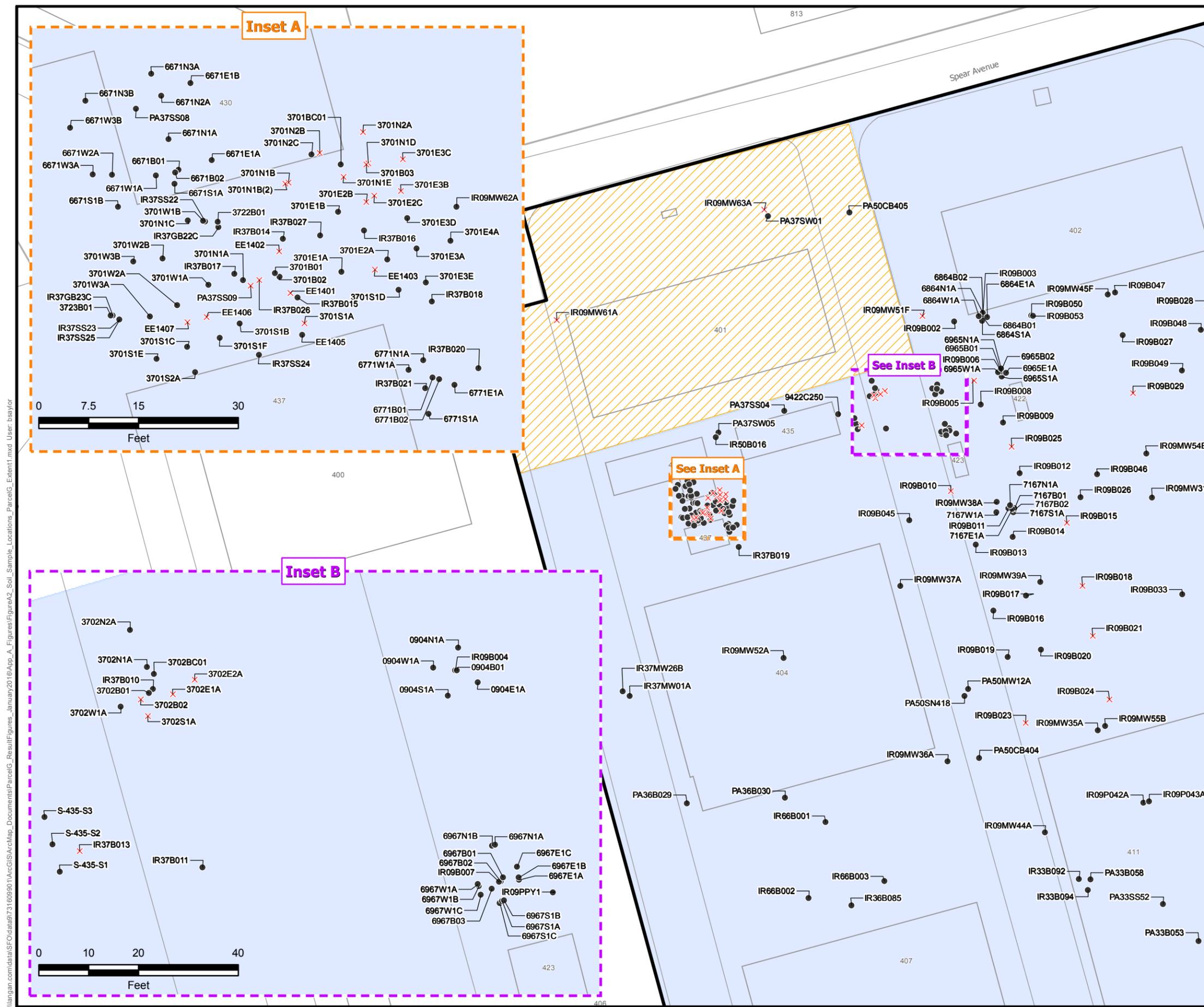


HUNTERS POINT NAVAL SHIPYARD
San Francisco, California

PARCEL G SOIL SAMPLE LOCATIONS

Date 11/16/2016	Project 731609901	Figure A1
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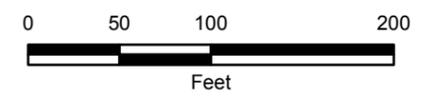


Legend

- x Sample Location Removed
- Existing Soil Sample Location
- Parcel G Boundary
- Existing Building
- Roads
- Residential Use Allowed per Record of Decision
- Area Proposed for Residential Use

Notes:

1. Parcels boundaries are considered to be approximate; updated December 2014.
2. Data and information provided by San Francisco Department of Public Health and Kleinfelder.
3. Navy, 2009. Final Record of Decision for Parcel G, Hunters Point Shipyard, San Francisco, California, February 18.
4. Map displayed in California State Plane Coordinate System, Zone III, North American Datum of 1983 (NAD83), US Survey Feet.



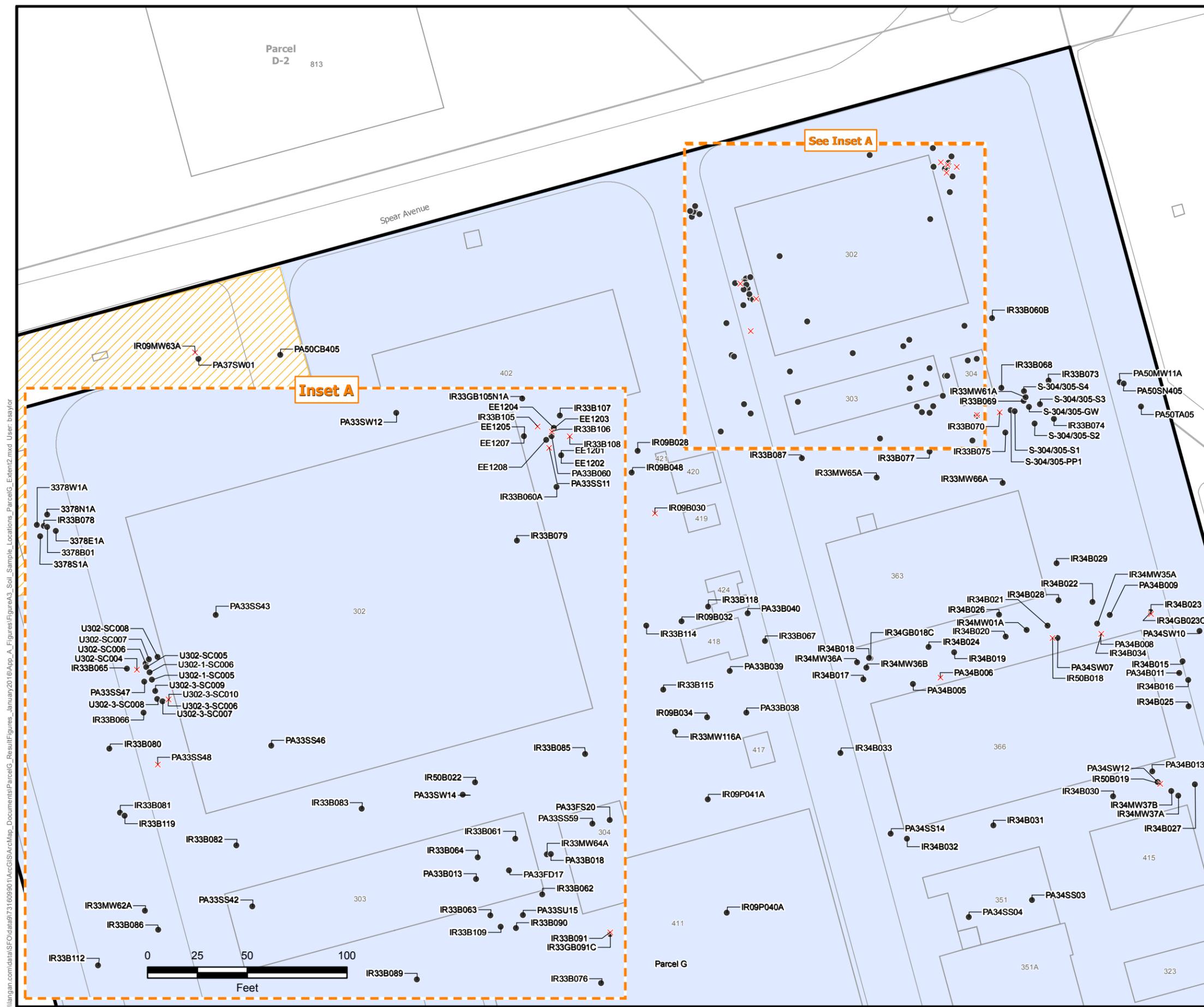
HUNTERS POINT NAVAL SHIPYARD
San Francisco, California

PARCEL G SOIL SAMPLE LOCATIONS GRID EXTENT 1

Date 11/16/2016 Project 731609901 Figure A2



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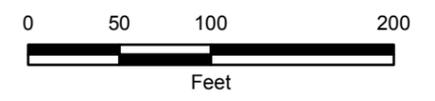


Legend

- x Sample Location Removed
- Existing Soil Sample Location
- Parcel G Boundary
- Existing Building
- Roads
- Residential Use Allowed per Record of Decision
- Area Proposed for Residential Use

Notes:

1. Parcels boundaries are considered to be approximate; updated December 2014.
2. Data and information provided by San Francisco Department of Public Health and Kleinfelder.
3. Navy, 2009. Final Record of Decision for Parcel G, Hunters Point Shipyard, San Francisco, California, February 18.
4. Map displayed in California State Plane Coordinate System , Zone III, North American Datum of 1983 (NAD83) , US Survey Feet.



HUNTERS POINT NAVAL SHIPYARD
San Francisco, California

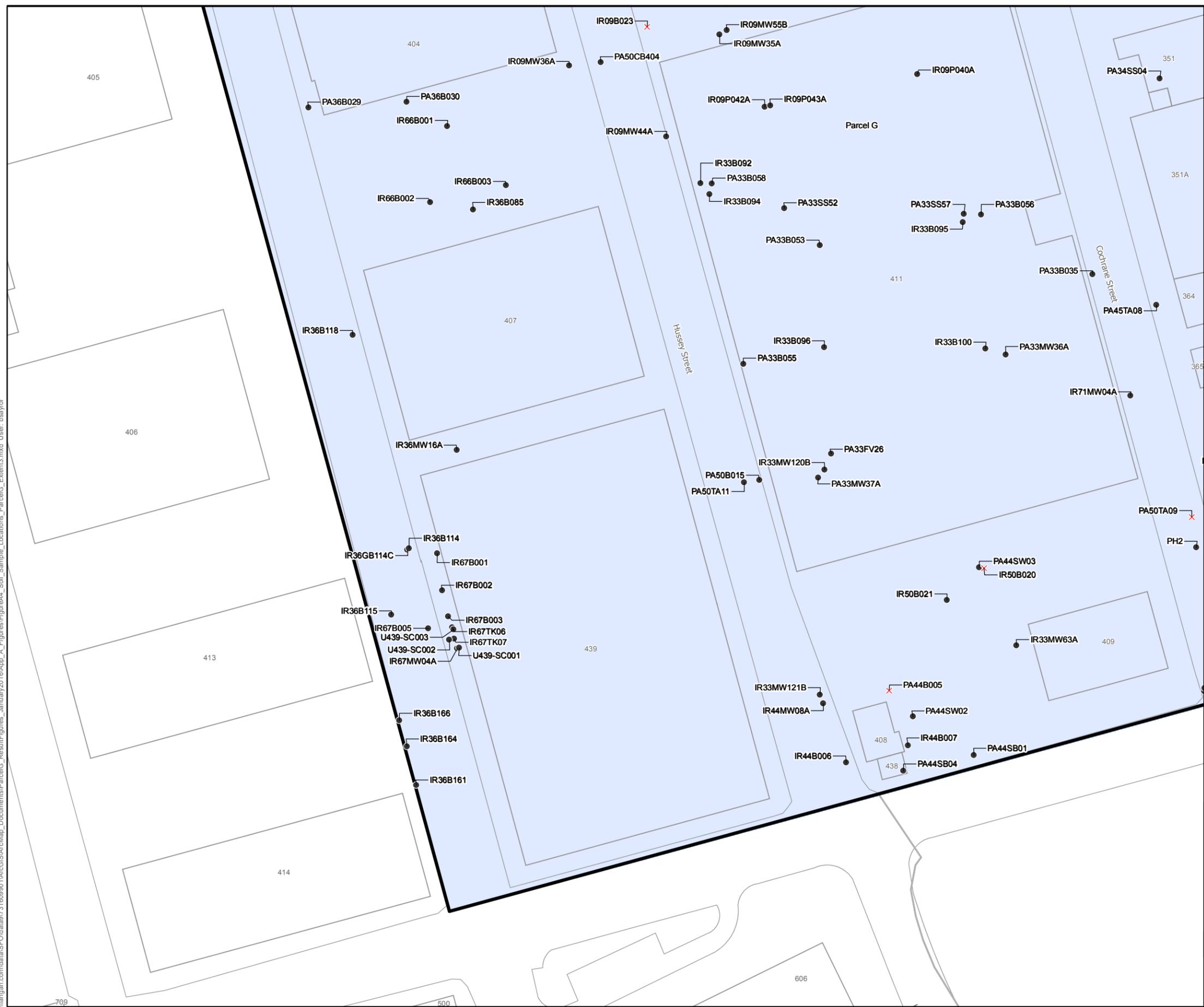
PARCEL G SOIL SAMPLE LOCATIONS GRID EXTENT 2

Date 11/16/2016 Project 731609901 Figure A3



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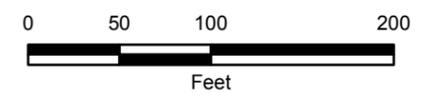


Legend

- × Sample Location Removed
- Existing Soil Sample Location
- Parcel G Boundary
- Existing Building
- Roads
- Area Proposed for Residential Use

Notes:

1. Parcels boundaries are considered to be approximate; updated December 2014.
2. Data and information provided by San Francisco Department of Public Health and Kleinfelder.
3. Navy, 2009. Final Record of Decision for Parcel G, Hunters Point Shipyard, San Francisco, California, February 18.
4. Map displayed in California State Plane Coordinate System , Zone III, North American Datum of 1983 (NAD83) , US Survey Feet.



