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ENVIRONMENT

Ms. Lynn Nakashima
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Subject:
Final Pre-Design Investigation Report for Habitat Area 2
Campus Bay Site, Richmond, California

Date:
November 13, 2014

Contact:
Jenifer Beatty

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Our ref:
EM009358.0038

Dear Ms. Nakashima:

On behalf of Zeneca Inc. (Zeneca), ARCADIS U.S. Inc., (ARCADIS) is submitting the enclosed Final Pre-Design Investigation (PDI) Report for Habitat Area 2 of the Campus Bay site located in Richmond, California. The Final PDI Report addresses comments from the Department of Toxic Substances Control (DTSC) in a letter dated July 18, 2014 (DTSC comment letter). ARCADIS provided responses and information to respond to the DTSC comment letter and the DTSC subsequently approved the revised report in a letter dated October 9, 2014 with the condition that two additional comments, provided herein, be addressed.

The DTSC comments provided in a letter dated October 9, 2014 included the following:

- *Include within revised Section 4.3.2, Soils and Sediment Screening Levels, a sub-section heading containing the term "Presumptive Remedy Area" or "PRA".*

- *In addition, while Figure 4 has been modified to include a description of sediment and soil borings, please include on the figure the outline of the presumptive remedy area.*

To respond to these comments, a subsection, Section 4.3.2.1, Presumptive Remedy Area, has been added to Section 4.3.2, Soils and Sediment Screening Levels and an outline of the presumptive remedy area has been added to Figure 4 of the enclosed report.

Please feel free to contact me if you have any questions or require additional information.

Sincerely,

ARCADIS U.S., Inc.

Jenifer Beatty

Jenifer Beatty, P.G. (6650)
Principal Hydrogeologist

Enclosures:
Final Pre-Design Investigation Report

Copies:
Bill Marsh, Esq., Edgcomb Law Group
Chuck Elmendorf, Zeneca Inc.
Karl Hans, UC
Curtis Toll, Esq., counsel for EFG-Campus Bay, LLC

Imagine the result

Zeneca Inc.

Final Pre-Design Investigation Report

Habitat Area 2

Campus Bay, Richmond, California

November 13, 2014

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Final Pre-Design Investigation Report

Habitat Area 2
Campus Bay, Richmond, California

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Tables

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Appendices

Acronyms and Abbreviations

ABA	acid-base accounting
amsl	above mean sea level
ARCADIS	ARCADIS U.S., Inc.
As	arsenic
ASTM	ASTM International (formerly American Society for Testing and Materials)
BAPB	biologically active permeable barrier
bgs	below ground surface
bss	below sediment surface
C&T	Curtis & Tompkins, Ltd.
CalEPA	California Environmental Protection Agency
CCCEHD	Contra Costa County Environmental Health Department
COC	constituents of concern
COPC	constituents of potential concern
Cooper	Cooper Testing Laboratory
CPT	cone penetration test
CRRMP	Conceptual Remediation and Risk Management Plan
CSM	Conceptual Site Model
DDE	1,1-dichloro-2,2-bis(p-chlorophenyl) ethylene
DDT	dichlordiphenyltrichloroethane
DF	dilution factor
DI	deionized
DO	dissolved oxygen
DTSC	Department of Toxic Substances Control
DTSC Order	Department of Toxic Substances Control Site Investigation and Remediation Order, Docket No. 06/07-005
EBRPD	East Bay Regional Park District

EKI	Erler & Kalinowski, Inc.
EPTC	s-ethyl dipropylthiocarbamate
ERA	ecological risk assessment
ESM	East Stege Marsh
FS	Feasibility Study
FS/RAP	Feasibility Study and Remedial Action Plan
ft	feet
GAC	granular activated carbon
GIS	geographic information system
GPS	global positioning system
Gregg Drilling	Gregg Drilling & Testing, Inc.
HA	Habitat Area
HHRA	human health risk assessment
IDW	investigation-derived waste
LFIS	Low-Flow Intercept System
LFR	LFR Inc.
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
mL/g	milliliters per gram
MVS	Mining Visualization System
µg/kg	micrograms per kilogram
OCPs	organochlorine pesticides
ORP	oxidation reduction potential
PCBs	polychlorinated biphenyls
PDI	Pre-Design Investigation
PP	proprietary pesticide
psf	pounds per square foot

PVC	polyvinyl chloride
QAPP	Quality Assurance Project Plan
RCRA	Resource Conservation and Recovery Act
RE	Risk Evaluation
RSL	Regional Screening Level
site	HA-2 located in the southeast portion of Campus Bay
S/S	solidification/stabilization
S-CPT	Seismic CPT
SPT	standard penetration test
SQD	specimen quality designation
SSE	sequential selective extractions
SVOCs	semivolatile organic compounds
TDS	total dissolved solids
TSDF	Treatment Storage and Disposal Facility
UC	University of California
UCL	upper confidence limit
USCS	Unified Soil Classification System
USEPA	U.S. Environmental Protection Agency
UU	unconsolidated-undrained
VOCs	volatile organic compounds
VST	vane shear test
WET	waste extraction test
Work Plan	Pre-Design Investigation Work Plan
Zeneca	Zeneca Inc.
µg/kg	micrograms per kilogram
µg/L	micrograms per liter

Executive Summary

This report presents the results of the Pre-Design Investigation (PDI) that was conducted in Habitat Area 2 (HA-2) at the Campus Bay site in Richmond, California (Figures 1 and 2). The PDI was conducted in general accordance with the Pre-Design Investigation Work Plan (ARCADIS 2013a), which was approved by the Department of Toxic Substances Control in a letter dated April 8, 2013. The PDI was conducted to further characterize the distribution of constituents of concern (COCs) within sediment, soil, pore water, and groundwater within HA-2 and to further refine the conceptual site model (CSM), to include potential leaching of COCs from soils/sediments to pore water and groundwater. These data will be used in the preparation of a feasibility study (FS) to develop and evaluate remedial alternatives for HA-2. A summary of the key conclusions of the PDI and the updated CSM is provided below.

- The vertical and horizontal extent of COCs in sediments in the Lower and Upper Lagoons, and in soils and groundwater within HA-2 has been delineated. Arsenic and proprietary pesticides (PPs; s-ethyl dipropylthiocarbamate [EPTC] and pebulate) are the primary COCs of concern in HA-2. These COCs have been detected in groundwater samples collected downgradient from the lagoons at concentrations that exceed applicable screening levels.
  - Lagoon sediments (non-native material) and associated pore water contain elevated concentrations of metals and PPs. Berm and upland soils, particularly those containing cinder material or fill material (concrete/brick debris), contain elevated concentrations of metals. PPs were detected infrequently in berm and upland soils.
  - PCBs were detected infrequently in soil and sediment samples from HA-2 and have only been detected at elevated concentrations in samples collected within the Upper Lagoon sediments and in soils north of the Upper Lagoon, adjacent to Lot 3.
  - Dichlordiphenyltrichloroethane (DDT) and 1,1-dichloro-2,2-bis(p-chlorophenyl) ethylene (DDE) were detected relatively infrequently in shallow Lower Lagoon sediments and in the upper 5 feet of Upper Lagoon sediments. Elevated concentrations of DDT and DDE were detected in varying soil types and depth intervals in upland soils and fill around the lagoons.
  - The samples of the native clay material underlying the berms and Lagoon sediments did not contain elevated concentrations of COCs.
  - Groundwater with concentrations of arsenic above screening levels is limited to the Upper Lagoon south berm, which separates the Upper Lagoon from the ESM and the middle berm between the Upper and Lower Lagoons (Figure 27). Groundwater with EPTC or pebulate concentrations above screening levels is generally limited to the middle berm area (PZ-19A2), and the south berm that separates the lagoons from the ESM (e.g., wells PZ-21 A1/A2, PZ-14, and PZ-15; see Figures 28 and 29).
- Cinder was observed more frequently, and arsenic concentrations were higher in soil samples collected from the Upper Lagoon south berm relative to soil samples collected from the Lower Lagoon south berm. Soluble dissolved arsenic detected in groundwater is associated with local geochemical

conditions and ferrous iron, suggesting dissolution of As(III) and alteration of arsenic-containing iron minerals, some of which may be associated with cinders. Concentrations of arsenic detected in groundwater samples collected from the Upper Lagoon south berm are influenced locally by arsenic detected in the Upper Lagoon south berm soil (including that associated with cinder) and temporal changes in geochemical conditions. Arsenic in Upper Lagoon sediment may also be contributing to the arsenic detected in groundwater; however, the results of pore water data and historical groundwater data indicate that the Upper Lagoon sediment is not the primary source of arsenic detected in groundwater.

- Geochemical conditions in groundwater downgradient of the Lower Lagoon and the lower concentrations of arsenic in soil (at the Lower Lagoon south berm) are unlikely to mobilize arsenic by the mechanisms influencing arsenic concentrations at the Upper Lagoon south berm.

- Arsenic detected in Lower Lagoon sediment and pore water does not appear to be impacting downgradient groundwater based on the groundwater data.

- Copper has been detected infrequently in groundwater and was detected during this investigation in only one groundwater sample (and no pore water samples) at a concentration greater than its screening level, despite widespread elevated concentrations in sediments and soils. Copper was detected in groundwater twice at one location at concentrations above the screening level (PZ-20A1, in 2011 and 2013). Copper present in soil and sediment is associated primarily with the organic and residual (mineral) fractions of soil and sediment. Copper associated with these fractions is stable and unlikely to be mobilized under the mildly reducing conditions present in the lagoons area. Leaching of copper from soil and sediment is a remote possibility but is not a significant concern at HA-2.

- Dissolved nickel, lead, mercury, and zinc were not detected in groundwater or pore water at concentrations above their respective screening levels, indicating leaching of these metals from soil and sediment is not a concern.

- The primary source of EPTC and/or pebulate detected in groundwater at the south berm (downgradient of the lagoons) is leaching from lagoon sediments. The Lower Lagoon has a larger area of impacted sediments and generally greater concentrations of EPTC and pebulate relative to the Upper Lagoon. A few locations within the Upper Lagoon also have relatively elevated concentrations of pebulate.

- Geotechnical data were collected to support the subsequent FS and the future evaluation of potential remedial alternatives.

1. Introduction

This Pre-Design Investigation (PDI) Report has been prepared by ARCADIS U.S., Inc. (ARCADIS) on behalf of Zeneca Inc. (Zeneca) for Habitat Area (HA) 2 located in the southeast portion of Campus Bay, in Richmond, California (the site; Figures 1 and 2). HA-2 is subject to the Department of Toxic Substances Control (DTSC) Site Investigation and Remediation Order, Docket No. 06/07-005 (DTSC Order; CalEPA. 2006). HA-2 includes the Upper and Lower Lagoons (formerly known as the evaporation ponds) and the associated upland area illustrated on Figure 2. As required by the DTSC in a letter dated September 11, 2012, the PDI included additional characterization of the distribution of constituents of concern (COCs) within sediment, soil, pore water, and groundwater, and further evaluation of fate and transport of COCs. The PDI was conducted in general accordance with the Pre-Design Investigation Work Plan (Work Plan; ARCADIS 2013a), which was approved by the DTSC in a letter dated April 8, 2013, except as noted herein (see Section 3).

1.1 Site Description

The Campus Bay site encompasses approximately 86 acres and, in accordance with the DTSC Order, is divided into six subareas: Lot 1, Lot 2, Lot 3, HA-1, HA-2, and the Southeast Parcel (Figure 2). HA-2 includes the two lagoons, approximately 8.5 acres, and the adjacent transitional habitat or habitat buffer area. During the rainy season, the Upper and Lower Lagoons contain some ponded water due to direct precipitation and their use as stormwater retention basins. Typically, in summer, due to evapotranspiration, the Upper Lagoon dries out and the Lower Lagoon water level and area of ponded water decreases. The Upper and Lower Lagoons contained some water in the summer of 2011 due to heavy rainfalls during the previous year and a leaking valve that appears to have allowed sea water to enter into the Upper Lagoon. The valve was replaced in December 2012, and subsequently the Upper Lagoon dried out in spring 2013, earlier than in previous years. HA-1 includes the 10.3-acre East Stege Marsh (ESM) and the adjacent upland areas along the northern bank of the ESM. ESM is a tidal salt marsh and is inundated by diurnal tides from San Francisco Bay.

Commercial and industrial businesses are located east of the site. The Southeast Parcel is located east of the lagoons, across Baxter Creek. Commercial and industrial businesses, including Allied Propane, are located north of HA-2. The site is bordered to the north by Meade Street and Highway 580, to the west by property owned by the University of California (UC), and to the south by East Bay Regional Park District (EBRPD) property. The EBRPD property was obtained from Southern Pacific Railroad, which constructed a railroad right-of-way at the San Francisco Bay margin in approximately 1959. After EBRPD assumed ownership of this land, the railroad tracks were removed and a paved trail was installed, which is now part of the San Francisco Bay Trail (walking/biking trail used for recreational purposes). The San Francisco Bay Trail is maintained by the EBRPD, and the trail separates ESM from San Francisco Bay. In 2002, Zeneca

granted the EBRPD a conservation easement that includes ESM and the southern portion of the lagoons as depicted in Figure 2.

1.2 Site History

The site was historically occupied by former manufacturing plants, Stauffer Chemical Company's Western Research Center, and open space. Portions of the site have undergone extensive remedial activities.

The upland portion of the site was formerly used for manufacturing of organic and inorganic industrial chemicals beginning in 1897 and continuing until operations ceased in 1997. During that time, a variety of chemicals, including fertilizer, pesticides, acids, and inorganic industrial chemicals, were manufactured, reformulated, and/or repackaged at the site. Pyrite ores were used in prior manufacturing activities at the site, and the resulting spent pyrite cinders were historically used as fill. As summarized in the Lot 3 Current Conditions Summary Report (LFR 2005b), pyrite ores were roasted at the southwestern portion of the site for the production of sulfuric acid, beginning as early as 1897 and continuing into the 1960s. These ores primarily contained pyrite (FeS_2), but also contained lesser amounts of chalcopyrite ($CuFeS_2$), sphalerite (ZnS), magnetite (Fe_3O_4), quartz (SiO_2), and calcite ($CaCO_3$). Nickel and arsenic are also commonly associated with pyrite ore. This operation resulted in the accumulation of cinders primarily on the southern and western portions of the site. Under oxidizing conditions, the spent pyrite cinders can act as a source of metals and acidity in soil and groundwater (LFR 2005b and Shepard Miller, Inc. 1999).

By 2000, all of the buildings and facilities associated with former manufacturing operations were demolished with the exception of one building in the eastern portion of Lot 3 and two buildings and greenhouses located in the eastern portion of Lot 1. Historical site operations resulted in impacts to soil and groundwater quality in certain portions of the site. Investigations and remediation have been conducted at the site beginning in 1987. In 1999, following plant closure, a site-wide investigation was performed (LFR Inc. [LFR] 2000a, 2000b), and a Conceptual Remediation and Risk Management Plan (Upland CRRMP; LFR 2000c) was prepared for the upland portion of the site. Beginning in 2001, remediation and supplemental investigations were implemented in accordance with the remedial action objectives presented in the Upland CRRMP.

Investigation and remedial actions implemented at the upland portion of the site since 2001 have included the following:

- Addition of buffering agents to neutralize acidic groundwater to reduce dissolved metals concentrations and acidity;
- Excavation and mixing of spent pyrite cinders with dolomitic limestone (calcium/magnesium carbonate) to neutralize pH and reduce metals leaching, and placement of the treated cinders at the site on Lot 3 under a temporary cap to reduce surface water infiltration;

- Installation of a biologically active permeable barrier (BAPB) to further reduce metals concentrations in groundwater as it flows toward the marsh;
- Abandonment of utilities that represented potential conduits to ESM;
- Construction of a storm water management system;
- Removal of impacted ESM sediment and habitat restoration;
- Installation of a slurry wall at the Site boundary between the UC Berkeley Richmond Field Station and the southern portion of Lot 3 of the site;
- Localized excavation of upland soils for offsite disposal;
- In situ treatment of groundwater by injection of reagents to reduce concentrations of volatile organic compounds (VOCs) and metals in groundwater; and
- Implementation of pilot studies to assess in situ treatment of dissolved divalent metals and dissolved arsenic in groundwater utilizing calcium polysulfide and nano-scale zero valent iron.

These upland remedial actions are detailed in the Current Conditions Summary Report, Lot 3, Campus Bay (LFR 2005b). ESM remediation was completed from 2004 through 2006 and included sediment removal and habitat restoration and (LFR 2007b). In addition, as part of the ESM remediation, a hot spot (1,710 cubic yards of sediment) was excavated from the Upper Lagoon in January 2005 and disposed of offsite. On December 20, 2013, the Revised Feasibility Study and Remedial Action Plan (FS/RAP) was submitted to DTSC on behalf of Zeneca. The FS/RAP evaluates and recommends remedial alternatives for Lots 1 and 2, and the uplands portion of Lot 3 to meet commercial/industrial standards (Terraphase, Inc. [Terraphase], 2013).

1.2.1 History of the Lagoons

The lagoons were created between 1960 and 1971 by the construction of levees in existing upland areas to retain stormwater and store effluent from the process water treatment system that previously operated at the site. The lagoons were formerly known as evaporation ponds when the facility was in operation.

The stormwater system was modified in 2002. The current stormwater system, shown on Figure 2, conveys surface water runoff from the upland portion of the site (Lots 1, 2, and 3) to the low-flow interceptors located in the western and eastern portions of the site. The upland Low-Flow Intercept System (LFIS) was designed to capture and convey first-flush rainwater (approximately 75% to 85% of the stormwater) to the Upper

Lagoon. Water in the Upper Lagoon (a combination of direct precipitation and stormwater conveyed to the Upper Lagoon via the LFIS) then flows to the Lower Lagoon when the water level is high enough to feed subsurface pipes connecting the Upper and Lower Lagoons (Figure 2). Water is discharged to ESM from Outfall 001, located in the southeastern corner of the Lower Lagoon, when the storage capacity of the lagoons is exceeded (i.e., overflow from the Lower Lagoon). When the pumping capacity of the LFI 1 (located at the western side of the Lot 3; see Figure 2) is exceeded during a rain event, the excess stormwater is discharged to San Francisco Bay through Outfall 003. When the pumping capacity of LFI 2 (located on the east side of Lot 3) is exceeded, water is discharged to the ESM through Outfall 002, located between the two lagoons (Figure 2).

Previous site investigations between 1986 and 2007 included the collection and analysis of sediment and/or soil samples from HA-2. These data were summarized and evaluated in the Revised Interim Freshwater Lagoon Report (ARCADIS 2011c), which presented a sampling plan based on consideration of the 2005 and 2007 sediment data for the Upper Lagoon and the 1999, 2004, and 2007 data for the Lower Lagoon. Sediment and soil data collected since 2007 are compiled and presented in this PDI Report and were formerly presented in the Final – Technical Memorandum – Lagoon Investigation Data Transmittal, dated August 3, 2012 (ARCADIS 2012c). Preliminary treatability testing was conducted in 2012 on sediments collected from the Lower Lagoon to assess the potential effectiveness and feasibility of a variety of potential solidification/stabilization (S/S) and in-situ granular activated carbon (GAC) treatment approaches. The results of this treatability testing were submitted to the DTSC (ARCADIS 2012d).

2. Pre-Design Investigation Objectives and Scope of Work Performed

The PDI was conducted to further characterize the distribution, nature, extent and fate and transport of COCs within sediment, soil, pore water, and groundwater and to use the additional information to refine the conceptual site model (CSM), including potential leaching of COCs from soils/sediments to pore water and groundwater. These data will be used in the preparation of a Feasibility Study (FS) to assess remedial measures for the sediment, soil, and groundwater at HA-2. Based on the results from several phases of investigation at the site, the constituents of potential concern (COPCs) at HA-2 have been narrowed to the following COCs:

- Select metals (arsenic, copper, nickel, lead, mercury, and zinc)
- Proprietary thiocarbamate pesticides (PPs)
- Polychlorinated biphenyls (PCBs)
- Organochlorine pesticides (OCPs)

2.1 Objectives

The objectives of the PDI presented in the Work Plan included:

- Further delineate the vertical and horizontal extent of the COCs in sediments, the leachability of arsenic and the PPs in sediments in the Lower and Upper Lagoons, and the extent of COCs in soils and groundwater within HA-2. These data will be used to refine the areas that may require remediation.
- Further evaluate geochemical characteristics of soils, sediments, groundwater, and pore water. These data will be used to better understand the fate and transport of COCs in sediments, soils, and groundwater; to refine the CSM, and to support the evaluation and development of potential remedial alternatives.
- Collect and retain sediment samples for bench-scale treatability testing.
- Collect geotechnical data to support the subsequent FS and the evaluation of potential remedial alternatives. These data will be used in the FS to assess static and seismic stability of earthen berms south of and between the Lower Lagoon and Upper Lagoon, including along the area near wells MW-16A and MW-16B where a seep has been observed (see Figure 3). The data will also be used in the FS to evaluate constructability issues related to remedial alternatives and evaluate potential effects of future sea level rise.

2.2 Scope of Work

The scope of work for the PDI included the collection and analysis of sediment, soil, pore water, and groundwater samples from HA-2 and in-situ geotechnical testing (Figure 3). Table 1 provides a summary of the sample locations and analyses. The following provides a summary of the scope of work.

- Soil samples were collected to refine the lateral extent of COCs in soil north of the Lower Lagoon (LL-25 and LL-26), to further characterize the presence of COCs detected in samples collected from locations within the south berms (UL-20 to 24 and LL-39 and 40), and to provide data to evaluate potential leaching of COCs from soils to groundwater (UL-20 to 24 and LL-39 and 40; see Figure 3).

- Groundwater samples were collected from selected existing monitoring wells and soil borings (groundwater grab samples) and analyzed for selected geochemical parameters and COCs.

- Sediment was collected from sample locations UL-25 to UL-34 (10 locations) and LL-27 to LL-38 and LL-41 (13 locations) to further characterize the lateral and vertical extent of COCs in Upper and Lower Lagoon sediments. Additional sediment cores and samples were archived for future treatability testing activities.

- Sediment, soil, groundwater, and pore water samples were analyzed for PPs and the following metals: arsenic, copper, nickel, lead, mercury, and zinc. Samples collected from select Upper Lagoon and Lower Lagoon sediment locations were also analyzed for PCBs (see Table 1). Soil samples collected from locations LL-25 and LL-26, north of the Lower Lagoon, were also analyzed for OCPs.

- Specialized geochemical tests were conducted on selected soil and sediment samples to support the refinement of the CSM and fate and transport evaluation.

- Pore water samples were extracted from select sediment samples and analyzed for COCs to evaluate the partitioning of COCs (metals and PPs) between sediments and the aqueous phase. Due to hold time constraints, four sediment locations (UL-26, UL-28, UL-30, and LL-31) were pre-selected for pore water extraction, arsenic speciation testing of the pore water extract, and analysis of geochemical parameters in the pore water extract. The remaining pore water sample locations were selected to provide a representative subset based on evaluation of chemistry data and in consultation with the DTSC.

- A geotechnical investigation was carried out to support the FS and subsequent remedial design. The investigation included borings with sample collection and in-situ testing. In-situ testing along the lagoon berms included standard penetration tests (SPTs), cone penetrometer tests (CPTs), and vane shear test (VST) explorations. VSTs were also performed on the lagoon sediments using a handheld vane

shear device. A geotechnical laboratory testing program was carried out on samples from borings drilled through the south berms and on lagoon sediment samples collected using vibracore equipment.

3. Investigation Activities

The field activities and analyses were conducted in accordance with the Work Plan that included/references a site-specific field sampling and analysis plan, the site-specific Quality Assurance Project Plan (QAPP; LFR 2005a), and the site-specific health and safety plan. Deviations to the investigation are described below and in Appendix D.

3.1 Lithologic Logging Procedures

Soil and sediment cores were collected in accordance with the Work Plan, as described in Sections 3.2 and 3.4. Upon collection, the cores were visually logged and screened in the field using a photoionization detector to evaluate the presence of VOCs. The ARCADIS field geologist or engineer classified the lithology of the sediment and soil samples using ASTM International (ASTM) Standard D 2488, based on the Unified Soil Classification System. Lithologic soil descriptions and field screening results were recorded on field boring logs. Boring logs are included as Appendix A.

Qualitative odor observations were conducted during sediment and soil sample collection and logging activities. Odors were generally observed when two types of soils/sediments were encountered, the black organic silts/clays (observed in both the Upper and Lower Lagoon) and the colored laminated sediments (primarily observed in the Upper Lagoon). An organic odor (e.g., described as “decaying odor”) was observed when handling the black organic silts/clays, unless otherwise noted in the logs (Appendix A). A chemical-like odor (e.g., described as a “sweet chemical odor”) was observed during handling of some sediments with colored laminations. Observations of odor were not consistently recorded in the field boring logs. The soil and sediment logs included in Appendix A only include the observations recorded in the field boring logs.

3.2 Sediment and Soil Sample Collection

Sediment and soil collection activities are summarized below. Prior to advancing the soil borings and sediment cores, ARCADIS obtained permits from and paid permit fees to the Contra Costa County Environmental Health Department (CCCEHD). When required, CCCEHD representatives were on site to observe the drilling and borehole abandonment activities.

3.2.1 Sediment Vibracore and Sonic Drill Rig Procedures

Where accessible by boat, sediment samples were advanced using vibracore sampling technology. At the time of sampling, only the Lower Lagoon had sufficient water to be accessed by boat or barge. The Lower Lagoon sediment samples were collected from May 7 to 14, 2013 by TEG Oceanographic Services using a

barge-mounted vibracore sampling device. The deviations to Lower Lagoon sediment sampling were limited to the addition of one sediment sample location (LL-41; see Figure 3).

Due to the dry condition of the Upper Lagoon, attempts were made to collect sediment samples from the Upper Lagoon using a crane and vibracore. Due to field conditions, the vibracore met refusal at approximately 5 to 8 feet below sediment surface (bss) and had insufficient sample recovery. These conditions required a deviation to the sample collection procedures that were proposed in the Work Plan. Following review of site conditions and consultation with the DTSC, the sediment sampling method for the Upper Lagoon was changed to a track-mounted sonic drilling rig. The Upper Lagoon sediment samples were collected from June 10 to 12, 2013 by National EWP. One surface sediment sample collected from the Upper Lagoon using the vibracore and crane was analyzed (UL-27). The remaining Upper Lagoon vibracore sediment samples were disposed of with the other investigation-derived waste (IDW).

The following general procedures were used for collection of sediment samples:

- A hand-held global positioning system (GPS) with sub-meter accuracy was utilized to obtain the position of the sample location.

- Sediment samples were collected in core tubes using either the vibracore device/core barrel or the sonic drilling rig with both a soft and a rigid liner. Once the desired depth was achieved, the vibracore/sonic rig was carefully retrieved from the borehole. As described below, at least three cores were collected at each location (except LL-41). Each core was located within approximately 5 feet of the initial sample location. The additional cores were collected to provide sufficient sample volume for potential pore water extraction, and additional laboratory or treatability testing.

- The total recoverable depth of these cores ranged from 13.5 to 15.0 feet bss in the Upper Lagoon, and from 2.9 to 5.25 feet bss in the Lower Lagoon (see boring logs in Appendix A).

- The sediment samples from the initial core were collected in a soft liner. In accordance with the Work Plan, these samples were extruded and processed for laboratory analysis. The sediment samples collected from the additional cores were collected in the hard plastic liners and were processed for archiving (i.e., cut, capped, and labeled). The processed samples and cores were hand-delivered or shipped on ice to the laboratory and pore water extraction facility under chain-of-custody.

- Vibracore locations in the Lower Lagoon (below water) were abandoned by allowing the hole to collapse (i.e., self-sealing). Sediment core locations in the Upper Lagoon were backfilled to the sediment surface using bentonite chips in accordance with the CCCEHD permit requirements.

Multiple cores (at least three) were collected at each sediment location except for LL-41. The multiple cores provided sediment for pore water extraction, specialized testing, and for future treatability testing. Sediment samples collected for archiving and sediment samples pre-selected for arsenic speciation of the pore water extract were preserved to maintain the in-situ redox conditions (exposure to ambient air) to the extent practical. Rigid plastic core liners with plastic end caps were used, the end caps were wrapped in tape, and the cores were wrapped in plastic wrap (i.e., Saran® Wrap), and flash-frozen using dry ice immediately after being collected in the field. The archived cores were stored in a freezer in a secured ARCADIS storage facility in Berkeley, CA until needed.

3.2.2 Soil Sampling

Soil samples were collected for chemistry analysis from nine soil borings located around the Upper and Lower Lagoons (see Figure 3). A hand-held GPS system was used to confirm the sample locations. The soil sample locations north of the Lower Lagoon (LL-25 and LL-26) were collected using a hand auger (see Figure 3). Hand auger equipment was advanced manually by repeatedly rotating the handle of a hand auger attached to a nominal 2- to 3-inch diameter by 8-inch long auger device. The auger was advanced to the desired depth and then removed from the borehole to allow for the collection of a soil core. Soil samples were collected by driving a brass-tube lined sample container into undisturbed soil at selected depth intervals using a slide hammer. The total depth of these soil borings was approximately 6 feet below ground surface (bgs). Upon completion, soil borings were abandoned in accordance with CCCEHD regulations.

The remaining soil samples for chemical characterization were collected during the drilling of the seven soil borings (LL-39, LL-40, UL-20, UL-21, UL-22, UL-23, and UL-24) in the south and middle berms using a truck-mounted drill rig using the direct push method in accordance with the revised Lot 3 Field Sampling and Analysis Plan (LFR 2005c). The borings were advanced to a maximum total depth of approximately was 28 feet bgs at UL-24 (see soil boring logs in Appendix A). Upon completion, soil borings were abandoned in accordance with CCCEHD regulations.

Geotechnical borings (LL-40, UL-22, and UL-24) were completed adjacent to several of the soil borings drilled for chemical characterization. Geotechnical sampling and testing is described in Section 3.4.

3.3 Groundwater Sampling

In accordance with the Work Plan, grab groundwater samples were collected from two soil borings (UL-24 and LL-39) and from 13 existing groundwater monitoring wells/piezometers (MW-16A, MW-17, PZ-20A1/A2, PZ-14, PZ-19A1/A2, PZ-21A1/A2, PZ-15, PZ-22A1/A2, and PZ-16).

3.3.1 Grab Groundwater Sampling

From May 23 to 24, 2013, grab groundwater samples were collected at two to three discrete depths from soil boring UL-24 (approximately 10 to 14 feet bgs, 16 to 18 feet bgs and 24 to 28 feet bgs) and soil boring LL-39 (approximately 12 to 15 feet bgs and 22 to 25 feet bgs; Figure 3). To minimize the potential for cross-contamination separate soil borings were drilled for each grab groundwater sample interval. The direct push drill rig was used to advance a 4-foot-long, 2-inch-diameter sampler containing an acetate sleeve into the subsurface to collect relatively undisturbed soil samples. Groundwater grab samples were collected in accordance with industry standard procedures. To collect a grab groundwater sample from a temporary soil boring, the soil boring was advanced to the specified groundwater depth interval. When the desired depth of the soil boring was reached, temporary 1-inch-diameter polyvinyl chloride (PVC) well screen and casing was inserted into the boring to maintain an open hole during groundwater grab sampling. The grab sample was then collected using a peristaltic pump with dedicated down-hole and raceway tubing. The grab groundwater samples were field filtered to reduce turbidity and, thus, more accurately reflect groundwater quality conditions. Upon completion of groundwater and soil sampling activities, the temporary soil borings were abandoned in accordance with CCCEHD regulations by tremie grouting with neat cement grout.