HUNTERS POINT NAVAL SHIPYARD
San Francisco, California

PARCEL G SOIL SAMPLE LOCATIONS GRID EXTENT 3

Date 11/16/2016	Project 731609901	Figure A4
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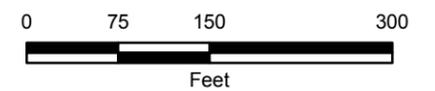


Legend

- ✕ Samples Removed during Previous Remedial Actions
- Samples Approved to Remain in Place
- ▭ Parcel G Boundary
- ▭ Parcel Boundary
- Roads
- ▭ AV20 Hot Spot Excavation
- ▭ 33-A Petroleum Sites
- ▭ TU67 Trench Survey Unit (various colors)

Notes:

1. Soil samples excavated during the Parcel G hotspot removal action were excluded from this evaluation as documented in the "Remedial Action Completion Report for Soil Hotspot Locations at Parcels B, D-1, and G and Soil Stockpiles at Parcels D-1 and G, Hunters Point Naval Shipyard, San Francisco, California" (Engineering/Remediation Resources Group, Inc., 2011).
2. Soil samples excavated during the Parcel G storm drain and sanitary sewer systems time-critical removal action were excluded from this evaluation as documented in the "Removal Action Completion Report, Parcel G, Hunters Point Naval Shipyard, San Francisco, California" (Tetra Tech, 2011).
3. Soil samples excavated or approved to remain in place as part of the Petroleum Program were excluded from this evaluation as documented in "Final Petroleum Hydrocarbon Site Closeout Report, Parcels D-1, D-2, and G (Former Parcel D), Revision 1, Hunters Point Shipyard, San Francisco, California" (Innovative Technical Solutions, Inc., 2012).
4. Map displayed in California State Plane Coordinate System, Zone III, North American Datum of 1983 (NAD83), US Survey Feet.



HUNTERS POINT NAVAL SHIPYARD
San Francisco, California

PARCEL G
SAMPLES REMOVED OR
APPROVED TO REMAIN IN PLACE

Date 11/16/2016 Project 731609901 Figure A6



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APPENDIX B
APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

Table B1
Chemical-Specific Applicable or Relevant and Appropriate Requirements¹
Parcel G Feasibility Assessment
Hunters Point Naval Shipyard

Langan Project 731609901
November 2016

Federal Chemical-Specific Applicable or Relevant and Appropriate Requirements				
Requirement	Prerequisite	Citation²	ARAR Determination	Comments
Soil				
Resource Conservation and Recovery Act (Title 42 U.S.C. Chapter 82, §§ 6901-6991[i])c				
Defines RCRA hazardous waste. A solid waste is characterized as toxic, based on TCLP, if the waste exceeds the TCLP maximum concentrations.	Waste	Cal. Code Regs. tit. 22, §§ 66261.21, 66261.22(a)(1), 66261.23, 66261.24(a)(1), and 66261.100	Applicable	These regulations are applicable to activities that generate waste in order to determine if the waste is hazardous. The Navy will determine if the excavated soil meets the definition of non-RCRA hazardous waste when it is generated.
State Chemical-Specific Applicable or Relevant and Appropriate Requirements				
Requirement	Prerequisite	Citation²	ARAR Determination	Comments
Soil				
Department of Toxic Substances Control^b				
Definition of non-RCRA hazardous waste.	Waste	Cal. Code Regs. tit. 22, §§66261.3 (a)(2)(C) or (a)(2)(F), 66261.22(a)(3) and (a)(4), 66261.24 (a)(2) – (a)(8), and 66261.101	Applicable	These regulations are applicable to activities that generate waste in order to determine if the waste is non-RCRA hazardous waste. Some of the alternatives evaluated in this revised feasibility study report include excavation and off-site disposal of soil. The Navy will determine if the excavated soil meets the definition of non-RCRA hazardous waste when it is generated.

Table B1
Chemical-Specific Applicable or Relevant and Appropriate Requirements¹
Parcel G Feasibility Assessment
Hunters Point Naval Shipyard

Langan Project 731609901
November 2016

State Chemical-Specific Applicable or Relevant and Appropriate Requirements (Continued)				
Requirement	Prerequisite	Citation²	ARAR Determination	Comments
Soil				
State Water Resources Control Board				
Definition of designated waste, nonhazardous waste, and inert waste	Waste	Cal. Code Regs. tit. 27, §§ 20210, 20220, and 20230	Applicable	These regulations are applicable to activities that generate waste for classifying waste and determining the status of other ARARs. One of the alternatives evaluated in this revised feasibility study report includes excavation and off-site disposal of soil. The Navy will determine if the excavated soil meets these definitions when it is generated.

Notes:

1. Applicable ARARs for chemicals of concern evaluated under this Feasibility Assessment provided from Attachment 1 of the Final Record of Decision for Parcel G, Hunters Point Shipyard (Navy, 2009).
2. Only the substantive provisions of the requirements cited in this table are ARARs.

§ = Section

§§ = Sections

ARAR = Applicable or relevant and appropriate requirement

Cal. Code Regs. = Code of California Regulations

RCRA = Resource Conservation and Recovery Act

tit. = Title

APPENDIX C
EXCAVATION COST ESTIMATES

Prepared for

Office of Community Investment and Infrastructure

CP Development Company, L.P.

FINAL APPENDIX C: PARCEL G HYPOTHETICAL EXCAVATION COST ESTIMATES

Prepared by

Geosyntec 
consultants

engineers | scientists | innovators

1111 Broadway, 6th Floor
Oakland, California 94607

Project Number: WR1247A

November 2016

**Final Appendix C:
Hypothetical Excavation Cost Estimates,
Parcel G**

**Hunters Point Naval Shipyard
San Francisco, California**

Prepared by

Geosyntec Consultants, Inc.
1111 Broadway, 6th Floor
Oakland, California 94607

Project Number: WR1247A
16 November 2016

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Table C-1: Cost Estimate – Excavation of Soil to Residential Action Levels

Table C-2: Cost Estimate – Excavation of Soil to Residential Screening Levels

C-1. INTRODUCTION

This appendix documents an estimate of the cost for implementing each hypothetical soil excavation alternative presented in the Parcel G Feasibility Assessment. This appendix is organized as follows:

- Section C-2 describes the purpose of the cost estimates.
- Section C-3 summarizes the cost-estimating methodology.
- Section C-4 describes components of the cost estimate for each hypothetical soil excavation alternative.
- Section C-5 provides assumptions used for the cost estimates.
- Section C-6 summarizes the total costs for each hypothetical soil excavation alternative.
- Section C-7 lists the reference used in preparing the cost estimates.

Tables C-1 and C-2 provide detailed cost estimates are included at the end of this appendix following Section C-7.

C-2. PURPOSE OF COST ESTIMATES

For purposes of evaluating soil levels that are health-protective for residential use, the Feasibility Assessment evaluates two hypothetical soil excavation alternatives: (1) excavation and disposal for soil with chemical of concern (COC) concentrations above residential Screening Levels and (2) excavation and disposal of soil with COC concentrations above residential Action Levels. Figures 6 and 7 of the Feasibility Assessment show the assumed excavation areas for soil with COC concentrations that exceed residential Screening and Action Levels, respectively. Cost estimates have been developed for this Parcel G Feasibility Assessment primarily to evaluate the cost effectiveness of each excavation approach and provide a relative comparison between the two approaches. The costs presented in this appendix are for comparison purposes only and are not intended to establish project budgets. The costs have an estimated accuracy of plus 50 percent to minus 20 percent. Some variables, such as determining the full extent of the excavation areas, and permitting requirements have not yet been fully established. A contingency of 30 percent is included in these estimates to reflect uncertainty in scope that may result from final permit conditions.

C-3. COST ESTIMATING METHODOLOGY

The cost estimates presented in this appendix were developed in general accordance with the EPA Guide to Developing and Documenting Cost Estimates during the Feasibility Study (EPA, 2000). No contractor bids were obtained to establish unit costs and model based approaches and estimating software packages were not used in developing the excavation costs.

The cost estimating methodology consisted of several steps, which are outlined as follows:

Step 1 – Scope definition: This step includes delineating each alternative into a series of tasks or work elements and developing a work breakdown structure.

Step 2 – Quantification: This step includes quantifying units associated with each work element (e.g., volume of soil to be excavated, pavement area to be demolished, volume of backfill soil, pavement area to be installed, etc.).

Step 3 – Identification of unit costs: This step includes identifying unit costs associated with each work element. Unit costs were based on available data provided by CP DevCo for work that has been conducted by contractors on other areas of Hunters Point Naval Shipyard; and assigned based on Geosyntec's experience on similar soil excavation projects.

Step 4 – Cost Calculations: Excel™ spreadsheets were developed to input line-item work elements, quantification data, and unit cost data. Line-item costs were calculated according to mathematical formulas input into the spreadsheet. All costs were tabulated in current 2016 dollars.

Ongoing costs incurred following the implementation of a remedy are typically included in the cost estimate. However, because there are no anticipated ongoing/periodic costs that are unique to the expected effort (e.g., annual O&M), these costs are not included.

C-4. COMPONENTS OF THE COST ESTIMATE

The types of costs assessed in a feasibility study generally include capital and annual O&M costs, and may include periodic costs (either capital or O&M) as necessary. Each cost component, and its relevance, is described below.

C-4.1 Capital Costs

Capital costs are those expenditures that are required to construct a remedy and they are exclusive of costs required to operate or maintain the remedy throughout its lifetime. Capital costs consist primarily of expenditures initially incurred to build or install the remedy and include all labor, equipment, and material costs, including contractor markups such as overhead and profit, associated with activities such as mobilization/demobilization; monitoring; site work; excavation; and disposal. Capital costs also include expenditures for professional/technical services that are necessary to support construction of the remedy.

In the case of the Parcel G Feasibility Assessment, all costs related to the excavation of soils above the specified screening or action level make up the capital costs.

C-4.2 Annual O&M Costs

Operation and maintenance (O&M) costs are those post-construction costs necessary to ensure or verify the continued effectiveness of a remedial action. These costs are estimated mostly on an annual basis and include all labor, equipment, and material costs, including contractor markups such as overhead and profit, associated with activities such as monitoring; operating and maintaining extraction, containment, or treatment systems; and disposal. Annual O&M costs also include expenditures for professional/technical services necessary to support O&M activities.

As noted in Section C-3, there are no annual O&M costs associated with the excavation of soils in Parcel G.

C-4.3 Periodic Costs

Periodic costs are those that occur only once every few years (e.g., five-year reviews, equipment replacement) or expenditures that occur only once during the entire O&M period or remedial timeframe (e.g., site closeout, remedy failure/replacement). These costs may be either capital or O&M costs, but because of their periodic nature, it is more practical to consider them separately from other capital or O&M costs in the estimating process.

As noted in Section C-3, there are no periodic costs associated with the excavation of soils in Parcel G.

C-4.4 Contingency Allowances

Contingency is factored into a cost estimate to cover unknown conditions, unforeseen circumstances, or unanticipated conditions that are not possible to anticipate based on the data on hand at the time the estimate is prepared. Contingency is typically applied as a percentage of the total cost of construction or O&M activities costs, rather than applied to individual cost elements. A more common approach, however, is to assign a contingency percentage based on engineering judgement.

For the hypothetical excavation alternatives in this Feasibility Assessment, a contingency of 30 percent is applied to the total costs based on engineering judgement.

Because there are no annual O&M or periodic costs associated with the excavation activities in Parcel G, all related costs are capital costs and are estimated assuming all work is conducted in 2016. In addition to capital costs, contingency costs are included to cover unanticipated conditions that are not known when the initial estimate is prepared.

C-5. COST ESTIMATE ASSUMPTIONS

This section identifies the assumptions used in developing cost estimates in support of the Feasibility Assessment for Parcel G. The hypothetical soil excavation alternatives include:

1. Excavation around any sample location where the concentration exceeds the Residential Screening Level (RSL); and,
2. Excavation around any sample location where the concentration exceeds the Residential Action Level (RAL).

General assumptions used to estimate costs in all alternatives are summarized below.

1. For each alternative, there are general project-management tasks. The cost estimates for these tasks are based on labor-hour projections and anticipated costs. In both cases, engineering judgment was used to estimate labor requirements.
2. Subcontractor markups are not included in the costs estimates since costs were developed for relative comparison between the two hypothetical excavation alternatives.
3. For each alternative, a 30 percent contingency was added to the subtotal of the planning, pre-construction, oversight, sampling, back-fill, and reporting costs.

Assumptions related to the excavation volumes and numbers of samples analyzed for each scenario are summarized below.