3.3.2 Groundwater Sampling Procedures

Groundwater sampling was conducted on May 23 and 24, 2013 by Confluence Environmental, Inc., under ARCADIS oversight. In accordance with the Work Plan, groundwater samples were collected from the following existing monitoring wells and piezometers: MW-16A, MW-17, PZ-20A1/A2, PZ-14, PZ-19A1/A2, PZ-21A1/A2, PZ-15, PZ-22A1/A2, and PZ-16. Groundwater samples were collected after first measuring the depth to groundwater at all the sample points using a water-level meter.

Following water-level monitoring, each well was purged and sampled. Purging and sampling was completed using conventional low-flow techniques in accordance with the U.S. Environmental Protection Agency's (USEPA's) protocol published in the April 1996 Ground Water Issue under the title, "Low-Flow (Minimal Drawdown) Groundwater Sampling Procedures." A low-flow pump, such as an electric peristaltic pump, was used to minimize the drawdown during purging. General water-quality parameters (temperature, pH, oxidation reduction potential [ORP], dissolved oxygen [DO], turbidity, and conductivity) were monitored during well purging using an in-line monitoring device. Groundwater samples were collected after the general water-quality parameters stabilized for three successive readings to within the following criteria:

Parameter	pH	Conductivity	ORP	Turbidity	DO
Stabilization Criterion	±0.1 units	±3%	±10 millivolts	±10%	±10%

Groundwater samples were collected using the low-flow pump into the appropriate laboratory-supplied groundwater sample containers, and the sample bottles were filled to limit headspace. Filtered and unfiltered samples were collected for metals analysis. Samples collected for metals analysis were filtered in the field by placing a disposable, in-line 0.45-micron filter on the tubing. The sample containers were properly labeled and placed in an ice-chilled cooler for transport to the analytical laboratory under chain of custody. Field forms for the groundwater sampling are included in Appendix B. Depth to groundwater and groundwater elevations measured in May and October 2013 are provided in Table 2.

3.4 Geotechnical Field Testing and Sampling

Geotechnical data collection included various investigation and test methods to characterize the site and subsurface materials in terms of stratigraphy, soil classification, stress history, and sediment and soil strength. The geotechnical investigation focused on two distinct site features and associated materials, the sediments in the Upper and Lower Lagoons and the materials within and below the earthen berms surrounding the lagoons. The field and laboratory methods are explained in more detail below. The field exploration locations are shown on Figure 3.

The geotechnical investigation program for the earthen berms included the following:

- Three soil borings with standard penetration testing (SPT) and collection of disturbed samples (split spoon samples) and relatively undisturbed samples (Shelby tubes).
- Laboratory testing on selected soil samples, including index properties (moisture content, grain size, Atterberg limits, and specific gravity), consolidation testing, and unconsolidated, undrained triaxial compressive strength testing.
- Six cone penetration test (CPT) explorations and one CPT with shear wave velocity measurements. Three of the CPT explorations were co-located with the three borings.
- Three vane shear test (VST) explorations co-located with the three borings.

Each of the three borings drilled through the earthen berms were co-located with one VST and one CPT exploration (Figure 3). The explorations were co-located to allow development of site-specific correlations between the various parameters measured in situ and in the laboratory. The following table provides a summary of which explorations were co-located:

Location	Boring	CPT	VST
Upper Lagoon / South Berm	UL-22	S-CPT-1	VST-B1
Middle Berm between Upper and Lower	UL-24	CPT-2	VST-B2

Lagoon			
Lower Lagoon / South Berm	LL-40	CPT-5	VST-B3

The geotechnical investigation program for the lagoons was focused on determining the undrained strength of the sediments. The program included the following:

- VSTs at various depths in the sediment using a hand-held VST device.
- Laboratory testing on selected sediment samples collected during vibracore sampling at co-located VST locations. The vibracore sampling was performed as part of the collection of chemistry data and is discussed in Section 3.2 of this report. The laboratory testing consisted of index property testing, including moisture content, organic content, grain size, and Atterberg limits.

3.4.1 Geotechnical Field Investigation Methods

3.4.1.1 Geotechnical Investigation for Earthen Berms

The soil borings for the collection of geotechnical data were advanced by Gregg Drilling & Testing, Inc. (Gregg Drilling). The drilling and in-situ testing was continuously observed by an engineer from ARCADIS. Exploration logs were prepared for the borings and CPT explorations. The boring logs were prepared by ARCADIS and are provided in Appendix A. The CPT logs were generated by Gregg Drilling and are provided in Appendix C.

Cone Penetrometer Test Explorations

On May 13 and 14, 2013, Gregg Drilling advanced six CPT explorations (CPT-1 through CPT-6) with pore pressure measurements to a depth of approximately 50 feet bgs using standardized equipment. Gregg Drilling used track-mounted CPT equipment to advance an instrumented steel cone (CPT cone) and push rods into the subsurface soils. The CPTs were performed in general accordance with ASTM D 5778 – Electronic Friction Cone and Piezocone Penetration Testing of Soils (ASTM 2013). The cone was advanced into the soils at a steady rate. A real-time data acquisition computer system continuously recorded the parameters measured by the sensors, which enabled the CPT operator to monitor and review the data as they were recorded. The system measured and recorded cone tip resistance, sleeve friction, and pore pressure at 4-inch-intervals. These measurements were used to characterize the soil with respect to soil type, consistency, and shear strength. The soil behavior type provided on the CPT logs was estimated based on a method developed at the University of British Columbia (Robertson 1983). Shear wave velocity was measured at various depths in one additional CPT (S-CPT-1). This CPT exploration was advanced to a depth of approximately 100 feet bgs. Shear wave velocity data are used to evaluate the

response of the site to earthquake loading. The shear wave velocity data was recorded by a seismometer built into the CPT cone (seismic cone). The seismic waves were generated by striking a seismic beam coupled to the ground surface by a hydraulic cylinder under the CPT truck rig. The CPT logs, including the log for the seismic CPT are provided in Appendix C.

Vane Shear Test Explorations

Between May 20 and May 23, 2013, Gregg Drilling advanced three VST explorations (VST-B1 through VST-B3). Gregg Drilling used a truck-mounted drill rig to advance the VST explorations. The VSTs were performed in general accordance with ASTM D2573 to obtain measurements of undrained strength of cohesive soils at various depths within the soil profile. Gregg Drilling used a Geonor H-10 vane to perform the VSTs. During the test, the four-bladed vane was pushed into undisturbed soil and rotated from the surface to determine the torque required to shear a cylindrical surface with the vane. This torque or moment was then converted to the unit shearing resistance along the failure surface. Friction of the vane rod and instrument were minimized during readings by use of a special housing. The VSTs were performed in drilled boreholes using drilling methods described below. Before the test, drilling was stopped at a depth that allowed the vane tip to penetrate undisturbed soil for a depth of at least five times the outside diameter of the hole. The vane was advanced from the bottom of the hole or the vane housing in a single thrust to the depth at which the test was conducted. The vane was pushed down without use of hammer blows, vibration, or rotation. No torque was applied to the rods during the thrust. Once the vane was in position, torque was applied to the vane with a geared drive at a rate that did not exceed 0.1 degree per second. After completion of each VST exploration, the boreholes were abandoned in accordance with Contra Costa County regulations. The raw VST data is provided in Appendix C.

Soil Borings

Between May 20 and May 23, 2013, Gregg Drilling drilled three soil borings (UL-22, UL-24, and LL-40) to depths ranging from 36.5 to 47 feet. Gregg Drilling used a Marl 5T truck-mounted drill rig to drill the borings. Hollow-stem auger drilling was used to advance Borings UL-22 and UL-24. Boring LL-40 was advanced using mud-rotary drilling because a significant amount of sand was detected in the co-located CPT exploration (CPT-5). Mud-rotary drilling is generally preferred in borings drilled in sands that have the potential for heaving (i.e., saturated, relatively loose sands). SPT blow count data would be adversely affected by heave in the borehole. In mud-rotary boreholes, heave is prevented by the drilling mud used to keep the borehole stable. As part of drilling of the hollow-stem auger and mud-rotary borings, disturbed samples were recovered using SPT split-spoon samplers. Relatively undisturbed samples of cohesive soils were recovered using thin-walled tubes (Shelby tubes). SPT and thin-walled tube sampling is discussed in more detail below. Soil samples obtained from the explorations were visually classified in the field by properly trained ARCADIS staff in general accordance with ASTM D2488. The samples were then taken to the laboratory, where testing was performed on selected samples to verify field classifications. Upon

completion of the soil borings, the borings were abandoned in accordance with Contra Costa County regulations.

Standard Penetration Test

SPTs were performed during auger and mud-rotary borings to obtain estimates of soil density/consistency and to recover disturbed soil samples. The tests are performed in general accordance with ASTM D1586 using a 2-inch-outside diameter split-spoon sampler. The split-spoon sampler is attached to steel rods and lowered to the bottom of the hole. The sampler is driven for 18 inches by using a 140-pound hammer with a drop height of 30 inches. For each 6-inch interval of driving, the number of hammer blows is recorded. The standard penetration resistance (N-value) is taken as the number of blows required to drive the sampler the last 12 inches. The N-values are provided on boring logs in Appendix A and can be correlated to the soil density of granular soils and the consistency of cohesive soils.

Thin-Walled Tube Sampling

Relatively undisturbed soil samples of cohesive material were recovered from the borings using 30-inch-long, 3-inch-diameter, thin-walled, seamless stainless steel sampling tubes (Shelby tubes) in general accordance with ASTM D1587. The Shelby tubes were collected using an Osterberg piston sampler. The Shelby tube along with the piston sampler was attached to the drill rods and carefully lowered to the bottom of the borehole. The tube was then hydraulically pushed in one continuous, relatively rapid motion without overfilling the tube. The tube was then carefully removed from the hole and sealed at both ends using plugs with expandable rubber O-rings and end caps for shipment to the laboratory. The Shelby tubes were handled and transported with the utmost care to reduce sample disturbance. A total of eleven Shelby tubes were recovered from the borings. Subsamples were taken from selected Shelby tubes for laboratory testing. Shelby tubes selected for laboratory testing were also logged during extrusion at the lab. The Shelby tube logs are provided in Appendix C.

3.4.1.2 Geotechnical Investigation for the Lagoons

The geotechnical field work for the lagoons consisted of VSTs and vibracores. The VSTs were performed by an ARCADIS engineer. The vibracores were logged by an ARCADIS geologist. The vibracore logs are presented in Appendix A.

During the week of May 20, 2013, ARCADIS performed VSTs at six locations in the Upper Lagoon and at seven locations in the Lower Lagoon. The VSTs were performed in general accordance with ASTM D2573 to obtain measurements of undrained strength of cohesive soils at various depths within the subsurface profile. Sediment VST locations in the Upper and Lower Lagoons were accessed on foot at locations with less than 2 feet of standing water and by barge in the remaining locations. ARCADIS used a hand-held

Geonor H-60 vane shear device to perform the tests. During the test, the four-bladed vane was pushed into undisturbed soil or sediment by hand and rotated to determine the torque required to shear a cylindrical surface with the vane. This torque or moment was then converted to the unit shearing resistance along the failure surface. Friction or adhesion between the sediment and the vane rod were measured by inserting the rod into the sediment without the vane and measuring the torque. The resulting torque was subtracted from the torque measured with the vane in place. The tests were generally conducted without prior excavation. The vane was advanced simply by pushing the vane by hand to the test depth. The vane was pushed down without use of hammer blows, vibration, or rotation. No torque was applied to the rods during the thrust. Once the vane was in position, torque was applied to the vane by hand using a torque wrench. Torque was applied very slowly to reduce strain-rate effects. The VST data is provided in Appendix C.

As described in Section 3.2, sediment sampling was conducted to observe lithology and to collect samples for chemical analyses as well as for geotechnical laboratory testing. Sampling was performed at each of the VST locations in the Upper Lagoon and Lower Lagoon.

3.4.2 Geotechnical Laboratory Methods

Geotechnical laboratory testing was performed on selected soil and sediment samples by Cooper Testing Laboratory (Cooper) in Palo Alto, California. The testing was performed under ARCADIS' guidance on both disturbed and relatively undisturbed samples. Geotechnical testing was performed in general accordance with ASTM test methods (ASTM 2013) described below.

Thin-walled tube samples obtained during drilling of geotechnical soil borings were taken to the laboratory for sample extrusion, visual description of the recovered soil, and collection of subsamples for geotechnical testing. To reduce sample disturbance the samples were hand delivered to Cooper, and the tubes were carefully cut at the laboratory to expose the sample material for subsampling. Sediment samples for geotechnical testing were collected using a vibracore (Lower Lagoon) and a sonic drill rig (Upper Lagoon) and were considered disturbed samples.

The following laboratory tests were performed on soil and/or sediment samples:

- Moisture content determination – ASTM D2216
- Grain size analysis (full sieve and hydrometer) – ASTM D422
- Grain size analysis (200-wash) – ASTM D1140
- Atterberg limits – ASTM D4318

- Specific gravity determination – ASTM D854

- Organic content – ASTM D2974

- Consolidation tests: One-dimensional consolidation tests were performed on representative fine-grained samples to evaluate the stress history of the soil unit. The tests were performed on relatively undisturbed samples in general accordance with ASTM D2435, Method B.

- Undrained Shear Strength Tests: Unconsolidated, undrained triaxial compressive strength tests (UU tests) were performed on selected samples in general accordance with ASTM D2850. This test method is used to estimate the undrained shear strength of cohesive soils.

Grain size analyses and Atterberg limits tests were used to classify the soil samples in general accordance with the Unified Soil Classification System (USCS; ASTM D2487). The two-letter USCS designations (e.g., CH = high plasticity clay) are provided where appropriate on the laboratory results presented in Appendix C.

3.5 Specialized Tests

Specialized tests were conducted on selected soil and sediment samples to support the refinement of the CSM and fate and transport evaluation. Due to the preservation requirements for arsenic speciation and geochemical parameter analyses, the pore water and groundwater samples for these specialized analyses were pre-selected based on available existing data as proposed in the Work Plan. The preliminary PDI analytical results for sediment and soil samples were reviewed to select additional samples to be submitted for pore water extraction and other specialized testing. The subset was selected to represent the range of chemical and physical conditions at HA-2. The preliminary chemistry data and the proposed samples for pore water extraction and/or specialized testing were presented to the DTSC during a meeting on July 23, 2013. The DTSC approved of the proposed plan following the addition of a Lower Lagoon pore water location and clarifications to the table.

As described in Section 3.2 sediment cores and soil samples collected during the PDI investigation were preserved by freezing. The archived, frozen samples selected for further testing in consultation with the DTSC were submitted for one or more of the following analyses:

- Pore water extraction from sediment and analysis of pore water for COCs.

- Analysis of arsenic following a modified waste extraction test (WET) using both deionized (DI) water and site groundwater as the extractant to assess the impact of salinity on arsenic mobility. The WET extracts were analyzed for arsenic using USEPA Method 6010B.

- Sequential selective extractions (SSEs) for arsenic and copper.
- Acid-base accounting (ABA) per the Modified Sobek Method.

The specialized test methodology and deviations to the Work Plan and samples for specialized testing are further described in Appendix D.

3.6 Investigation Derived Waste

IDW including soil/sediments, drilling mud, decontamination water, and sampling supplies and impacted plastic/disposable gloves were separated and stored on-site in a total of 14 Department of Transportation approved 55-gallon drums. A composite sample was collected from the drums and submitted to Curtis & Tompkins, Ltd. (C&T) for chemical analysis. Based on the metals concentrations, a total of 11 drums including five drums of drilling mud, five drums of cuttings from soil borings, and one drum of decontamination water and wastewater generated during groundwater sampling were characterized as non-hazardous waste. These 11 drums were disposed of as non-hazardous material at Crosby & Overton, Inc.'s fully permitted Part B Resource Conservation and Recovery Act (RCRA) Treatment Storage and Disposal Facility (TSDF) in Long Beach, California. Three drums of solids (consisting primarily of sediment from the lagoons) were characterized as California (non- RCRA) hazardous waste and were disposed of at Crosby & Overton's TSDF in Long Beach, California.

4. Results

Results of chemical, geotechnical, and specialized tests conducted as part of the PDI are summarized below and field documentation and/or laboratory reports are provided in the appendices. Soil and sediment boring logs from the PDI are provided in Appendix A. Geotechnical data and specialized test data are provided in Appendices C and D, respectively. The chemistry laboratory reports and data validation reports are provided in Appendices E and F, respectively. Photographs from the PDI are provided in Appendix G.

4.1 Site Lithology

Subsurface materials encountered during this investigation generally consist of recent sediments within the lagoons and the fill soils that were used to construct the earthen berms surrounding the lagoons. The native materials that underlie the surficial fill and recent sediments generally consist of estuarine and alluvial deposits. Generalized depictions of lithology in the vicinity of the lagoons are presented on cross-sections shown on Figures 4 through 7 and are described below. For the purposes of this report, “sediment” refers to shallow soil material that is associated with the lagoons/wetland habitat (i.e., vegetated wetland boundaries), and “soil” refers to soils that is encountered outside of the lagoons/wetland habitat areas and to the soils that comprise the native stratigraphic layers. The HA-2 sediment sample locations are the sample locations located within the Upper Lagoon and Lower Lagoon vegetated wetland boundaries shown on Figure 4. The HA-2 soil sample locations are the sample locations outside of the Upper Lagoon and Lower Lagoon vegetated wetland boundaries shown on Figure 4.

Lithology beneath the site consists primarily of alluvial soils that were deposited at the site from the Berkeley Hills, located east and northeast of the site. Earlier hydrogeologic evaluations indicate that soils within 80 to 100 feet bgs can be subdivided into four distinct units. In descending stratigraphic order, these units are: fill materials (including Lagoon Sediments), Recent Bay Mud, Quaternary Alluvium (interbedded gravel, sand, silt, and clay), and Old Bay (Yerba Buena) Mud (LFR 2005b and LFR 2007a).

Although Recent Bay Mud deposits were reported previously for other parts of the site, there was no clear indication of this material in the pre-design explorations. The berm fill and lagoon sediments appear to directly overlie Old Bay Mud deposits. Recent Bay Mud generally consists of very soft to soft clay. Old Bay (Yerba Buena) Mud consists predominantly of fine-grained material that is significantly stiffer than Recent Bay Mud. In some parts of the site, coarse-grained alluvial deposits are inter-fingered into the Old Bay Mud. The following discussion focuses on soils encountered within approximately 30 feet of the ground surface at HA-2 and includes the top two elements of this general stratigraphy: fill materials and underlying native material (Old Bay Mud and Alluvium Deposits).

4.1.1 Upland Soils

Upland soils are located to the north, east, and west of the lagoons and consist primarily of unconsolidated sands, silts, and clays and fill material (concrete, brick, and other debris) to a depth of approximately 10 to 15 feet bgs. Thin intervals (1 to 2 feet thick or less) of silty gravels and sands are commonly encountered in this depth interval. Lithologic logs of upland borings note the occasional presence of purple cinder materials (see Section 1.2) at varying depths and thicknesses as well as concrete, brick, and other debris.

4.1.2 Fill (Earthen Berms)

Fill material was used to construct the berms surrounding the Upper Lagoon (i.e., Upper Lagoon south berm) and Lower Lagoon (i.e., Lower Lagoon south berm) and in between the two lagoons (i.e., the middle berm). The fill thickness along the berms ranges from approximately 12 feet to 15 feet. The berm fill appears to be placed in a relatively uncontrolled manner. Based on the observations of the soil samples collected from the soil borings drilled in the berms, the soils used to construct the berms consist of various materials, including clay, clayey sand, and clayey gravel. Generally, the fill soils appear to be predominantly fine-grained in nature. Some intervals of soft organic material may exist in some areas. Occasional purple cinder materials were encountered in most of the PDI soil borings in the Upper Lagoon south berm. Cinder materials were encountered infrequently in soil borings in the Lower Lagoon south berm. Observations of cinder are summarized in Appendix D.

4.1.3 Lagoon Sediments

The lagoon sediments are generally fine-grained in size and typically classified as lean clay. Organic material was encountered toward the bottom of this layer. The sediments generally consist of non-native material and include cinders and laminations of black, orange, red, and white materials (see photos in Appendix G). Highly organic black sediment is also present in the Lower Lagoon and directly above the native material in the Upper Lagoon. The organic content of sediments ranged from approximately 4.9 to 14.5 percent (Appendix C).

In the Upper Lagoon, the sediment thickness is approximately 10 to 12 feet. The PDI sediment cores were completed deeper than previous investigations and had better recovery, which allowed confirmation of the Upper Lagoon sediment thickness. The observed sediment thickness in the Lower Lagoon ranges from approximately 2 to 5 feet based on borings completed between 2007 and 2013 (Figures 4 to 7). The sediment thicknesses observed in 2012 (LL-14 through LL-18) and during the PDI in 2013 (LL-27 through LL-38 and LL-41) were limited to approximately 2 to 3.5 feet in the Lower Lagoon (thickness of up to 1.5 foot less thickness of sediments than what was previously reported in some locations). Based on the number of cores collected in 2012 and 2013, these results provide a more comprehensive data set for Lower Lagoon sediment thickness and most areas of the Lower Lagoon only have 2 to 3.5 feet of sediment, although there

may be localized areas with up to 5 feet of sediment. The sediments in the Lower Lagoon are significantly softer than the sediments in the Upper Lagoon, as explained in Section 4.5 Geotechnical Test Results.

4.1.4 Native Material

Although Recent Bay Mud was not distinctly identified in the explorations presented in this report, there may be areas below the berms and within the lagoons where fill and/or lagoon sediments are underlain by a relatively thin layer of Recent Bay Mud. Recent Bay Mud generally consists of very soft to soft, highly plastic clay. A thick deposit of Old Bay Mud (Yerba Buena Mud) underlies the surficial fill and lagoon sediments. Based on the explorations completed to date, the Old Bay Mud extends to at least 50 feet bgs. This material was consistently observed in the soil borings drilled within the footprint of the Upper and Lower Lagoons and consists predominantly of stiff relatively dry clay. Alluvial deposits consisting of sand and gravel appear to be inter-fingered with the Old Bay Mud in some parts of the site.

4.2 Groundwater Flow

Shallow groundwater beneath the vicinity of HA-2 is encountered at depths ranging from approximately 4 to 14 feet bgs, depending on season and location (topography) within the site (Table 2). Shallow groundwater beneath the site lies at elevations ranging from approximately 4 feet above mean sea level (amsl) in the northwest of the Upper Lagoon to approximately 2 to 3 feet amsl in the south and southeast portion of the site (closer to the ESM). Groundwater monitoring wells around the Upper and Lower Lagoons have been installed with screen intervals from between approximately 5 to 20 feet bgs to monitor “Upper Horizon” groundwater and from approximately 22 to 37 feet bgs to monitor “Lower Horizon” groundwater.

Wells designated as “A1 and A2” have been installed in HA-2 near the lagoons with a maximum well screen length of 5 feet. The purpose of these wells is to characterize the occurrence and quality of the Upper horizon groundwater located in the immediate vicinity of the Upper and Lower Lagoons. The screened intervals for the A1 wells are generally between 6 to 12 feet bgs. These wells are designed to monitor groundwater within elevations similar to the elevation of sediments within the lagoons. The screened intervals for the A2 wells are generally between 12 to 20 feet bgs. A2 wells were designed to monitor groundwater quality at an elevation approximately equal to or below the sediments within the lagoons. Lower horizon, or “B” interval, groundwater refers to groundwater encountered at approximately 20 to 30 feet bgs, and wells designed to monitor this interval are screened over a five foot interval in native sediments generally between 20 to 30 feet bgs.

Potentiometric surface maps indicate that, in general, shallow groundwater in the A1 and A2 intervals beneath the site flows from the north/northeast to the south/southwest, in the general direction of the ESM (Figures 8, 9, 10, and 11). This generalized pattern of flow is complicated by an apparent mound or other local increase in groundwater elevation in the immediate vicinity of the Upper Lagoon. The A1/A2

potentiometric surfaces measured during the third quarter of 2011 (Figure 8) and the third quarter of 2013 (Figure 10) indicate a mounding pattern associated with the Upper Lagoon as evidenced by relatively higher groundwater elevations measured at piezometers PZ-14, PZ-10, and PZ-13. This mounding pattern is consistent with the construction of the Upper Lagoon as described below. The Upper Lagoon berms are constructed at elevations that allow surface water and sediment to accumulate up to 5 feet higher than the surrounding elevations. In this setting, stormwater accumulated in the Upper Lagoon exerts localized hydraulic pressure, resulting in a mounding pattern away from the Lagoon in all directions. In the upland area that is not impacted by the apparent mounding, groundwater flows primarily toward the south in the general direction of its discharge point to ESM or San Francisco Bay.

A leaky flapper valve at the discharge of storm drain outfall 002 was determined to have allowed surface water (saltwater) during high tides in ESM to backflow into the stormwater interceptor trench and enter the Upper Lagoon. That defective valve was repaired in December 2012. Since that repair, the extent of mounding at the Upper Lagoon appears to have decreased, based on groundwater elevations measured in October 2013 (Figures 10 and 11). The interpreted net direction of groundwater flow in the vicinity of the lagoons is depicted on Figures 8 through 11. These flow directions are inferred based on the groundwater potentiometric surface and patterns observed in groundwater geochemistry (Section 5.1).

4.3 Screening Levels

Screening levels for HA-2 groundwater, soil, and sediments are described below.

4.3.1 Groundwater Screening Levels

The analytical results for the groundwater samples were compared to screening levels to evaluate groundwater impacts of concern. The groundwater potentially discharges to ESM and San Francisco Bay and therefore the point of compliance for groundwater at HA-2 is anticipated to be the Upper and Lower Lagoon south berms/HA-2 southern boundary.

Site-specific screening levels have been developed for COCs detected in groundwater samples collected at the Lot 3 portion of the Campus Bay site using a dilution factor (DF) approach. The existing DF of 5-times for upper horizon groundwater at Lot 3 was developed based on a CSM that included a potential sensitive receptor for COCs (i.e., benthic organisms within ESM), a source of the COCs (i.e., Lot 3 groundwater), and the pathway for the COCs to reach the receptor (i.e., lateral groundwater migration from beneath the Lot 3 upland area south toward ESM and discharge into the ESM and San Francisco Bay) (Terraphase 2013 and Erler & Kalinowski, Inc. [EKI] 2008). The CSM for HA-2 includes the same receptor with a similar source (i.e., HA-2 groundwater) and migration pathway (i.e., lateral migration from HA-2 upland area toward ESM and discharge into ESM and San Francisco Bay). For both Lot 3 and HA-2, as groundwater encounters the ESM, a portion of that groundwater is expected to migrate upward (under the influence of upward gradients)

and mix with the saline surface water before ultimately discharging into the ESM. As a result, water in the pore space of ESM marsh sediments is expected to consist of a mixture of groundwater migrating upward from below the ESM, and surface water migrating downward from the saline tidal surface water. Based on these hydraulics, the percentage of groundwater within the pore space of ESM sediments is expected to increase with depth, from close to zero at the sediment surface (nearly all of the pore water is surface water), to close to 100% at deeper depths, at the aquifer/marsh sediment interface.

As described above and presented in a memorandum from ARCADIS to the DTSC dated October 11, 2013, based on an evaluation of the CSM and hydraulics (i.e., amount of mixing between groundwater and pore water within the ESM), the 5-times DF calculated for Lot 3 shallow groundwater is applicable to HA-2, and can be used to establish an appropriately conservative screening level value for shallow groundwater within HA-2 that is protective of sensitive receptors within the ESM (ARCADIS 2013b). Screening levels for groundwater at HA-2 consist of saltwater aquatic criteria[1] adjusted by the location-specific DF of 5 times (Table 3). Additional investigation and data collection was conducted to confirm that the DF for HA-2 is at least 5-times (ARCADIS 2014a and 2014b).

4.3.2 Soil and Sediment Screening Levels

A site-specific baseline risk evaluation will be conducted for HA-2 soils and will be used to evaluate potential risks posed by COCs present in upland soil surrounding the lagoons (i.e., soil located outside of the vegetated wetland boundaries shown on Figure 4). The risk evaluation results will be used in the FS. Therefore, soil screening levels are not included in this report. Sediments within the lagoons are not included in the risk evaluation. Sediments are included in the presumptive remedy area as described below.

Remedial action objectives for soils and sediments are anticipated to include addressing soils and sediments, which may contribute to exceedances of the groundwater screening levels via leaching. A site-specific sediment screening level for potential leaching of s-ethyl dipropylthiocarbamate (EPTC) and pebulate to groundwater has been calculated as described in Section 5.2.1.3. The potential for leaching of arsenic from soils and sediments is described in Section 5.2.1.1.

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[1] Saltwater Aquatic Criteria are the continuous concentration criteria, where available, from the following sources in order of preference: (1) more stringent of the Basin Plan (Regional Water Quality Control Board 2006) and the California Toxics Rule (USEPA 2000) and (2) the National Recommended Water Quality Criteria (USEPA 2006).

4.3.2.1 Presumptive Remedy Area

Based on concentrations of COCs in sediments (i.e., non-native sediments within the vegetated wetland boundaries shown on Figure 4), unacceptable risk is considered presumptive for sediments (i.e., concentrations of COCs in lagoon sediments are significantly elevated to indicate risk based on a comparison to risk screening levels; ARCADIS 2011b). The Upper Lagoon and the Lower Lagoon vegetated boundaries define the presumptive remedy area (Figure 4). To address this potential risk, it is anticipated the remedial action objectives will include elimination of potential exposure pathways to sediment for ecological receptors. As a result, risk-based sediment screening levels are not included in this report.

4.4 Chemistry Data Results

Based on the results from several phases of investigation at the site, the COPCs at HA-2 have been refined to the following COCs and respective media:

- Select metals (arsenic, copper, nickel, lead, mercury, and zinc) in sediment, soils, and groundwater
- PPs in sediment, soils, and groundwater
- PCBs in limited areas of sediment and soil
- OCPs in limited soil

The nature and extent of COCs identified within HA-2 are described below. Tables 4, 5, 6, and 7 provide summary statistics (i.e., detections, mean detected concentrations, maximum detected concentrations, and upper confidence limits [UCLs]) for COPCs in sediment, soil, groundwater, and pore water, respectively. The mean and maximum detected concentration statistics only include concentrations detected above the laboratory reporting limit. UCLs were calculated using USEPA's ProUCL 4.1.00 software program (USEPA 2010a and 2010b) for COPCs with eight or more sample points and at least five detected concentrations. The UCLs are in some cases less than the mean detected concentrations because the calculation of UCLs includes non-detect concentrations.