1. The areas designated for excavation are shown on Figures 6 and 7 of the Feasibility Assessment for Parcel G.
2. The depth of each excavation is one foot below the maximum sampling depth where an exceedance of the residential Screening or Action Level occurs.
3. Sidewall benching at a slope of 1:1 to account for sloping and benching protective systems as-needed to prevent cave-ins.
4. A 20% bulking factor to account for an increase in soil volume following excavation.
5. No adjustments were made to account for proximity to buildings or utilities.
6. The assumed excavation footprint will be a 15-foot square around the sample location where the concentration exceeds the Screening/Action Level as shown on Figures 6 and 7 of this Feasibility Assessment. Approximately 19,000 cubic yards of in-place soil would be removed if excavating soil to the residential Screening Levels (Table 3) and approximately 1,800 cubic yards of soil will be removed if excavating soil to the residential Action Levels (Table 4). It is assumed that 100% of excavated soils would be disposed of off-site Class III disposal facility.
7. Soil excavated will be loaded directly into trucks for off-site disposal.
8. Between five and nine pre-excavation samples will be analyzed for each area designated for excavation. Four sidewall samples and one bottom sample will be collected at each location. If there is an exceedance in a pre-excavation sample, an additional step-out sample will be analyzed beyond that exceedance. It is assumed that half of the step-out samples will be analyzed.
9. At least six confirmation samples will be collected at each location following excavation. One sample will be collected per 17 linear feet of sidewall, one bottom sample will be collected per 500 square feet of bottom area, and one additional sidewall sample for every planned sidewall sample will be collected when excavation depth exceeds 7.0 feet. Quality control/quality assurance (QA/QC) samples are assumed to equal 10% of the total number of confirmation samples, but will not include soil duplicates.
10. One sample for soil profiling will be collected for every 500 cubic yards of stockpiled material.

Tables 3 and 4 of the Feasibility Assessment summarize the target COCs, hypothetical excavation areas and depths, soil excavation volumes, and confirmation sampling requirements.

C-6. SUMMARY

Tables C-1 and C-2 present the cost details for the hypothetical excavation alternatives to residential action and residential screening level, respectively.

The total cost for each hypothetical excavation alternative is summarized below.

Alternative Description	Duration	Estimated Rounded Cost
Excavation of Soil to residential Action Levels; 15 ft buffer	~2.5 month	\$616,500
Excavation of Soil to residential Screening Levels; 15 ft buffer	~11 months	\$3,894,500

REFERENCES

EPA, 2000. "A Guide to Developing and Documenting Cost Estimates during the Feasibility Study." EPA/540/R-00/002. Washington, D.C. July.

TABLES

TABLE C-1
Cost Estimate - Excavation of Soil to Residential Action Levels
Feasibility Assessment for Reducing Areas with Land Use Restrictions
Parcel G, Hunters Point Naval Shipyard
San Francisco, California

Prepared By: T.Kamegai-Karadi and M. Vishnevskiy
Reviewed By: J.Ramirez
Date: 16 November 2016

1.0 PLANNING, PRE-CONSTRUCTION WORK, AND OVERSIGHT

		Quantity	Unit	Unit Cost	Amount	Notes
1.1	Excavation Work Plan and Specification Support	1.0	ls	\$ 30,000	\$ 30,000	Geosyntec Estimate ¹ (Preparation of a Work Plan, one revision following agency comments, and support with specifications)
1.2	Planning Documentation Support and Review ²	1.0	ls	\$ 35,000	\$ 35,000	Geosyntec Estimate ¹
1.3	Project Management ³	2.4	mo	\$ 5,700	\$ 13,680	1 staff 1/4 time for approximately 2.4 months during field activities
1.4	Excavation Permit(s)	1.0	ls	\$ 10,000	\$ 10,000	Geosyntec Estimate ¹ (City Building Dept. application & inspection fees; Article 31 compliance included)
1.5	Oversight during Excavation, Backfill and Compaction	2.4	mo	\$ 4,700	\$ 11,280	1 field staff, 1/4 time for duration of field activities
1.6	Project Management	2.4	mo	\$ 5,000	\$ 12,000	General project management
1.7	Construction Meetings	1.0	ls	\$ 13,600	\$ 13,600	Includes 2 on-site meetings per month for duration of field activities
					<i>Subtotal</i>	\$ 125,560

2.0 PRE-EXCAVATION SAMPLING, EXCAVATION, CONFIRMATION SAMPLING, PROFILING, OFF-HAUL

		Quantity	Unit	Unit Cost	Amount	Notes
2.1	Pre-excavation Sampling	14	day	\$ 2,100	\$ 29,400	9-10 borings/day to a maximum of 11' with a 2" direct push rig; 9 borings per excavation for 15 areas (per driller's verbal estimate)
	Pre-excavation Analysis	105	sa	\$ 420	\$ 44,100	5 samples per excavation (see FA Figure 7 for areas), with 4 additional tentative step-out analyses for half of the excavations. All samples will be collected; it's assumed that some initial excavation boundary samples will be below Residential Action Levels and not require analysis of the associated step-out sample.
2.2	Dust Monitoring ⁴	2.4	mo	\$ 19,800	\$ 47,520	Includes equipment and personnel for 36 hr/wk for duration of field activities
2.3	Excavation and Stockpile ^{5,6}	1,800	cy	\$ 34	\$ 60,300	Excavation volume based on a 15'x15' square centered on sample with 1:1 benching and 20% bulking (see Table 4 in main document)
2.4	Confirmation Sampling and Analysis	104	sa	\$ 428	\$ 44,512	One sidewall sample per 17 linear feet of sidewall; one bottom sample per 500 square feet of bottom area; one additional sidewall sample for every planned sidewall sample when excavation depth exceeds 7.0 feet; QA/QC samples will be 10% of total
2.5	Stockpile Profile Sampling and Analysis ⁷	4.0	sa	\$ 452	\$ 1,808	1 sample per 500 cy of stockpiled material for disposal
2.6	Transport and Disposal - Class III ⁸	2400	ton	\$ 25	\$ 60,000	Disposal likely at Ox Mountain or Potrero Hills, per CP DevCo
					<i>Subtotal</i>	\$ 287,640

3.0 BACKFILL⁹

		Quantity	Unit	Unit Cost	Amount	Notes
3.1	Importing Clean Fill	1800	cy	\$ 15	\$ 27,000	Volume based on excavated soil that will be disposed offsite and replaced with imported fill. Unit cost based on approximate CP DevCo rate.
3.2	Analytical Testing of Import Fill ¹⁰	5	sa	\$ 1,198	\$ 6,000	Per SFDPH approved Soil Import Plan (full analyte list, RAD, standard TAT)
3.3	Placing and Compacting of Clean Fill, and Geotechnical Testing ¹¹	8	day	\$ 1,500	\$ 12,000	Typical cost - \$1,500/day ¹
					<i>Subtotal</i>	\$ 45,000

4.0 REPORTING

		Quantity	Unit	Unit Cost	Amount	Notes
4.1	Final Completion and Closure Report	1	each	\$ 16,000	\$ 16,000	Geosyntec Estimate ¹
					<i>Subtotal</i>	\$ 16,000

Subtotal \$ 474,200
30% Contingency \$ 142,300
TOTAL COST \$ 616,500

Assumptions:

- "Geosyntec Estimate" indicates that costs estimate is based on Geosyntec experience with similar excavation projects. Unless otherwise stated a month is assumed to include approximately 4.3 weeks (or 22 days) at 8 hours per day.
- Includes support and review for remediation aspects of all planning documents, including HASP, Dust Control Plan, SWPPP, and Traffic Control Plan.
- Required during design & planning, utility earthwork, and subsurface earthwork. Includes planning and oversight for pre-excavation sampling.
- Site perimeter dust monitoring required during earthwork in impacted soils. Includes dust monitoring stations and personnel to operate.
- Includes additional charges to handle potentially hazardous soil (PPE, 40 hr. training, personal dust monitoring, wash-down management, equipment decontamination, and exclusion zone monitoring).
- Assumes an averages excavation rate of 1150 cy/wk
- Soil samples analyzed for TPH, CAM 17 metals, PCB, VOCs, and STLC/TTL (assume 10 percent of all samples collected analyzed for STLC/TTL).
- 100 percent of soil to be disposed of off-site will require Class III transport and disposal. Transport and disposal cost of Class III material are included as part of the redevelopment costs. Costs are based on Lennar's approximate costs
- Costs do not include the repair of the durable cover. Post-excavation backfill and compaction will be conducted prior to grading and preparation of the site for development.
- Imported fill must be tested for compliance with SFDPH approved Soil Import Plan. The number of samples is dependent on total volume (set at 12 for the first 5,000 cy and 1 per each subsequent 1,000 cy of soil).
- If well timed with the arrival of sourced soils, backfill, compaction and testing can be completed at a rate of 10,000-12,000 cy/wk. A rate of 1,200 cy/day is assumed to account for potential delays in the transport of soils to the site.

Abbreviations:

ls - lump sum
mo - month
sa - sample
cy - cubic yard
wk - week

CP DevCo - CP Development Company, LLC
SFDPH - San Francisco Department of Public Health
TAT - Turn-around time

TABLE C-2
Cost Estimate - Excavation of Soil to Residential Screening Levels
Feasibility Assessment for Reducing Areas with Land Use Restrictions
Parcel G, Hunters Point Naval Shipyard
San Francisco, California

Prepared By: T.Kamegai-Karadi and M. Vishnevskiy
Reviewed By: J. Ramirez
Date: 16 November 2016

1.0 PLANNING, PRE-CONSTRUCTION WORK, AND OVERSIGHT

		Quantity	Unit	Unit Cost	Amount	Notes
1.1	Excavation Work Plan and Specification Support	1.0	ls	\$ 30,000	\$ 30,000	Geosyntec Estimate ¹ (Preparation of a Work Plan, one revision following agency comments, and support with specifications)
1.2	Planning Documentation Support and Review ²	1.0	ls	\$ 35,000	\$ 35,000	Geosyntec Estimate ¹
1.3	Project Management ³	10.8	mo	\$ 5,700	\$ 61,560	1 person 1/4 time for approximately 10.8 months during field activities
1.4	Excavation Permit(s)	1.0	ls	\$ 10,000	\$ 10,000	Geosyntec Estimate ¹ (City Building Dept. application and inspection fees; Article 31 compliance included)
1.5	Oversight during Excavation, Backfill and Compaction	10.8	mo	\$ 4,700	\$ 50,760	1 field staff, 1/4 time for duration of field activities
1.6	Project Management	10.8	mo	\$ 5,000	\$ 54,000	General project management
1.7	Construction Meetings	1.0	ls	\$ 61,300	\$ 61,300	Includes 2 on-site meetings per month for duration of field activities
					<i>Subtotal</i>	\$ 302,620

2.0 PRE-EXCAVATION SAMPLING, EXCAVATION, CONFIRMATION SAMPLING, PROFILING, OFF-HAUL

		Quantity	Unit	Unit Cost	Amount	Notes
2.1	Pre-excavation Sampling	88	day	\$ 2,100	\$ 185,220	9-10 borings/day to a maximum of 11' with a 2" direct push rig; 9 borings per excavation for 98 areas (per driller's verbal estimate)
	Pre-excavation Analysis	686	sa	\$ 420	\$ 288,120	5 samples for each excavation (see FA Figure 6 for areas), with additional 4 tentative step-out samples for half of the excavations. All samples will be collected; it's assumed that some initial excavation boundary samples will be below Residential Screening Levels and not require analysis of the associated step-out sample.
2.2	Dust Monitoring ⁴	10.8	mo	\$ 19,800	\$ 213,840	Includes equipment and personnel for 36 hr/wk for duration of field activities
2.3	Excavation and Stockpile ^{5,6}	18,740	cy	\$ 34	\$ 627,800	Excavation volume based on a 15'x15' square centered on sample w/ 1:1 benching and 20% bulking (see Table 3 in main document)
2.4	Confirmation Sampling and Analysis	874	sa	\$ 428	\$ 374,100	One sidewall sample per 17 linear feet of sidewall; one bottom sample per 500 square feet of bottom area; one additional sidewall sample for every planned sidewall sample when excavation depth exceeds 7.0 feet; QA/QC samples 10% of total
2.5	Stockpile Profile Sampling and Analysis ⁷	38	sa	\$ 724	\$ 27,500	1 sample per 500 cy of stockpiled material
2.6	Transport and Disposal - Class III ⁸	24,987	ton	\$ 25	\$ 624,700	Disposal at Ox Mountain or Potrero Hills, per CP DevCo
					<i>Subtotal</i>	\$ 2,341,280

3.0 BACKFILL⁹

		Quantity	Unit	Unit Cost	Amount	Notes
3.1	Importing Clean Fill	18,740	cy	\$ 15	\$ 281,100	Volume based on excavated soil that will be disposed offsite and replaced with imported fill. Unit cost based on approximate CP DevCo rate.
3.2	Analytical Testing of Import Fill ¹⁰	26	sa	\$ 1,198	\$ 30,800	Per SFDPH approved Soil Import Plan - full analyte list, RAD, standard TAT
3.3	Placing & Compacting Clean Fill & Geotechnical Testing (for duration) ¹¹	16	day	\$ 1,500	\$ 24,000	Typical cost - \$1,500/day ¹
					<i>Subtotal</i>	\$ 335,900

4.0 REPORTING

		Quantity	Unit	Unit Cost	Amount	Notes
4.1	Final Completion and Closure Report	1	each	\$ 16,000	\$ 16,000	Geosyntec Estimate ¹
					<i>Reporting Costs</i>	\$ 16,000
					<i>Subtotal</i>	\$ 2,995,800
					<i>30% Contingency</i>	\$ 898,700
					TOTAL COST	\$ 3,894,500

Assumptions:

- "Geosyntec Estimate" indicates that costs estimate is based on Geosyntec experience with similar excavation projects. Unless otherwise stated a month is assumed to include approximately 4.3 weeks (or 22 days) at 8 hours per day.
- Includes support and review for remediation aspects of all planning documents, including HASP, Dust Control Plan, SWPPP, and Traffic Control Plan.
- Required during design & planning, utility earthwork, and subsurface earthwork. Includes planning and oversight for pre-excavation sampling.
- Site perimeter dust monitoring required during earthwork in impacted soils. Includes dust monitoring stations and personnel to operate.
- Includes additional charges to handle potentially hazardous soil (PPE, 40 hr. training, personal dust monitoring, wash-down management, equipment decontamination, and exclusion zone monitoring).
- Assumes an average excavation rate of 1150 cy per week.
- Soil samples analyzed for TPH, CAM 17 metals, PCB, VOCs, SVOCs, and STLC/TTLC (assume 10 percent of all samples collected analyzed for STLC/TTLC).
- 100 percent of soil to be disposed of off-site will require Class III disposal. Transport and disposal cost of Class III material are included as part of the redevelopment costs. The difference between transport and disposal costs for Class II and Class I are applied to this line item.
- Costs do not include the repair of the durable cover. Post-excavation backfill and compaction will be conducted prior to grading and preparation of the site for development.
- Imported fill must be tested for compliance with SFDPH approved Soil Import Plan. The number of samples is dependent on total volume (set at 12 for the first 5,000 cy and 1 per each subsequent 1,000 cy of soil). With small volumes number of samples are prorated.
- If well timed with the arrival of sourced soils, backfill, compaction and testing can be completed at a rate of 10,000-12,000 cy/wk. A rate of 1,200 cy/day is assumed to account for potential delays in the transport of soils to the site.

Abbreviations:

ls - lump sum
mo - month
sa - sample
cy - cubic yard
wk - week

CP DevCo - CP Development Company, LLC
SFDPH - San Francisco Department of Public Health
TAT - Turn-around time

APPENDIX D
**BOUNDARY SELECTION FOR AREAS REQUIRING RESTRICTED LAND
USE**

TABLES

Table D1
Residential Risk Grids Recommended for Land Use Restrictions
Parcel G Feasibility Assessment
Hunters Point Naval Shipyard

Langan Project: 731609901
November 2016

Point ID	COCs above Action Levels	Residential Risk Grid with COC(s) above Action Levels	Historical Conditions at Residential Risk Grid with COC(s) above Action Levels ¹	Conclusions	Surrounding Residential Risk Grids							
					N Cell	NE Cell	E Cell	SE Cell	S Cell	SW Cell	W Cell	NW Cell
6967B02	Cr(VI)	069067	6967B02 was identified as part of De Minimis Area 6967. The area is located in IR-9-1 in the NW corner of IR-9, N of the pickling tank area. The pickling tanks reportedly contained sulfuric acid; no chromic acid was used. Chemicals used at IR-09 included zinc chromate (paint primer), sodium dichromate, and sulfuric and phosphoric acids. Cr(VI) was detected in soil above Action Levels at 6967B02.	The selected boundaries for restricted land use due to Cr(VI) at risk grids 069066, 069067, and 070066 are protective of human health. Cr(VI) is present in soil above action levels at 6967E1A, 6967B02 and 696W1A at the border between risk grids 069066 and 069067. Considering the larger area requiring land use restrictions, partial delineation of Cr(VI) to the N and S, and historical use of adjacent risk grids, the land use restriction boundaries are appropriate. Risk grid 070066 has been identified for restricted land use based on unknown conditions related to Cr(VI) in soil.	068066: Historical site use is similar to risk grid 069067; however, Cr(VI) is delineated in soil to the N by 6967B01 and 6967N1A. Therefore, land use restrictions are not recommended for risk grid 068066.	069066: Land use restrictions are recommended due to 6967E1A and 6967E1B in risk grid 069066 where arsenic and Cr(VI) were detected above Action Levels. See details regarding risk grid 069066 in this table.	070066: Historical site use is similar to risk grid 069067. The nearest samples with Cr(VI) below Action Levels to the E/SE are located at borings IR09B009 and IR09B025. As a conservative measure, it is recommended that risk grid 070066 be identified for land use restrictions based on unknown conditions related to Cr(VI) in soil.	070067: Historical site use is similar to risk grid 069067; however, Cr(VI) is delineated to the S by 6967S1A. Therefore, land use restrictions are not recommended for risk grid 070067.	070068: No recognized environmental concerns identified based on historical site use. Cr(VI) is delineated to the S by 6967S1A.	069068: No recognized environmental concerns identified based on historical site use.	068068: No recognized environmental concerns identified based on historical site use.	068067: Historical site use is similar to risk grid 069067; however, Cr(VI) is delineated in soil to the N by 6967B01 and 6967N1A. In addition, an adequate distance exists between the grid boundary and samples with Cr(VI) above Action Levels. Therefore, land use restrictions are not recommended for risk grid 068067.
6967E1A	Cr(VI)	069066	6967E1A was identified as part of De Minimis Area 6967. The area is located in IR-9-1 in the NW corner of IR-9, N of the pickling tank area. The pickling tanks reportedly contained sulfuric acid; no chromic acid was used. Chemicals used at IR-09 included zinc chromate (paint primer), sodium dichromate, and sulfuric and phosphoric acids. Cr(VI) was detected in soil above Action Levels at 6967E1A.	The selected boundaries for restricted land use due to Cr(VI) at risk grids 069066, 069067, and 070066 are protective of human health. Cr(VI) is present in soil above Action Levels at 6967E1A, 6967B02 and 696W1A at the border between risk grids 069067 and 069066. Considering the larger area requiring land use restrictions (risk grids 069065, 069066, and 069067), delineation of Cr(VI) to the N, NW, and S, and historical use of adjacent risk grids, the land use restriction boundaries are appropriate. However, as a conservative measure it is recommended that risk grid 070066 be identified for land use restrictions based on unknown conditions related to Cr(VI) in soil.	068065: Historical site use is similar to risk grid 069066; however, Cr(VI) is delineated to the N by 6967B01 and 6967N1A. Therefore, land use restrictions are not recommended for risk grid 068065.	069065: Land use restrictions are recommended due to IR09B006 in risk grid 069065 where cobalt was detected above Action Levels. See details regarding risk grid 069065 in this table. Site conditions do not warrant land use restrictions due to Cr(VI) based on adequate distance between the grid boundary and samples with Cr(VI) above Action Levels.	070065: No recognized environmental concerns identified based on historical site use.	070066: Historical site use is similar to risk grid 069066. The nearest samples with Cr(VI) below Action Levels to the E/SE are located at borings IR09B009 and IR09B025. As a conservative measure, it is recommended that risk grid 070066 be identified for land use restrictions based on unknown conditions related to Cr(VI) in soil.	070067: Historical site use is similar to risk grid 069066; however, Cr(VI) is delineated to the S by 6967S1A. Therefore, land use restrictions are not recommended for risk grid 070067.	069067: Land use restrictions are recommended due to 6967B02, 6967W1A, and IR09B007 in risk grid 069067 where arsenic and Cr(VI) were detected above Action Levels. See details regarding risk grid 069067 in this table.	068067: Historical site use is similar to risk grid 069066; however, Cr(VI) is delineated in soil to the N by 6967B01 and 6967N1A. In addition, an adequate distance exists between the grid boundary and samples with Cr(VI) above Action Levels. Therefore, land use restrictions are not recommended for risk grid 068067.	068066: Historical site use is similar to risk grid 069066; however, Cr(VI) is delineated in soil to the N by 6967B01 and 6967N1A. Therefore, land use restrictions are not recommended for risk grid 068066.
6967W1A	Cr(VI)	069067	6967W1A was identified as part of De Minimis Area 6967. The area is located in IR-9-1 in the NW corner of IR-9, N of the pickling tank area. The pickling tanks reportedly contained sulfuric acid; no chromic acid was used. Chemicals used at IR-09 included zinc chromate (paint primer), sodium dichromate, and sulfuric and phosphoric acids. Cr(VI) was detected in soil above Action Levels (De Minimis Area 6967). Arsenic was detected in soil above Action Levels.	The selected boundaries for restricted land use due to Cr(VI) at risk grids 069066, 069067, and 070066 are protective of human health. Cr(VI) is present in soil above action levels at 6967E1A, 6967B02 and 696W1A at the border between risk grids 069066 and 069067. Considering the larger area requiring land use restrictions, partial delineation of Cr(VI) to the N and S, and historical use of adjacent risk grids, the land use restriction boundaries are appropriate. Risk grid 070066 has been identified for restricted land use based on unknown conditions related to Cr(VI) in soil.	068066: Historical site use is similar to risk grid 069067; however, Cr(VI) is delineated to the N by 6967B01 and 6967N1A. Therefore, land use restrictions are not recommended for risk grid 068066.	069066: Land use restrictions are recommended due to 6967E1A and 6967E1B in risk grid 069066 where arsenic and Cr(VI) were detected above Action Levels. See details regarding risk grid 069066 in this table.	070066: Historical site use is similar to risk grid 069067. The nearest samples with Cr(VI) below Action Levels to the E/SE are located at borings IR09B009 and IR09B025. As a conservative measure, it is recommended that risk grid 070066 be identified for land use restrictions based on unknown conditions related to Cr(VI) in soil.	070067: Historical site use is similar to risk grid 069067; however, Cr(VI) is delineated to the S by 6967S1A. Therefore, land use restrictions are not recommended for risk grid 070067.	070068: No recognized environmental concerns identified based on historical site use. Cr(VI) is delineated to the S by 6967S1A.	069068: No recognized environmental concerns identified based on historical site use.	068068: No recognized environmental concerns identified based on historical site use.	068067: Historical site use is similar to risk grid 069067; however, Cr(VI) is delineated in soil to the N by 6967B01 and 6967N1A. In addition, an adequate distance exists between the grid boundary and samples with Cr(VI) above Action Levels. Therefore, land use restrictions are not recommended for risk grid 068067.

Table D1
Residential Risk Grids Recommended for Land Use Restrictions
Parcel G Feasibility Assessment
Hunters Point Naval Shipyard

Langan Project: 731609901
November 2016

Point ID	COCs above Action Levels	Residential Risk Grid with COC(s) above Action Levels	Historical Conditions at Residential Risk Grid with COC(s) above Action Levels ¹	Conclusions	Surrounding Residential Risk Grids							
					N Cell	NE Cell	E Cell	SE Cell	S Cell	SW Cell	W Cell	NW Cell
6967E1B	arsenic	069066	6967E1B was identified as part of De Minimis Area 6967. The area is located in IR-9-1 in the NW corner of IR-9, N of the pickling tank area. Chemicals used at IR-09 included zinc chromate (paint primer), sodium dichromate, and sulfuric and phosphoric acids. Arsenic was detected in soil above Action Levels. Arsenic is not associated with known historical site operations.	The selected boundaries for restricted land use due to arsenic at risk grids 069066 and 069067 are protective of human health. Arsenic is not associated with known historical site operations and is consistent with variations in ambient concentrations.	068065: Historical site use is similar to risk grid 069066; however, arsenic is delineated to the N by 6967N1B. Therefore, land use restrictions are not recommended for risk grid 068065.	069065: Land use restrictions are recommended due to IR09B006 in risk grid 069065 where cobalt was detected above Action Levels. See details regarding risk grid 069065 in this table. Site conditions do not warrant land use restrictions due to arsenic based on adequate distance between the grid boundary and samples with arsenic above Action Levels.	070065: No recognized environmental concerns identified based on historical site use.	070066: Historical site use is similar to risk grid 069066. As a conservative measure, it is recommended that risk grid 070066 be identified for land use restrictions based on unknown conditions related to Cr(VI) in soil. Site conditions do not warrant land use restrictions due to arsenic based on adequate distance between the grid boundary and samples with arsenic above Action Levels.	070067: Historical site use is similar to risk grid 069066; however, arsenic is delineated to the S by 6967B03. In addition, arsenic in soil is likely attributed to ambient conditions. Therefore, land use restrictions are not recommended for risk grid 070067.	069067: Land use restrictions are recommended due to 6967B02, 6967W1A, and IR09B007 in risk grid 069067 where arsenic and Cr(VI) were detected above Action Levels. See details regarding risk grid 069067 in this table.	068067: Historical site use is similar to risk grid 069066. Site conditions do not warrant land use restrictions due to arsenic based on adequate distance between the grid boundary and samples with arsenic above Action Levels. In addition, arsenic is likely attributed to ambient conditions.	068066: Historical site use is similar to risk grid 069066; however, arsenic is delineated to the N by 6967N1B. In addition, arsenic in soil is likely attributed to ambient conditions. Therefore, land use restrictions are not recommended for risk grid 068066.
IR09B007	arsenic	069067	IR09B007 was identified as part of De Minimis Area 6967. The area is located in IR-9-1 in the NW corner of IR-9, N of the pickling tank area. Chemicals used at IR-09 included zinc chromate (paint primer), sodium dichromate, and sulfuric and phosphoric acids. Arsenic was detected in soil above Action Levels. Arsenic is not associated with known historical site operations.	The selected boundaries for restricted land use due to arsenic at risk grids 069066 and 069067 are protective of human health. Arsenic is not associated with known historical site operations and is consistent with variations in ambient concentrations.	068066: Historical site use is similar to risk grid 069066; however, arsenic is delineated to the N by 6967N1B. In addition, arsenic in soil is likely attributed to ambient conditions. Therefore, land use restrictions are not recommended for risk grid 068066.	069066: Land use restrictions are recommended due to 6967E1A and 6967E1B in risk grid 069066 where arsenic and Cr(VI) were detected above Action Levels. See details regarding risk grid 069066 in this table.	070066: Historical site use is similar to risk grid 069066. As a conservative measure, it is recommended that risk grid 070066 be identified for land use restrictions based on unknown conditions related to Cr(VI) in soil. Site conditions do not warrant land use restrictions due to arsenic based on adequate distance between the grid boundary and samples with arsenic above Action Levels.	070067: Historical site use is similar to risk grid 069066; however, arsenic is delineated to the S by 6967B03. In addition, arsenic in soil is likely attributed to ambient conditions. Therefore, land use restrictions are not recommended for risk grid 070067.	070068: No recognized environmental concerns identified based on historical site use. Arsenic is delineated to the S by 6967B03. In addition, arsenic in soil is likely attributed to ambient conditions. Therefore, land use restrictions are not recommended for risk grid 070068.	068068: No recognized environmental concerns identified based on historical site use. Arsenic is delineated to the W by boring 6967W1B. In addition, arsenic in soil is likely attributed to ambient conditions. Therefore, land use restrictions are not recommended for risk grid 068068.	068067: Historical site use is similar to risk grid 069067; however, arsenic is delineated to the N by boring 6967N1B. In addition, arsenic in soil is likely attributed to ambient conditions. Therefore, land use restrictions are not recommended for risk grid 068067.	
IR09B003	cobalt	068064	IR09B003 was identified as part of De Minimis Area 6864. The area is located in IR-9-1 in the NW corner of IR Site 9, N of the pickling tank area. The pickling tanks reportedly contained sulfuric acid; no chromic acid was used. Chemicals used at IR-09 included zinc chromate (paint primer), sodium dichromate, and sulfuric and phosphoric acids. Cr(VI) was detected in soil at De Minimis Area 6864; however no action was recommended per the 2011 TCRA. Cr(VI) is not present in soil samples collected at 68064 above Action Levels established in this Feasibility Assessment (6864E1A, 6864B01, 6864S1A, 6864B02, 6864W1A). Cobalt is not associated with known historical site operations.	The selected boundaries for the proposed land use restrictions due to cobalt at risk grid 068064, 069064, and 069065 are protective of human health. Cobalt is likely associated with borrowed fill placed at Parcel G. Cobalt is not associated with known historical site operations and is consistent with variations in ambient concentrations.	067063: No recognized environmental concerns identified based on historical site use.	068063: No recognized environmental concerns identified based on historical site use.	069063: No recognized environmental concerns identified based on historical site use.	069064: Historical site use is similar to risk grid 068064. Land use restrictions are recommended for risk grid 069064 due to proximity of IR09B003 in risk grid 068064 where cobalt was detected above Action Levels. Cobalt in soil is likely attributed to ambient conditions.	069065: Land use restrictions are recommended due to IR09B005 where cobalt was detected above Action Levels. See details regarding risk grid 069065 in this table.	068065: Historical site use is similar to risk grid 069064; however, site conditions do not warrant land use restrictions based on adequate distance between the grid boundary and the sample with cobalt above Action Levels. In addition, cobalt in soil is likely attributed to ambient conditions.	067065: No recognized environmental concerns identified based on historical site use.	067064: No recognized environmental concerns identified based on historical site use.