The PDI laboratory reports are provided in Appendix E. Sediment data are reported on a dry weight basis. Soil data collected prior to the PDI were reported on an as received basis, and soil data collected as part of the PDI (i.e., in 2013) are reported on a dry weight basis.

Semivolatile organic compounds (SVOCs) and VOCs were previously evaluated as COPCs and were not detected or were detected at relatively low concentrations in soils and sediments, and are not considered

COCs for HA-2. The analytical data for SVOCs and VOCs for HA-2 in sediment and soil are presented in Tables 8, 9, 10, and 11.

4.4.1 Data Validation

The chemistry analytical data for the PDI were verified and validated according to Tier I and II procedures. A Tier II data quality assessment, including a review of data package completeness, was conducted on laboratory reports from C&T. Data validation qualifiers are incorporated into the data presented in the tables. Based on the data validation, the analytical data collected during the PDI are considered useable with one exception. The orthophosphate phosphorous analyses were conducted after the required hold time for the samples was exceeded and thus, the results are not presented in the report. This deviation does not affect the findings of the Pre-Design Investigation. The Data Validation Reports are included in Appendix F.

4.4.2 Data Visualization

ARCADIS prepared visualizations of the historical and PDI chemistry data for key COCs utilizing the Mining Visualization System (MVS) software by CTech, Inc., of Kaneohe, Hawaii. MVS unites state-of-the art analysis, visualization, geographic information system (GIS), and animation tools into a software system. MVS was used to evaluate the large dataset in 3D, including modeling COC concentrations using kriging. MVS outputs aided in development of the CSM. MVS generated visualizations of arsenic, EPTC, and pebulate are shown on Figures 12 through 23 and 27 through 32.

4.4.3 COCs in Sediments

The COCs identified within Lagoon sediments include PPs, metals, and PCBs. The pesticides of greatest concern are EPTC and pebulate, because they have been detected in downgradient groundwater monitoring wells at elevated levels. The results for COCs in sediments are detailed below. The PDI also included specialized testing and analysis of pH and ORP for sediments, as detailed in Appendix D and summarized in Section 4.6.

4.4.3.1 Metals in Sediments

Arsenic, copper, nickel, lead, and zinc were detected in all of the sediment samples collected from HA-2. Samples of lagoon sediments (non-native material) contained elevated concentrations of these metals. Mixed cinder-related material has been observed in some of the lagoon sediment samples, particularly in samples from the Upper Lagoon. The maximum concentration of arsenic was 4,800 milligrams per kilogram (mg/kg) in the Upper Lagoon (UL-34; 5.5 to 6.0 feet [ft] bss) and 1,200 mg/kg in the Lower Lagoon (LL-31 and LL-36; 0.0 to 0.5 ft bss). The Upper Lagoon contains elevated metals concentrations within the lagoon sediment material to a maximum depth of approximately 10 feet bss. The Lower Lagoon sediment samples

generally contain lower concentrations of metals relative to samples collected from the Upper Lagoon and are present to a maximum depth of approximately 3 feet bss. Samples from the native clay material that underlies the lagoon sediments in both the Upper Lagoon and the Lower Lagoon do not contain elevated concentrations of metals. The metals results in the lagoon sediments are presented in Table 12, and arsenic concentrations are shown on Figures 12 to 15.

4.4.3.2 Proprietary Pesticides in Sediments

EPTC and pebulate are the most frequently detected PPs and were detected in greater than 60 percent of sediment samples from HA-2 (Tables 4 and 13). Samples of lagoon sediments (non-native material) contained elevated concentrations of EPTC and pebulate. EPTC was detected at a maximum concentration of 12,000 micrograms per kilogram (µg/kg) in the Upper Lagoon (UL-32; 7.5 to 8.0 ft bss) and 1,300,000 µg/kg in the Lower Lagoon (LL-1; 2.5 ft bss). Pebulate was detected at a maximum concentration of 950,000 µg/kg in the Upper Lagoon (UL-32; 7.5 to 8.0 ft bss) and 220,000 µg/kg in the Lower Lagoon (LL-34; 0.0 to 0.5 ft bss).

The Lower Lagoon sediment contains elevated PP concentrations to a maximum depth of approximately 4.5 feet bss (LL-1). The Upper Lagoon has a more limited area of PP-impacted sediment and generally contains lower concentrations of PPs than the Lower Lagoon with exception of the sample collected at UL-32. Samples from the native clay material that underlies the lagoon sediments in both the Upper Lagoon and the Lower Lagoon do not have elevated concentrations of PPs. The PP results for sediment are presented in Table 13. Figures 16 to 23 show EPTC and pebulate concentrations in sediment and soil.

4.4.3.3 Organochlorine Pesticides in Sediment

The main OCP of concern is dichlordiphenyltrichloroethane (DDT) and its breakdown products, including 1,1-Dichloro-2,2-bis(p-chlorophenyl) ethylene (DDE). DDT was detected in two sediment samples with a maximum concentration of 16 µg/kg (UL-7, 0.5 feet bss). DDE was detected in approximately 31 percent of sediment samples with a maximum concentration of 970 µg/kg (LL-5, 0.2 feet bss; Tables 4 and 14). DDT and/or DDE were detected in shallow Lower Lagoon sediments and primarily in the upper 5 feet of Upper Lagoon sediments. Based on these limited detections of OCPs in sediment, OCPs are not considered COCs for sediments. The OCP results for sediment are presented in Table 14 and Figure 24.

4.4.3.4 PCBs in Sediments

PCBs have been detected infrequently in sediment samples from HA-2. PCBs have only been identified at elevated concentrations within the Upper Lagoon. The most elevated PCB concentrations (total detected PCBs) were detected in Upper Lagoon sediment samples UL-6 (0.5 foot bss), UL-12 (8.5 to 9 feet bss), and

UL-1 (5 feet bss) at concentrations of 1,710 µg/kg, 1,900 µg/kg, and 1,100 µg/kg, respectively. The PCB results in the lagoon sediments are presented in Table 15 and Figure 25.

4.4.4 COCs in Berm/Upland Soils

The COCs identified within berm/upland soils are OCPs and metals, and to a lesser extent PCBs and PPs. The results for COCs in soils are detailed below. The PDI also included specialized testing and analysis of soils, as detailed in Appendix D and summarized in Section 4.6.

4.4.4.1 Metals in Soils

Arsenic, copper, nickel, lead, and zinc were detected in all of the soil samples collected from HA-2. The most elevated metals concentrations were typically observed in soil containing cinder material or fill material (concrete/brick debris). Cinder material was observed in most of the soil borings advanced around the Upper Lagoon and north of the Lower Lagoon (see soil boring logs in Appendix A and summary of PDI cinder observations in Appendix D). Cinder was infrequently observed in soil samples collected from soil borings drilled in the middle berm and the Lower Lagoon south berm.

Elevated metals concentrations were detected within the berm fill and upland soils at sample depths ranging from approximately 0.5 feet bgs to 12 feet bgs in the Upper Lagoon south berm and adjacent soils and to approximately 9 feet bgs in the soils north of the Lower Lagoon. The maximum concentration of arsenic in soils was 950 mg/kg in the soils north of the Upper Lagoon (UL-18; 8.0 ft bgs). The maximum concentration of arsenic in the soils in the Upper Lagoon south berm (390 mg/kg at UL-21; 0.0 to 0.5 ft bgs) was greater than that observed in the Lower Lagoon south berm (49 mg/kg at LL-39; 0.0 to 0.5 ft bgs). Arsenic concentrations in the Upper Lagoon south berm soils were elevated near the surface and within saturated soils (concentrations of up to 200 mg/kg at 7 to 10 ft bgs). The native clay material that underlies the berm fill and upland soils does not have elevated concentrations of metals. The metals results in the Lagoon berm/perimeter soil are presented in Table 16. Arsenic concentrations in soil are shown on Figures 12 to 15.

4.4.4.2 Proprietary Pesticides in Soils

EPTC and pebulate are the most frequently detected PPs in soil and were detected in less than 15 percent of soil samples from HA-2. Elevated EPTC and/or pebulate concentrations were detected in soil samples collected from five borings UL-17, UL-22, UL-23 PZ-19A2, LL-23, and LL-24 within the berm fill and upland soils at depths ranging approximately from 6 to 12 feet bgs similar to that encountered in the lagoon sediments. EPTC was detected at a maximum concentration of 31,000 µg/kg (UL-17; 5.5 to 6.0 ft bgs). Pebulate was detected at a maximum concentration of 62,000 µg/kg (UL-22; 9.5 to 10.0 feet bgs).The PP results for soil are presented in Table 17. Figures 16 to 23 show EPTC and pebulate concentrations in sediment and soil.

4.4.4.3 Organochlorine Pesticides in Soil

DDT was detected in approximately 50 percent of soil samples with a maximum concentration of 4,600 µg/kg (UL-15; 0.5 feet bgs). DDE was detected in soil at a maximum concentration of 4,800 µg/kg (LL-20; 4.0 feet bgs). Elevated concentrations of DDT and DDE were detected in varying soil types and depth intervals in upland soils and fill around the lagoons. DDE and DDT concentrations were detected at sample depths ranging from approximately 0.5 feet bgs to 12 feet bgs near the Upper Lagoon and to approximately 4 feet bgs around the Lower Lagoon. Dieldrin was detected in less than 15 percent of soil samples with a maximum concentration of 490 µg/kg (LL-20 at 4 feet bgs). The OCP results for soil are presented in Table 18 and Figure 26.

4.4.4.4 PCBs in Soils

PCBs have been detected infrequently in soil samples from HA-2. PCBs have only been identified at elevated concentrations north of the Upper Lagoon, adjacent to Lot 3. The most elevated PCB soil concentration (total detected PCBs) was detected in UL-17 (0.5 feet bgs; 565 µg/kg). The PCB results for soil are presented in Table 19 and Figure 25.

4.4.5 COCs in HA-2 Groundwater

Historical and PDI groundwater data are presented in Tables 20, 21 and 22. Figures 27 to 29 present the most recent groundwater data for arsenic, EPTC, and pebulate. Groundwater statistics are provided in Table 6 and include samples collected from 2005 to 2013. These data indicate that the primary COCs in groundwater in HA-2 are arsenic, pebulate, and EPTC. Groundwater geochemical parameter data from the PDI and historically are provided in Tables 23 and 24, respectively. Groundwater COC data are discussed further below. Geochemical parameter data and specialized test results for groundwater are detailed in Appendix D and summarized in Section 4.6.

4.4.5.1 B-Interval Groundwater

Recent groundwater monitoring results from 2012 and 2013 indicate that none of the groundwater COCs (EPTC, pebulate, or arsenic) are present in B-interval groundwater at concentrations that exceed screening levels (Tables 20 and 21 and Figure 27, 28, and 29). These monitoring results are consistent with inorganic chemistry data collected from the B interval (see Section 5.1.3), which indicates that B-interval groundwater is not mixing significantly with A1/A2 groundwater or surface water from the ESM. There is evidence of potential migration of proprietary pesticides from A2 groundwater in the vicinity of the middle berm (e.g., PZ-19 A2) into B-interval groundwater generally downgradient from that area (e.g., PZ-21B and grab sample from LL-39). However, results of two rounds of groundwater sampling at PZ-21B indicate that the resulting concentrations of COCs from this pathway are below screening levels at PZ-21B.

4.4.5.2 A1/A2 Groundwater

4.4.5.2.1 Metals in A1/A2 Groundwater

Groundwater with concentrations of arsenic above screening levels is limited to the Upper Lagoon south berm and the middle berm (Table 20 and Figures 27). The most elevated concentrations of arsenic (maximum of 640 micrograms per liter [µg/L] at PZ-14) have been detected in groundwater samples collected from wells PZ-14, MW-17, MW-16A, and PZ-20A1/A2.

Significantly lower concentrations of arsenic are detected in groundwater samples collected from monitoring wells located within the Lower Lagoon south berm (maximum concentration of 22 µg/L at PZ-15), and the middle berm (maximum concentration of 81 µg/L at PZ-19A1).

Groundwater monitoring data indicate concentrations of arsenic have been increasing since 2002 in samples collected from wells MW-16A and MW-17 located in the Upper Lagoon south berm. Concurrent with the increase in arsenic concentration, ferrous iron concentration has increased steadily in samples collected from wells PZ-14 and MW-17 and increased more moderately and with more fluctuations in samples collected from well MW-16A (Appendix D). At the Lower Lagoon south berm monitoring wells, where the arsenic concentration is below the screening level, ferrous iron concentration has historically been and is currently either below laboratory reporting limits or detected at very low concentrations. The geochemical data are discussed further in Appendix D.

Four groundwater samples were submitted for arsenic speciation testing as described in Appendix D and discussed in Section 4.6. Significant concentrations of both As(III) and As(V) were detected in all four groundwater samples. Two of the groundwater samples (MW-17 and PZ-14), contained relatively higher concentrations of As (III) than As (V), and relatively higher total dissolved arsenic concentrations than the other two groundwater samples (Appendix D).

Metals other than arsenic have been detected infrequently and generally less than their respective screening levels as summarized below.

- Copper was detected infrequently in groundwater samples. Copper was detected in four groundwater samples (MW-17, PZ-14, PZ-15, and PZ-16) at concentrations less than the screening level (16 µg/L). Copper was detected in groundwater twice at concentrations above the screening level (PZ-20A1 in 2011 and 2013 at 98 µg/L and 28 µg/L, respectively). The 2013 detection was in the filtered groundwater sample, whereas copper was not detected in the unfiltered sample and concentrations of iron, lead, manganese, and zinc were higher in the filtered sample, suggesting a likely error in labeling and reporting for the sample.

- Lead was detected in three groundwater samples collected from HA-2 at a maximum concentration of 68 µg/L (PZ-14). The detection of 68 µg/L at PZ-14 was the only detection greater than the screening level (41 µg/L). Lead was not detected in samples collected from PZ-14 during the six other monitoring events between 2009 and 2013.

- Nickel was detected in multiple groundwater samples collected from HA-2 at a maximum concentration of 36 µg/L (PZ-21A2), which is less than the screening level (41 µg/L).

- Mercury was detected in one groundwater sample (PZ-22A1) at a concentration (0.34 µg/L) less than the screening level (5 µg/L).

- Zinc was detected in approximately 10 percent of groundwater samples from HA-2 at a maximum concentration of 270 µg/L (PZ-20A1), which is less than the screening level (410 µg/L).

4.4.5.2.2 Proprietary Pesticides in A1/A2 Groundwater

Groundwater with EPTC or pebulate concentrations above screening levels is generally limited to the middle portion of the lagoons, including the middle berm (PZ-19A2), and the Upper and Lower Lagoon south berms (e.g., wells PZ-21 A1/A2, PZ-14, and PZ-15) as shown on Figures 28 and 29. The maximum concentrations of EPTC and pebulate in groundwater (2,400 µg/L and 2,600 µg/L, respectively) were detected in groundwater samples collected from piezometer PZ-19A2 in May 2013. PZ-19A1 has significantly lower concentrations of EPTC and pebulate. Groundwater samples collected from wells located at Lot 3 to the north of the Upper Lagoon (PZ-17A1/A2 and PZ-18A1/A2) have elevated concentrations of EPTC and pebulate.

The most elevated concentrations of EPTC and pebulate downgradient of the lagoons were detected in samples collected from piezometer PZ-21A1 (470 µg/L and 320 µg/L, respectively). The concentrations of EPTC and pebulate in samples collected from wells and piezometers located in the Lower Lagoon south berm decrease with distance to the east at PZ-15, at PZ-22A1/A2, and to below laboratory reporting limits for samples collected from piezometer PZ-16 at the southeastern edge of the Lower Lagoon south berm. Groundwater samples collected to the west of piezometer PZ-14, along the Upper Lagoon south berm (MW-16, MW-17, and PZ-20A1/A2) did not contain pesticides at concentrations at or above the screening level. Groundwater samples collected along the middle portion of the Upper Lagoon south berm (e.g., wells PZ-20A1/A2 and MW-17) generally contained low concentrations of EPTC and pebulate (i.e., less than 100 µg/L). However, at the southwestern edge of the Upper Lagoon south berm, EPTC concentrations detected in samples collected from well MW-16A have decreased from a maximum of 200 µg/L in 2008 to less than laboratory reporting limits in samples collected from May 2010 to May 2013.

Grab groundwater samples were collected in May 2013 to provide additional delineation of groundwater impacts downgradient of PZ-19A1/A2 (Figures 28 and 29). The grab groundwater samples collected from 10 to 14 feet bgs (A1 interval) and from 16 to 18 ft bgs (A2 interval) from soil boring UL-24, which is located immediately downgradient (south) of PZ-19A1/A2, contained concentrations of EPTC and pebulate that exceed screening levels. The grab groundwater sample collected 24 to 28 feet bgs (B interval) from soil boring UL-24, contained relatively low concentrations. Grab groundwater samples were also collected from LL-39, which is located in the Lower Lagoon south berm between piezometers PZ-14 and PZ-21A1/A2 downgradient of PZ-19A1/A2 and slightly upgradient of PZ-21A1/A2 (see Figure 3).The grab groundwater sample collected 12 to 15 feet bgs (A1/A2 zone) from LL-39 contained concentrations of EPTC and pebulate which exceed screening levels (1,100 µg/L and 150 µg/L, respectively). The grab groundwater sample collected 22 to 25 feet bgs (B interval) from LL-39 contained concentrations of EPTC and pebulate at 550 µg/L and 330 µg/L, respectively.

The lower concentrations of PPs detected in groundwater samples collected west of PZ-14 and east of PZ-15 and PZ-22A1/A2 are consistent with the presence of generally lower concentrations of PPs in sediments in the Upper Lagoon and the eastern portion of the Lower Lagoon. These data are consistent with groundwater elevation and geochemistry data, and validate the apparent groundwater flow direction.

4.4.6 COCs in Pore Water

The objective of pore water extraction and analysis was to evaluate the partitioning of COCs (metals and PPs) between sediments and the aqueous phase. As described in USEPA Contaminated Sediment Remediation Guidance for Hazardous Waste Sites, pore water is generally interconnected with surface water and ground water, but the degree of interconnection varies at different sites and may also vary across a site and with changes in groundwater and surface water flow and mixing (USEPA 2005). The relative fraction of COCs in sediment and pore water depends on the type of contaminant and the physical and chemical properties of the sediment and water (USEPA 2005). Organic COCs, such as PPs, typically adsorb to fine and organic sediment particles and exist in the pore water between sediment particles (as observed in the lagoon sediments at the Upper and Lower Lagoons). The partitioning of metals from sediment to the aqueous phase is often more complex; metals tend to adsorb to sediment and may also bind to sulfides, iron, or other minerals in the sediment. Concentrations of the COCs detected in pore water provide an indication of the potential for the COCs to leach from sediment to groundwater or surface water; however, COC concentrations detected in pore water are not directly representative of or comparable to COC concentrations in underlying or surrounding groundwater. The results of pore water analysis are described below and the evaluation of the results and potential leaching are provided in Section 5.2.1.

The COCs analyzed in pore water samples collected from lagoon sediments include metals and PPs (see Table 25 and 26). The COCs of greatest concern are EPTC, pebulate, and arsenic, because they have been detected in groundwater samples at elevated levels.

Arsenic, copper, nickel, lead, and zinc were detected in one or more of the pore water samples (Table 25). Arsenic was detected in all 18 pore water samples at concentrations ranging from 2.9 µg/L to a maximum of 1,600 µg/L (UL-34; 7.0 to 8.0 ft bss) and at an average of approximately 275 µg/L. Arsenic concentrations in pore water were elevated in both Upper and Lower Lagoon sediments and were not well correlated with concentrations of arsenic in sediment. Arsenic concentrations in pore water are shown on Figure 30.

EPTC and pebulate were detected in 14 of the 15 pore water samples analyzed for PPs (Table 26). Generally, concentrations of EPTC and pebulate were greater in Lower Lagoon pore water except for sample UL-32, which also had relatively elevated EPTC and pebulate concentrations in the co-located sediment sample. EPTC was detected at concentrations ranging from 6.3 µg/L to a maximum of 5,900 µg/L (LL-37; 0.0 to 1.5 ft bss) and an average of approximately 747 µg/L. Pebulate was detected at concentrations ranging from 5.7 µg/L to a maximum of 4,500 µg/L (UL-32; 7.5 to 8.5 ft bss) and an average of approximately 762 µg/L. Concentrations of EPTC and pebulate in pore water generally correlated with corresponding concentrations in sediment. EPTC and pebulate concentrations in pore water are shown on Figures 31 and 32.

Four pore water samples were also analyzed for arsenic speciation and geochemical parameters as described in Section 4.6 and Appendix D (Table D-2). Three of the four speciated pore water samples, contained elevated concentrations of both As(III) and As(V). Two pore water samples (LL-31, and UL-28), had greater concentrations of As(III) relative to As(V) and greater dissolved total arsenic concentrations. Pore water sample UL-26 had the lowest total arsenic concentration and the lowest As(III) concentration (less than 1 µg/L). Geochemical data indicate higher salinity in the Upper Lagoon pore water and groundwater relative to the Lower Lagoon. Concentrations of most major cations and anions are higher in the Upper Lagoon pore water and groundwater relative to the Lower Lagoon (including chloride, calcium, magnesium, potassium, and sodium), and total dissolved solids concentration and conductivity were also on average higher in the Upper Lagoon area. Pore water geochemical parameter data are provided in Table 27 and the results are further discussed in Appendix D.

4.5 Geotechnical Test Results

The geotechnical data collected as part of the geotechnical investigation can generally be subdivided into the following types of data:

- Generalized subsurface conditions as observed in the geotechnical explorations and vibracores;
- In-situ test data consisting of CPT, SPT, and VST data; and
- Laboratory test results.

An overview of the available geotechnical data is provided below. The geotechnical test results are provided in Appendix C. This includes tables and figures referenced in this section.

4.5.1 Geotechnical In-Situ Test Results (Earthen Berms)

4.5.1.1 Standard Penetration Test Data

SPTs were performed in the borings at regular intervals as part of split-spoon sampling. SPT results can be used to estimate the density of cohesionless materials and the consistency of cohesive materials. In this report, the SPT results were used to describe the relative density and consistency of the subsurface materials. The SPT results (N values) are provided on the boring logs in Appendix A.

4.5.1.2 Vane Shear Test Data

VSTs were performed to measure the undrained strength of the cohesive soils in the fill and Old Bay Mud deposits. The VST results consisting of peak and remolded undrained shear strength are summarized in Table C-1 in Appendix C. The VST peak strengths are also presented on Figure C-1, along with undrained strength data from laboratory strength values and undrained strength estimated using CPT data. The laboratory and CPT strength data were taken from explorations that were co-located with the VST explorations as described in Section 3.4.1.1 – Geotechnical Investigation for Earthen Berms. Based on the VST results, the undrained shear strength of the cohesive materials in the fill soil are generally in the 500 to 800 pounds per square foot (psf) range. Based on Figure C-1, the undrained strength of the Old Bay Mud appears to be quite variable, ranging from approximately 1500 psf to over 2500 psf. Because the VST equipment reached its maximum capacity at approximately 2500 psf, the VST equipment was not able to measure the full undrained strength of some of the Old Bay Mud.

4.5.1.3 Cone Penetrometer Test Data

CPTs were performed to obtain nearly continuous subsurface stratigraphy along the berms. CPT cone tip resistance data was used to estimate undrained shear strength of the cohesive soils in the berms (Kulhawy & Mayne 1990). The results are provided on Figure C-1, along with laboratory and VST data obtained from co-located explorations. As described above for the VST results and based on the explorations presented in this report, the undrained strength of the fill material may be as low as approximately 500 psf. The undrained strength of the Old Bay Mud is highly variable and appears to range from approximately 1300 to 4500 psf in the Upper 50 feet (based on the three CPTs co-located with the borings and VST explorations). Shear wave velocity was measured at various depths in S-CPT-1. The CPT data, including shear wave velocity data, are provided on the CPT logs provided in Appendix C.

4.5.2 Geotechnical In-Situ Test Results (Lagoons)

VSTs were performed to measure the undrained shear strength of the lagoon sediments. In some locations in the Lower Lagoon, the vane was also advanced into the underlying Old Bay Mud below the lagoon sediments. The VST results consisting of peak and remolded undrained shear strength are summarized in Table C-2. Based on the VST results, the sediment strength can be relatively high in areas that have been subject to drying and a crust was formed over time. This is the case in the Upper Lagoon, which was largely dry when the testing was performed. The crust is generally less thick in the middle of the Upper Lagoon and thicker toward the berms. In these areas, the undrained strength can range from approximately 800 to nearly 2,000 psf. Most of the sediments below the crust appear to have strengths of less than 500 to 600 psf. Undrained strengths are significantly lower in the Lower Lagoon. This is because the sediments in the Lower Lagoon are usually under water and rarely get exposed to air. Therefore, there is no crust or only a thin crust in these areas and the sediments are generally extremely soft with undrained strengths of less than 100 psf. The sediment in the Lower Lagoon is generally relatively thin. Some of the VSTs were performed in the underlying native soil. Most of these appear to be Old Bay Mud with undrained strengths of approximately 1,260 to 1,900 psf.

4.5.3 Geotechnical Laboratory Test Data

4.5.3.1 Index Property and Classification Test Data

Index property and classification tests were performed on selected samples to determine basic physical properties of the soils and sediments and to verify classifications performed in the field. The index property and classification test results for the earthen berm locations and lagoon sediments are summarized in Tables C-3 and C-4, respectively. The geotechnical laboratory reports provided by Cooper are provided in Appendix C.

Based on the index property data, the vast majority of the fine-grained soils and sediments at the site consist of lean clay. These materials include the lagoon sediments, fill soils, and Old Bay Mud. The Atterberg limit test results are summarized for the earthen berms and the lagoons on Figures C-3 and C-4. Fill soils and Old Bay Mud consisting of clays generally have fines contents ranging between 82 and 90 percent. The lagoon sediments generally have slightly higher fines contents ranging from approximately 88 to 99 percent. The organic content of lagoon sediments ranged from approximately 4.9 to 14.5 percent. The moisture contents of the lagoon sediments vary widely and were measured as high as 250 percent. This correlates well with the very low VST shear strength values measured for some of the sediments.

4.5.3.2 Consolidation Test Data (Berm Locations)

The consolidation test results in terms of preconsolidation stress and overconsolidation ratio are provided in Table C-5 along with laboratory shear strength data. Preconsolidation stress was calculated using Casagrande's method (Casagrande 1936). Based on the test results, both the sample collected from the berm fill as well as the Old Bay Mud sample were overconsolidated. The Bay Mud sample was more overconsolidated than the sample of fill. The samples were assessed for sample quality based on the specimen quality designation (SQD; Andresen & Kolstad 1979). Depending on the strain the sample experiences during the consolidation test, it is given an SQD between "A" and "E", with "A" being the highest rating (i.e., excellent sample quality) and "E" being the lowest possible rating (i.e., very poor sample quality). The two samples tested both had a SQD of "B" (i.e., good quality).

4.5.3.3 Laboratory Undrained Strength Data (Berm Locations)

In addition to measuring undrained shear strength in the field using VST equipment, undrained strength of cohesive soil was also measured in the laboratory by performing UU tests. The UU test data are summarized in Table C-5 and Figure C-1. Figure C-1 also shows undrained strength data obtained from in-situ tests consisting of VSTs and CPTs. Generally, the UU test data appears to correlate well with the in-situ test data. Some of the UU test shear strengths appear to be slightly lower than the VST and CPT data. This may have been caused by variations in the soil and/or sample disturbance that occurs during sampling, handling, transport, and testing and cannot easily be avoided under normal conditions.

4.5.4 Discussion of Geotechnical Data

The geotechnical data presented herein are adequate for the assessment of various remedial alternatives that will be evaluated as part of the FS. A focus of this investigation was the evaluation of the strength of the subsurface materials for the assessment of berm stability, equipment support during remedial construction, and feasibility of technologies such as capping. Various methods to measure undrained shear strength have been employed in this investigation and yielded useful information for the FS. It should be noted that the undrained shear strength values presented herein are not design values. Engineering judgment will be needed to select adequate design values based on the data provided herein.

4.6 Specialized Test Results

A summary of several significant findings from the specialized test results is provided below. Additional details and the data supporting these findings are presented in Appendix D.

Cinders observed in Lagoon sediment are not actively oxidizing to leach acidity and metals. Cinders located in an oxidizing environment in Lot 3 were historically leaching metals and acidity to groundwater, as

indicated by low groundwater pH (2.9 to 3.9), high iron concentrations in groundwater (480 to 1900 mg/L), and the detection of significant concentrations of copper and zinc in groundwater (Shepherd Miller 1999). Cinders in the lagoons, however, do not appear to be actively leaching acidity and metals based on the specialized test results. Geochemical parameter data indicate redox conditions at the lagoons are not oxidizing, but are rather mildly reducing (Appendix D). ABA results indicate lagoon sediments are significantly acid-neutralizing on average, with very few net acid-generating samples (Appendix D). Sediment and groundwater pH are neutral to alkaline, which indicates that soils and sediments are not leaching acidity. Iron concentrations in pore water and groundwater, while elevated, are not as high as those detected historically in groundwater under Lot 3. Copper and zinc have not been detected in groundwater and pore water samples from the lagoon area above the screening level, with few sporadic exceptions at low concentrations. PDI data therefore support the relative stability of cinders in sediments under the conditions present in the lagoons.

Arsenic is predominantly associated with iron minerals in the HA-2 non-native soil and sediments including iron sulfides and iron hydroxide. Geochemical conditions, including oxic conditions (through introduction of dissolved oxygen), or reducing conditions (through introduction of organic carbon) can destabilize these minerals and release arsenic. Hydrogeological and geochemical data indicate the geochemical conditions in the vicinity of the south berms may be affecting arsenic retention in some areas, including the Upper Lagoon south berm (Appendix D). Under mildly reducing conditions, reductive dissolution of iron minerals may also result in the solubilization of arsenic that had been sorbed to the iron mineral surfaces. SSE data indicate a significant fraction of arsenic associated with amorphous iron minerals as well as more crystalline iron mineral phases (Appendix D). Speciation data indicate a significant fraction of arsenic is As(III), which more readily desorbs from iron minerals than As(V) (Appendix D). Changing geochemical conditions in the vicinity of the Upper Lagoon south berm may be destabilizing arsenic associate with iron minerals, resulting in arsenic (including that associated with cinder) being sourced to groundwater from the local Upper Lagoon south berm soils.

***Salinity is unlikely to be a direct factor in mobilizing arsenic*.** Saline water has been observed in Upper Lagoon surface water and groundwater as a result of migration of saline surface water from the ESM into the Upper Lagoon and local shallow groundwater due to leakage of a flapper valve of the stormwater piping system. Elevated salinity can in some cases increase the mobility of arsenic. WET extraction tests were therefore conducted with two Upper Lagoon soil samples using both DI water and saline groundwater as extractant solutions. The results of these tests indicate that salinity does not enhance leaching of arsenic from the soil (Appendix D). Furthermore, concentrations of arsenic in pore water of sediment samples from the Lower Lagoon were similar to those collected from Upper Lagoon sediments, indicating salinity was not enhancing leaching of arsenic from Upper Lagoon sediments.

***Copper is stable in soils and sediment and is primarily associated with organic matter or is in an immobile phase*.** Based on the copper SSE data, copper is associated primarily with the organic and

immobile (residual) fractions of soil and sediment (Appendix D). The organic matter in soil and sediment is unlikely to be oxidized and mobilized under the reducing conditions present at the site, and therefore, the copper associated with organic matter is stable. The residual phase of soil and sediment (as measured by the selective extractions procedure) consists of minerals (other than iron and manganese) and is considered immobile as the copper in this phase is primarily contained in the crystalline lattice of minerals (Gleyzes et al. 2002). Copper associated with the residual phase is not expected to be released in solution over a reasonable time span under the conditions normally encountered in nature (Tessier et al. 1979).The organic and residual fractions are stable under the mildly reducing conditions present in the lagoon area. Despite elevated concentrations of copper detected in soil and sediments, the concentrations of copper detected in groundwater and pore water are less than the screening level, with two sporadic exceptions, which indicates the copper detected in the solid phase is stable.

5. Conceptual Site Model

This section presents a CSM for hydrogeologic processes at HA-2, including the Upper and Lower Lagoons (sediment and surface water), surrounding berm/perimeter soil and underlying groundwater. The CSM also presents an evaluation of fate and transport of COCs and potential human and ecological exposure pathways. A conceptual depiction of the CSM is shown on Figure 33.

5.1 Groundwater Interaction with Surface Water

5.1.1 Tidal Study Results

Results of a tidal study conducted in 2012 indicate that shallow groundwater in the vicinity of the lagoons responds to tidal fluctuations of the San Francisco (SF) Bay and ESM, with the magnitude of that response decreasing inland away from the ESM (ARCADIS 2012b). Total tidal fluctuation in the San Francisco Bay and ESM observed during the study were approximately 6 feet and 4 feet, respectively. The largest tidal responses in groundwater were observed in A1/A2 piezometers located in the south berms that separate the Lagoons from the ESM. Tidal response in these wells typically ranged from approximately 0.8 to 1.3 feet. Lesser tidal responses (generally about 0.2 feet), were observed in both the A1/A2 and the B interval groundwater north (generally upgradient) of the lagoons. These tidal data indicate some hydraulic communication between groundwater beneath/surrounding the lagoons and the adjacent ESM.

5.1.2 Groundwater and Surface Water Geochemistry

Groundwater beneath the lagoons varies from brackish (with total dissolved solids [TDS] in the 3,000 to 5,000 mg/L range) to more saline (with TDS up to 15,000 mg/L; Table 23). Dissolved solids in both surface and groundwater are dominated by sodium and chloride, followed by magnesium and sulfate, with lesser amounts of calcium carbonate. Surface water samples collected in 2011 had TDS ranging from 25,000 mg/L in the Upper Lagoon to approximately 5,000 mg/L in the Lower Lagoon, and chloride ranging from 15,000 mg/L in the Upper Lagoon to approximately 1,300 mg/L in the Lower Lagoon. Groundwater interaction with surface water and the elevated concentrations of TDS previously measured in the Upper Lagoon are discussed further below.

5.1.3 B-Interval Groundwater Interaction with Surface Water

In general, groundwater in the B depth interval (generally corresponding to the Lower Horizon) is consistent with Lower Horizon groundwater elsewhere at the site and is characterized as having TDS of less than 5,000 mg/L (Table 24). This water is characterized as having similar contributions of sodium/chloride, magnesium sulfate, and calcium carbonate to the overall low salinity. These geochemical data indicate that B interval groundwater does not significantly mix with tidal groundwater of the ESM, surface water of the

lagoons, or A1/A2 interval groundwater beneath those lagoons. Based on the tidal influence observed in B-interval groundwater, it is expected that B-interval groundwater will undergo hydraulic mixing with groundwater underlying the ESM, prior to its ultimate discharge to the San Francisco Bay.

Based on geochemical, groundwater elevation, and COC data, it appears that groundwater in the B interval flows beneath the lagoon system with only limited interaction with the overlying surface or A1/A2 groundwater in the lagoons. There is evidence of some migration of COCs from an area of elevated concentrations of COCs in A2 groundwater beneath the middle berm, and this migration may result in the presence of low concentrations of pesticides in B-interval groundwater generally downgradient from the middle berm. Results of two rounds of groundwater sampling at PZ-21B indicate that concentrations of COCs from this pathway are below screening levels.

5.1.4 A1/A2-Interval Groundwater Interaction with Surface Water

Elevated TDS and chloride measured in A1/A2 groundwater, especially in wells surrounding the Upper Lagoon (up to 22,000 mg/L and 13,000 mg/L, respectively) indicate some mixing and communication of that water with saline surface water. The elevated concentrations of TDS observed in Upper Lagoon surface water were due to migration of saline surface water from the ESM into the Upper Lagoon, and subsequent migration of surface water from the Upper Lagoon into local shallow groundwater. In November 2011, TDS and chloride were measured in surface water collected from the Upper Lagoon at concentrations greater than that found in groundwater. The source of this elevated TDS and chloride appeared to be saline water leaking into the flapper valve on Outfall 002. Outfall 002 is located in the middle berm and releases stormwater directly to ESM through the flapper valve. Outfall 002 and the flapper valve were installed in 2002 as upgrades to the previous stormwater system. The flapper valve was designed to prevent intrusion of surface water from the ESM into the stormwater piping. However, at some period following installation, the flapper valve began to malfunction. Observations of the flapper valve and Outfall 002 in 2012 (and possibly earlier) indicated that saline surface water from the ESM bypassed that valve, and, during high tide, saline surface water migrated into the stormwater collection sump and subsequently discharged into the Upper Lagoon. This saline surface water then percolated into local shallow groundwater. Based on these observations, the malfunctioning flapper valve was repaired in December 2012. Since the valve was repaired, the Upper Lagoon has been relatively dry, indicating the effectiveness of the flapper valve repair in eliminating the migration of saline water into the Upper Lagoon. It is expected that the concentrations of TDS and chloride in groundwater surrounding the Upper Lagoon will decrease over time to ambient levels, similar to the TDS and chloride concentrations measured in the vicinity of the Lower Lagoon.

A1/A2 interval groundwater adjacent to the Lower Lagoon is characterized as being much lower in TDS (approximately 1,000 to 4,000 mg/L) and chloride (approximately 200 to 1,000 mg/L) reflecting the lower TDS and chloride encountered in surface water of the Lower Lagoon (approximately 5,000 mg/L and 1,300 mg/L, respectively).

Overall, these geochemical data indicate some hydraulic connection between the surface water of the lagoons with the groundwater surrounding those lagoons, with an apparent net flux or mixing of surface water into A1/A2 interval groundwater, and provide an additional line of evidence to support the inferred groundwater flow lines depicted on Figures 8, 9, 10, and 11.

5.2 Fate and Transport of COCs

Major components of the CSM are described below and shown on Figure 33.

5.2.1 Leaching from Soils/Sediments to Pore Water and A1/A2 Groundwater

Based on the distribution of TDS and COCs, and groundwater elevation data, it appears that COCs in sediments and/or soils (specifically arsenic, EPTC, and pebulate) can partition to pore water and/or A1/A2 groundwater. This discussion focuses on EPTC, pebulate, and arsenic. These COCs have been detected in groundwater directly downgradient from the lagoons in wells installed in the respective south berms at concentrations that exceed applicable screening levels. Copper was only detected in one sample above its screening level during the PDI and previous sampling events, and it is only detected occasionally (at concentrations less than screening levels) at other locations (e.g., total of 13 detections in 96 samples; see Table 6).

5.2.1.1 Leaching of Arsenic

The concentrations of arsenic detected in the Upper Lagoon sediments and in the Upper Lagoon berm soils are more elevated than in the Lower Lagoon sediments and in Lower Lagoon berm soils. Arsenic concentrations in pore water from the Upper and Lower Lagoons, however, are very similar on average, and are approximately equal to the screening level on average, suggesting the lagoon sediments are not leaching arsenic at concentrations greater than screening levels. These data indicate that the primary source of arsenic resulting in arsenic concentrations above screening levels in groundwater within the Upper Lagoon south berm is Upper Lagoon south berm soils (including that associated with cinder), rather than transport of pore water from the Upper Lagoon sediments. Furthermore, the concentrations of arsenic detected in extracted pore water are not direct measurements of groundwater as described in Section 4.4.6.

Distribution coefficient (K_d) calculations were attempted for arsenic using sediment and pore water data, but no linear relationship exists between arsenic concentration in the solid phase and arsenic concentration in the aqueous phase. No clear correlation therefore exists between arsenic concentration in soils/sediments and arsenic in groundwater or pore water. This further supports a lack of widespread, consistent, and direct leaching of arsenic from solid phases and suggests more complex influences on arsenic mobility.

Arsenic concentrations in groundwater from the Upper Lagoon south berm are greater than in groundwater from the Lower Lagoon south berm; arsenic concentrations in groundwater at the Lower Lagoon south berm are below screening levels. The maximum arsenic concentrations detected in groundwater in the Upper Lagoon south berm are also greater than the concentrations detected in sediment pore water in the Upper Lagoon (with one exception, which is not in proximity to the berm), indicating that arsenic in Upper Lagoon sediment is not the only or the primary source of arsenic that results in concentrations above screening levels in groundwater within the Upper Lagoon south berm. Lithologic logs for borings completed within and around the lagoons, including in the Upper Lagoon south berm, indicate the presence of cinder materials. Elsewhere at the site, cinder materials have been shown to actively oxidize and leach acidity and metals to groundwater. However, the results of specialized testing and geochemical parameter data indicate that cinders observed in HA-2 sediment are not actively oxidizing to leach acidity and metals (Section 4.4). Arsenic concentrations in groundwater at the Upper Lagoon south berm were historically below the screening level and have increased steadily since monitoring began in 2002 (Appendix D and Table 20). If cinders or arsenic in sediment were significant, steady sources of arsenic to groundwater, historical arsenic concentrations would be expected to have been greater than the screening level.

The majority of arsenic present in soil from the Upper Lagoon south berm is associated with iron minerals (based on SSE data, Appendix D). Redox conditions can alter iron mineral stability and therefore affect the mobility of arsenic. For example, the introduction of dissolved oxygen to pyrite cinders can result in the oxidation of iron sulfide and potential release of arsenic as As(III) (Yu et al., 2007). The concentration of As(III) was higher in samples with higher total dissolved arsenic concentrations. The predominance of As(V) in one of the samples with a lower total dissolved arsenic concentration is consistent with this conceptual model. These specialized test results suggest desorption of reduced arsenic [As(III)] from pyrite cinders (arsenic associated with sulfide minerals). Similarly, arsenic associated with iron hydroxide minerals may be mobilized through reductive dissolution of arsenic-containing iron minerals; however, this process may be less prevalent given the relatively low concentration of arsenic detected in lagoon sediment porewater. Trends in arsenic concentration over time are also correlated with iron concentrations, indicating the importance of local geochemical conditions (specifically, redox potential and alteration of iron minerals) on arsenic mobility. Based on these observations, it appears that the concentration of arsenic detected in groundwater samples collected from wells completed in the Upper Lagoon south berm are influenced locally by arsenic detected in soil, observations of cinders, and temporal changes in geochemical conditions.

Elevated concentrations of arsenic in groundwater samples from wells MW-16A, MW-17, and PZ-14 may be influenced by the construction of these wells/piezometers. These wells were constructed with approximately 10 feet of well screen that penetrates into the native material beneath the non-native Upper Lagoon south berm soils (including those containing arsenic and cinders). Due to the well screen extending into the native material, these wells experience relatively large water level fluctuations with the tides (up to 1.3 feet; Section 5.1.1). These water level fluctuations may influence the geochemical conditions by introducing oxygen into the shallow A-zone groundwater and may contribute to arsenic dissolving from the Upper Lagoon south berm soils (including arsenic associated with cinder) to A-zone groundwater in the wells. Piezometers PZ-20A1 and PZ-20A2 were constructed with less than 5-feet of well screen in the A-zone in the Upper Lagoon south berm between wells MW-17 and PZ-14. PZ-20A1 and PZ-20A2 have similar concentrations of arsenic in adjacent soil samples and observations of cinder as MW-17 and PZ-14. However, water levels at PZ-20A1 and PZ-20A2 experience less fluctuation with the tides, and these wells have relatively lower concentrations of arsenic in groundwater samples. Based on these observations, the shorter well screens at wells PZ-20A1 and PZ-20A2 may provide a more accurate measurement of arsenic in groundwater in the Upper Lagoon south berm. The arsenic speciation, SSEs, and other geochemistry data support the conclusion that changing geochemical conditions in the south berm may mobilize arsenic from soils to groundwater (see Appendix D). The changing geochemical conditions may be artificially greater in the wells with tidal fluctuations. Appendix D details the potential mechanisms which may result in the release of arsenic through either oxic conditions or reducing conditions.

5.2.1.2 Leaching of Other Metals

Other metal COCs at HA-2 include copper, nickel, lead, mercury, and zinc. Dissolved nickel, lead, mercury, and zinc were not detected in groundwater or pore water at concentrations above their respective screening levels, indicating leaching of these metals from soil and sediment is not a concern.

Copper was detected during this investigation in only one groundwater sample (PZ-20A1; 28 µg/L) at a concentration greater than the screening level and was not detected in pore water at concentrations greater than the screening level, despite elevated concentrations in sediments and soils. This detection was in the filtered groundwater sample, whereas copper was not detected in the unfiltered sample, and concentrations of iron, lead, manganese, and zinc were higher in the filtered sample, suggesting a potential error in labeling and reporting for the sample (e.g., filtered sample may not have been filtered). Historically, only one sample had a copper concentration greater than the screening level (PZ-20A1, 2011, 98 µg/L), which is the same location as the PDI exceedance. Based on the SSE data, copper is associated primarily with the organic and residual fractions of soil and sediment. These fractions are stable under the mildly reducing conditions present in the lagoons area as described in Section 4.6 and Appendix D. Leaching of copper from soil and sediment is therefore not a concern at HA-2.

5.2.1.3 Leaching of EPTC and Pebulate

As discussed above, groundwater with concentrations of EPTC and/or pebulate at or above screening levels is generally limited to the middle berm (PZ-19A1/A2), the southeastern corner of the Upper Lagoon south berm (PZ-14), and western half of the Lower Lagoon south berm (PZ-21A1/A2 and PZ-15). The presence of EPTC and/or pebulate in groundwater is correlated with the elevated concentrations of these pesticides in sediments surrounding or upgradient from this area.

As described below, two approaches were used to develop a site-specific sediment screening level for potential leaching of EPTC and pebulate to groundwater to delineate portions of the lagoons that represent a potential threat to groundwater.

<u>USEPA Screening Level Calculator</u>

The USEPA Region IX Regional Screening Level (RSL) Calculator was used to calculate a site-specific screening level for EPTC and pebulate in sediments for the soil to groundwater leaching pathway (USEPA, 2013). Within the RSL calculator, the "soil to groundwater" scenario was selected, and Method 1 (Partitioning Equation from Soil to Groundwater) was used. Default inputs were then used with three exceptions: the fraction of organic carbon was changed from the default 0.002 to a site-specific value 0.07 (i.e., 7%, based on PDI data presented in Appendix C), the water filled porosity was changed from the default 0.3 to a site-specific value 0.75 to reflect the water saturated condition of the sediments and the dry bulk density was changed from the default of 1.5 to the site-specific value 0.4 based on data collected during previous treatability testing (ARCADIS 2012a). The default Dilution Attenuation Factor of 1 was retained for this analysis to ensure a conservative approach to developing the screening level.

Using these inputs, and based on the USEPA drinking water pathway the RSL calculator produced RSLs[2] of 3,820 and 9,540 µg/kg for EPTC and pebulate in soil/sediment, respectively. These output values were then multiplied by a correction factor to account for the (lower) site-specific groundwater screening level endpoint for this site. This correction factor was calculated by dividing the site-specific groundwater goal

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[2] RSLs are risk-based concentrations derived from standardized equations combining exposure information assumptions with EPA toxicity data. SLs are considered by USEPA to be protective for humans over a lifetime; however, SLs are not always applicable to a particular site and do not address ecological receptors. The SLs contained in the SL table are generic; they are calculated without site-specific information. They were re-calculated using site-specific data in the RSL Calculator. USEPA Regions 3, 6, and 9. 2013 Regional Screening Levels for Chemical Contaminants at Superfund Sites. http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/index.htm

(220 µg/L for EPTC and 120 µg/L for pebulate) by the corresponding drinking water RSL in the RSL calculator (286 µg/L for EPTC and 418 µg/L for pebulate), resulting in correction factors of 0.77 and 0.29 for EPTC and pebulate, respectively. Using these values resulted in calculated, site-specific screening levels of 2,941 µg/kg for EPTC and 2,767 µg/kg for pebulate. The RSL calculator print-out is included in Appendix H.

Estimated Site-Specific Soil-Water Partition Coefficients

The pore water data and bulk sediment data were evaluated to estimate site-specific soil-water adsorption coefficients (K_d) for EPTC and pebulate. For organic compounds, the adsorption coefficient is estimated by multiplying the organic carbon normalized soil-water partition coefficient (K_{oc}) by the fraction of organic content (f_{oc}) of the soils. EPTC and pebulate have a published K_{oc} of 164 milliliters per gram (mL/g) and 299 mL/g, respectively (USEPA, 2013). The K_d was calculated empirically by dividing the concentration in the bulk sediment by the concentration measured in pore water. The empirical K_d was then averaged (excluding two data outliers) to provide one empirical K_d for EPTC (14.4 mL/g) and for pebulate (36.6 mL/g). For comparison with the empirical K_d, the K_d was also calculated by multiplying the published K_{oc} by the f_{oc} for the sediment extracted for pore water. The average calculated K_d (excluding two data outliers) was 13.7 mL/g for EPTC and for 24.9 mL/g pebulate. These calculations are provided as Appendix H.

These data were then used to estimate site-specific sediment screening levels for evaluation of leaching of EPTC and pebulate from sediments at concentrations which may exceed groundwater screening levels. The average calculated K_d and the average empirical K_d were multiplied by the groundwater screening levels. The lower resulting sediment concentration, approximately 3,000 µg/kg for both EPTC and pebulate, was selected for use as a site-specific sediment screening level. This concentration is equivalent to the values calculated using USEPA's RSL calculator.

Delineation Based on Site-Specific Screening values

Based on these site-specific screening values of 3,000 µg/kg, the lateral extent of EPTC and pebulate in sediment concentrations which may result in groundwater concentrations of pesticides at or above leaching screening levels includes the following:

- Lower Lagoon: Concentrations of EPTC and/or pebulate greater than 3,000 µg/kg are generally limited to sediments in the western portion of the Lower Lagoon (LL-1, LL-2, LL-4, LL-14, LL-28, LL-32, LL-33, LL-34, LL-35, LL-36, and LL-41) and are greatest in the northwestern portion of the Lower Lagoon. These concentrations were limited to the shallow lagoon sediments (0.0 to 3.0 feet bss) with exception of LL-1 (4.0 to 4.5 feet bss).

- Upper Lagoon: Pebulate was detected more frequently and at greater concentrations in the Upper Lagoon than EPTC. Concentrations of EPTC and/or pebulate greater than 3,000 µg/kg are generally

limited to sediments in the northern and eastern portion of the Upper Lagoon (UL-1, UL-2, UL-6, UL-9, UL-10, UL-11, UL-28, UL-32, UL-33, and UL-34). The vertical extent of these EPTC and pebulate concentrations in the Upper Lagoon is generally between 0.5 ft bss and 10 ft bss, with the most elevated concentrations located between 5 and 10 ft bss.

The EPTC and pebulate concentrations in soil and sediment were contoured (using MVS) and are shown on Figures 17 to 23. The groundwater concentrations exceeding the screening levels for EPTC and pebulate at the Upper and Lower Lagoon south berms are shown on Figures 28 and 29.

This conceptual model is confirmed with groundwater quality data that indicates that the occurrence of groundwater with pesticides above screening levels is limited to areas directly downgradient from these sediments (PZ-19A1, PZ-19A2, PZ-21A1, PZ-21A2, PZ-14, and PZ-15).

Because the berm/upland soils (non-native material) have lower organic content than sediments, they would have a lower soil-water partitioning coefficient. However, only a limited number of soil samples in HA-2 had detectable concentrations of EPTC or pebulate. EPTC and pebulate soil concentrations which may result in groundwater concentrations of pesticides at or above leaching screening levels are limited to a few sample locations (PZ-19A2, Ul-16, UL-17, UL-23, UL-24, and PZ-17B [located north of HA-2]). Generally, the HA-2 berm/upland soils represent a much smaller source of EPTC and pebulate which may leach to groundwater.

5.2.2 Potential Migration of COCs from Groundwater to ESM

Based on geochemical and groundwater elevation data, it appears that groundwater in the B interval flows beneath the lagoon system and does not mix significantly with shallower A//A2 groundwater.

A1/A2 groundwater is expected to undergo tidal mixing with groundwater beneath ESM, and ultimately discharge into ESM and/or San Francisco Bay. As described in Section 4.3.1, the HA-2 site specific DF of 5 times is based on hydraulic mixing. It is also important to note that these mixing estimates represent a *minimum* dilution attenuation factor, in that they consider only hydraulic mixing, and do not consider chemical reactions (sorption, abiotic, and biotic reactions) that can occur along the pathway from HA-2 to ESM. Along this pathway COCs in groundwater are anticipated to naturally attenuate via soil/water partitioning, abiotic hydrolysis, volatilization, and mixing. As indicated in Section 4.3.1, additional investigation and data collection was conducted to confirm that the DF for HA-2 is at least 5-times (ARCADIS 2014a and 2014b). As such, use of the 5 times hydraulic mixing value for a site DF is considered highly conservative and is appropriate for use.

5.2.3 Migration of COCs to Lagoon Surface Water

Migration of COCs from lagoon sediments into lagoon surface water is not a pathway of concern. This conclusion is based on observations that the hydraulic gradient of the surface/A zone groundwater system is downward, toward the shallow groundwater (i.e., groundwater is not discharging into the lagoons). As such, migration of COCs into surface water is limited to entrainment of COC-affected sediments and or leaching of COCs from sediments in contact with surface water. Surface water samples collected from the Lower Lagoon in November 2011 contained detectable concentrations of PPs but at levels below screening values (Phase I Treatability Tests; ARCADIS 2012a). Surface water samples from the Lower Lagoon in April 2012 did not contain detectable concentrations of PPs (Phase II Treatability tests, ARCADIS 2012d). Stormwater samples collected from Outfall 001in 2012 contained relatively low concentrations (<5 µg/L) of PPs and relatively low concentrations of metals in filtered and unfiltered samples (arsenic <10 µg/L; copper < 15 µg/L; zinc <40 µg/L) (Terraphase 2012). These surface water and stormwater data indicate that that these potential pathways do not result in an exceedance of screening levels.

5.3 Potential Human and Ecological Exposures

Potential human and ecological receptors and potential exposure pathways were evaluated as part of the revised CSM. The key elements of an exposure pathway include:

- A potential or suspected source and mechanism of chemical release
- A retention or transport medium
- A point of potential human/ecological contact (current and future receptors)
- An exposure route at the contact point

Consistent with USEPA guidance, each of these elements must be present for an exposure pathway to be complete (USEPA 1989). In the absence of a complete exposure pathway, it can be assumed that there would be no exposure, and consequently no risk to humans and ecological receptors associated with site-related chemical constituents. For this site, the upland portion of HA-2 (soils) and the Lagoons (sediments) will be evaluated separately.

A baseline risk evaluation will be conducted to evaluate potential impacts to human and ecological receptors potentially exposed to site-related compounds in soils located in the upland portion of HA-2 only (i.e., the areas surrounding the lagoons).

For the sediments, unacceptable risk is considered presumptive (i.e., concentrations of COCs in lagoon sediments are significantly elevated to indicate risk based on a comparison to screening levels; ARCADIS 2011b). Therefore, a baseline risk evaluation is not necessary for sediments. As part of the FS, remedial action objectives will be developed which include elimination of potential exposure pathways to sediment for ecological receptors. The selected remedy will eliminate exposure pathways to sediment for ecological receptors. As described in Section 5.2, the primary fate and transport pathway of concern for COCs in sediments is potential leaching to groundwater and subsequent exposure of ecological receptors to groundwater within ESM. Site-specific groundwater screening levels have been developed as described in Section 4.3 and will be used to evaluate this pathway.

6. Conclusions

The PDI was conducted to further characterize the distribution, nature, extent, and fate and transport of COCs within sediment, soil, pore water, and groundwater and to refine the CSM including potential leaching of COCs from soils/sediments to pore water and groundwater. A summary of the key conclusions of the PDI and the updated CSM is provided below.

- The vertical and horizontal extent of COCs and in sediments in the Lower and Upper Lagoons, and in soils and groundwater within HA-2 has been delineated. Metals (particularly arsenic) and PPs (EPTC and pebulate) are the primary COCs of concern in HA-2. These COCs have been detected in groundwater downgradient from the lagoons at concentrations that exceed applicable screening levels.
  - Lagoon sediments (non-native material) and associated pore water contain elevated concentrations of metals and PPs. Berm and upland soils, particularly those containing cinder material or fill material (concrete/brick debris), contain elevated concentrations of metals. PPs were detected infrequently in berm and upland soils.
  - PCBs were detected infrequently in soil and sediment samples from HA-2 and have only been identified at elevated concentrations in samples collected within the Upper Lagoon sediments and in soils north of the Upper Lagoon, adjacent to Lot 3.
  - DDT and/or DDE were detected relatively infrequently in shallow Lower Lagoon sediments and in the upper 5 feet of Upper Lagoon sediments. Elevated concentrations of DDT and DDE were detected in varying soil types and depth intervals in upland soils and fill around the lagoons.
  - The native clay material underlying the berms and Lagoon sediments does not have elevated concentrations of COCs.
  - Groundwater with concentrations of arsenic above screening levels is limited to the Upper Lagoon south berm, which separates the Upper Lagoon from the ESM and the middle berm between the Upper and Lower Lagoons (Figure 27). Groundwater with EPTC or pebulate concentrations above screening levels is generally limited to the middle berm area (PZ-19A2), and the south berm that separates the lagoons from the ESM (e.g., wells PZ-21 A1/A2, PZ-14, and PZ-15; see Figures 28 and 29).
- Evaluation of the specialized test and pore water data were used to refine the CSM and fate and transport evaluation. The key CSM components and conclusions include:
  - Arsenic in groundwater: Cinder was observed more frequently, and arsenic concentrations were higher in soil samples collected from the Upper Lagoon south berm relative to soil samples collected from the Lower Lagoon south berm. Soluble dissolved arsenic detected in groundwater is associated with local geochemical conditions and ferrous iron, suggesting dissolution of As(III) and alteration of arsenic-containing iron minerals, some of which may be associated with cinders. Concentrations of arsenic detected in groundwater samples collected from the Upper Lagoon south berm are influenced locally by arsenic detected in the berm soil (including that associated with cinder) and temporal changes in geochemical conditions. Arsenic in Upper Lagoon sediment may be contributing to arsenic detected in groundwater, but Upper Lagoon sediment is not the primary

source of arsenic in downgradient groundwater based on specialized testing and evaluation of the pore water data and historical groundwater data. Arsenic concentrations in soil and in groundwater in the Lower Lagoon south berm are lower than in the Upper Lagoon south berm. Based on geochemical parameter data, geochemical conditions in groundwater downgradient of the Lower Lagoon and the low concentrations of arsenic in soils (at the Lower Lagoon south berm) are unlikely to mobilize arsenic by the mechanisms influencing arsenic concentrations at the Upper Lagoon south berm. Arsenic in detected in Lower Lagoon sediment and pore water does not appear to be impacting downgradient groundwater based on groundwater data.

- Copper in groundwater: Copper has been detected infrequently in groundwater and was detected during this investigation in only one groundwater sample (and no pore water samples) at a concentration greater than its screening level, despite widespread elevated concentrations in sediments and soils. Copper was detected in groundwater twice at one location at concentrations above the screening level (PZ-20A1, in 2011 and 2013). Copper present in soil and sediment is associated primarily with the organic and residual (mineral) fractions of soil and sediment. Copper associated with these fractions is stable and unlikely to be mobilized under the mildly reducing conditions present in the lagoons area. Leaching of copper from soil and sediment is a remote possibility but is not a significant concern at HA-2.
- Other metals in groundwater: Dissolved nickel, lead, mercury, and zinc were not detected in groundwater or pore water at concentrations above their respective screening levels, indicating leaching of these metals from soil and sediment is not a concern.
- EPTC and Pebulate in groundwater: The primary source of EPTC and/or pebulate detected in groundwater at the south berm (downgradient of the lagoons) is leaching from lagoon sediments. The Lower Lagoon has a larger area of impacted sediments and generally greater concentrations of EPTC and pebulate, although a few locations within the Upper Lagoon have relatively elevated concentrations of pebulate. A site-specific sediment screening level of 3,000 µg/kg was developed to estimate the extent of sediments with potential to leach to groundwater above screening levels.

- Geotechnical data were collected to support the subsequent FS and the future evaluation of potential remedial alternatives. These data will be used in the FS to assess static and seismic stability of earthen berms south of and between the Lower Lagoon and Upper Lagoon, including along the area near wells MW-16A and MW-16B where a seep has been observed. The data will also be used in the FS to evaluate constructability issues related to remedial alternatives and adding height to the berms for potential future sea level rise.

7. Path Forward

As required by the DTSC, the PDI investigation was completed as documented in this Report. This report has been revised based on comments DTSC provided in letters dated April 3, 2014, July 18, 2014 and October 9, 2014. The PDI data collection objectives have been met. The following activities were recently completed for HA-2:

- The Screening Level Treatability Tests were conducted using sediment samples collected during the PDI. The Screening Level Treatability Test results were submitted to DTSC in May2014 and October 2014. The DTSC approved the May 2014 Screening Level Treatability Test Report in a letter dated September 8, 2014.

- The additional pore water sampling to evaluate the DF for HA-2 was conducted in January 2014 following DTSC approval of the revised Pore Water Field Sampling Plan Work Plan. The results were submitted to DTSC on April 10, 2014. The DTSC concurred that the DF of 5 times may be used for HA-2 in a letter dated July 8, 2014.

Following DTSC approval of this Report, a FS and Remedial Action Plan (RAP) will be prepared as required by the DTSC Order. Depending on the schedule for the preceding activities, it is anticipated that the FS/RAP will be submitted in the first quarter of 2015.