Table D1
Residential Risk Grids Recommended for Land Use Restrictions
Parcel G Feasibility Assessment
Hunters Point Naval Shipyard

Langan Project: 731609901
November 2016

Point ID	COCs above Action Levels	Residential Risk Grid with COC(s) above Action Levels	Historical Conditions at Residential Risk Grid with COC(s) above Action Levels ¹	Conclusions	Surrounding Residential Risk Grids							
					N Cell	NE Cell	E Cell	SE Cell	S Cell	SW Cell	W Cell	NW Cell
IR09B006	cobalt	069065	IR09B006 was identified as part of De Minimis Area 6965. The area is located in IR-9-1 in the NW corner of IR Site 9, N of the pickling tank area. The pickling tanks reportedly contained sulfuric acid; no chromic acid was used. Chemicals used at IR-09 included zinc chromate (paint primer), sodium dichromate, and sulfuric and phosphoric acids. Cr(VI) was detected in soil at 6965; however no action was recommended per the 2011 TCRA. Cr(VI) is not present in soil samples collected at 69065 above Action Levels established in this Feasibility Assessment (6965B01, 6965B02, 6965N1A, 6965E1A, 6965S1A, and 6965W1A). Cobalt is not associated with known historical site operations.	The selected boundaries for the proposed land use restrictions due to cobalt at risk grid 068064, 069064, and 069065 are protective of human health. Cobalt is likely associated with borrowed fill placed at Parcel G. Cobalt is not associated with known historical site operations and is consistent with variations in ambient concentrations.	068064: Land use restrictions are recommended due to IR09B003 at risk grid 068064 where cobalt was detected above Action Levels. See details regarding risk grid 068064 in this table.	069064: Land use restrictions are recommended due to proximity to IR09B003 in risk grid 068064 where cobalt was detected above Action Levels. See details regarding risk grid 068064 in this table.	070064: No recognized environmental concerns identified based on historical site use.	070065: No recognized environmental concerns identified based on historical site use.	070066: Risk grid 070066 is identified for land use restrictions based on unknown conditions related to Cr(VI). Site conditions do not warrant land use restrictions due to cobalt based on adequate distance between the grid boundary and the sample with cobalt above Action Levels. In addition, cobalt is likely attributed to ambient conditions.	069066: Land use restrictions are recommended due to 6967E1A and 6967E1B where Cr(VI) and arsenic were detected above Action Levels. See details regarding risk grid 069066 in this table. Site conditions do not warrant land use restrictions due to cobalt based on adequate distance between the grid boundary and the sample with cobalt above Action Levels.	068066: Historical site use is similar to risk grid 069065. Site conditions do not warrant land use restrictions due to cobalt based on adequate distance between the grid boundary and the sample with cobalt above Action Levels. In addition, cobalt is likely attributed to ambient conditions.	068065: Historical site use is similar to risk grid 069065. Site conditions do not warrant land use restrictions due to cobalt based on adequate distance between the grid boundary and the sample with cobalt above Action Levels. In addition, cobalt is likely attributed to ambient conditions.
IR09B012	cobalt	071066	IR09B012 is located near the SW corner of IR-9, N of the pickling tank area. The pickling tanks reportedly contained sulfuric acid; no chromic acid was used. Chemicals used at IR-09 included zinc chromate (paint primer), sodium dichromate, and sulfuric and phosphoric acids. Cobalt is not associated with known historical site operations.	The selected boundaries for restricted land use due to cobalt at risk grids 068064, 069064, and 069065 are protective of human health. Cobalt is likely associated with borrowed fill placed at Parcel G. Cobalt is not associated with known historical site operations and is consistent with variations in ambient concentrations.	070065: No recognized environmental concerns identified based on historical site use.	071065: No recognized environmental concerns identified based on historical site use.	072065: No recognized environmental concerns identified based on historical site use.	072066: No recognized environmental concerns identified based on historical site use.	072067: Historical site use is similar to risk grid 071066. Site conditions do not warrant land use restrictions due to cobalt based on adequate distance between the grid boundary and the sample with cobalt above Action Levels. In addition, cobalt is likely attributed to ambient conditions.	071067: Historical site use is similar to risk grid 071066. Site conditions do not warrant land use restrictions due to cobalt based on adequate distance between the grid boundary and the sample with cobalt above Action Levels. In addition, cobalt is likely attributed to ambient conditions.	070067: Historical site use is similar to risk grid 071066. Site conditions do not warrant land use restrictions due to cobalt based on adequate distance between the grid boundary and the sample with cobalt above Action Levels. In addition, cobalt is likely attributed to ambient conditions.	070066: Land use restrictions are recommended based on proximity to 6967E1A in risk grid 069066 where Cr(VI) was detected above Action Levels. See details related to risk grid 069066 in this table. Site conditions do not warrant land use restrictions due to cobalt based on adequate distance between the grid boundary and the sample with cobalt above Action Levels.
IR09B016	b(a)p	072069	IR09B016 is located in IR-9, the former pickling and plate yard. The structures formerly located at the site consisted of three below grade brick lined pickling tanks, a plate drying rack, plate storage racks, and an overhead crane system. B(a)p is not associated with known pickling tank and zinc chromate painting operations.	The selected boundaries for the proposed land use restrictions at risk grid 072069 are protective of human health. B(a)p is not associated with known historical site operations. The b(a)p above Action Levels appears isolated and is anticipated to be localized to the immediate area.	071068: Historical site use is similar to risk grid 072069. Site conditions do not warrant land use restrictions due to b(a)p based on adequate distance between the grid boundary and the sample with b(a)p above Action Levels.	072068: Land use restrictions are recommended due to IR09B017 in risk grid 072068 where arsenic was detected above Action Levels. See details regarding risk grid 072068 in this table.	073068: No recognized environmental concerns identified based on historical site use. Land use restrictions are recommended due to proximity of IR09B017 in risk grid 072068 where arsenic was detected above Action Levels. See details regarding risk grid 072068 in this table.	073069: Historical site use is similar to risk grid 072069. Site conditions do not warrant land use restrictions due to b(a)p based on adequate distance between the grid boundary and the sample with b(a)p above Action Levels.	073070: No recognized environmental concerns identified based on historical site use.	072070: No recognized environmental concerns identified based on historical site use.	071070: No recognized environmental concerns identified based on historical site use.	071069: No recognized environmental concerns identified based on historical site use.

**Table D1
Residential Risk Grids Recommended for Land Use Restrictions
Parcel G Feasibility Assessment
Hunters Point Naval Shipyard**

Point ID	COCs above Action Levels	Residential Risk Grid with COC(s) above Action Levels	Historical Conditions at Residential Risk Grid with COC(s) above Action Levels ¹	Conclusions	Surrounding Residential Risk Grids							
					N Cell	NE Cell	E Cell	SE Cell	S Cell	SW Cell	W Cell	NW Cell
IR09B017	arsenic	072068	IR09B017 is located near the SW corner of IR-9, N of the pickling tank area. The pickling tanks reportedly contained sulfuric acid; no chromic acid was used. Chemicals used at IR-09 included zinc chromate (paint primer), sodium dichromate, and sulfuric and phosphoric acids. Arsenic is not associated with known historical site operations.	The selected boundaries for restricted land use due to arsenic at risk grids 072068 and 073068 are protective of human health. Arsenic is likely associated with borrowed fill placed at Parcel G. Arsenic is not associated with known historical site operations and is consistent with variations in ambient concentrations.	071067: Historical site use is similar to risk grid 072068. Site conditions do not warrant land use restrictions due to arsenic based on adequate distance between the grid boundary and the sample with arsenic above Action Levels. In addition, arsenic is likely attributed to ambient conditions.	072067: Historical site use is similar to risk grid 072068. Site conditions do not warrant land use restrictions due to arsenic based on adequate distance between the grid boundary and the sample with arsenic above Action Levels. In addition, arsenic is likely attributed to ambient conditions.	073067: Historical site use is similar to risk grid 072068. Site conditions do not warrant land use restrictions due to arsenic based on adequate distance between the grid boundary and the sample with arsenic above Action Levels. In addition, arsenic is likely attributed to ambient conditions.	073068: No recognized environmental concerns identified based on historical site use. Land use restrictions are recommended due to proximity of IR09B017 in risk grid 072068 where arsenic was detected above Action Levels.	073069: Historical site use is similar to risk grid 072068. Site conditions do not warrant land use restrictions due to arsenic based on adequate distance between the grid boundary and the sample with arsenic above Action Levels. In addition, arsenic is likely attributed to ambient conditions.	072069: Land use restrictions are recommended due to IR09B016 in risk grid 072069 where bla(p) was detected above Action Levels. See details regarding risk grid 072069 in this table. Site conditions do not warrant land use restrictions due to arsenic based on adequate distance between the grid boundary and the sample with arsenic above Action Levels.	071069: No recognized environmental concerns identified based on historical site use.	071068: Historical site use is similar to risk grid 072068. Site conditions do not warrant land use restrictions due to arsenic based on adequate distance between the grid boundary and the sample with arsenic above Action Levels. In addition, arsenic is likely attributed to ambient conditions.
IR09MW62A	cobalt	067070	IR09MW62A is identified as part of Remedial Area 37-1 in IR-37, between Bldgs 436 and 437. Bldg 436 was used by the Navy as a painting and paint storage facility and Bldg 437 was used as a pipe storage facility. Remedial Area 37-1 was investigated for manganese and PCBs in soil. A TCRA addressed PCB contamination in soil (2011). Per the 2011 TCRA, no action was recommended for manganese (2011 TCRA). PCBs and manganese are not present in soil samples collected at 67070 (3701E3D, 3701E2A, 3701E3E, 3701E3E, and 3701E4A) above Action Levels established in this Feasibility Assessment. Cobalt is not associated with known historical site operations.	The selected boundaries for the proposed land use restrictions due to cobalt at risk grid 067070 are protective of human health. Cobalt is likely associated with borrowed fill placed at Parcel G. Cobalt is not associated with known historical site operations and is consistent with variations in ambient concentrations.	066069: No recognized environmental concerns identified based on historical site use.	067069: No recognized environmental concerns identified based on historical site use.	068069: No recognized environmental concerns identified based on historical site use.	068070: No recognized environmental concerns identified based on historical site use.	068071: No recognized environmental concerns identified based on historical site use.	067071: Historical site use is similar to risk grid 067070. Site conditions do not warrant land use restrictions due to cobalt based on adequate distance between the grid boundary and the sample with cobalt above Action Levels. In addition, cobalt in soil is likely attributed to ambient conditions.	066071: Land use restrictions are recommended for a portion of risk grid 066071 surrounding 3701S1C where manganese was detected above Action Levels. ² Land use restrictions are not recommended due to cobalt based on adequate distance between the grid boundary and the sample with cobalt above Action Levels.	066070: Land use restrictions are recommended for a portion of risk grid 066070 surrounding 6671N2A where manganese was detected above Action Levels. ² Land use restrictions are not recommended due to cobalt because cobalt at IR09MW62A is delineated to the W by IR37B016. In addition, cobalt is likely attributed to ambient conditions.
IR33B062	arsenic	076057	IR33B062 is identified as part of De Minimis Area DM-7657 in IR-33 N. The area is located near the SE corner of Bldg 302A. The Navy had used this Bldg as a transportation shop which included activities such as vehicle repair, sandblasting, and painting operations. Additionally, hydraulic lifts were located in Bldg 302A and in between Bldg 302A and 304. An interconnected floor drain and sump are located inside and outside of Bldg 302A. Arsenic is not associated with known historical site operations.	The selected boundaries for the proposed land use restrictions at risk grid 076057 are protective of human health. Arsenic is likely associated with borrowed fill placed at Parcel G. Arsenic is not associated with known historical site operations and is consistent with variations in ambient concentrations; therefore, the risk grid is anticipated to provide adequate delineation for this COC.	075056: Historical site use is similar to risk grid 076057. Site conditions do not warrant land use restrictions due to arsenic based on adequate distance between the grid boundary and the sample with arsenic above Action Levels. In addition, arsenic in soil is likely attributed to ambient conditions.	076056: Historical site use is similar to risk grid 076057. Site conditions do not warrant land use restrictions due to arsenic based on adequate distance between the grid boundary and the sample with arsenic above Action Levels. In addition, arsenic in soil is likely attributed to ambient conditions.	077056: Risk grid 077056 is part of Remedial Area 33N-1, which was investigated for PAHs. Site conditions do not warrant land use restrictions due to arsenic based on adequate distance between the grid boundary and the sample with arsenic above Action Levels. In addition, arsenic in soil is likely attributed to ambient conditions.	077057: Risk grid 077057 is part of Remedial Area 33N-1, which was investigated for PAHs. Site conditions do not warrant land use restrictions due to arsenic based on adequate distance between the grid boundary and the sample with arsenic above Action Levels. In addition, arsenic in soil is likely attributed to ambient conditions.	077058: No recognized environmental concerns identified based on historical site use.	076058: Historical site use is similar to risk grid 076057. Site conditions do not warrant land use restrictions due to arsenic based on adequate distance between the grid boundary and the sample with arsenic above Action Levels. In addition, arsenic in soil is likely attributed to ambient conditions.	075058: No recognized environmental concerns identified based on historical site use.	075057: Historical site use is similar to risk grid 076057. Site conditions do not warrant land use restrictions due to arsenic based on adequate distance between the grid boundary and the sample with arsenic above Action Levels. In addition, arsenic in soil is likely attributed to ambient conditions.