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Tables

Tables

Table 1
Pre-Design Investigation Sample Matrix
Pre-Design Investigation Report
HA-2, Campus Bay, Richmond, California

Sample Location	Characterization		Specialized Tests					Geotechnical Tests	
	Chemistry	Pore Extraction and Analysis	Geochemistry (Pore Water or Groundwater)	Arsenic Speciation	Arsenic and/or Copper Sequential Selective Extractions	Acid Base Accounting	Assessment of Impact of Salinity on Arsenic Mobility	In Situ Tests	Laboratory Tests
HA-2 Upper and Lower Lagoons									
UL-25	X	X			X	X			
UL-26	X	X	X	X	X	X			
UL-27	X								X
UL-28	X	X	X	X	X	X			X
UL-29	X								
UL-30	X	X	X	X	X	X			X
UL-31	X	X			X	X			
UL-32	X								
UL-33	X	X							X
UL-34	X	X			X	X			
LL-27	X								
LL-28	X	X			X	X			
LL-29	X	X							
LL-30	X								X
LL-31	X	X	X	X		X			X
LL-32	X	X							X
LL-33	X	X							
LL-34	X	X							
LL-35	X								
LL-36	X					X			
LL-37	X	X							
LL-38	X	X							X
LL-41	X								
VST-S1, VST-S2, VST-S3, VST-S4, VST-S5, VST-S6, VST-S8, VST-S9, VST-S10, VST-S11, and VST-S12								X	co-located with sediment sampling locations
HA-2 Upland Area Soil									
UL-20	X				X	X			
UL-21	X				X	X	X		
UL-22	X				X	X	X	X	X
UL-23	X				X	X			
UL-24	X							X	X
LL-25	X								
LL-26	X								
LL-39	X				X	X			
LL-40	X							X	X
VST-B1, VST-B2, and VST-B3								X	co-located with geotechnical soil boring locations
CPT-1, CPT-2, CPT-3, CPT-4, CPT-5, and CPT-6								X	co-located with soil boring locations
HA-2 Groundwater									
PZ-20A1/A2, PZ-19A2, PZ-21A1/A2, PZ-15, PZ-22A1/A2, and PZ-16	X		X						
MW-17, PZ-14, MW-16A, and PZ-19A1	X		X	X					
Grab Groundwater - UL-24	X								
Grab Groundwater - LL-39	X								

Table 2
May and October 2013 Groundwater Elevations
Pre-Design Investigation Report
HA-2, Campus Bay, Richmond, California

Well Name	Date	Top of Casing Elevation (feet NGVD29)	Depth to Water (feet below top of casing)	Groundwater Elevation (feet NGVD29)
MW-13	10/7/2013	13.18	10.39	2.79
MW-14	10/7/2013	12.92	10.17	2.75
MW-15	10/7/2013	16.83	14.14	2.69
MW-16A	5/23/2013	12.80	9.81	2.99
MW-16A	10/7/2013	12.72	9.67	3.05
MW-16B	10/7/2013	11.72	8.60	3.12
MW-17	5/23/2013	12.50	8.87	3.63
MW-17	10/7/2013	12.50	9.20	3.30
PZ-10	10/7/2013	13.19	8.94	4.25
PZ-13	10/7/2013	11.39	7.58	3.81
PZ-14	5/23/2013	11.93	7.13	4.80
PZ-14	10/7/2013	11.93	8.09	3.84
PZ-15	5/24/2013	7.49	4.15	3.34
PZ-15	10/7/2013	7.49	4.57	2.92
PZ-16	5/24/2013	6.71	3.60	3.11
PZ-17A1	10/7/2013	11.29	7.52	3.77
PZ-17A2	10/7/2013	10.78	6.95	3.83
PZ-17B	10/7/2013	11.39	7.76	3.63
PZ-18A1	10/7/2013	11.00	7.93	3.07
PZ-18A2	10/7/2013	11.12	7.12	4.00
PZ-19A1	5/23/2013	11.87	7.16	4.71
PZ-19A1	10/7/2013	11.87	8.62	3.25
PZ-19A2	5/23/2013	11.56	7.60	3.96
PZ-19A2	10/7/2013	11.56	8.39	3.17
PZ-20A1	5/24/2013	12.14	5.86	6.28
PZ-20A1	10/7/2013	12.14	8.46	3.68
PZ-20A2	5/23/2013	12.29	7.62	4.67
PZ-20A2	10/7/2013	12.29	8.48	3.81
PZ-20B	10/7/2013	12.09	8.64	3.45
PZ-21A1	5/24/2013	7.22	4.05	3.17
PZ-21A1	10/7/2013	7.22	4.38	2.84
PZ-21A2	5/24/2013	7.04	4.00	3.04
PZ-21A2	10/7/2013	7.04	4.46	2.58
PZ-21B	10/7/2013	7.11	4.41	2.70
PZ-22A1	5/24/2013	7.93	5.42	2.51
PZ-22A1	10/7/2013	7.93	7.22	0.71
PZ-22A2	5/24/2013	7.72	4.89	2.83
PZ-22A2	10/7/2013	7.72	5.10	2.62
PZ-22B	10/7/2013	7.65	4.88	2.77

Notes:
NGVD29 = National Geodetic Vertical Datum of 1929
NM = Not measured
May 2013 depth to water measurements were conducted prior to well sampling.
October 2013 depth to water measurements were conducted by Terraphase.

Table 3
Groundwater Screening Levels
Pre-Design Investigation Report
HA-2, Campus Bay, Richmond, California

Chemical	Saltwater Aquatic Criteria (a) (µg/L)		5x Saltwater Aquatic Criteria (b) (µg/L)
Inorganics			
Arsenic	36	(c)	180
Copper (d)	3.1	(c)	16.0
Lead (e)	8.1	(c)	41.0
Mercury	0.94	(c)	5.0
Nickel	8.2	(c)	41.0
Zinc (f)	81	(c)	410
Pesticides			
Butylate	55		280
Cycloate	47		240
EPTC	43		220
Molinate	35		180
Napromide	47		240
Pebulate	23		120
Vernolate	NC		NC

Notes:
CTR = California Toxics Rule
EPTC = s-ethyl dipropylthiocarbamate
mg/L = milligrams per liter
NC = indicates that the numerical value is not available for the chemical
NRWQC = National Recommended Water Quality Criteria
RWQCB = Regional Water Quality Control Board
SSG = site-specific goal
ug/L = micrograms per liter
USEPA = U.S. Environmental Protection Agency

(a) Saltwater Aquatic Criteria are the continuous concentration criteria, where available, from the following sources in order of preference: (1) more stringent of the Basin Plan (RWQCB 2006) and the CTR (USEPA 2000), (2) the NRWQC (USEPA 2006b).
(b) For upper horizon groundwater, between the biologically active permeable barrier area and East Stege Marsh, the dilution factor was set at 5 times the aquatic criteria based on the site-specific study (EKI 2008). Dilution/attenuation factors for groundwater discharging from HA-2 to East Stege Marsh are also set at 5 times the saltwater aquatic criteria based on a HA-2 site-specific study presented in Appendix X.
(c) These SSGs are expressed in terms of the dissolved fraction of the metal in the water column.
(d) The objective for copper is hardness dependent. The value in the table is for a hardness of 100 mg/L as CaCO3. At other hardnesses, the four-day average for copper is = 0.960*e^(0.8545*H - 1.702), where H = ln (hardness) as CaCO3 in mg/L (RWQCB 2006).
(e) The objective for lead is hardness dependent. The value in this table is for a hardness 100 mg/L as CaCO3. At other hardnesses, the four-day average lead value is = (1.46203 - 0.475712*H) *e^(1.273*H-4.705), where H = ln (hardness) as CaCO3 in mg/L (RWQCB 2006).
(f) The objective for zinc is hardness dependent. The value in the table is for a hardness of 100 mg/L as CaCO3. At other hardnesses, the four-day zinc value is = 0.986*e^(0.8473*H + 0.884), where H = ln (hardness) as CaCO3 in mg/L (RWQCB 2006).

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Table 4
Sediment Statistics
Pre-Design Investigation Report
HA-2, Campus Bay, Richmond, California

Parameter	Number Locations	Number Samples	Detections	Frequency Detected	Min RL	Max RL	Min Detected	Max Detected	Mean Detection	UCL	UCL methodology
Metal Concentrations in milligrams per kilogram (mg/kg)											
Antimony	13	42	19	45%	0.5	2.5	2.1	28	5.93	5.11	95% KM (% Bootstrap) UCL
Arsenic	45	170	170	100%	0.22	98	3.5	4800	299.59	522.50	Use 95% Chebyshev (Mean, Sd) UCL
Barium	13	42	42	100%	0.25	1.3	12	380	153.19	213.20	Use 95% Chebyshev (Mean, Sd) UCL
Beryllium	13	42	36	86%	0.1	0.5	0.21	0.93	0.46	0.47	95% KM (Percentile Bootstrap) UCL
Cadmium	13	42	31	74%	0.25	1.3	0.42	54	10.15	15.07	95% KM (Chebyshev) UCL
Chromium	13	42	42	100%	0.25	1.3	8.6	200	65.59	78.39	Use 95% Approximate Gamma UCL
Cobalt	13	42	42	100%	0.25	1.3	1.5	86	14.44	17.48	Use 95% Approximate Gamma UCL
Copper	45	170	170	100%	0.23	100	12	15000	1,254.91	2,093.00	Use 95% Chebyshev (Mean, Sd) UCL
Lead	45	170	170	100%	0.18	6.8	2.7	870	168.70	233.40	Use 95% Chebyshev (Mean, Sd) UCL
Mercury	45	170	168	99%	0.015	48	0.034	140	7.78	14.45	97.5% KM (Chebyshev) UCL
Molybdenum	13	42	30	71%	0.25	1.3	0.42	23	5.49	5.37	95% KM (Percentile Bootstrap) UCL
Nickel	45	170	170	100%	0.22	1.3	11	380	68.88	83.09	Use 95% Chebyshev (Mean, Sd) UCL
Selenium	13	42	28	67%	0.5	2.5	0.66	110	25.81	38.54	95% KM (Chebyshev) UCL
Silver	13	42	25	60%	0.25	1.3	0.61	14	2.93	2.63	95% KM (t) UCL
Thallium	13	43	3	7%	0.5	2.5	1.7	3.3	2.50	--	--
Vanadium	13	42	42	100%	0.25	1.3	19	150	53.45	59.58	Use 95% Approximate Gamma UCL
Zinc	45	170	170	100%	0.93	450	30	28000	2,083.72	3,524.00	Use 95% Chebyshev (Mean, Sd) UCL
Pesticide Concentrations in micrograms per kilogram (µg/kg)											
4,4'-DDD	22	58	19	33%	3.3	320	6.8	5900	383.36	582.00	95% KM (Chebyshev) UCL
4,4'-DDE	22	58	18	31%	3.3	320	6.3	970	275.57	139.80	95% KM (t) UCL
4,4'-DDT	22	58	2	3%	3.3	320	13	16	14.50	--	--
Aldrin	22	58	0	0%	1.7	170	NA	NA	NA	--	--
alpha-BHC	22	58	0	0%	1.7	170	NA	NA	NA	--	--
alpha-Chlordane	22	58	0	0%	1.7	170	NA	NA	NA	--	--
beta-BHC	22	58	0	0%	1.7	170	NA	NA	NA	--	--
Butylate	45	170	37	22%	23	12000	35	15000	1,762.84	605.60	95% KM (BCA) UCL
Cycloate	45	170	55	32%	23	12000	45	89000	5,710.42	4,601.00	95% KM (Chebyshev) UCL
delta-BHC	22	58	0	0%	1.7	170	NA	NA	NA	--	--
Dieldrin	22	58	0	0%	3.3	320	NA	NA	NA	--	--
Endosulfan I	22	58	0	0%	1.7	170	NA	NA	NA	--	--
Endosulfan II	22	58	0	0%	3.3	320	NA	NA	NA	--	--
Endosulfan sulfate	22	58	0	0%	3.3	320	NA	NA	NA	--	--
Endrin	22	58	0	0%	3.3	320	NA	NA	NA	--	--
Endrin aldehyde	22	58	0	0%	3.3	320	NA	NA	NA	--	--
EPTC	45	170	116	68%	57	29000	99	1300000	16,607.41	62,240.00	97.5% KM (Chebyshev) UCL
Fonofos	45	170	1	1%	23	12000	1900	1900	1,900.00	--	--
gamma-BHC	22	58	0	0%	1.7	170	NA	NA	NA	--	--
gamma-Chlordane	22	58	3	5%	1.7	170	7	460	171.67	--	--
Heptachlor	22	58	0	0%	1.7	170	NA	NA	NA	--	--
Heptachlor epoxide	22	58	2	3%	1.7	170	7.8	26	16.90	--	--
Methoxychlor	22	58	0	0%	17	1700	NA	NA	NA	--	--
Molinate	45	170	69	41%	23	12000	61	1700000	29,066.84	58,670.00	95% KM (Chebyshev) UCL
Napropamide	45	170	37	22%	23	12000	130	6600	1,149.73	555.80	95% KM (BCA) UCL
Pebulate	45	170	103	61%	23	12000	57	950000	21,799.94	51,914.00	97.5% KM (Chebyshev) UCL
Toxaphene	22	58	0	0%	59	5800	NA	NA	NA	--	--
Vernolate	45	170	64	38%	23	12000	72	180000	6,599.36	7,604.00	95% KM (Chebyshev) UCL

Table 4
Sediment Statistics
Pre-Design Investigation Report
HA-2, Campus Bay, Richmond, California

Parameter	Number Locations	Number Samples	Detections	Frequency Detected	Min RL	Max RL	Min Detected	Max Detected	Mean Detection	UCL	UCL methodology
SVOC Concentrations in micrograms per kilogram (µg/kg)											
2,4,5-Trichlorophenol	13	42	0	0%	330	80000	NA	NA	NA	--	--
2,4,6-Trichlorophenol	13	42	0	0%	330	80000	NA	NA	NA	--	--
2,4-Dichlorophenol	13	42	0	0%	330	80000	NA	NA	NA	--	--
2,4-Dimethylphenol	13	42	0	0%	330	80000	NA	NA	NA	--	--
2,4-Dinitrophenol	13	42	0	0%	670	160000	NA	NA	NA	--	--
2,4-Dinitrotoluene	13	42	0	0%	330	80000	NA	NA	NA	--	--
2,6-Dinitrotoluene	13	42	0	0%	330	80000	NA	NA	NA	--	--
2-Chloronaphthalene	13	42	0	0%	330	80000	NA	NA	NA	--	--
2-Chlorophenol	13	42	0	0%	330	80000	NA	NA	NA	--	--
2-Methylnaphthalene	13	42	0	0%	67	16000	NA	NA	NA	--	--
2-Methylphenol	13	42	0	0%	330	80000	NA	NA	NA	--	--
2-Nitroaniline	13	42	0	0%	670	160000	NA	NA	NA	--	--
2-Nitrophenol	13	42	0	0%	670	160000	NA	NA	NA	--	--
3,3'-Dichlorobenzidine	13	42	0	0%	670	160000	NA	NA	NA	--	--
3-Nitroaniline	13	42	0	0%	670	160000	NA	NA	NA	--	--
4,6-Dinitro-2-methylphenol	13	42	0	0%	670	160000	NA	NA	NA	--	--
4-Bromophenyl-phenylether	13	42	0	0%	330	80000	NA	NA	NA	--	--
4-Chloro-3-methylphenol	13	42	0	0%	330	80000	NA	NA	NA	--	--
4-Chloroaniline	13	42	0	0%	330	80000	NA	NA	NA	--	--
4-Chlorophenyl-phenylether	13	42	0	0%	330	80000	NA	NA	NA	--	--
4-Methylphenol	13	42	0	0%	330	80000	NA	NA	NA	--	--
4-Nitroaniline	13	42	0	0%	670	160000	NA	NA	NA	--	--
4-Nitrophenol	13	42	0	0%	670	160000	NA	NA	NA	--	--
Acenaphthene	13	42	0	0%	67	16000	NA	NA	NA	--	--
Acenaphthylene	13	42	0	0%	67	16000	NA	NA	NA	--	--
Anthracene	13	42	0	0%	67	16000	NA	NA	NA	--	--
Azobenzene	13	42	0	0%	330	80000	NA	NA	NA	--	--
Benzo(a)anthracene	13	42	1	2%	67	16000	110	110	110.00	--	--
Benzo(a)pyrene	13	42	1	2%	67	16000	120	120	120.00	--	--
Benzo(b)fluoranthene	13	42	2	5%	67	16000	120	270	195.00	--	--
Benzo(g,h,i)perylene	13	42	2	5%	67	16000	640	800	720.00	--	--
Benzo(k)fluoranthene	13	42	0	0%	67	16000	NA	NA	NA	--	--
Benzoic acid	13	42	0	0%	1700	400000	NA	NA	NA	--	--
Benzyl alcohol	13	42	0	0%	330	80000	NA	NA	NA	--	--
bis(2-Chloroethoxy)methane	13	42	0	0%	330	80000	NA	NA	NA	--	--
bis(2-Chloroethyl)ether	13	42	0	0%	330	80000	NA	NA	NA	--	--
bis(2-Chloroisopropyl) ether	1	4	0	0%	330	1700	NA	NA	NA	--	--
bis(2-Ethylhexyl)phthalate	13	42	1	2%	330	80000	91000	91000	91,000.00	--	--
Chrysene	13	42	1	2%	67	16000	120	120	120.00	--	--
Dibenz(a,h)anthracene	13	42	0	0%	67	16000	NA	NA	NA	--	--
Dibenzofuran	13	42	0	0%	330	80000	NA	NA	NA	--	--
Diethylphthalate	13	42	0	0%	330	80000	NA	NA	NA	--	--

Table 4
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Parameter	Number Locations	Number Samples	Detections	Frequency Detected	Min RL	Max RL	Min Detected	Max Detected	Mean Detection	UCL	UCL methodology
SVOC Concentrations in micrograms per kilogram (µg/kg)											
Dimethylphthalate	13	42	0	0%	330	80000	NA	NA	NA	--	--
Di-n-butylphthalate	13	42	0	0%	330	80000	NA	NA	NA	--	--
Di-n-octylphthalate	13	42	0	0%	330	80000	NA	NA	NA	--	--
Fluoranthene	13	42	4	10%	67	16000	120	610	325.00	--	--
Fluorene	13	42	0	0%	67	16000	NA	NA	NA	--	--
Hexachlorobenzene	13	42	0	0%	330	80000	NA	NA	NA	--	--
Hexachlorocyclopentadiene	13	42	0	0%	670	160000	NA	NA	NA	--	--
Hexachloroethane	13	42	0	0%	330	80000	NA	NA	NA	--	--
Indeno(1,2,3-cd)pyrene	13	42	0	0%	67	16000	NA	NA	NA	--	--
Isophorone	13	42	0	0%	330	80000	NA	NA	NA	--	--
Nitrobenzene	13	42	0	0%	330	80000	NA	NA	NA	--	--
N-Nitrosodimethylamine	13	42	0	0%	330	80000	NA	NA	NA	--	--
N-Nitroso-di-n-propylamine	13	42	0	0%	330	80000	NA	NA	NA	--	--
N-Nitrosodiphenylamine	13	42	0	0%	330	80000	NA	NA	NA	--	--
Pentachlorophenol	13	42	0	0%	670	160000	NA	NA	NA	--	--
Phenanthrene	13	42	3	7%	67	16000	130	330	200.00	--	--
Phenol	13	42	0	0%	330	80000	NA	NA	NA	--	--
Pyrene	13	42	7	17%	67	16000	110	1200	625.71	315.30	95% KM (t) UCL
VOC Concentrations in micrograms per kilogram (µg/kg)											
1,1,1,2-Tetrachloroethane	13	41	0	0%	4.5	2000	NA	NA	NA	--	--
1,1,2,2-Tetrachloroethane	13	41	0	0%	4.5	2000	NA	NA	NA	--	--
1,1,2-Trichloroethane	13	41	0	0%	4.5	2000	NA	NA	NA	--	--
1,1-Dichloroethane	13	41	0	0%	4.5	2000	NA	NA	NA	--	--
1,1-Dichloroethene	13	41	0	0%	4.5	2000	NA	NA	NA	--	--
1,2,3-Trichlorobenzene	13	41	0	0%	4.5	2000	NA	NA	NA	--	--
1,2,4-Trimethylbenzene	13	41	0	0%	4.5	2000	NA	NA	NA	--	--
1,2-Dibromo-3-Chloropropane	13	41	0	0%	4.5	2000	NA	NA	NA	--	--
1,2-Dibromoethane	13	41	0	0%	4.5	2000	NA	NA	NA	--	--
1,2-Dichlorobenzene	13	83	1	1%	4.5	80000	93	93	93.00	--	--
1,2-Dichloroethane	13	41	1	2%	4.5	2000	19	19	19.00	--	--
1,2-Dichloropropane	13	41	0	0%	4.5	2000	NA	NA	NA	--	--
1,3,5-Trimethylbenzene	13	41	0	0%	4.5	2000	NA	NA	NA	--	--
1,3-Dichlorobenzene	13	83	0	0%	4.5	80000	NA	NA	NA	--	--
1,3-Dichloropropane	13	41	0	0%	4.5	2000	NA	NA	NA	--	--
1,4-Dichlorobenzene	13	83	0	0%	4.5	80000	NA	NA	NA	--	--
2,2-Dichloropropane	13	41	0	0%	4.5	2000	NA	NA	NA	--	--
2-Butanone	13	41	0	0%	9	3900	NA	NA	NA	--	--
2-Chlorotoluene	13	41	0	0%	4.5	2000	NA	NA	NA	--	--
2-Hexanone	13	41	0	0%	9	3900	NA	NA	NA	--	--
4-Chlorotoluene	13	41	0	0%	4.5	2000	NA	NA	NA	--	--
4-Methyl-2-Pentanone	13	41	0	0%	9	3900	NA	NA	NA	--	--
Acetone	13	41	1	2%	18	7800	120	120	120.00	--	--

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Parameter	Number Locations	Number Samples	Detections	Frequency Detected	Min RL	Max RL	Min Detected	Max Detected	Mean Detection	UCL	UCL methodology
VOC Concentrations in micrograms per kilogram (µg/kg)											
Benzene	13	41	6	15%	4.5	2000	19	2200	449.33	179.70	95% KM (t) UCL
Bromobenzene	13	41	0	0%	4.5	2000	NA	NA	NA	--	--
Bromochloromethane	13	41	0	0%	4.5	2000	NA	NA	NA	--	--
Bromodichloromethane	13	41	0	0%	4.5	2000	NA	NA	NA	--	--
Bromoform	13	41	0	0%	4.5	2000	NA	NA	NA	--	--
Bromomethane	13	41	0	0%	9	3900	NA	NA	NA	--	--
Carbon Disulfide	13	41	1	2%	4.5	2000	8.6	8.6	8.60	--	--
Carbon Tetrachloride	13	41	0	0%	4.5	2000	NA	NA	NA	--	--
Chlorobenzene	13	41	0	0%	4.5	2000	NA	NA	NA	--	--
Chloroethane	13	41	0	0%	9	3900	NA	NA	NA	--	--
Chloroform	13	41	0	0%	4.5	2000	NA	NA	NA	--	--
Chloromethane	13	41	0	0%	9	3900	NA	NA	NA	--	--
cis-1,2-Dichloroethene	13	41	0	0%	4.5	2000	NA	NA	NA	--	--
Dibromochloromethane	13	41	0	0%	4.5	2000	NA	NA	NA	--	--
Dibromomethane	13	41	0	0%	4.5	2000	NA	NA	NA	--	--
Ethylbenzene	13	41	0	0%	4.5	2000	NA	NA	NA	--	--
Hexachlorobutadiene	13	83	0	0%	4.5	80000	NA	NA	NA	--	--
Methylene Chloride	13	41	0	0%	18	7800	NA	NA	NA	--	--
Naphthalene	13	83	0	0%	4.5	16000	NA	NA	NA	--	--
o-Xylene	13	41	0	0%	4.5	2000	NA	NA	NA	--	--
para-Isopropyl Toluene	13	41	0	0%	4.5	2000	NA	NA	NA	--	--
Propylbenzene	13	41	0	0%	4.5	2000	NA	NA	NA	--	--
sec-Butylbenzene	13	41	0	0%	4.5	2000	NA	NA	NA	--	--
tert-Butylbenzene	13	41	0	0%	4.5	2000	NA	NA	NA	--	--
Tetrachloroethene	13	41	0	0%	4.5	2000	NA	NA	NA	--	--
Toluene	13	41	2	5%	4.5	2000	1500	26000	13,750.00	--	--
trans-1,2-Dichloroethene	13	41	0	0%	4.5	2000	NA	NA	NA	--	--
trans-1,3-Dichloropropene	13	41	0	0%	4.5	2000	NA	NA	NA	--	--
Trichloroethene	13	41	1	2%	4.5	2000	28	28	28.00	--	--
Vinyl Acetate	13	41	0	0%	45	20000	NA	NA	NA	--	--
Vinyl Chloride	13	41	0	0%	9	3900	NA	NA	NA	--	--

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Parameter	Number Locations	Number Samples	Detections	Frequency Detected	Min RL	Max RL	Min Detected	Max Detected	Mean Detection	UCL	UCL methodology
PCB Concentrations in micrograms per kilogram (µg/kg)											
Aroclor-1016	26	67	0	0%	12	810	NA	NA	NA	--	--
Aroclor-1221	26	67	0	0%	24	1600	NA	NA	NA	--	--
Aroclor-1232	26	67	0	0%	12	810	NA	NA	NA	--	--
Aroclor-1242	26	67	0	0%	12	810	NA	NA	NA	--	--
Aroclor-1248	26	67	7	10%	12	810	130	1900	575.71	302.10	95% KM (BCA) UCL
Aroclor-1254	26	67	8	12%	12	810	23	950	235.63	74.48	95% KM (t) UCL
Aroclor-1260	26	67	11	16%	12	52	31	1100	192.00	98.61	95% KM (BCA) UCL
Aroclor-1262	1	1	0	0%	12	12	NA	NA	NA	--	--

Notes:
-- = UCL not calculated due to insufficient sample size (i.e., 5 detections and 8 total samples).
BHC = Benzene Hexa Chloride
DDE = Dichlorodiphenyldichloroethylene
DDT = Dichlordiphenyltrichloroethane
EPTC = S-ethyl dipropylthiocarbamate
NA = not applicable (no detections)
PCB = polychlorinated biphenyl
RL = reporting limit
SVOC = semivolatile organic compound
UCL = upper confidence limit
VOC = volatile organic compound
KM = Kaplan-Meier
KM (t) = UCL based upon Kaplan-Meier estimates using the Student's t-distribution cutoff value
KM (Chebyshev) = UCL based upon Kaplan-Meier estimates using the Chebyshev inequality
BCA = bias-corrected accelerated bootstrap method
The mean concentration calculation only includes concentrations detected above the laboratory reporting limit.
Sediment concentrations are on a dry weight basis.
Upper confidence limits (UCLs) were calculated using USEPA's ProUCL 4.1.00 software program (USEPA 2010a,b) for COPCs with eight or more sample points and at least five detects. The UCLs do not include duplicates. The parent sample concentration was used.

References:

USEPA. 2010a. ProUCL Version 4.1.00 Technical Guide (Draft). Statistical Software for Environmental Applications for Data Sets with and without Nondetect Observations. Prepared by Lockheed Martin Environmental Services for USEPA Office of Research and Development. U.S. Environmental Protection Agency. EPA/600/R-07/041. May.

USEPA. 2010b. ProUCL Version 4.1.00 User Guide (Draft). Statistical Software for Environmental Applications for Data Sets with and without Nondetect Observations. Prepared by Lockheed Martin Environmental Services for USEPA Office of Research and Development. EPA 600-R-07-038. May.