**Table D1
Residential Risk Grids Recommended for Land Use Restrictions
Parcel G Feasibility Assessment
Hunters Point Naval Shipyard**

Point ID	COCs above Action Levels	Residential Risk Grid with COC(s) above Action Levels	Historical Conditions at Residential Risk Grid with COC(s) above Action Levels ¹	Conclusions	Surrounding Residential Risk Grids							
					N Cell	NE Cell	E Cell	SE Cell	S Cell	SW Cell	W Cell	NW Cell
IR33B092	b(a)p, lead	077072	IR33B092 is identified as part of Remedial Area 33S-1 in IR-33 S. This area is located inside of Bldg 411. Sample IR33B092 was collected adjacent to a floor sump associated with fixed machinery that was used for machining and welding operations. B(a)p was detected above Action Levels between 1 and 5 feet bgs, which is consistent with a possible release from a floor sump. Lead was detected above Action Levels between 1 and 1.5 feet bgs. Arsenic is not associated with known historical site operations and is consistent with variations in ambient concentrations.	The selected boundaries for the proposed land use restrictions at risk grids 077072 and 076072 are protective of human health. Although b(a)p may be associated with machinery used in Bldg 411, the detection above Action Levels is anticipated to be localized to the immediate area adjacent to the sump at Bldg 411. The risk grid (077072) is located at the W Bldg 411 border and b(a)p in soil is not expected to extend beyond the limits of the bldg footprint. Lead in soil may be associated with bldg materials (e.g., leaded paint) or fill at Bldg 411. Arsenic is likely associated with borrowed fill placed at Parcel G and is consistent with variations in ambient concentrations.	076071: No recognized environmental concerns identified based on historical site use.	077071 : No recognized environmental concerns identified based on historical site use.	078071: No recognized environmental concerns identified based on historical site use.	078072: Historical site use is similar to risk grid 077072; however, land use restrictions are not recommended for risk grid 078072 based on adequate distances between the grid boundary and samples with COCs above Action Levels. In addition, arsenic is likely attributed to ambient conditions.	078073: No recognized environmental concerns identified based on historical site use.	077073: No recognized environmental concerns identified based on historical site use.	076073: No recognized environmental concerns identified based on historical site use.	076072: No recognized environmental concerns identified based on historical site use. Land use restrictions are recommended for risk grid 076072 due to proximity of IR33B092 in risk grid 077072 where b(a)p and lead were detected above Action Levels.
IR33B094	arsenic											
IR33B096	b(a)a, b(b)f, lead	081073	IR33B096 is identified as part of Remedial Area 33S-3 in IR-33 S. This area is located inside of Bldg 411 adjacent to a floor sump associated with fixed machinery that was used for machining and welding operations. B(a)a and b(b)f were detected above Action Levels between 6 to 7 feet bgs, which is consistent with a possible release from a floor sump. Lead was detected above Action Levels between 1.5 and 2 feet bgs.	The selected boundaries for the proposed land use restrictions at risk grids 080073 and 081073 are protective of human health. Although b(a)a and b(b)f may be associated with machinery used in Bldg 411, the detections above Action Levels are anticipated to be localized to the immediate area adjacent to the sump at Bldg 411. Lead in soil may be associated with bldg materials (e.g., leaded paint) or fill at Bldg 411.	080072: No recognized environmental concerns identified based on historical site use.	081072: No recognized environmental concerns identified based on historical site use.	082072: No recognized environmental concerns identified based on historical site use.	082073: No recognized environmental concerns identified based on historical site use.	082074: No recognized environmental concerns identified based on historical site use.	081074: No recognized environmental concerns identified based on historical site use.	080074: No recognized environmental concerns identified based on historical site use.	080073: No recognized environmental concerns identified based on historical site use. Land use restrictions are recommended for risk grid 080073 due to proximity of IR33B096 in risk grid 081073 where b(a)a, b(b)f, and lead were detected above Action Levels.
IR65B004	arsenic	088066	IR65B004 is located in IR-65 S of Bldg 324 in De minimis area 8866. De minimis area 8866 is about 25 feet from the SW corner of Building 324. The Navy used Building 324 as a carbon dioxide refilling station for fire extinguishers. Arsenic is not associated with known historical site operations.	The selected boundaries for restricted land use due to arsenic at risk grid 088066 are protective of human health. Arsenic is likely associated with borrowed fill placed at Parcel G. Arsenic is not associated with known historical site operations and is consistent with variations in ambient concentrations.	087065: No recognized environmental concerns identified based on historical site use.	088065: No recognized environmental concerns identified based on historical site use.	089065: No recognized environmental concerns identified based on historical site use.	089066: No recognized environmental concerns identified based on historical site use.	089067: No recognized environmental concerns identified based on historical site use.	088067: No recognized environmental concerns identified based on historical site use.	087067: 087067 is located at Bldg. 351, Electronics Shop. Site conditions do not warrant land use restrictions due to arsenic based on adequate distance between the grid boundary and the sample with arsenic above Action Levels. In addition, arsenic in soil is likely attributed to ambient conditions.	087066: No recognized environmental concerns identified based on historical site use.

Table D1
Residential Risk Grids Recommended for Land Use Restrictions
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Hunters Point Naval Shipyard

Langan Project: 731609901
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Point ID	COCs above Action Levels	Residential Risk Grid with COC(s) above Action Levels	Historical Conditions at Residential Risk Grid with COC(s) above Action Levels ¹	Conclusions	Surrounding Residential Risk Grids							
					N Cell	NE Cell	E Cell	SE Cell	S Cell	SW Cell	W Cell	NW Cell
PA33SS57	cobalt	081069	PA33SS57 is identified as part of De Minimis Area 8169 in IR-33 S. The area is located inside Bldg 411 in an area where surface staining was observed. Bldg 411 had formerly been used for machining and welding operations. Cobalt is not associated with known historical site operations.	The selected boundaries for the proposed land use restrictions at risk grid 081069 are protective of human health. Cobalt is likely associated with borrowed fill placed at Parcel G. Cobalt is not associated with known historical site operations and is consistent with variations in ambient concentrations.	080068: No recognized environmental concerns identified based on historical site use.	081068: No recognized environmental concerns identified based on historical site use.	082068: No recognized environmental concerns identified based on historical site use.	082069: Historical site use is similar to risk grid 081069. Site conditions do not warrant land use restrictions due to cobalt based on adequate distance between the grid boundary and the sample with cobalt above Action Levels. In addition, cobalt in soil is likely attributed to ambient conditions.	082070: No recognized environmental concerns identified based on historical site use.	081070: Historical site use is similar to risk grid 081069; however, site conditions do not warrant land use restrictions because cobalt in soil is likely attributed to ambient conditions. In addition, cobalt at PA33SS57 is delineated to the SW by boring IR33B095.	080070: No recognized environmental concerns identified based on historical site use.	080069: No recognized environmental concerns identified based on historical site use.

Notes:

- Historical site conditions for the residential risk grids recommended for land use restrictions and surrounding areas are summarized from the 2000 Risk Management Review Process (Tetra Tech) and 2007 Revised Feasibility Study (SuTech).
- Areas recommended for restricted land use surrounding IR33B078, IR65B004, 3701S1C, and 6671N2A were reduced from the residential grid boundaries based on adequate delineation using existing soil data below residential Action Levels; therefore, historical use of surrounding risk grids is not reevaluated within this Feasibility Assessment.

b(a)a = benzo(a)anthracene
b(a)p = benzo(a)pyrene
b(b)f = benzo(b)fluoranthene,

Bldg = building
COC = chemical of concern
Cr(VI) = hexavalent chromium

IR = Installation Restoration
Residential risk grid = 2,500-square-foot exposure areas defined by the 2000 Risk Management Review Process (Tetra Tech) and 2007 Revised Feasibility Study (SuTech, 2007).
TCRA = time-critical removal action

Table D2
Areas Recommended for Land Use Restrictions based on Sample Delineation
Parcel G Feasibility Assessment
Hunters Point Naval Shipyard

Langan Project 731609901
November 2016

Sample Type	Point ID	Sample ID	Sample Date	Top Depth (feet bgs)	Bottom Depth (feet bgs)	Analyte	Result (mg/kg)	Q	Action Level (mg/kg)
Sample Above Action Levels	3701S1C	3701S1C_2	1/16/2001	2.0	2.5	manganese	11,000	J2	9,000
Sample Below Action Levels - North	3701W2A	3701W2A_4	1/16/2001	3.5	4.0	manganese	799		9,000
Sample Below Action Levels - South	3701S2A	3701S2A_2	3/20/2001	1.0	2.0	manganese	997		9,000
Sample Below Action Levels - East	3701S1F	3701S1F_1	3/20/2001	0.5	1.0	manganese	922		9,000
Sample Below Action Levels - West	3701S1E	3701S1E_2	3/20/2001	1.5	2.0	manganese	852		9,000
Sample Above Action Levels	6671N2A	6671N2A_1	1/18/2001	1.0	1.5	manganese	11,900	J4	9,000
Sample Below Action Levels - North	6671N3A	6671N3A_2	1/18/2001	1.0	2.0	manganese	4,830	J2	9,000
Sample Below Action Levels - South	6671N1A	6671N1A_1	12/21/2000	1.0	1.5	manganese	1,480	J4	9,000
Sample Below Action Levels - East	6671E1B	6671E1B_2	1/18/2001	1.5	2.0	manganese	994	J2	9,000
Sample Below Action Levels - West	PA37SS08	9310J389	3/11/1993	1.25	1.25	manganese	2,440	J3	9,000
Samples Above Action Levels	6967B02	6967B02_5	12/20/2000	5.0	5.5	chromium VI	4.9	J3	1.5
	6967E1A	6967E1A_5	12/14/2000	5.0	5.5	chromium VI	< 1.7	U	1.5
	6967W1A	6967W1A_5	12/13/2000	5.0	5.5	chromium VI	4.9		1.5
Sample Below Action Levels - North	6967B01	6967B01_7	12/1/2000	7.0	8.0	chromium VI	< 0.06	U	1.5
Sample Below Action Levels - North	6967N1A	6967N1A_3	12/13/2000	3.0	3.5	chromium VI	< 0.05	U	1.5
Sample Below Action Levels - South	6967S1A	6967S1A_7	12/14/2000	6.5	7.0	chromium VI	1.3		1.5
Sample Below Action Levels - ESE	IR09B009	8939E023	9/27/1989	5.75	5.75	chromium VI	< 0.055	U	1.5
Sample Below Action Levels - ESE	IR09B025	8941F009	10/11/1989	5.75	5.75	chromium VI	< 0.057	U	1.5
Sample Above Action Levels	6967E1B	6967E1B_1.5	3/12/2001	1.5	2.0	arsenic	15		11.1
	IR09B007	8939E012	9/26/1989	1.25	1.25	arsenic	12.7		11.1
Sample Below Action Levels - At Depth	IR09B007	8939E013	9/26/1989	5.25	5.25	arsenic	3.2		11.1
Sample Below Action Levels - North	6967N1B	6967N1B_0.5	3/12/2001	0.50	1.00	arsenic	4.0		11.1
Sample Below Action Levels - South	6967B03	6967B03_1	2/20/2001	1.0	1.5	arsenic	1.9		11.1
Sample Below Action Levels - East	IR09B008	8939E004	9/26/1989	2.75	2.75	arsenic	1.8		11.1
Sample Below Action Levels - ESE	IR09B025	8941F007	10/11/1989	1.25	1.25	arsenic	< 1.4	U1	11.1
Sample Below Action Levels - Southeast	IR09B009	8939E021	9/27/1989	1.25	1.25	arsenic	2.1		11.1
Sample Below Action Levels - West	6967W1B	6967W1B_1.5	3/12/2001	1.50	2.50	arsenic	3.8		11.1

Table D2
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Parcel G Feasibility Assessment
Hunters Point Naval Shipyard