Table 5
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Parameter	Number Locations	Number Samples	Detections	Frequency Detected	Min RL	Max RL	Min Detected	Max Detected	Mean Detection	UCL	UCL methodology
Metal Concentrations in milligrams per kilogram (mg/kg)											
Antimony	30	105	36	34%	0.44	4.9	0.53	25	4.16	2.5	95% KM (t) UCL
Arsenic	39	144	144	100%	0.22	23	0.8	950	66.57	117.4	Use 95% Chebyshev (Mean, Sd) UCL
Barium	30	97	97	100%	0.22	25	13	12,000	274.71	824.6	Use 95% Chebyshev (Mean, Sd) UCL
Beryllium	30	98	90	92%	0.088	0.98	0.14	1	0.37	0.4	95% KM (t) UCL
Cadmium	30	97	82	85%	0.22	2.5	0.24	55	3.36	6.2	95% KM (Chebyshev) UCL
Chromium	30	97	97	100%	0.22	2.5	2.6	170	46.27	56.3	Use 95% Chebyshev (Mean, Sd) UCL
Cobalt	30	97	96	99%	0.22	2.5	0.64	39	10.66	11.6	95% KM (BCA) UCL
Copper	39	144	144	100%	0.22	32	11	4,200	277.95	469.7	Use 95% Chebyshev (Mean, Sd) UCL
Lead	39	144	144	100%	0.17	2.5	2.9	560	80.85	91.9	Use 95% Approximate Gamma UCL
Mercury	39	145	142	98%	0.016	1.9	0.022	16	1.79	3.2	97.5% KM (Chebyshev) UCL
Molybdenum	30	97	70	72%	0.22	2.5	0.25	16	2.39	3.0	95% KM (Chebyshev) UCL
Nickel	39	144	144	100%	0.22	2.5	7.3	190	50.50	55.1	Use 95% H-UCL
Selenium	30	106	37	35%	0.44	4.9	0.57	140	13.25	8.8	95% KM (BCA) UCL
Silver	30	97	31	32%	0.22	2.5	0.26	32	2.59	1.7	95% KM (BCA) UCL
Thallium	30	107	2	2%	0.44	4.9	0.54	5	2.92	--	--
Vanadium	30	97	97	100%	0.22	2.5	13	130	38.82	40.2	or 95% Modified-t UCL
Zinc	39	144	144	100%	0.88	170	25	6,600	429.85	453.0	Use 95% H-UCL
Pesticide Concentrations in micrograms per kilogram (µg/kg)											
4,4'-DDD	32	105	46	44%	3.2	330	4.2	2,300	234.83	248.1	95% KM (Chebyshev) UCL
4,4'-DDE	32	105	42	40%	3.2	3300	3.5	4,800	187.48	279.5	95% KM (Chebyshev) UCL
4,4'-DDT	32	105	51	49%	3.2	670	3.6	4,600	210.62	189.1	95% KM (BCA) UCL
Aldrin	32	105	2	2%	1.7	17	3.7	220	111.85	--	--
alpha-BHC	32	105	0	0%	1.7	17	NA	NA	NA	--	--
alpha-Chlordane	32	105	23	22%	1.7	170	1.7	920	74.29	61.1	95% KM (Chebyshev) UCL
beta-BHC	32	105	4	4%	1.7	17	1.8	3	2.58	--	--
Butylate	39	144	7	5%	22	1100	63	1,300	566.43	106.1	95% KM (t) UCL
Cycloate	39	144	11	8%	22	1100	51	83,000	8,667.55	4516.0	97.5% KM (Chebyshev) UCL
delta-BHC	32	105	1	1%	1.7	17	6.6	7	6.60	--	--
Dieldrin	32	105	15	14%	3.2	330	3.3	490	64.68	36.2	95% KM (Chebyshev) UCL
Endosulfan I	32	105	3	3%	1.7	17	2.6	94	52.20	--	--
Endosulfan II	32	105	2	2%	3.2	34	4.4	6	5.05	--	--
Endosulfan sulfate	32	105	1	1%	3.2	34	23	23	23.00	--	--
Endrin	32	105	3	3%	3.2	34	11	36	22.33	--	--
Endrin aldehyde	32	105	1	1%	3.2	34	2.2	2	2.20	--	--
EPTC	39	144	20	14%	54	2200	110	31,000	3,559.50	899.0	95% KM (BCA) UCL
Fonofos	39	144	1	1%	49	1100	1100	1,100	1,100.00	--	--
gamma-BHC	32	105	1	1%	1.7	17	31	31	31.00	--	--
gamma-Chlordane	32	105	20	19%	1.7	170	2.4	690	74.61	50.9	95% KM (Chebyshev) UCL
Heptachlor	32	105	0	0%	1.7	17	NA	NA	NA	--	--
Heptachlor epoxide	32	105	2	2%	1.7	17	2.3	7	4.80	--	--
Methoxychlor	32	105	0	0%	17	170	NA	NA	NA	--	--
Molinate	39	144	11	8%	22	1100	82	15,000	1,843.82	144.9	95% KM (t) UCL
Napropamide	39	144	25	17%	22	1100	69	57,000	3,402.04	2526.0	95% KM (Chebyshev) UCL
Pebulate	39	144	21	15%	22	1100	55	78,000	7,591.95	2580.0	95% KM (Chebyshev) UCL
Toxaphene	32	105	0	0%	59	610	NA	NA	NA	--	--
Vernolate	39	144	11	8%	22	1100	78	7,800	1,494.36	259.0	95% KM (BCA) UCL

Table 5
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Parameter	Number Locations	Number Samples	Detections	Frequency Detected	Min RL	Max RL	Min Detected	Max Detected	Mean Detection	UCL	UCL methodology
SVOC Concentrations in micrograms per kilogram (µg/kg)											
2,4,5-Trichlorophenol	16	41	0	0%	330	33000	NA	NA	NA	--	--
2,4,6-Trichlorophenol	16	41	0	0%	330	33000	NA	NA	NA	--	--
2,4-Dichlorophenol	16	41	0	0%	330	33000	NA	NA	NA	--	--
2,4-Dimethylphenol	16	41	0	0%	330	33000	NA	NA	NA	--	--
2,4-Dinitrophenol	16	41	0	0%	660	66000	NA	NA	NA	--	--
2,4-Dinitrotoluene	16	41	0	0%	330	33000	NA	NA	NA	--	--
2,6-Dinitrotoluene	16	41	0	0%	330	33000	NA	NA	NA	--	--
2-Chloronaphthalene	16	41	0	0%	330	33000	NA	NA	NA	--	--
2-Chlorophenol	16	41	0	0%	330	33000	NA	NA	NA	--	--
2-Methylnaphthalene	16	41	0	0%	66	6600	NA	NA	NA	--	--
2-Methylphenol	16	41	0	0%	330	33000	NA	NA	NA	--	--
2-Nitroaniline	16	41	0	0%	660	66000	NA	NA	NA	--	--
2-Nitrophenol	16	41	0	0%	660	66000	NA	NA	NA	--	--
3,3'-Dichlorobenzidine	16	41	0	0%	660	66000	NA	NA	NA	--	--
3-Nitroaniline	16	41	0	0%	660	66000	NA	NA	NA	--	--
4,6-Dinitro-2-methylphenol	16	41	0	0%	660	66000	NA	NA	NA	--	--
4-Bromophenyl-phenylether	16	41	0	0%	330	33000	NA	NA	NA	--	--
4-Chloro-3-methylphenol	16	41	0	0%	330	33000	NA	NA	NA	--	--
4-Chloroaniline	16	41	0	0%	330	33000	NA	NA	NA	--	--
4-Chlorophenyl-phenylether	16	41	0	0%	330	33000	NA	NA	NA	--	--
4-Methylphenol	16	41	0	0%	330	33000	NA	NA	NA	--	--
4-Nitroaniline	16	41	0	0%	660	66000	NA	NA	NA	--	--
4-Nitrophenol	16	41	0	0%	660	66000	NA	NA	NA	--	--
Acenaphthene	23	69	2	3%	4.9	6600	5.7	7	6.35	--	--
Acenaphthylene	23	69	5	7%	4.9	6600	5.6	47	15.66	10.7	95% KM (t) UCL
Anthracene	23	69	9	13%	4.9	6600	5.9	140	39.88	20.3	95% KM (t) UCL
Azobenzene	16	41	0	0%	330	33000	NA	NA	NA	--	--
Benzo(a)anthracene	23	69	16	23%	4.9	6600	5.6	420	88.40	53.5	95% KM (t) UCL
Benzo(a)pyrene	23	69	19	28%	4.9	6600	5.1	230	69.36	46.8	95% KM (t) UCL
Benzo(b)fluoranthene	23	69	21	30%	4.9	6600	6.6	470	96.09	67.4	95% KM (t) UCL
Benzo(g,h,i)perylene	23	69	13	19%	4.9	6600	6.7	120	50.75	29.1	95% KM (t) UCL
Benzo(k)fluoranthene	23	69	11	16%	4.9	6600	5.2	100	34.54	23.3	95% KM (t) UCL
Benzoic acid	15	40	0	0%	1600	170000	NA	NA	NA	--	--
Benzyl alcohol	16	41	1	2%	330	33000	350	350	350.00	--	--
bis(2-Chloroethoxy)methane	16	41	0	0%	330	33000	NA	NA	NA	--	--
bis(2-Chloroethyl)ether	16	41	0	0%	330	33000	NA	NA	NA	--	--
bis(2-Chloroisopropyl) ether	14	36	0	0%	330	33000	NA	NA	NA	--	--
bis(2-Ethylhexyl)phthalate	16	41	1	2%	330	33000	250	250	250.00	--	--
Chrysene	23	69	18	26%	4.9	6600	5.4	390	91.64	59.1	95% KM (t) UCL
Dibenz(a,h)anthracene	23	69	7	10%	4.9	6600	7.5	48	19.89	14.4	95% KM (t) UCL
Dibenzofuran	16	41	0	0%	330	33000	NA	NA	NA	--	--
Diethylphthalate	16	41	0	0%	330	33000	NA	NA	NA	--	--

Table 5
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Parameter	Number Locations	Number Samples	Detections	Frequency Detected	Min RL	Max RL	Min Detected	Max Detected	Mean Detection	UCL	UCL methodology
SVOC Concentrations in micrograms per kilogram (µg/kg)											
Dimethylphthalate	16	41	0	0%	330	33000	NA	NA	NA	--	--
Di-n-butylphthalate	16	41	0	0%	330	33000	NA	NA	NA	--	--
Di-n-octylphthalate	16	41	0	0%	330	33000	NA	NA	NA	--	--
Fluoranthene	23	69	21	30%	4.9	6600	5.6	1,000	150.86	100.0	95% KM (t) UCL
Fluorene	23	69	4	6%	4.9	6600	6.1	38	15.05	--	--
Hexachlorobenzene	16	41	1	2%	330	33000	33	33	33.00	--	--
Hexachlorocyclopentadiene	16	41	0	0%	660	66000	NA	NA	NA	--	--
Hexachloroethane	16	41	0	0%	330	33000	NA	NA	NA	--	--
Indeno(1,2,3-cd)pyrene	23	69	11	16%	4.9	6600	6.2	110	42.11	23.8	95% KM (t) UCL
Isophorone	16	41	0	0%	330	33000	NA	NA	NA	--	--
Nitrobenzene	16	41	0	0%	330	33000	NA	NA	NA	--	--
N-Nitrosodimethylamine	16	41	0	0%	330	33000	NA	NA	NA	--	--
N-Nitroso-di-n-propylamine	16	41	0	0%	330	33000	NA	NA	NA	--	--
N-Nitrosodiphenylamine	16	41	0	0%	330	33000	NA	NA	NA	--	--
Pentachlorophenol	16	42	1	2%	660	66000	0	0	0.00	--	--
Phenanthrene	23	69	18	26%	4.9	6600	10	600	132.28	82.4	95% KM (BCA) UCL
Phenol	16	41	0	0%	330	33000	NA	NA	NA	--	--
Pyrene	23	69	23	33%	4.9	6600	6.5	620	151.67	101.6	95% KM (t) UCL
VOC Concentrations in micrograms per kilogram (µg/kg)											
1,1,1,2-Tetrachloroethane	15	31	0	0%	4.1	7.8	NA	NA	NA	--	--
1,1,2,2-Tetrachloroethane	15	31	0	0%	4.1	7.8	NA	NA	NA	--	--
1,1,2-Trichloroethane	15	31	0	0%	4.1	7.8	NA	NA	NA	--	--
1,1-Dichloroethane	15	31	0	0%	4.1	7.8	NA	NA	NA	--	--
1,1-Dichloroethene	15	31	0	0%	4.1	7.8	NA	NA	NA	--	--
1,2,3-Trichlorobenzene	15	31	0	0%	4.1	7.8	NA	NA	NA	--	--
1,2,4-Trimethylbenzene	15	31	1	3%	4.1	7.8	11	11	11.00	--	--
1,2-Dibromo-3-Chloropropane	15	31	0	0%	4.1	7.8	NA	NA	NA	--	--
1,2-Dibromoethane	15	31	0	0%	4.1	7.8	NA	NA	NA	--	--
1,2-Dichlorobenzene	17	72	1	1%	4.1	33000	58	58	58.00	--	--
1,2-Dichloroethane	15	31	0	0%	4.1	7.8	NA	NA	NA	--	--
1,2-Dichloropropane	15	31	0	0%	4.1	7.8	NA	NA	NA	--	--
1,3,5-Trimethylbenzene	15	31	1	3%	4.1	7.8	19	19	19.00	--	--
1,3-Dichlorobenzene	17	72	0	0%	4.1	33000	NA	NA	NA	--	--
1,3-Dichloropropane	15	31	0	0%	4.1	7.8	NA	NA	NA	--	--
1,4-Dichlorobenzene	17	72	0	0%	4.1	33000	NA	NA	NA	--	--
2,2-Dichloropropane	15	31	0	0%	4.1	7.8	NA	NA	NA	--	--
2-Butanone	15	31	0	0%	8.2	16	NA	NA	NA	--	--
2-Chlorotoluene	15	31	0	0%	4.1	7.8	NA	NA	NA	--	--
2-Hexanone	15	31	0	0%	8.2	16	NA	NA	NA	--	--
4-Chlorotoluene	15	31	0	0%	4.1	7.8	NA	NA	NA	--	--
4-Methyl-2-Pentanone	15	31	0	0%	8.2	16	NA	NA	NA	--	--
Acetone	15	31	2	6%	16	31	19	46	32.50	--	--

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Parameter	Number Locations	Number Samples	Detections	Frequency Detected	Min RL	Max RL	Min Detected	Max Detected	Mean Detection	UCL	UCL methodology
VOC Concentrations in micrograms per kilogram (µg/kg)											
Benzene	15	31	0	0%	4.1	7.8	NA	NA	NA	--	--
Bromobenzene	15	31	0	0%	4.1	7.8	NA	NA	NA	--	--
Bromochloromethane	15	31	0	0%	4.1	7.8	NA	NA	NA	--	--
Bromodichloromethane	15	31	0	0%	4.1	7.8	NA	NA	NA	--	--
Bromoform	15	31	0	0%	4.1	7.8	NA	NA	NA	--	--
Bromomethane	15	31	0	0%	8.2	16	NA	NA	NA	--	--
Carbon Disulfide	15	31	0	0%	4.1	7.8	NA	NA	NA	--	--
Carbon Tetrachloride	15	31	0	0%	4.1	7.8	NA	NA	NA	--	--
Chlorobenzene	15	31	0	0%	4.1	7.8	NA	NA	NA	--	--
Chloroethane	15	31	0	0%	8.2	16	NA	NA	NA	--	--
Chloroform	15	31	0	0%	4.1	7.8	NA	NA	NA	--	--
Chloromethane	15	31	0	0%	8.2	16	NA	NA	NA	--	--
cis-1,2-Dichloroethene	15	31	0	0%	4.1	7.8	NA	NA	NA	--	--
Dibromochloromethane	15	31	0	0%	4.1	7.8	NA	NA	NA	--	--
Dibromomethane	15	31	0	0%	4.1	7.8	NA	NA	NA	--	--
Ethylbenzene	15	31	0	0%	4.1	7.8	NA	NA	NA	--	--
Hexachlorobutadiene	17	72	0	0%	4.1	33000	NA	NA	NA	--	--
Methylene Chloride	15	31	0	0%	16	31	NA	NA	NA	--	--
Naphthalene	24	76	4	4%	4.1	6600	6.3	11	8.60	--	--
o-Xylene	15	31	0	0%	4.1	7.8	NA	NA	NA	--	--
para-Isopropyl Toluene	15	31	1	3%	4.1	7.8	10	10	10.00	--	--
Propylbenzene	15	31	0	0%	4.1	7.8	NA	NA	NA	--	--
sec-Butylbenzene	15	31	0	0%	4.1	7.8	NA	NA	NA	--	--
tert-Butylbenzene	15	31	0	0%	4.1	7.8	NA	NA	NA	--	--
Tetrachloroethene	15	31	0	0%	4.1	7.8	NA	NA	NA	--	--
Toluene	15	31	0	0%	4.1	7.8	NA	NA	NA	--	--
trans-1,2-Dichloroethene	15	31	0	0%	4.1	7.8	NA	NA	NA	--	--
trans-1,3-Dichloropropene	15	31	0	0%	4.1	7.8	NA	NA	NA	--	--
Trichloroethene	15	31	0	0%	4.1	7.8	NA	NA	NA	--	--
Vinyl Acetate	15	31	0	0%	41	78	NA	NA	NA	--	--
Vinyl Chloride	15	31	0	0%	8.2	16	NA	NA	NA	--	--

Table 5
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Parameter	Number Locations	Number Samples	Detections	Frequency Detected	Min RL	Max RL	Min Detected	Max Detected	Mean Detection	UCL	UCL methodology
PCB Concentrations in micrograms per kilogram (µg/kg)											
Aroclor-1016	22	62	0	0%	9.4	15	NA	NA	NA	--	--
Aroclor-1221	22	62	0	0%	19	30	NA	NA	NA	--	--
Aroclor-1232	22	62	0	0%	9.4	15	NA	NA	NA	--	--
Aroclor-1242	22	62	0	0%	9.4	15	NA	NA	NA	--	--
Aroclor-1248	22	62	1	2%	9.4	15	510	510	510.00	--	--
Aroclor-1254	22	62	2	3%	9.4	15	32	42	37.00	--	--
Aroclor-1260	22	62	5	8%	9.4	15	11	55	29.20	14.1	95% KM (t) UCL
Aroclor-1262	15	23	3	13%	9.4	12	15	82	45.00	--	--

Notes:
-- = UCL not calculated due to insufficient sample size (i.e., 5 detections and 8 total samples).
BHC = Benzene Hexa Chloride
DDE = Dichlorodiphenyldichloroethylene
DDT = Dichlordiphenyltrichloroethane
EPTC = S-ethyl dipropylthiocarbamate
NA = not applicable (no detections)
PCB = polychlorinated biphenyl
RL = reporting limit
SVOC = semivolatile organic compound
UCL = upper confidence limit
VOC = volatile organic compound
KM = Kaplan-Meier
KM (t) = UCL based upon Kaplan-Meier estimates using the Student's t-distribution cutoff value
KM (Chebyshev) = UCL based upon Kaplan-Meier estimates using the Chebyshev inequality
BCA = bias-corrected accelerated bootstrap method
H-UCL = UCL based upon Land's H-statistic
The mean concentration calculation only includes concentrations detected above the laboratory reporting limit.
Historical soil data are on an as received basis. 2013 soil data are on a dry weight basis.
Upper confidence limits (UCLs) were calculated using USEPA's ProUCL 4.1.00 software program (USEPA 2010a,b) for COPCs with eight or more sample points and at least five detects. The UCLs do not include duplicates. The parent sample concentration was used.

References:

USEPA. 2010a. ProUCL Version 4.1.00 Technical Guide (Draft). Statistical Software for Environmental Applications for Data Sets with and without Nondetect Observations. Prepared by Lockheed Martin Environmental Services for USEPA Office of Research and Development. U.S. Environmental Protection Agency. EPA/600/R-07/041. May.

USEPA. 2010b. ProUCL Version 4.1.00 User Guide (Draft). Statistical Software for Environmental Applications for Data Sets with and without Nondetect Observations. Prepared by Lockheed Martin Environmental Services for USEPA Office of Research and Development. EPA 600-R-07-038. May.

Table 6
Groundwater Statistics
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Parameter	Number Locations	Number Samples	Detections	Frequency Detected	Min RL	Max RL	Min Detected	Max Detected	Mean Detection	2013 UCL	2013 UCL methodology
Dissolved Metal Concentrations in micrograms per liter (µg/L)											
Antimony	19	80	4	5%	1	100	18	27	22.25	--	--
Arsenic	19	97	67	69%	1	50	1.1	640	160.64	283.1	Use 95% Adjusted Gamma UCL
Barium	19	80	79	99%	1	50	17	470	96.04	--	--
Beryllium	19	80	0	0%	1	20	NA	NA	NA	--	--
Cadmium	19	83	0	0%	1	50	NA	NA	NA	--	--
Chromium	19	80	5	6%	1	50	6.2	14	10.00	--	--
Cobalt	19	80	7	9%	1	50	1.1	16	8.49	--	--
Copper	19	96	13	14%	1	50	2.5	98	16.65	--	--
Iron	14	16	13	81%	50	1000	120	79000	17,549.23	38,812	95% KM (Chebyshev) UCL
Lead	19	96	3	3%	1	50	4.5	68	27.83	--	--
Manganese	14	16	16	100%	5	50	270	39000	9,623.13	20,613	Use 95% Approximate Gamma UCL
Mercury	19	96	1	1%	0.2	0.2	0.34	0.34	0.34	--	--
Molybdenum	19	80	40	50%	1	50	2.2	29	13.88	--	--
Nickel	19	96	35	36%	1	50	2.2	36	10.49	4.13	95% KM (t) UCL
Selenium	19	83	5	6%	1	100	11	19	14.80	--	--
Silver	19	80	1	1%	1	50	6	6	6.00	--	--
Thallium	19	81	7	9%	1	100	11	160	35.00	--	--
Vanadium	19	80	14	18%	1	50	2.4	17	7.08	--	--
Zinc	19	96	10	10%	5	200	10	270	69.10	--	--
Pesticide Concentrations in micrograms per liter (µg/L)											
4,4'-DDE	19	74	0	0%	0.09	0.1	NA	NA	NA	--	--
4,4'-DDT	19	74	2	3%	0.09	0.1	0.1	0.1	0.10	--	--
Aldrin	19	74	0	0%	0.05	0.05	NA	NA	NA	--	--
alpha-BHC	19	75	2	3%	0.05	5	27	27	27.00	--	--
beta-BHC	19	75	5	7%	0.05	1	0.07	7.7	3.15	--	--
Butylate	21	144	13	9%	1	5	2.8	27	7.41	--	--
Cycloate	21	144	23	16%	1	5	2.8	34	15.83	8.84	95% KM (t) UCL
delta-BHC	19	75	2	3%	0.05	1	4.9	4.9	4.90	--	--
Dieldrin	19	74	0	0%	0.09	0.1	NA	NA	NA	--	--
Endosulfan II	19	74	0	0%	0.09	0.1	NA	NA	NA	--	--
Endosulfan sulfate	19	74	0	0%	0.09	0.1	NA	NA	NA	--	--
Endrin	19	74	0	0%	0.09	1.1	NA	NA	NA	--	--
Endrin aldehyde	19	74	0	0%	0.09	0.1	NA	NA	NA	--	--
EPTC	21	148	91	61%	1	200	1.2	2400	192.03	778.8	95% KM (Chebyshev) UCL
gamma-BHC	19	74	0	0%	0.05	0.05	NA	NA	NA	--	--
Heptachlor	19	74	0	0%	0.05	0.05	NA	NA	NA	--	--
Heptachlor epoxide	19	74	0	0%	0.05	0.05	NA	NA	NA	--	--
Molinate	21	144	45	31%	1	100	2	830	37.40	269.4	97.5% KM (Chebyshev) UCL
Napropamide	21	144	43	30%	1	5	2.6	33	10.50	9.03	95% KM (Percentile Bootstrap) UCL
Pebulate	21	144	82	57%	1	50	1.6	2600	170.24	675.5	95% KM (Chebyshev) UCL
Toxaphene	19	76	0	0%	0.9	1.1	NA	NA	NA	--	--
Vernolate	21	144	34	24%	1	5	2.8	83	31.43	21.15	95% KM (t) UCL

Table 6
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Parameter	Number Locations	Number Samples	Detections	Frequency Detected	Min RL	Max RL	Min Detected	Max Detected	Mean Detection	2013 UCL	2013 UCL methodology
VOC Concentrations in micrograms per liter (µg/L)											
1,1,1,2-Tetrachloroethane	19	132	0	0%	0.5	1.7	NA	NA	NA	--	--
1,1,2,2-Tetrachloroethane	19	132	0	0%	0.5	1.7	NA	NA	NA	--	--
1,1,2-Trichloroethane	19	132	0	0%	0.5	1.7	NA	NA	NA	--	--
1,1-Dichloroethane	19	132	0	0%	0.5	1.7	NA	NA	NA	--	--
1,1-Dichloroethene	19	132	20	15%	0.5	1.7	0.3	1.5	0.69	--	--
1,2,3-Trichlorobenzene	19	132	0	0%	0.5	1.7	NA	NA	NA	--	--
1,2,4-Trimethylbenzene	19	132	0	0%	0.5	1.7	NA	NA	NA	--	--
1,2-Dibromo-3-Chloropropane	19	132	0	0%	0.5	6.7	NA	NA	NA	--	--
1,2-Dibromoethane	19	132	0	0%	0.5	1.7	NA	NA	NA	--	--
1,2-Dichlorobenzene	19	132	78	59%	0.5	1.7	0.4	12	1.66	--	--
1,2-Dichloroethane	19	132	99	75%	0.5	1.7	0.3	27	5.12	--	--
1,2-Dichloropropane	19	132	0	0%	0.5	1.7	NA	NA	NA	--	--
1,3,5-Trimethylbenzene	19	132	0	0%	0.5	1.7	NA	NA	NA	--	--
1,3-Dichlorobenzene	19	132	21	16%	0.5	1.7	0.3	2.3	0.59	--	--
1,3-Dichloropropane	19	132	0	0%	0.5	1.7	NA	NA	NA	--	--
1,4-Dichlorobenzene	19	132	32	24%	0.5	1.7	0.3	3.9	1.26	--	--
2,2-Dichloropropane	19	132	0	0%	0.5	1.7	NA	NA	NA	--	--
2-Butanone	19	132	0	0%	5	33	NA	NA	NA	--	--
2-Chlorotoluene	19	120	0	0%	0.5	1.7	NA	NA	NA	--	--
2-Hexanone	19	132	0	0%	5	33	NA	NA	NA	--	--
4-Chlorotoluene	19	120	0	0%	0.5	1.7	NA	NA	NA	--	--
4-Methyl-2-Pentanone	19	132	0	0%	5	33	NA	NA	NA	--	--
Acetone	19	120	3	3%	10	33	6.2	13	8.70	--	--
Benzene	19	132	42	32%	0.5	1.7	0.3	9.3	1.28	--	--
Bromobenzene	19	132	0	0%	0.5	1.7	NA	NA	NA	--	--
Bromochloromethane	19	132	0	0%	0.5	1.7	NA	NA	NA	--	--
Bromodichloromethane	19	132	0	0%	0.5	1.7	NA	NA	NA	--	--
Bromofluorobenzene	6	43	43	100%	0	0	83	111	99.14	--	--
Bromoform	19	132	0	0%	0.5	3.3	NA	NA	NA	--	--
Bromomethane	19	126	4	3%	1	20	0.6	0.7	0.65	--	--
Carbon Disulfide	19	120	2	2%	0.5	1.7	0.3	0.3	0.30	--	--
Carbon Tetrachloride	19	132	0	0%	0.5	1.7	NA	NA	NA	--	--
Chlorobenzene	19	132	75	57%	0.5	2	0.3	280	46.55	--	--
Chloroethane	19	132	0	0%	0.5	3.3	NA	NA	NA	--	--
Chloroform	19	132	3	2%	0.5	1.7	0.3	0.6	0.40	--	--
Chloromethane	19	132	0	0%	0.5	3.3	NA	NA	NA	--	--
cis-1,2-Dichloroethene	19	132	56	42%	0.5	1.7	0.5	44	11.83	--	--
Dibromochloromethane	19	132	0	0%	0.5	1.7	NA	NA	NA	--	--
Dibromofluoromethane	6	37	37	100%	0	0	97	129	107.03	--	--
Dibromomethane	19	132	0	0%	0.5	1.7	NA	NA	NA	--	--
Ethylbenzene	19	132	0	0%	0.5	1.7	NA	NA	NA	--	--
Hexachlorobutadiene	19	132	0	0%	0.5	6.7	NA	NA	NA	--	--

Table 6
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Parameter	Number Locations	Number Samples	Detections	Frequency Detected	Min RL	Max RL	Min Detected	Max Detected	Mean Detection	2013 UCL	2013 UCL methodology
VOC Concentrations in micrograms per liter (µg/L)											
Methylene Chloride	19	132	0	0%	5	20	NA	NA	NA	--	--
Naphthalene	19	132	1	1%	0.5	6.7	1.4	1.4	1.40	--	--
o-Xylene	19	132	0	0%	0.5	1.7	NA	NA	NA	--	--
para-Isopropyl Toluene	19	132	0	0%	0.5	1.7	NA	NA	NA	--	--
Propylbenzene	19	132	0	0%	0.5	1.7	NA	NA	NA	--	--
sec-Butylbenzene	19	132	0	0%	0.5	1.7	NA	NA	NA	--	--
tert-Butylbenzene	19	132	0	0%	0.5	1.7	NA	NA	NA	--	--
Tetrachloroethene	19	132	33	25%	0.5	2	0.3	200	21.60	--	--
Toluene	19	132	2	2%	0.5	1.7	0.3	0.4	0.35	--	--
trans-1,2-Dichloroethene	19	132	30	23%	0.5	1.7	0.3	2	1.13	--	--
trans-1,3-Dichloropropene	19	132	0	0%	0.5	1.7	NA	NA	NA	--	--
Trichloroethene	19	132	51	39%	0.5	1.7	0.3	50	8.83	--	--
Vinyl Acetate	19	120	0	0%	10	33	NA	NA	NA	--	--
Vinyl Chloride	19	132	12	9%	0.5	1.7	0.3	0.9	0.61	--	--
PCB Concentrations in micrograms per liter (µg/L)											
Aroclor-1016	4	4	0	0%	0.5	0.5	NA	NA	NA	--	--
Aroclor-1221	4	4	0	0%	1	1	NA	NA	NA	--	--
Aroclor-1232	4	4	0	0%	0.5	0.5	NA	NA	NA	--	--
Aroclor-1242	4	4	0	0%	0.5	0.5	NA	NA	NA	--	--
Aroclor-1248	4	4	0	0%	0.5	0.5	NA	NA	NA	--	--
Aroclor-1254	4	4	0	0%	0.5	0.5	NA	NA	NA	--	--
Aroclor-1260	4	4	0	0%	0.5	0.5	NA	NA	NA	--	--

Notes:
BHC = Benzene Hexa Chloride
DDE = Dichlorodiphenyldichloroethylene
DDT = Dichlordiphenyltrichloroethane
EPTC = S-ethyl dipropylthiocarbamate
NA = not applicable (no detections)
PCB = polychlorinated biphenyl
RL = reporting limit
UCL = upper confidence limit
VOC = volatile organic compound
KM = Kaplan-Meier
KM (t) = UCL based upon Kaplan-Meier estimates using the Student's t-distribution cutoff value
KM (Chebyshev) = UCL based upon Kaplan-Meier estimates using the Chebyshev inequality
The mean concentration calculation only includes concentrations detected above the laboratory reporting limit.
Groundwater statistics are from 2005 to 2013 for wells located within HA-2.
Upper confidence limits (UCLs) were calculated using USEPA's ProUCL 4.1.00 software program (USEPA 2010a,b) for COPCs with eight or more sample points and at least five detects. The UCLs do not include duplicates. The parent sample concentration was used. The UCLs for groundwater were calculated for the 2013 data. The UCLs do not include duplicates. The parent sample concentration was used.

References:
USEPA. 2010a. ProUCL Version 4.1.00 Technical Guide (Draft). Statistical Software for Environmental Applications for Data Sets with and without Nondetect Observations. Prepared by Lockheed Martin Environmental Services for USEPA Office of Research and Development. U.S. Environmental Protection Agency. EPA/600/R-07/041. May.

USEPA. 2010b. ProUCL Version 4.1.00 User Guide (Draft). Statistical Software for Environmental Applications for Data Sets with and without Nondetect Observations. Prepared by Lockheed Martin Environmental Services for USEPA Office of Research and Development. EPA 600-R-07-038. May.

Table 7
Pore Water Statistics
Pre-Design Investigation Report
HA-2, Campus Bay, Richmond, California

Parameter	Number Locations	Number Samples	Detections	Frequency Detected	Min RL	Max RL	Min Detected	Max Detected	Mean Detection	UCL	UCL methodology
Metals Concentrations in micrograms per liter (µg/L)											
Arsenic	15	18	18	100%	1	12	2.9	1600	274.56	461.50	Use 95% Approximate Gamma UCL
Copper	15	18	9	50%	1	1	1.6	12	4.13	3.94	95% KM (t) UCL
Iron	4	4	3	75%	100	10000	160	330000	112,753.33	--	--
Lead	15	18	4	22%	1	1	1.1	2.4	1.58	--	--
Manganese	4	4	3	75%	5	500	57	12000	4,055.67	--	--
Mercury	4	4	0	0%	0.2	0.2	NA	NA	NA	--	--
Nickel	15	18	15	83%	1	3	2.5	26	8.16	9.87	95% KM (BCA) UCL
Zinc	15	18	12	67%	5	20	5.4	300	52.38	71.88	95% KM (BCA) UCL
Pesticide Concentrations in micrograms per liter (µg/L)											
Butylate	14	15	7	47%	0.069	13	2.6	91	23.34	23.22	95% KM (t) UCL
Cycloate	14	15	10	67%	0.069	50	3.9	430	59.79	219.30	97.5% KM (Chebyshev) UCL
EPTC	14	15	14	93%	5	100	6.3	5900	747.45	4,710.00	99% KM (Chebyshev) UCL
Molinate	14	15	9	60%	2.5	50	17	3500	653.33	861.90	95% KM (BCA) UCL
Napropamide	14	15	8	53%	0.069	13	0.12	59	19.49	18.55	95% KM (t) UCL
Pebulate	14	15	14	93%	2.5	50	5.7	4500	762.12	2,170.00	95% KM (Chebyshev) UCL
Vernolate	14	15	11	73%	2.5	50	5.6	480	147.15	288.30	95% KM (Chebyshev) UCL

Notes:
-- = UCL not calculated due to insufficient sample size (i.e., 5 detections and 8 total samples).
EPTC = S-ethyl dipropylthiocarbamate
NA = not applicable (no detections)
RL = reporting limit
UCL = upper confidence limit
KM = Kaplan-Meier
KM (t) = UCL based upon Kaplan-Meier estimates using the Student's t-distribution cutoff value
KM (Chebyshev) = UCL based upon Kaplan-Meier estimates using the Chebyshev inequality
BCA = bias-corrected accelerated bootstrap method
The mean concentration calculation only includes concentrations detected above the laboratory reporting limit.
Upper confidence limits (UCLs) were calculated using USEPA's ProUCL 4.1.00 software program (USEPA 2010a,b) for COPCs with eight or more sample points and at least five detects.

References:

USEPA. 2010a. ProUCL Version 4.1.00 Technical Guide (Draft). Statistical Software for Environmental Applications for Data Sets with and without Nondetect Observations. Prepared by Lockheed Martin Environmental Services for USEPA Office of Research and Development. U.S. Environmental Protection Agency. EPA/600/R-07/041. May.

USEPA. 2010b. ProUCL Version 4.1.00 User Guide (Draft). Statistical Software for Environmental Applications for Data Sets with and without Nondetect Observations. Prepared by Lockheed Martin Environmental Services for USEPA Office of Research and Development. EPA 600-R-07-038. May.

Table 8
SVOCs in Sediment
Pre-Design Investigation Report
HA-2, Campus Bay, Richmond, California
Concentrations in micrograms per kilogram (µg/kg)

Location	Sample Name	Sample Date	Top Depth (feet bss)	Bottom Depth (feet bss)	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	bis(2-Ethylhexyl) phthalate	Chrysene	Fluoranthene	Phenanthrene	Pyrene
LL-1	LL-1-0.2	8/30/2007	0	0.2	<1.7	<1.7	<1.7	<1.7	<8.7	<1.7	<1.7	<1.7	<1.7
LL-1	LL-1-2.5	8/30/2007	2	2.5	<1.3	<1.3	<1.3	<1.3	<6.5	<1.3	<1.3	<1.3	<1.3
LL-1	LL-1-4.5	8/30/2007	4	4.5	<0.091	<0.091	<0.091	<0.091	<0.46	<0.091	<0.091	<0.091	<0.091
LL-2	LL-2-0.2	8/30/2007	0	0.2	<0.97	<0.97	<0.97	<0.97	<4.8	<0.97	<0.97	<0.97	<0.97
LL-2	LL-2-2.5	8/30/2007	2	2.5	<0.25	<0.25	0.27	<0.25	<1.2	<0.25	<0.25	<0.25	0.39
LL-2	LL-2-5.0	8/30/2007	4.5	5	<0.075	<0.075	<0.075	<0.075	<0.38	<0.075	<0.075	<0.075	<0.075
LL-3	LL-3-0.2	8/30/2007	0	0.2	<0.86	<0.86	<0.86	<0.86	<4.3	<0.86	<0.86	<0.86	<0.86
LL-3	LL-3-2.5	8/30/2007	2	2.5	<0.26	<0.26	<0.26	<0.26	<1.3	<0.26	<0.26	<0.26	<0.26
LL-3	LL-3-4.0	8/30/2007	3.5	4	<0.079	<0.079	<0.079	<0.079	<0.4	<0.079	<0.079	<0.079	<0.079
LL-4	LL-4-0.2	8/31/2007	0	0.2	<1.8	<1.8	<1.8	<1.8	<9	<1.8	<1.8	<1.8	<1.8
LL-4	LL-4-3.0	8/31/2007	2.5	3	<1.3	<1.3	<1.3	<1.3	<6.5	<1.3	<1.3	<1.3	<1.3
LL-4	LL-4-4.5	8/31/2007	4	4.5	<0.081	<0.081	<0.081	<0.081	<0.41	<0.081	<0.081	<0.081	<0.081
LL-5	LL-5-0.2	8/31/2007	0	0.2	<1.4	<1.4	<1.4	<1.4	<7.1	<1.4	<1.4	<1.4	<1.4
LL-5	LL-5-1.5	8/31/2007	1	1.5	<0.56	<0.56	<0.56	0.64	<2.8	<0.56	0.61	<0.56	0.87
LL-5	LL-5-4.0	8/31/2007	3.5	4	<0.087	<0.087	<0.087	<0.087	<0.43	<0.087	<0.087	<0.087	<0.087
LL-6	LL-6-0.5	8/30/2007	0	0.5	<1.5	<1.5	<1.5	<1.5	<7.5	<1.5	<1.5	<1.5	<1.5
LL-6	LL-6-2.5	8/30/2007	2	2.5	0.11	0.12	0.12	<0.09	<0.45	0.12	0.2	0.14	0.24
LL-6	LL-6-4.0	8/30/2007	3.5	4	<0.084	<0.084	<0.084	<0.084	<0.42	<0.084	<0.084	<0.084	<0.084
UL-1	UL-1-0.5	8/15/2007	0	0.5	<0.26	<0.26	<0.26	<0.26	<1.3	<0.26	<0.26	<0.26	<0.26
UL-1	UL-1-11.0	8/15/2007	10.5	11	<0.083	<0.083	<0.083	<0.083	<0.42	<0.083	<0.083	<0.083	<0.083
UL-1	UL-1-5.0	8/15/2007	4.5	5	<16	<16	<16	<16	91	<16	<16	<16	<16
UL-2	UL-2-0.5	8/15/2007	0	0.5	<0.44	<0.44	<0.44	<0.44	<2.2	<0.44	<0.44	<0.44	<0.44
UL-2	UL-2-10.5	8/15/2007	10	10.5	<0.085	<0.085	<0.085	<0.085	<0.42	<0.085	<0.085	<0.085	<0.085
UL-2	UL-2-5.0	8/15/2007	4.5	5	<0.75	<0.75	<0.75	0.8	<3.7	<0.75	<0.75	<0.75	1.2
UL-3	UL-3-0.5	8/14/2007	0	0.5	<0.4	<0.4	<0.4	<0.4	<2	<0.4	<0.4	<0.4	<0.4
UL-3	UL-3-12.0	8/14/2007	11.5	12	<0.081	<0.081	<0.081	<0.081	<0.41	<0.081	<0.081	<0.081	<0.081
UL-3	UL-3-5.0	8/14/2007	4.5	5	<2.1	<2.1	<2.1	<2.1	<10	<2.1	<2.1	<2.1	<2.1
UL-3	UL-3-9.0	8/14/2007	8.5	9	<0.35	<0.35	<0.35	<0.35	<1.8	<0.35	0.37	<0.35	0.47
UL-4	UL-4-0.5	8/14/2007	0	0.5	<0.27	<0.27	<0.27	<0.27	<1.3	<0.27	<0.27	<0.27	<0.27
UL-4	UL-4-11.8	8/14/2007	11.3	11.8	<0.08	<0.08	<0.08	<0.08	<0.4	<0.08	<0.08	<0.08	<0.08
UL-4	UL-4-5.0	8/14/2007	4.5	5	<0.79	<0.79	<0.79	<0.79	<4	<0.79	<0.79	<0.79	<0.79
UL-5	UL-5-0.5	8/14/2007	0	0.5	<0.19	<0.19	<0.19	<0.19	<0.93	<0.19	<0.19	<0.19	<0.19
UL-5	UL-5-11.5	8/14/2007	11	11.5	<0.085	<0.085	<0.085	<0.085	<0.42	<0.085	<0.085	<0.085	<0.085
UL-5	UL-5-3.0	8/14/2007	2.5	3	<0.27	<0.27	<0.27	<0.27	<1.4	<0.27	<0.27	0.33	<0.27
UL-5	UL-5-5.0	8/14/2007	4.5	5	<0.28	<0.28	<0.28	<0.28	<1.4	<0.28	<0.28	<0.28	<0.28
UL-6	UL-6-0.5	8/14/2007	0	0.5	<8.3	<8.3	<8.3	<8.3	<41	<8.3	<8.3	<8.3	<8.3
UL-6	UL-6-11.8	8/14/2007	11.3	11.8	<0.082	<0.082	<0.082	<0.082	<0.41	<0.082	<0.082	<0.082	<0.082
UL-6	UL-6-5.0	8/14/2007	4.5	5	<1.1	<1.1	<1.1	<1.1	<5.3	<1.1	<1.1	<1.1	1.1
UL-7	UL-7-0.5	11/10/2011	0	0.5	<0.34	<0.34	<0.34	<0.34	<1.7	<0.34	<0.34	<0.34	<0.34
UL-7	UL-7-10	10/24/2011	9.5	10	<0.067	<0.067	<0.067	<0.067	<0.33	<0.067	<0.067	<0.067	<0.067
UL-7	UL-7-11.5	10/24/2011	11	11.5	<0.068	<0.068	<0.068	<0.068	<0.34	<0.068	0.12	0.13	0.11
UL-7	UL-7-2.5	10/24/2011	2	2.5	<0.067	<0.067	<0.067	<0.067	<0.34	<0.067	<0.067	<0.067	<0.067

Notes:
Only chemicals with at least one detection are shown on this table.
Sediment data are on a dry weight basis.
< = analyte not detected above the method detection limit; shown value is the laboratory reporting limit.
-- = not analyzed
bss = below sediment surface
SVOC = semivolatile organic compound

Table 9
SVOCs in Soil
Pre-Design Investigation Report
HA-2, Campus Bay, Richmond, California
Concentrations in micrograms per kilogram (µg/kg)

Location	Sample Name	Sample Date	Top Depth (feet bgs)	Bottom Depth (feet bgs)	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a) anthracene	Benzo(a) pyrene	Benzo(b) fluoranthene	Benzo(g,h,i) perylene	Benzo(k) fluoranthene	Benzyl alcohol	bis(2-Ethylhexyl) phthalate	Chrysene	Dibenz(a,h) anthracene	Fluoranthene	Fluorene	Hexachlorobenzene	Indeno(1,2,3-cd)pyrene	PCP	Phenanthrene	Pyrene
LL-7	LL-7-1.0	6/29/2007	0.5	1	<0.73	<0.73	<0.73	<0.73	<0.73	<0.73	<0.73	<0.73	<3.6	<3.6	<0.73	<0.73	<0.73	<0.73	<3.6	<0.73	<7.3	<0.73	<0.73
LL-7	LL-7-4.0	6/29/2007	3.5	4	<0.082	<0.082	<0.082	<0.082	<0.082	<0.082	<0.082	<0.082	<0.41	<0.41	<0.082	<0.082	<0.082	<0.082	<0.41	<0.082	<0.82	<0.082	<0.082
LL-7	LL-7-7.0	6/29/2007	6.5	7	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.4	<0.4	<0.08	<0.08	<0.08	<0.08	<0.4	<0.08	<0.8	<0.08	<0.08
LL-8	LL-8-1.0	6/29/2007	0.5	1	<0.75	<0.75	<0.75	<0.75	<0.75	<0.75	<0.75	<0.75	<3.8	<3.8	<0.75	<0.75	<0.75	<0.75	<3.8	<0.75	<7.5	<0.75	<0.75
LL-8	LL-8-5.5	6/29/2007	5	5.5	<0.084	<0.084	<0.084	<0.084	<0.084	<0.084	<0.084	<0.084	<0.42	<0.42	<0.084	<0.084	<0.084	<0.084	<0.42	<0.084	<0.84	<0.084	<0.084
LL-9	LL-9-0.5	11/10/2011	0	0.5	<0.067	<0.067	<0.067	<0.067	<0.067	<0.067	<0.067	<0.067	<0.34	<0.34	<0.067	<0.067	<0.067	<0.067	<0.34	<0.067	<0.67	<0.067	<0.067
LL-9	LL-9-1.5	10/26/2011	1	1.5	<0.066	<0.066	<0.066	<0.066	<0.066	<0.066	<0.066	<0.066	<0.33	<0.33	<0.066	<0.066	<0.066	<0.066	<0.33	<0.066	<0.66	<0.066	<0.066
LL-9	LL-9-3.25	10/26/2011	2.75	3.25	<2.7	<2.7	<2.7	<2.7	<2.7	<2.7	<2.7	<2.7	<13	<13	<2.7	<2.7	<2.7	<2.7	<13	<2.7	<27	<2.7	<2.7
LL-9R	LL-9R-0.5	5/9/2012	0	0.5	<0.005	<0.005	<0.005	0.0056	0.0073	0.011	<0.005	<0.005	--	--	0.0083	<0.005	0.014	<0.005	--	<0.005	--	0.01	0.016
LL-9R	LL-9R-2.0	5/9/2012	1.5	2	<0.005	0.007	0.0073	0.046	0.044	0.055	0.021	0.021	--	--	0.047	0.0077	0.053	<0.005	--	0.019	--	0.022	0.066
LL-9R	LL-9R-8.0	5/9/2012	7.5	8	<0.005	<0.005	<0.005	0.013	0.021	0.022	0.016	0.0081	--	--	0.017	<0.005	0.019	<0.005	--	0.013	--	0.018	0.034
LL-9R	LL-9R-9.0	5/9/2012	8.5	9	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	--	--	<0.005	<0.005	<0.005	<0.005	--	<0.005	--	<0.005	<0.005
LL-10	LL-10-0.5	11/10/2011	0	0.5	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<6.6	<6.6	<1.3	<1.3	<1.3	<1.3	<6.6	<1.3	<13	<1.3	<1.3
LL-10	LL-10-1.5	10/25/2011	1	1.5	<6.6	<6.6	<6.6	<6.6	<6.6	<6.6	<6.6	<6.6	<33	<33	<6.6	<6.6	<6.6	<6.6	<33	<6.6	<66	<6.6	<6.6
LL-10	LL-10-5.5	10/25/2011	5	5.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.99	<0.99	<0.2	<0.2	0.22	<0.2	<0.99	<0.2	<2	0.21	0.33
LL-10	LL-10-6	10/25/2011	5.5	6	<0.067	<0.067	<0.067	<0.067	<0.067	<0.067	<0.067	<0.067	<0.33	<0.33	<0.067	<0.067	<0.067	<0.067	<0.33	<0.067	<0.67	<0.067	<0.067
LL-11	LL-11-0.5	11/10/2011	0	0.5	<0.2	<0.2	<0.2	0.42	<0.2	0.47	<0.2	<0.2	<1	<1	0.39	<0.2	1	<0.2	<1	<0.2	<2	0.56	0.61
LL-11	LL-11-1.5	10/25/2011	1	1.5	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<1.7	<1.7	<0.34	<0.34	<0.34	<0.34	<1.7	<0.34	<3.4	<0.34	<0.34
LL-11	LL-11-8	10/25/2011	7.5	8	<0.13	<0.13	<0.13	<0.13	<0.13	<0.13	<0.13	<0.13	<0.66	<0.66	<0.13	<0.13	0.14	<0.13	<0.66	<0.13	<1.3	0.19	0.18
LL-12	LL-12-0.5	11/10/2011	0	0.5	<0.66	<0.66	<0.66	<0.66	<0.66	<0.66	<0.66	<0.66	<3.3	<3.3	<0.66	<0.66	<0.66	<0.66	<3.3	<0.66	<6.6	<0.66	<0.66
LL-12	LL-12-1.5	10/25/2011	1	1.5	<0.13	<0.13	<0.13	<0.13	<0.13	<0.13	<0.13	<0.13	<0.66	<0.66	<0.13	<0.13	<0.13	<0.13	<0.66	<0.13	<1.3	<0.13	<0.13
LL-12	LL-12-7	10/25/2011	6.5	7	<0.067	<0.067	<0.067	<0.067	<0.067	<0.067	<0.067	<0.067	<0.34	<0.34	<0.067	<0.067	<0.067	<0.067	<0.34	<0.067	<0.67	<0.067	<0.067
LL-13	LL-13-0.5	11/10/2011	0	0.5	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<6.7	<6.7	<1.3	<1.3	<1.3	<1.3	<6.7	<1.3	<13	<1.3	<1.3
LL-13	LL-13-1.5	10/24/2011	1	1.5	<0.068	<0.068	<0.068	<0.068	<0.068	<0.068	<0.068	<0.068	<0.34	<0.34	<0.068	<0.068	<0.068	<0.068	<0.34	<0.068	<0.68	<0.068	<0.068
LL-13	LL-13-6	10/24/2011	5.5	6	<3.3	<3.3	<3.3	<3.3	<3.3	<3.3	<3.3	<3.3	<16	<16	<3.3	<3.3	<3.3	<3.3	<16	<3.3	<33	<3.3	<3.3
LL-19	LL-19-0.5	5/7/2012	0	0.5	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	--	--	<0.005	<0.005	<0.005	<0.005	--	<0.005	--	<0.005	<0.005
LL-19	LL-19-2.0	5/7/2012	1.5	2	<0.005	<0.005	<0.005	<0.005	0.0051	0.0075	<0.005	<0.005	--	--	0.0054	<0.005	0.0056	<0.005	--	<0.005	--	<0.005	0.01
LL-19	LL-19-4.0	5/7/2012	3.5	4	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	--	--	<0.01	<0.01	<0.01	<0.01	--	<0.01	--	<0.01	<0.01
LL-19	LL-19-4.5	5/7/2012	4	4.5	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051	--	--	<0.0051	<0.0051	<0.0051	<0.0051	--	<0.0051	--	<0.0051	<0.0051
LL-19	LL-19-5.0	5/7/2012	5	5	<0.035	<0.035	<0.035	0.043	0.097	0.12	<0.035	0.053	--	--	0.061	<0.035	0.065	<0.035	--	<0.035	--	0.044	0.099
LL-20	LL-20-0.5	5/7/2012	0.5	0.5	0.007	0.0067	0.021	0.049	0.05	0.061	0.028	0.019	--	--	0.054	0.01	0.078	0.0061	--	0.026	--	0.055	0.078
LL-20	LL-20-2.0	5/7/2012	2	2	<0.0049	<0.0049	<0.0049	0.013	0.018	0.024	0.014	0.0052	--	--	0.018	<0.0049	0.027	<0.0049	--	0.012	--	0.019	0.028
LL-20	LL-20-4.0	5/7/2012	3.5	4	0.0057	0.0056	0.013	0.047	0.051	0.065	0.021	0.026	--	--	0.062	<0.0049	0.094	0.01	--	0.017	--	0.11	0.16
LL-20	LL-20-5.5	5/7/2012	5	5.5	<0.069 J	<0.069 J	<0.069 J	<0.069 J	0.14 J	0.077 J	0.12 J	<0.069 J	--	--	0.1 J	<0.069 J	<0.069 J	<0.069 J	--	<0.069 J	--	<0.069 J	0.094 J
LL-21	LL-21-0.5	5/7/2012	0.5	0.5	<0.03	0.047	0.14	0.32	0.23	0.36	0.097	0.1	--	--	0.38	0.048	0.7	0.038	--	0.11	--	0.6	0.62
LL-21	LL-21-2.0	5/7/2012	2	2	<0.005	<0.005	<0.005	0.011	0.012	0.016	0.0067	<0.005	--	--	0.015	<0.005	0.02	<0.005	--	0.0062	--	0.016	0.022
LL-21	LL-21-4.0	5/7/2012	4	4	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	--	--	<0.03	<0.03	<0.03	<0.03	--	<0.03	--	<0.03	<0.03
LL-22	LL-22-0.5	5/7/2012	0	0.5	<0.0049	<0.0049	0.0059	0.019	0.025	0.039	0.024	0.0096	--	--	0.025	0.0075	0.028	<0.0049	--	0.021	--	0.012	0.029
LL-22	LL-22-2.0	5/7/2012	1.5	2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	--	--	<0.1	<0.1	<0.1	<0.1	--	<0.1	--	<0.1	<0.1
LL-22	LL-22-4.0	5/7/2012	3.5	4	<0.0049	<0.0049	<0.0049	<0.0049	<0.0049	0.0066	<0.0049	<0.0049	--	--	<0.0049	<0.0049	0.0064	<0.0049	--	<0.0049	--	<0.0049	0.0065
LL-23	LL-23-0.5	5/8/2012	0	0.5	<0.099	<0.099	<0.099	<0.099	<0.099	<0.099	<0.099	<0.099	--	--	<0.099	<0.099	<0.099	<0.099	--	<0.099	--	<0.099	<0.099
LL-23	LL-23-2.0	5/8/2012	1.5	2	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	--	--	<0.005	<0.005	<0.005	<0.005	--	<0.005	--	<0.005	<0.005
LL-23	LL-23-6.0	5/8/2012	5.5	6	<0.0099	<0.0099	<0.0099	<0.0099	<0.0099	<0.0099	<0.0099	<0.0099	--	--	<0.0099	<0.0099	<0.0099	<0.0099	--	<0.0099	--	<0.0099	<0.0099
LL-23	LL-23-7.0	5/8/2012	6.5	7	<0.0049	0.012	0.033	0.07	0.11	0.12	0.083	0.034	--	--	0.077	0.021	0.11	0.0061	--	0.071	--	0.059	0.17
LL-23	LL-23-8.0	5/8/2012	7.5	8	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	--	--	<0.005	<0.005	<0.005	<0.005	--	<0.005	--	<0.005	<0.005
LL-24	LL-24-0.5	5/9/2012	0	0.5	<0.005	<0.005	<0.005	<0.005	0.0051	0.0075	<0.005	<0.005	--	--	<0.005	<0.005	<0.005	<0.005	--	<0.005	--	<0.005	<0.005
LL-24	LL-24-2.0	5/9/2012	1.5	2	<0.005	<0.005	<0.005	0.0088	0.0074	0.0082	<0.005	<0.005	--	--	0.0098	<0.005	0.017	<0.005	--	<0.005	--	0.015	0.02
LL-24	LL-24-6.5	5/9/2012	6	6.5	<0.0051	<0.0051	0.0087	0.085	0.14	0.16	0.11	0.045	--	--	0.11	0.03	0.1	<0.0051	--	0.092	--	0.03	0.13
LL-24	LL-24-9.0	5/9/2012	8.5	9	<0.0098	<0.0098	0.02	0.084	0.15	0.18	0.087	0.059	--	--	0.09	0.015	0.12	<0.0098	--	0.076	--	0.061	0.22

Table 9
SVOCs in Soil
Pre-Design Investigation Report
HA-2, Campus Bay, Richmond, California
Concentrations in micrograms per kilogram (µg/kg)

Location	Sample Name	Sample Date	Top Depth (feet bgs)	Bottom Depth (feet bgs)	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a) anthracene	Benzo(a) pyrene	Benzo(b) fluoranthene	Benzo(g,h,i) perylene	Benzo(k) fluoranthene	Benzyl alcohol	bis(2-Ethylhexyl) phthalate	Chrysene	Dibenz(a,h) anthracene	Fluoranthene	Fluorene	Hexachlorobenzene	Indeno(1,2,3-cd)pyrene	PCP	Phenanthrene	Pyrene
PZ-17B	PZ-17-0.5	11/10/2011	0	0.5	<0.66	<0.66	<0.66	<0.66	<0.66	<0.66	<0.66	<0.66	<3.3	<3.3	<0.66	<0.66	<0.66	<0.66	<3.3	<0.66	<6.6	<0.66	<0.66
PZ-17B	PZ-17B-1.5	10/18/2011	1	1.5	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<1.7	<1.7	<0.34	<0.34	<0.34	<0.34	<1.7	<0.34	<3.4	<0.34	<0.34
PZ-17B	PZ-17B-7.5	10/18/2011	7	7.5	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<6.7	<6.7	<1.3	<1.3	<1.3	<1.3	<6.7	<1.3	<13	<1.3	<1.3
PZ-17B	PZ-17B-9.5	10/18/2011	9	9.5	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<1.6	<1.6	<0.33	<0.33	<0.33	<0.33	<1.6	<0.33	<3.3	<0.33	<0.33
PZ-18A2	PZ-18-0.5	11/10/2011	0	0.5	<0.67	<0.67	<0.67	<0.67	<0.67	<0.67	<0.67	<0.67	<3.3	<3.3	<0.67	<0.67	<0.67	<0.67	<3.3	<0.67	<6.7	<0.67	<0.67
PZ-18A2	PZ-18A2-1.5	10/19/2011	1	1.5	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<2	<2	<0.4	<0.4	<0.4	<0.4	<2	<0.4	<4	<0.4	<0.4
PZ-18A2	PZ-18A2-9.5	10/19/2011	9	9.5	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	<0.68	<0.68	<0.14	<0.14	<0.14	<0.14	<0.68	<0.14	<1.4	<0.14	<0.14
PZ-19A2	PZ-19-0.5	11/10/2011	0	0.5	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<1.7	<1.7	<0.34	<0.34	<0.34	<0.34	<1.7	<0.34	<3.4	<0.34	<0.34
PZ-19A2	PZ-19A2-1.5	10/14/2011	1	1.5	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<1.7	<1.7	<0.33	<0.33	<0.33	<0.33	<1.7	<0.33	0 R	<0.33	<0.33
PZ-19A2	PZ-19A2-12	10/14/2011	11.5	12	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<1.6	<1.6	<0.33	<0.33	<0.33	<0.33	<1.6	<0.33	<3.3	<0.33	<0.33
PZ-19A2	PZ-19A2-15	10/14/2011	14.5	15	<0.067	<0.067	<0.067	<0.067	<0.067	<0.067	<0.067	<0.067	<0.33	<0.33	<0.067	<0.067	<0.067	<0.067	<0.33	<0.067	<0.67	<0.067	<0.067
PZ-20A2	PZ-20-0.5	11/10/2011	0	0.5	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	<0.68	<0.68	<0.14	<0.14	<0.14	<0.14	<0.68	<0.14	<1.4	<0.14	<0.14
PZ-20A2	PZ-20A2-1.5	10/13/2011	1	1.5	<0.66	<0.66	<0.66	<0.66	<0.66	<0.66	<0.66	<0.66	<3.3	<3.3	<0.66	<0.66	<0.66	<0.66	<3.3	<0.66	<6.6	<0.66	<0.66
PZ-20B	PZ-20B-10	10/13/2011	9.5	10	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<1.7	<1.7	<0.33	<0.33	<0.33	<0.33	<1.7	<0.33	<3.3	<0.33	<0.33
PZ-20B	PZ-20B-11.5	10/13/2011	11	11.5	<0.13	<0.13	<0.13	<0.13	<0.13	<0.13	<0.13	<0.13	<0.66	<0.66	<0.13	<0.13	<0.13	<0.13	<0.66	<0.13	<1.3	<0.13	<0.13
PZ-20B	PZ-20B-13.5	10/13/2011	13	13.5	<0.67	<0.67	<0.67	<0.67	<0.67	<0.67	<0.67	<0.67	<3.3	<3.3	<0.67	<0.67	<0.67	<0.67	<3.3	<0.67	<6.7	<0.67	<0.67
PZ-21A2	PZ-21-0.5	11/10/2011	0	0.5	<0.068	<0.068	<0.068	<0.068	<0.068	<0.068	<0.068	<0.068	<0.34	<0.34	<0.068	<0.068	<0.068	<0.068	<0.34	<0.068	<0.68	<0.068	<0.068
PZ-21A2	PZ-21A2-7.5	10/12/2011	7	7.5	<0.066	<0.066	<0.066	<0.066	<0.066	<0.066	<0.066	<0.066	<0.33	<0.33	<0.066	<0.066	<0.066	<0.066	<0.33	<0.066	<0.66	<0.066	<0.066
PZ-21A2	PZ-2A2-7.5	10/12/2011	7	7.5	<0.066	<0.066	<0.066	<0.066	<0.066	<0.066	<0.066	<0.066	<0.33	<0.33	<0.066	<0.066	<0.066	<0.066	<0.33	<0.066	<0.66	<0.066	<0.066
PZ-21B	PZ-21B-1.5	10/12/2011	1	1.5	<0.13	<0.13	<0.13	<0.13	<0.13	<0.13	<0.13	<0.13	<0.66	<0.66	<0.13	<0.13	<0.13	<0.13	<0.66	<0.13	<1.3	<0.13	<0.13
PZ-22A2	PZ-22-0.5	11/10/2011	0	0.5	<0.066	<0.066	<0.066	<0.066	<0.066	<0.066	<0.066	<0.066	<0.33	<0.33	<0.066	<0.066	<0.066	<0.066	<0.33	<0.066	<0.66	<0.066	<0.066
PZ-22B	PZ-22B-1.5	10/10/2011	1	1.5	<0.067	<0.067	0.11	0.18	0.17	0.16	<0.067	<0.067	<0.34	<0.34	0.18	<0.067	0.31	<0.067	<0.34	<0.067	<0.67	0.35	0.42
PZ-22B	PZ-22B-7.5	10/10/2011	7	7.5	<0.066	<0.066	<0.066	<0.066	<0.066	<0.066	<0.066	<0.066	<0.33	<0.33	<0.066	<0.066	<0.066	<0.066	<0.33	<0.066	<0.66	<0.066	0.073
UL-8	UL-8-0.5	11/10/2011	0	0.5	<0.067	<0.067	<0.067	<0.067	<0.067	<0.067	<0.067	<0.067	<0.34	<0.34	<0.067	<0.067	<0.067	<0.067	<0.34	<0.067	<0.67	<0.067	<0.067
UL-8	UL-8-1.5	10/24/2011	1	1.5	<0.066	<0.066	<0.066	<0.066	<0.066	<0.066	<0.066	<0.066	0.35	<0.33	<0.066	<0.066	<0.066	<0.066	<0.33	<0.066	<0.66	<0.066	<0.066
UL-8	UL-8-8	10/24/2011	7.5	8	<0.067	<0.067	<0.067	<0.067	<0.067	<0.067	<0.067	<0.067	<0.33	<0.33	<0.067	<0.067	<0.067	<0.067	<0.33	<0.067	<0.67	<0.067	<0.067

Notes:
Only chemicals with at least one detection are shown on this table.
Historical soil data are on an as received basis.
< = analyte not detected above the method detection limit; shown value is the laboratory reporting limit.
-- = not analyzed
J = estimated value
PCP = pentachlorophenol
bgs = below ground surface
SVOC = semivolatile organic compound

Table 10
VOCs in Sediment
Pre-Design Investigation Report
HA-2, Campus Bay, Richmond, California
Concentrations in micrograms per kilogram (µg/kg)