Langan Project 731609901
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Sample Type	Point ID	Sample ID	Sample Date	Top Depth (feet bgs)	Bottom Depth (feet bgs)	Analyte	Result (mg/kg)	Q	Action Level (mg/kg)
Sample Above Action Levels	IR09B003	8939G003	9/25/1989	5.75	5.75	cobalt	201		115
Sample Below Action Levels - At Depth	IR09B003	8939G004	9/25/1989	10.25	10.25	cobalt	90.4		115
Sample Below Action Levels - South	IR09B005	8939E008	9/26/1989	5.75	5.75	cobalt	34.6		115
Sample Below Action Levels - East	IR09B053	9606G085	2/6/1996	6.5	7.5	cobalt	10.6		115
Sample Below Action Levels - West	IR09B002	8939E002	9/25/1989	3.3	3.3	cobalt	12.4		115
Sample Above Action Levels	IR09B006	8939E017	9/26/1989	3.25	3.25	cobalt	167		115
	IR09B006	8939E018	9/26/1989	5.75	5.75	cobalt	383		115
Sample Below Action Levels - At Depth	IR09B006	8939E020	9/26/1989	15.8	15.8	cobalt	91.8		115
Sample Below Action Levels - South	IR09B008	8939E004	9/26/1989	2.75	2.75	cobalt	21.4		115
Sample Below Action Levels - South		8939E005	9/26/1989	5.25	5.25	cobalt	17.2		115
Sample Below Action Levels - Northeast	IR09B053	9606G084	2/6/1996	2.5	3.5	cobalt	9		115
		9606G085	2/6/1996	6.5	7.5	cobalt	10.6		115
Sample Below Action Levels - West	IR09B005	8939E007	9/26/1989	2.75	2.75	cobalt	44.7		115
		8939E008	9/26/1989	5.75	5.75	cobalt	34.6		115
Sample Above Action Levels	IR09B012	8941G077	10/11/1989	5.75	5.75	cobalt	122		115
Sample Below Action Levels - At Depth	IR09B012	8941G078	10/11/1989	10.75	10.75	cobalt	95.7		115
Sample Below Action Levels - North	IR09B025	8941F009	10/11/1989	5.75	5.75	cobalt	60.5		115
Sample Below Action Levels - South	IR09B011	8941G083	10/12/1989	5.75	5.75	cobalt	106		115
Sample Below Action Levels - West	IR09MV38A	9015G178	4/10/1990	5.25	5.25	cobalt	63		115
Sample Above Action Levels	IR09B017	8939E059	9/29/1989	1.25	1.25	arsenic	14.2		11.1
Sample Below Action Levels - At Depth	IR09B017	8939E060	9/29/1989	3.25	3.25	arsenic	1.6		11.1
Sample Below Action Levels - North	IR09B014	8941F002	10/10/1989	1.25	1.25	arsenic	6.5		11.1
Sample Below Action Levels - Northeast	IR09B015	8939E029	9/27/1989	1.75	1.75	arsenic	1.6		11.1
Sample Below Action Levels - Northwest	IR09B013	8939E024	9/27/1989	1.75	1.75	arsenic	1.9		11.1
Sample Below Action Levels - South	IR09B020	8943G110	10/27/1989	1.25	1.25	arsenic	4		11.1
Sample Below Action Levels - Southeast	IR09B021	8939E039	9/28/1989	1.25	1.25	arsenic	1.7		11.1
Sample Below Action Levels - East	IR09B018	8939E034	9/27/1989	1.25	1.25	arsenic	3.5		11.1
Sample Below Action Levels - West	IR09B016	8939E055	9/29/1989	3.25	3.25	arsenic	5.3		11.1

Table D2
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Sample Type	Point ID	Sample ID	Sample Date	Top Depth (feet bgs)	Bottom Depth (feet bgs)	Analyte	Result (mg/kg)	Q	Action Level (mg/kg)
Sample Above Action Levels	IR09MW62A	0413T026	3/24/2004	5	7	cobalt	124		115
Sample Below Action Levels - At Depth	IR09MW62A	0413T027	3/24/2004	15.0	17.0	cobalt	55.6		115
Sample Below Action Levels - South	IR37B020	9538J291	9/21/1995	6.0	6.5	cobalt	108.0		115
Sample Below Action Levels - Southwest	IR37B018	9537J243	9/15/1995	6.0	6.5	cobalt	108.0		115
Sample Below Action Levels - Southwest	IR37B021	9545J584	11/6/1995	5.0	6.0	cobalt	114.0		115
Sample Below Action Levels - West	IR37B016	9423C261	6/9/1994	5.75	5.75	cobalt	87.8		115
Sample Above Action Levels	IR33B062	9414H569	4/6/1994	2.25	2.25	arsenic	24	J3	11.1
Sample Below Action Levels - At Depth	IR33B062	9414H570	4/6/1994	7.75	7.75	arsenic	3.2	J39	11.1
Sample Below Action Levels - North	PA33B018	9309A651	3/3/1993	2.25	2.25	arsenic	1.2		11.1
Sample Below Action Levels - South	IR33B090	9431R494	8/4/1994	1.75	1.75	arsenic	1.3		11.1
Sample Below Action Levels - East	IR33B091	9413L170	3/29/1994	1.25	1.25	arsenic	2.7	J3	11.1
Sample Below Action Levels - West	PA33B013	9313N182	4/1/1993	1.75	1.75	arsenic	< 0.59	UJ3	11.1
Sample Above Action Levels	IR33B078	9414A748	4/5/1994	1.8	1.8	arsenic	13	J3	11.1
Sample Below Action Levels - At Depth	IR33B078	9414A749	4/5/1994	5.8	5.8	arsenic	11	J3	11.1
Sample Below Action Levels - North	3378N1A	3378N1A_1	4/25/2001	0.5	1.0	arsenic	< 0.24	U	11.1
Sample Below Action Levels - South	3378S1A	3378S1A_1	4/25/2001	0.5	1.0	arsenic	8.1		11.1
Sample Below Action Levels - East	3378B01	3378B01_2	4/25/2001	1.5	2.0	arsenic	7.3		11.1
Sample Below Action Levels - West	3378W1A	3378W1A_2	4/25/2001	1.5	2.0	arsenic	5.2		11.1
Sample Above Action Levels	IR33B094	9545J591	11/7/1995	6.5	7.0	arsenic	11		11.1
Sample Below Action Levels - At Depth	IR33B094	9545J592	11/7/1995	9.5	10.0	arsenic	5.7		11.1
Sample Below Action Levels - North	IR33B092	9606J856	2/7/1996	4.0	5.0	arsenic	2.5		11.1
Sample Below Action Levels - North	PA33B058	9311N180	3/19/1993	3.75	3.75	arsenic	< 2	U1	11.1
Sample Below Action Levels - Southeast	PA33SS52	9310J393	3/12/1993	4.50	4.50	arsenic	5.3	J3	11.1

Table D2
Areas Recommended for Land Use Restrictions based on Sample Delineation
Parcel G Feasibility Assessment
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Sample Type	Point ID	Sample ID	Sample Date	Top Depth (feet bgs)	Bottom Depth (feet bgs)	Analyte	Result (mg/kg)	Q	Action Level (mg/kg)
Sample Above Action Levels	IR33B096	9607J866	2/13/1996	1.5	2.0	benzo(a)anthracene	< 11	U	0.80
	IR33B096	9607J866	2/13/1996	1.5	2.0	benzo(b)fluoranthene	< 11	U	0.80
	IR33B096	9607J866	2/13/1996	1.5	2.0	lead	559	J2	400
Sample Below Action Levels - At Depth	IR33B096	9607J867	2/13/1996	6.00	7.00	benzo(a)anthracene	0.81	J5	0.80
Sample Below Action Levels - At Depth	IR33B096	9607J867	2/13/1996	6.00	7.00	benzo(b)fluoranthene	1.00	J05	0.80
Sample Below Action Levels - At Depth	IR33B096	9607J867	2/13/1996	6.00	7.00	lead	191.00	J2	400
Sample Below Action Levels - North	PA33SS52	9310J393	3/12/1993	4.50	4.50	benzo(a)anthracene	< 0.39	U	0.80
Sample Below Action Levels - North	PA33SS52	9310J393	3/12/1993	4.50	4.50	benzo(b)fluoranthene	< 0.39	U	0.80
Sample Below Action Levels - North	PA33SS52	9310J393	3/12/1993	4.50	4.50	lead	8.9	J3	400
Sample Below Action Levels - South	PA33MW37A	9309A641	3/2/1993	3.75	3.75	benzo(a)anthracene	< 0.34	U	0.80
Sample Below Action Levels - South	PA33MW37A	9309A641	3/2/1993	3.75	3.75	benzo(b)fluoranthene	< 0.34	U	0.80
Sample Below Action Levels - South	PA33MW37A	9309A641	3/2/1993	3.75	3.75	lead	2.5		400
Sample Above Action Levels	IR65B004	9604J757	1/25/1996	0.5	1.5	arsenic	47		11.1
Sample Below Action Levels - At Depth	IR65B004	9604J758	1/25/1996	2.5	3.5	arsenic	0.48		11.1
Sample Below Action Levels - North	8866BC01	8866BC01	3/20/2001	3.0	3.5	arsenic	< 0.76	U1	11.1
Sample Below Action Levels - South	8866B01	8866B01_3	12/4/2000	3.0	3.5	arsenic	< 0.76	U1	11.1
Sample Below Action Levels - East	IR65B003	9604J754	1/25/1996	0.5	1.5	arsenic	0.46		11.1
Sample Below Action Levels - West	IR65B005	9604J760	1/25/1996	0.5	1.5	arsenic	0.45		11.1
Sample Above Action Levels	PA33SS57	9310J394	3/12/1993	5.25	5.25	cobalt	134		115
Sample Below Action Levels - South	IR33B095	9607J870	2/13/1996	5.0	6.0	cobalt	50.7		115
Sample Below Action Levels - Southeast	PA33B056	9313N181	4/1/1993	7.25	7.25	cobalt	40.2		115

Notes:

1. All data obtained from the Final Revised Feasibility Study for Parcel D, Hunters Point Shipyard, San Francisco, California (Sultech, 2007). Delineation Samples Below Action Levels collected within three feet (above/below) of Sample Above Action Levels.

- J = estimated detected result that is greater than the detection limit but less than the reporting limit (Sultech, 2007)
- J0 = estimated detected result based on internal standards (Sultech, 2007)
- J2 = estimated detected result based on matrix duplicate (Sultech, 2007)
- J3 = estimated detected result due to inaccuracies from a blank spike, surrogate spike, or matrix spike (Sultech, 2007)
- J4 = estimated detected result due to serial dilution (Sultech, 2007)
- J5 = estimated detected result due to holding time (Sultech, 2007)
- U = nondetect result (Sultech, 2007)
- U1 = nondetect result with method blank contamination (Sultech, 2007)

- bgs = below ground surface
- ESE = east-southeast
- mg/kg = milligrams per kilogram
- Q = qualifier
- < # = analyte not detected above laboratory reporting limit
- WSW = west-southwest

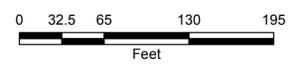
FIGURES



Legend

- Delineating Soil Sample Location Below Action Levels
- Soil Sample Location Above Action Levels
- 071066 Proposed Area with Restricted Land Use
- Residential Risk Grid^{2,3}
- Parcel G Boundary

- Notes:**
1. Navy, 2009. Final Record of Decision for Parcel G, Hunters Point Shipyard, San Francisco, California. February 18.
 2. Navy, 2007. Final Revised Feasibility Study for Parcel D, Hunters Point Shipyard, San Francisco, California. November 30.
 3. Tetra Tech EM Inc., 2000. Draft Final Parcel D Risk Management Review Process, Hunters Point Shipyard, San Francisco, California. Volumes I and II. June 20.
 4. Aerial imagery provided through Langan's subscription to nearmap.com. Aerial imagery flown on February 1, 2016.
 5. Map displayed in California State Plane Coordinate System, Zone III, North American Datum of 1983 (NAD83), US Survey Feet.



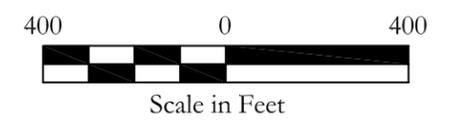
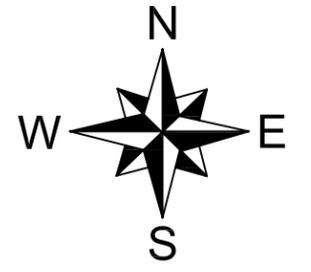
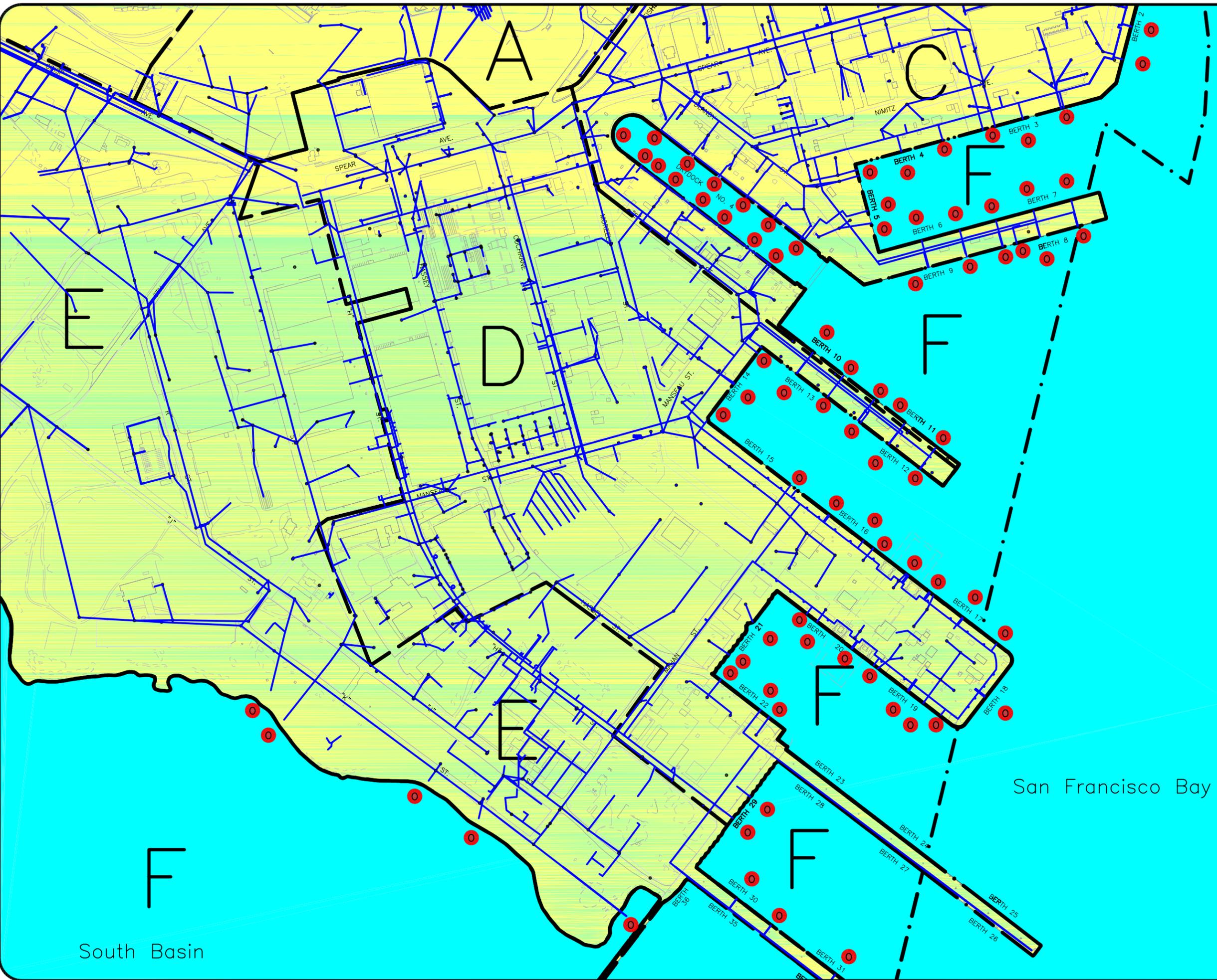
HUNTERS POINT NAVAL SHIPYARD
San Francisco, California

**PARCEL G
PROPOSED AREAS WITH
RESTRICTED LAND USE
WITH DELINEATING SAMPLES**

Date 11/16/2016 Project 731609901 Figure D1



EXHIBITS



Notes:

Shoreline data per Aerial Photography dated 10-01-86.

-  1986 Shoreline
-  Parcel Boundary w/Designation
-  Shipyard Sanitary Sewer System
-  Topographic Feature
-  Location of Storm Drain Outfall

Hunters Point Naval Shipyard
San Francisco CA

Historical Radiological
Assessment

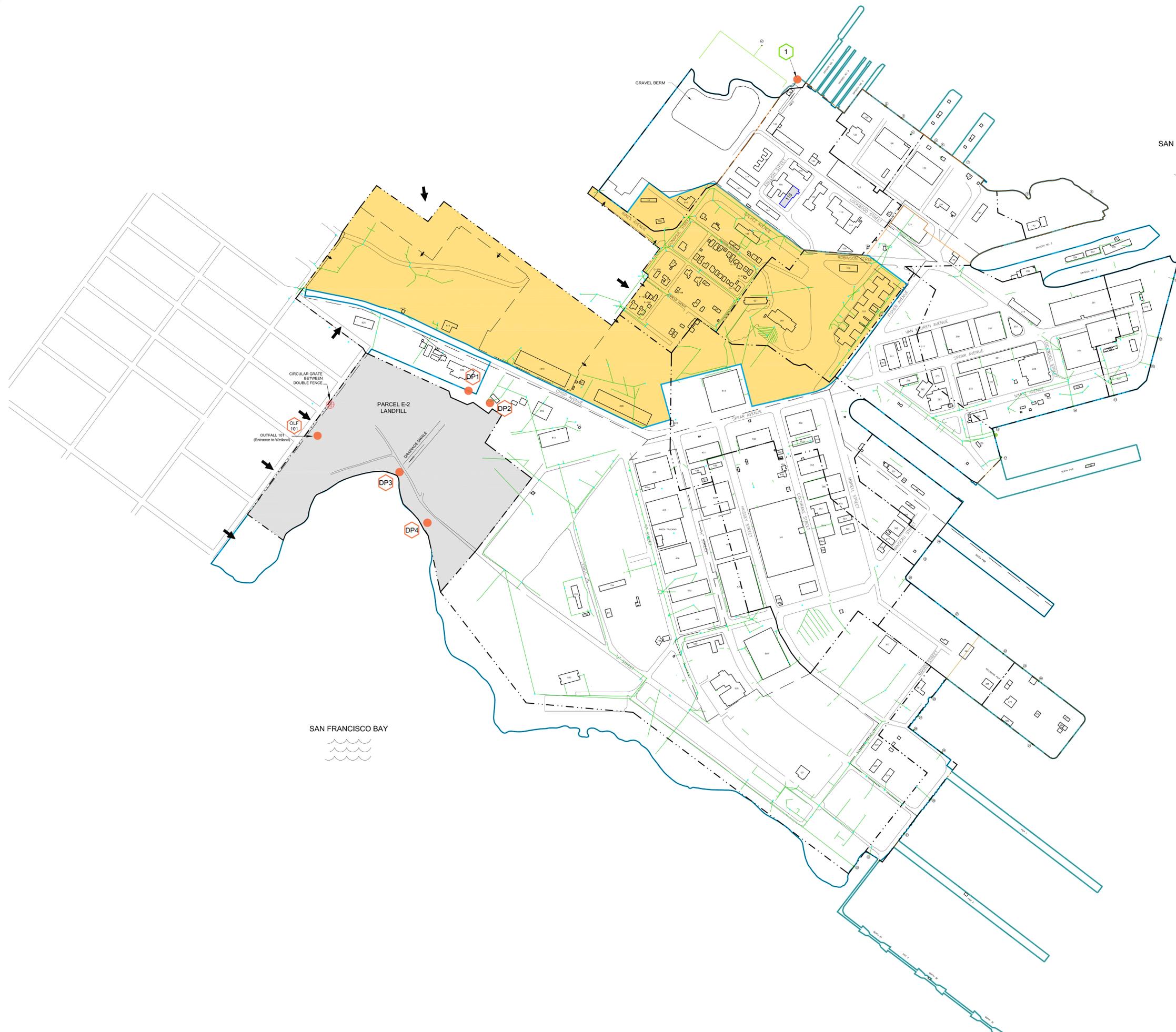
August, 2004



New World Technology
448 Commerce Way, Livermore CA 94550
Phone (925) 443-7967 Fax (925) 443-0119

SAGE Consultants, Inc.
LAT 38°13'46"N LONG 122°42'46"W ELEV 1433m
Surveyors * Application Developers * GIS Integrators * Engineers
1978 Ventura Blvd., CAMARILLO CA 93010-7847
Tel. (805) 482-6088 * Fax (805) 389-9815
www.sagecon.com

Figure 8.3.6.1D
Storm Drain System Parcel D



General Notes/Legend

- ① Storm water sampling location and number
- Storm drain
- Storm drain manhole
- Storm drain manhole with filter fabric
- Storm drain catchbasin
- ② Outfall location and number not sampled
- ③ Sheet flow location and number
- - - Drainage basin boundary
- Area of possible run-on to adjacent drainage basin during high flow
- Area of run-on from off site
- Activity boundary
- Industrial Facility outline and number
- San Francisco Redevelopment Agency Property

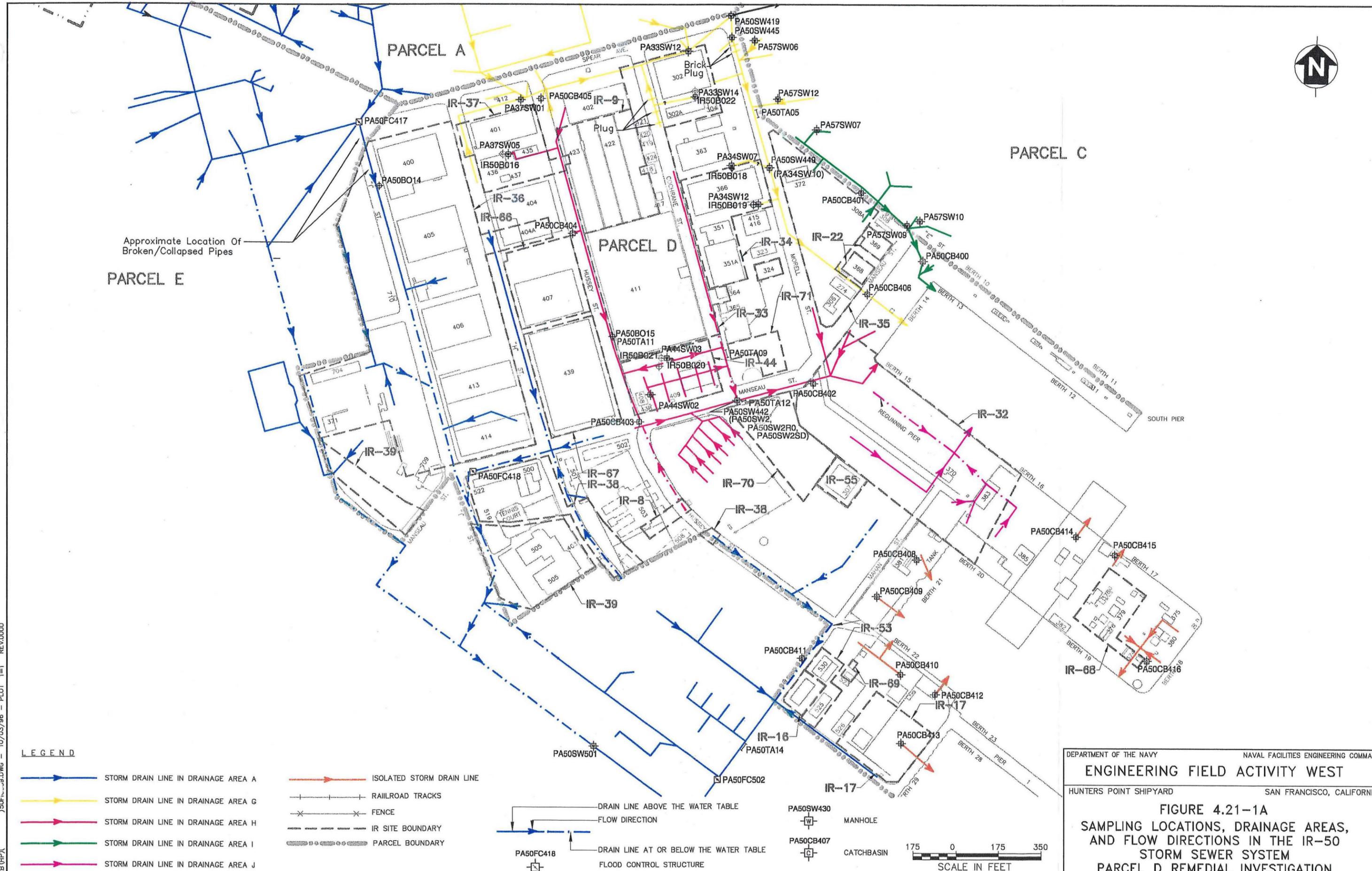
Prepared by/Date: RMH 5/17/2013		
Checked by/Date: RFG 5/17/2013		
No.	Revision/Issue	Date

AMEC Environment & Infrastructure, Inc.
 9177 Sky Park Court, Suite A, San Diego, CA 92123
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Client
BRAC PMO WEST
 Hunters Point Naval Shipyard
 San Francisco, CA

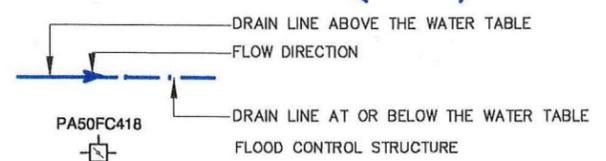
Project Name
2012/2013
STORM WATER
MONITORING REPORT

AMEC Project Number 5512-11-7055	Figure 2 OUTFALL LOCATION MAP
Date JUNE 2013	
Scale NOT TO SCALE	



Approximate Location Of Broken/Collapsed Pipes

- LEGEND**
- STORM DRAIN LINE IN DRAINAGE AREA A
 - STORM DRAIN LINE IN DRAINAGE AREA G
 - STORM DRAIN LINE IN DRAINAGE AREA H
 - STORM DRAIN LINE IN DRAINAGE AREA I
 - STORM DRAIN LINE IN DRAINAGE AREA J
 - ISOLATED STORM DRAIN LINE
 - RAILROAD TRACKS
 - FENCE
 - IR SITE BOUNDARY
 - PARCEL BOUNDARY
 - DRAIN LINE ABOVE THE WATER TABLE
 - DRAIN LINE AT OR BELOW THE WATER TABLE
 - FLOOD CONTROL STRUCTURE
 - MANHOLE
 - CATCHBASIN



DEPARTMENT OF THE NAVY
 NAVAL FACILITIES ENGINEERING COMMAND
ENGINEERING FIELD ACTIVITY WEST
 HUNTERS POINT SHIPYARD
 SAN FRANCISCO, CALIFORNIA

FIGURE 4.21-1A
 SAMPLING LOCATIONS, DRAINAGE AREAS,
 AND FLOW DIRECTIONS IN THE IR-50
 STORM SEWER SYSTEM
 PARCEL D REMEDIAL INVESTIGATION

RE (HP) 10/03/96 - PLOT 1=1 REV.0000