Location	Sample Name	Sample Date	Top Depth (feet bss)	Bottom Depth (feet bss)	1,2-Dichlorobenzene	1,2-Dichloroethane	Acetone	Benzene	Carbon Disulfide	Toluene	Trichloroethene
LL-1	LL-1-0.2	8/30/2007	0.0	0.2	<0.026	<0.026	0.12	<0.026	<0.026	<0.026	<0.026
LL-1	LL-1-2.5	8/30/2007	2.0	2.5	<6.5	<2	<7.8	2.2	<2	26	<2
LL-1	LL-1-4.5	8/30/2007	4.0	4.5	<0.46	<0.17	<0.69	0.36	<0.17	1.5	<0.17
LL-2	LL-2-0.2	8/30/2007	0.0	0.2	<0.022	<0.022	<0.087	<0.022	<0.022	<0.022	<0.022
LL-2	LL-2-2.5	8/30/2007	2.0	2.5	<0.011	<0.011	<0.045	0.032	<0.011	<0.011	<0.011
LL-2	LL-2-5.0	8/30/2007	4.5	5.0	<0.38	<0.0047	<0.019	<0.0047	<0.0047	<0.0047	<0.0047
LL-3	LL-3-0.2	8/30/2007	0.0	0.2	<4.3	<0.029	<0.11	<0.029	<0.029	<0.029	<0.029
LL-3	LL-3-2.5	8/30/2007	2.0	2.5	<1.3	<0.0061	<0.024	0.019	<0.0061	<0.0061	<0.0061
LL-3	LL-3-4.0	8/30/2007	3.5	4.0	<0.4	<0.0062	<0.025	<0.0062	<0.0062	<0.0062	<0.0062
LL-4	LL-4-0.2	8/31/2007	0.0	0.2	<9	<0.022	<0.087	<0.022	<0.022	<0.022	<0.022
LL-4	LL-4-3.0	8/31/2007	2.5	3.0	<6.5	<0.0096	<0.038	0.061	<0.0096	<0.0096	<0.0096
LL-4	LL-4-4.5	8/31/2007	4.0	4.5	<0.41	<0.0052	<0.021	<0.0052	<0.0052	<0.0052	<0.0052
LL-5	LL-5-0.2	8/31/2007	0.0	0.2	<0.013	<0.013	<0.052	<0.013	<0.013	<0.013	<0.013
LL-5	LL-5-1.5	8/31/2007	1.0	1.5	<0.0092	<0.0092	<0.037	<0.0092	<0.0092	<0.0092	<0.0092
LL-5	LL-5-4.0	8/31/2007	3.5	4.0	<0.0059	<0.0059	<0.023	<0.0059	<0.0059	<0.0059	<0.0059
LL-6	LL-6-0.5	8/30/2007	0.0	0.5	<0.017	<0.017	<0.067	<0.017	<0.017	<0.017	<0.017
LL-6	LL-6-2.5	8/30/2007	2.0	2.5	<0.45	<0.019	<0.076	<0.019	<0.019	<0.019	<0.019
LL-6	LL-6-4.0	8/30/2007	3.5	4.0	<0.42	<0.0056	<0.022	<0.0056	<0.0056	<0.0056	<0.0056
UL-1	UL-1-0.5	8/15/2007	0.0	0.5	<1.3	<0.0063	<0.025	<0.0063	<0.0063	<0.0063	<0.0063
UL-1	UL-1-11.0	8/15/2007	10.5	11.0	<0.0081	<0.0081	<0.032	<0.0081	<0.0081	<0.0081	<0.0081
UL-1	UL-1-5.0	8/15/2007	4.5	5.0	<0.01	<0.01	<0.041	<0.01	<0.01	<0.01	<0.01
UL-2	UL-2-0.5	8/15/2007	0.0	0.5	<0.0064	<0.0064	<0.026	<0.0064	<0.0064	<0.0064	<0.0064
UL-2	UL-2-10.5	8/15/2007	10.0	10.5	<0.0058	<0.0058	<0.023	<0.0058	<0.0058	<0.0058	<0.0058
UL-2	UL-2-5.0	8/15/2007	4.5	5.0	<0.016	0.019	<0.065	<0.016	<0.016	<0.016	<0.016
UL-3	UL-3-0.5	8/14/2007	0.0	0.5	<2	<0.024	<0.098	<0.024	<0.024	<0.024	<0.024
UL-3	UL-3-12.0	8/14/2007	11.5	12.0	<0.41	<0.0051	<0.02	<0.0051	<0.0051	<0.0051	<0.0051
UL-3	UL-3-5.0	8/14/2007	4.5	5.0	<10	<0.022	<0.087	<0.022	<0.022	<0.022	<0.022
UL-3	UL-3-9.0	8/14/2007	8.5	9.0	<1.8	<0.0088	<0.035	<0.0088	<0.0088	<0.0088	<0.0088
UL-4	UL-4-0.5	8/14/2007	0.0	0.5	<0.0045	<0.0045	<0.018	<0.0045	<0.0045	<0.0045	<0.0045
UL-4	UL-4-11.8	8/14/2007	11.3	11.8	<0.4	<0.005	<0.02	<0.005	<0.005	<0.005	<0.005
UL-4	UL-4-5.0	8/14/2007	4.5	5.0	<4	<0.018	<0.072	<0.018	<0.018	<0.018	<0.018
UL-5	UL-5-0.5	8/14/2007	0.0	0.5	<0.0089	<0.0089	<0.036	<0.0089	<0.0089	<0.0089	<0.0089
UL-5	UL-5-11.5	8/14/2007	11.0	11.5	<0.42	<0.005	<0.02	<0.005	<0.005	<0.005	<0.005
UL-5	UL-5-3.0	8/14/2007	2.5	3.0	<0.037	<0.037	<0.15	<0.037	<0.037	<0.037	<0.037
UL-5	UL-5-5.0	8/14/2007	4.5	5.0	<1.4	<0.047	<0.19	<0.047	<0.047	<0.047	<0.047
UL-6	UL-6-0.5	8/14/2007	0.0	0.5	<0.048	<0.048	<0.19	<0.048	<0.048	<0.048	<0.048
UL-6	UL-6-11.8	8/14/2007	11.3	11.8	<0.005	<0.005	<0.02	<0.005	<0.005	<0.005	<0.005
UL-6	UL-6-5.0	8/14/2007	4.5	5.0	0.093	<0.021	<0.085	0.024	<0.021	<0.021	0.028
UL-7	UL-7-0.5	11/10/2011	0.0	0.5	<1.7	--	--	--	--	--	--
UL-7	UL-7-10	10/24/2011	9.5	10.0	<0.0079	<0.0079	<0.032	<0.0079	0.0086	<0.0079	<0.0079
UL-7	UL-7-11.5	10/24/2011	11.0	11.5	<0.0076	<0.0076	<0.031	<0.0076	<0.0076	<0.0076	<0.0076
UL-7	UL-7-2.5	10/24/2011	2.0	2.5	<0.34	<0.008	<0.032	<0.008	<0.008	<0.008	<0.008

Notes:
Only chemicals with at least one detection are shown on this table.
Sediment data are on a dry weight basis.
< = analyte not detected above the method detection limit; shown value is the laboratory reporting limit.
-- = not analyzed
bss = below sediment surface
VOC = volatile organic compound

Table 11
VOCs in Soil
Pre-Design Investigation Report
HA-2, Campus Bay, Richmond, California
Concentrations in micrograms per kilogram (µg/kg)

Location	Sample Name	Sample Date	Top Depth (feet bgs)	Bottom Depth (feet bgs)	1,2,4-Trimethylbenzene	1,3,5-Trimethylbenzene	Acetone	Naphthalene	para-Isopropyl Toluene
LL-7	LL-7-1.0	6/29/2007	0.5	1.0	<0.0054	<0.0054	<0.022	<0.0054	<0.0054
LL-7	LL-7-4.0	6/29/2007	3.5	4.0	<0.005	<0.005	<0.02	<0.005	<0.005
LL-7	LL-7-7.0	6/29/2007	6.5	7.0	<0.0049	<0.0049	<0.019	<0.0049	<0.0049
LL-8	LL-8-1.0	6/29/2007	0.5	1.0	<0.0047	<0.0047	<0.019	<0.75	<0.0047
LL-8	LL-8-5.5	6/29/2007	5.0	5.5	<0.0057	<0.0057	<0.023	<0.084	<0.0057
LL-9	LL-9-0.5	11/10/2011	0.0	0.5	--	--	--	<0.067	--
LL-9	LL-9-1.5	10/26/2011	1.0	1.5	<0.0062	<0.0062	<0.025	<0.0062	<0.0062
LL-9	LL-9-3.25	10/26/2011	2.8	3.3	<0.0061	<0.0061	<0.025	<0.0061	0.01
LL-9R	LL-9R-0.5	5/9/2012	0.0	0.5	--	--	--	<0.005	--
LL-9R	LL-9R-2.0	5/9/2012	1.5	2.0	--	--	--	<0.005	--
LL-9R	LL-9R-8.0	5/9/2012	7.5	8.0	--	--	--	<0.005	--
LL-9R	LL-9R-9.0	5/9/2012	8.5	9.0	--	--	--	<0.005	--
LL-10	LL-10-0.5	11/10/2011	0.0	0.5	--	--	--	<1.3	--
LL-10	LL-10-1.5	10/25/2011	1.0	1.5	0.011	0.019	0.046	<6.6	<0.0078
LL-10	LL-10-5.5	10/25/2011	5.0	5.5	<0.0043	<0.0043	0.019	<0.2	<0.0043
LL-10	LL-10-6	10/25/2011	5.5	6.0	<0.0047	<0.0047	<0.019	<0.0047	<0.0047
LL-11	LL-11-0.5	11/10/2011	0.0	0.5	--	--	--	<0.2	--
LL-11	LL-11-1.5	10/25/2011	1.0	1.5	<0.007	<0.007	<0.028	<0.34	<0.007
LL-11	LL-11-8	10/25/2011	7.5	8.0	<0.0044	<0.0044	<0.018	<0.13	<0.0044
LL-12	LL-12-0.5	11/10/2011	0.0	0.5	--	--	--	<0.66	--
LL-12	LL-12-1.5	10/25/2011	1.0	1.5	<0.0061	<0.0061	<0.024	<0.13	<0.0061
LL-12	LL-12-7	10/25/2011	6.5	7.0	<0.0045	<0.0045	<0.018	<0.0045	<0.0045
LL-13	LL-13-0.5	11/10/2011	0.0	0.5	--	--	--	<1.3	--
LL-13	LL-13-1.5	10/24/2011	1.0	1.5	<0.0042	<0.0042	<0.017	<0.0042	<0.0042
LL-13	LL-13-6	10/24/2011	5.5	6.0	<0.0055	<0.0055	<0.022	<3.3	<0.0055
LL-19	LL-19-0.5	5/7/2012	0.0	0.5	--	--	--	<0.005	--
LL-19	LL-19-2.0	5/7/2012	1.5	2.0	--	--	--	<0.005	--
LL-19	LL-19-4.0	5/7/2012	3.5	4.0	--	--	--	<0.01	--
LL-19	LL-19-4.5	5/7/2012	4.0	4.5	--	--	--	<0.0051	--
LL-19	LL-19-5.0	5/7/2012	5.0	5.0	--	--	--	<0.035	--
LL-20	LL-20-0.5	5/7/2012	0.5	0.5	--	--	--	<0.005	--
LL-20	LL-20-2.0	5/7/2012	2.0	2.0	--	--	--	<0.0049	--
LL-20	LL-20-4.0	5/7/2012	3.5	4.0	--	--	--	0.0072	--
LL-20	LL-20-5.5	5/7/2012	5.0	5.5	--	--	--	<0.069 J	--
LL-21	LL-21-0.5	5/7/2012	0.5	0.5	--	--	--	<0.03	--
LL-21	LL-21-2.0	5/7/2012	2.0	2.0	--	--	--	<0.005	--
LL-21	LL-21-4.0	5/7/2012	4.0	4.0	--	--	--	<0.03	--
LL-22	LL-22-0.5	5/7/2012	0.0	0.5	--	--	--	<0.0049	--
LL-22	LL-22-2.0	5/7/2012	1.5	2.0	--	--	--	<0.1	--
LL-22	LL-22-4.0	5/7/2012	3.5	4.0	--	--	--	<0.0049	--
LL-23	LL-23-0.5	5/8/2012	0.0	0.5	--	--	--	<0.099	--
LL-23	LL-23-2.0	5/8/2012	1.5	2.0	--	--	--	<0.005	--
LL-23	LL-23-6.0	5/8/2012	5.5	6.0	--	--	--	<0.0099	--
LL-23	LL-23-7.0	5/8/2012	6.5	7.0	--	--	--	0.0099	--
LL-23	LL-23-8.0	5/8/2012	7.5	8.0	--	--	--	<0.005	--
LL-24	LL-24-0.5	5/9/2012	0.0	0.5	--	--	--	<0.005	--
LL-24	LL-24-2.0	5/9/2012	1.5	2.0	--	--	--	<0.005	--
LL-24	LL-24-6.5	5/9/2012	6.0	6.5	--	--	--	0.0063	--
LL-24	LL-24-9.0	5/9/2012	8.5	9.0	--	--	--	0.011	--

Table 11
VOCs in Soil
Pre-Design Investigation Report
HA-2, Campus Bay, Richmond, California
Concentrations in micrograms per kilogram (µg/kg)

Location	Sample Name	Sample Date	Top Depth (feet bgs)	Bottom Depth (feet bgs)	1,2,4-Trimethylbenzene	1,3,5-Trimethylbenzene	Acetone	Naphthalene	para-Isopropyl Toluene
PZ-17B	PZ-17-0.5	11/10/2011	0.0	0.5	--	--	--	<0.66	--
PZ-17B	PZ-17B-1.5	10/18/2011	1.0	1.5	<0.0053	<0.0053	<0.021	<0.0053	<0.0053
PZ-17B	PZ-17B-7.5	10/18/2011	7.0	7.5	<0.0048	<0.0048	<0.019	<1.3	<0.0048
PZ-17B	PZ-17B-9.5	10/18/2011	9.0	9.5	<0.0046	<0.0046	0.024	<0.0046	<0.0046
PZ-18A2	PZ-18-0.5	11/10/2011	0.0	0.5	--	--	--	<0.67	--
PZ-18A2	PZ-18A2-1.5	10/19/2011	1.0	1.5	<0.0053	<0.0053	<0.021	<0.4	<0.0053
PZ-18A2	PZ-18A2-9.5	10/19/2011	9.0	9.5	<0.0042	<0.0042	<0.017	<0.14	<0.0042
PZ-19A2	PZ-19-0.5	11/10/2011	0.0	0.5	--	--	--	<0.34	--
PZ-19A2	PZ-19A2-1.5	10/14/2011	1.0	1.5	<0.0047	<0.0047	<0.019	<0.0047	<0.0047
PZ-19A2	PZ-19A2-12	10/14/2011	11.5	12.0	<0.0042	<0.0042	<0.017	<0.0042	<0.0042
PZ-19A2	PZ-19A2-15	10/14/2011	14.5	15.0	<0.0041	<0.0041	<0.017	<0.067	<0.0041
PZ-20A2	PZ-20-0.5	11/10/2011	0.0	0.5	--	--	--	<0.14	--
PZ-20A2	PZ-20A2-1.5	10/13/2011	1.0	1.5	<0.005	<0.005	<0.02	<0.005	<0.005
PZ-20B	PZ-20B-10	10/13/2011	9.5	10.0	<0.0041	<0.0041	<0.016	<0.0041	<0.0041
PZ-20B	PZ-20B-11.5	10/13/2011	11.0	11.5	<0.0042	<0.0042	<0.017	<0.0042	<0.0042
PZ-20B	PZ-20B-13.5	10/13/2011	13.0	13.5	<0.0045	<0.0045	<0.018	<0.0045	<0.0045
PZ-21A2	PZ-21-0.5	11/10/2011	0.0	0.5	--	--	--	<0.068	--
PZ-21A2	PZ-21A2-7.5	10/12/2011	7.0	7.5	<0.0045	<0.0045	<0.018	<0.066	<0.0045
PZ-21A2	PZ-2A2-7.5	10/12/2011	7.0	7.5	<0.0045	<0.0045	<0.018	<0.066	<0.0045
PZ-21B	PZ-21B-1.5	10/12/2011	1.0	1.5	<0.0046	<0.0046	<0.018	<0.0046	<0.0046
PZ-22A2	PZ-22-0.5	11/10/2011	0.0	0.5	--	--	--	<0.066	--
PZ-22B	PZ-22B-1.5	10/10/2011	1.0	1.5	<0.0046	<0.0046	<0.018	<0.067	<0.0046
PZ-22B	PZ-22B-7.5	10/10/2011	7.0	7.5	<0.0045	<0.0045	<0.018	<0.066	<0.0045
PZ-23A2	PZ-23A2-8	10/20/2011	7.5	8.0	<0.0043	<0.0043	<0.017	<0.0043	<0.0043
UL-8	UL-8-0.5	11/10/2011	0.0	0.5	--	--	--	<0.067	--
UL-8	UL-8-1.5	10/24/2011	1.0	1.5	<0.0062	<0.0062	<0.025	<0.0062	<0.0062
UL-8	UL-8-8	10/24/2011	7.5	8.0	<0.0045	<0.0045	<0.018	<0.0045	<0.0045

Notes:
Only chemicals with at least one detection are shown on this table.
Historical soil data are on an as received basis.
< = analyte not detected above the method detection limit; shown value is the laboratory reporting limit.
-- = not analyzed
J = estimated value
bgs = below ground surface
VOC = volatile organic compound

Table 12
Metals in Sediment
Pre-Design Investigation Report
HA-2, Campus Bay, Richmond, California
Concentrations in milligrams per kilogram (mg/kg)

Location	Sample Name	Sample Date	Top Depth (feet bss)	Bottom Depth (feet bss)	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Mercury	Molybdenum	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc
LL-1	LL-1-4.5	8/30/2007	4.0	4.5	<0.69	50	130	0.53	0.49	46	11	49	14	0.086	<0.35	53	<0.69	<0.35	<0.69	74	85
LL-1	LL-1-0.2	8/30/2007	0.0	0.2	6.8	97	180	0.33	17	110	27	1200	210	5.1	8.2	140	11	3	<1.3	54	2800
LL-1	LL-1-2.5	8/30/2007	2.0	2.5	2.3	170	260	0.43	1.6	61	15	590	140	11	5	59	2.8	1.3	<0.98	59	610
LL-2	LL-2-0.2	8/30/2007	0.0	0.2	6.6	60	200	0.7	13	140	32	1700	250	7.6	5	180	16	3.8	<1.5	69	4000
LL-2	LL-2-2.5	8/30/2007	2.0	2.5	3.8	120	210	0.39	2.3	78	11	490	190	11	2.6	53	2.9	1.1	<0.93	55	920
LL-2	LL-2-5.0	8/30/2007	4.5	5.0	<0.57	4.6	130	0.33	<0.29	34	8.5	15	4.6	0.065	<0.29	45	<0.57	<0.29	<0.57	36	39
LL-3	LL-3-4.0	8/30/2007	3.5	4.0	<0.6	12	120	0.34	<0.3	42	7.2	19	3.6	0.069	<0.3	42	<0.6	<0.3	<0.6	37	38
LL-3	LL-3-2.5	8/30/2007	2.0	2.5	<0.66	160	94	0.35	5.1	67	8.1	720	120	2.9	2.8	47	<0.66	1.1	<0.66	42	1900
LL-3	LL-3-0.2	8/30/2007	0.0	0.2	<1.3	43	140	0.56	9	72	19	1000	150	3.1	2.6	98	12	3	<1.3	51	2200
LL-4	LL-4-3.0	8/31/2007	2.5	3.0	3.4	250	170	0.33	6.5	73	8.7	1000	220	8.3	7.5	53	7.2	1	<0.98	57	1900
LL-4	LL-4-0.2	8/31/2007	0.0	0.2	4.4	63	170	0.52	15	90	27	1200	150	5.8	6.8	150	11	2.7	<1.4	55	2400
LL-4	LL-4-4.5	8/31/2007	4.0	4.5	<0.61	4.6	130	0.39	<0.3	47	7.4	21	3.8	0.098	<0.3	46	<0.61	<0.3	<0.61	33	41
LL-5	LL-5-1.5	8/31/2007	1.0	1.5	3.9	91	160	0.38	1.3	73	11	480	290	11	2.2	54	1.3	1.1	<0.85	54	620
LL-5	LL-5-0.2	8/31/2007	0.0	0.2	4	56	130	0.45	14	82	23	1300	110	9.2	2.3	120	11	2.3	<1.1	42	3300
LL-5	LL-5-4.0	8/31/2007	3.5	4.0	<0.66	15	290	0.66	<0.33	53	24	40	8.1	0.097	0.57	93	0.74	<0.33	<0.66	53	55
LL-6	LL-6-0.5	8/30/2007	0.0	0.5	5.6	100	150	0.47	13	130	13	2000	140	7.5	10	88	15	2.2	<1.1	61	2600
LL-6	LL-6-2.5	8/30/2007	2.0	2.5	<0.68	29	79	0.28	0.7	43	10	270	77	9.4	0.78	37	<0.68	<0.34	<0.68	35	440
LL-6	LL-6-4.0	8/30/2007	3.5	4.0	<0.63	7.5	170	0.52	<0.32	44	17	28	7.9	0.14	<0.32	70	<0.63	<0.32	<0.63	35	49
LL-14	LL14-1-1.5	3/1/2012	1.0	1.5	--	150	--	--	--	--	--	690	180	11	--	75	--	--	--	--	1100
LL-14	LL14-3.5-4	3/1/2012	3.5	4.0	--	10	--	--	--	--	--	15	3.1	0.12	--	42	--	--	--	--	40
LL-15	LL15-1-1.5	3/1/2012	1.0	1.5	--	86	--	--	--	--	--	510	230	7	--	52	--	--	--	--	750
LL-16	LL16-3.5-4	3/1/2012	3.5	4.0	--	7.1	--	--	--	--	--	21	5.2	0.54	--	52	--	--	--	--	42
LL-16	LL16-2-2.5	3/1/2012	2.0	2.5	--	25	--	--	--	--	--	250	82	13	--	33	--	--	--	--	460
LL-17	LL17-2.5-3	3/1/2012	2.5	3.0	--	8.7	--	--	--	--	--	32	6.3	0.037	--	83	--	--	--	--	52
LL-18	LL18-3.5-4	3/1/2012	3.5	4.0	--	8	--	--	--	--	--	45	8.1	0.18	--	100	--	--	--	--	71
LL-18	LL18-1-1.5	3/1/2012	1.0	1.5	--	57	--	--	--	--	--	300	130	5.3	--	110	--	--	--	--	1200
LL-27	LL-27_1.0-1.5	5/13/2013	1.0	1.5	--	28	--	--	--	--	--	26	6.6	0.1	--	62 J	--	--	--	--	58
LL-27	LL-27_0.0-0.5	5/13/2013	0.0	0.5	--	48	--	--	--	--	--	220	48	4.1	--	110 J	--	--	--	--	400
LL-27	LL-27_2.5-2.9	5/13/2013	2.5	2.9	--	4.8	--	--	--	--	--	15	5	1.5	--	41 J	--	--	--	--	46
LL-28	LL-28_5.0-5.2 D	5/13/2013	5.0	5.2	--	7.5	--	--	--	--	--	19	5.6	0.024	--	54 J	--	--	--	--	45
LL-28	LL-28_5.0-5.2	5/13/2013	5.0	5.2	--	5.3	--	--	--	--	--	18	4.9	0.044	--	53 J	--	--	--	--	45
LL-28	LL-28_2.5-3.0	5/13/2013	2.5	3.0	--	51	--	--	--	--	--	450	160	7.5	--	46 J	--	--	--	--	750
LL-28	LL-28_1.0-1.5	5/13/2013	1.0	1.5	--	540 J	--	--	--	--	--	3300 J	440 J	9.6	--	120 J	--	--	--	--	4800 J
LL-28	LL-28_4.0-4.5	5/13/2013	4.0	4.5	--	4.5	--	--	--	--	--	21	5.7	0.071	--	56 J	--	--	--	--	42
LL-28	LL-28_1.0-1.5 D	5/13/2013	1.0	1.5	--	340 J	--	--	--	--	--	2100 J	310 J	11	--	91 J	--	--	--	--	3400 J
LL-28	LL-28_0.5-1.0 D	5/13/2013	0.5	1.0	--	100	--	--	--	--	--	860	180	3.7	--	96 J	--	--	--	--	1600
LL-28	LL-28_4.0-4.5 D	5/13/2013	4.0	4.5	--	5	--	--	--	--	--	20	5.2	0.045	--	57 J	--	--	--	--	43
LL-28	LL-28_0.5-1.0	5/13/2013	0.5	1.0	--	120	--	--	--	--	--	660	160	3.3	--	71 J	--	--	--	--	1300
LL-28	LL-28_2.5-3.0 D	5/13/2013	2.5	3.0	--	49	--	--	--	--	--	390	150	8.1	--	48 J	--	--	--	--	600
LL-29	LL-29_0.0-0.5	5/8/2013	0.0	0.5	--	93	--	--	--	--	--	1600	190	6.8	--	130	--	--	--	--	3600
LL-29	LL-29_1.0-1.5	5/8/2013	1.0	1.5	--	60	--	--	--	--	--	640	180	7.7	--	47	--	--	--	--	720
LL-29	LL-29_2.5-3.0	5/8/2013	2.5	3.0	--	6.8	--	--	--	--	--	12	2.7	0.22	--	31	--	--	--	--	30
LL-30	LL-30_2.5-3.0	5/9/2013	2.5	3.0	--	5.5	--	--	--	--	--	25	7.5	0.034	--	76	--	--	--	--	41
LL-30	LL-30_1.0-1.5	5/9/2013	1.0	1.5	--	58	--	--	--	--	--	380	140	7	--	39	--	--	--	--	250
LL-30	LL-30_0.0-0.5	5/9/2013	0.0	0.5	--	300	--	--	--	--	--	400	280	8.9	--	86	--	--	--	--	510
LL-31	LL-31_4.0-4.7	5/9/2013	4.0	4.7	--	9.6	--	--	--	--	--	39	8.4	0.12	--	86	--	--	--	--	70
LL-31	LL-31_1.0-1.5	5/8/2013	1.0	1.5	--	97	--	--	--	--	--	480	240	9.2	--	70	--	--	--	--	640
LL-31	LL-31_2.5-3.0	5/8/2013	2.5	3.0	--	12	--	--	--	--	--	45	7.4	0.17	--	120	--	--	--	--	70
LL-31	LL-31_0.0-0.5	5/8/2013	0.0	0.5	--	1200	--	--	--	--	--	1500	180	5.8	--	61	--	--	--	--	1000
LL-32	LL-32_0.0-0.5	5/8/2013	0.0	0.5	--	110	--	--	--	--	--	860	180	7	--	67	--	--	--	--	1300
LL-32	LL-32_2.5-3.0	5/8/2013	2.5	3.0	--	12	--	--	--	--	--	21	5.1	0.11	--	60	--	--	--	--	47
LL-32	LL-32_1.0-1.5	5/8/2013	1.0	1.5	--	180	--	--	--	--	--	760	220	9.8	--	66	--	--	--	--	1200
LL-32	LL-32_4.0-4.25	5/8/2013	4.0	4.3	--	5.7	--	--	--	--	--	13	2.9	0.067	--	42	--	--	--	--	38
LL-33	LL-33_1.0-1.5	5/13/2013	1.0	1.5	--	120	--	--	--	--	--	1700	510	15	--	74 J	--	--	--	--	1500
LL-33	LL-33_0.0-0.5	5/13/2013	0.0	0.5	--	40	--	--	--	--	--	330	87	0.98	--	73 J	--	--	--	--	500
LL-33	LL-33_4.0-4.5	5/13/2013	4.0	4.5	--	14	--	--	--	--	--	23	4.8	0.1	--	68 J	--	--	--	--	43
LL-33	LL-33_2.5-3.0	5/13/2013	2.5	3.0	--	140	--	--	--	--	--	560	200	11	--	60 J	--	--	--	--	710
LL-33	LL-33_5.0-5.25	5/13/2013	5.0	5.3	--	11	--	--	--	--	--	19	3.5	0.066	--	62 J	--	--	--	--	44
LL-34	LL-34_1.0-1.5	5/7/2013	1.0	1.5	--	620 J	--	--	--	--	--	1800	230	86	--	70 J	--	--	--	--	2500
LL-34	LL-34_2.5-3.0	5/7/2013	2.5	3.0	--	7.1 J	--	--	--	--	--	24	6	0.11	--	63 J	--	--	--	--	46

Table 12
Metals in Sediment
Pre-Design Investigation Report
HA-2, Campus Bay, Richmond, California
Concentrations in milligrams per kilogram (mg/kg)

Location	Sample Name	Sample Date	Top Depth (feet bss)	Bottom Depth (feet bss)	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Mercury	Molybdenum	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc
LL-34	LL-34_4.0-4.3	5/7/2013	4.0	4.3	--	6.8	--	--	--	--	--	25	5.5	0.15	--	64	--	--	--	--	46
LL-34	LL-34_0.0-0.5	5/7/2013	0.0	0.5	--	430 J	--	--	--	--	--	2400	490 J	8.5	--	140 J	--	--	--	--	3500
LL-35	LL-35_0.0-0.5	5/7/2013	0.0	0.5	--	64	--	--	--	--	--	820	170 J	10	--	64 J	--	--	--	--	1500
LL-35	LL-35_2.5-3.0	5/7/2013	2.5	3.0	--	7.5	--	--	--	--	--	26	5.3 J	0.095	--	69	--	--	--	--	49
LL-35	LL-35_4.0-4.5	5/10/2013	4.0	4.5	--	8.3	--	--	--	--	--	20	5.4	0.049	--	62	--	--	--	--	40
LL-35	LL-35_1.0-1.5	5/7/2013	1.0	1.5	--	420	--	--	--	--	--	1500	260	13	--	87 J	--	--	--	--	2900
LL-36	LL-36_0.0-0.5	5/7/2013	0.0	0.5	--	1200 J	--	--	--	--	--	1600	540 J	11	--	96 J	--	--	--	--	1800
LL-36	LL-36_1.0-1.5	5/7/2013	1.0	1.5	--	19	--	--	--	--	--	170	38 J	4.2	--	46	--	--	--	--	180
LL-36	LL-36_3.5-4.0	5/10/2013	3.5	4.0	--	5.1	--	--	--	--	--	16	4.4	0.1	--	46	--	--	--	--	35
LL-36	LL-36_2.5-3.0	5/7/2013	2.5	3.0	--	7.9	--	--	--	--	--	34	6.6	0.14	--	63	--	--	--	--	65
LL-37	LL-37_1.0-1.5	5/9/2013	1.0	1.5	--	210	--	--	--	--	--	810	250	11	--	87	--	--	--	--	1600
LL-37	LL-37_2.5-3.0	5/9/2013	2.5	3.0	--	8.7	--	--	--	--	--	38	7.2	0.14	--	130	--	--	--	--	75
LL-37	LL-37_3.5-4.0	5/9/2013	3.5	4.0	--	27	--	--	--	--	--	58	9.3	0.09	--	380	--	--	--	--	57
LL-37	LL-37_0.0-0.5	5/9/2013	0.0	0.5	--	93	--	--	--	--	--	1600	230	9	--	180	--	--	--	--	4900
LL-38	LL-38_1.0-1.5	5/9/2013	1.0	1.5	--	100	--	--	--	--	--	730	240	8.1	--	50	--	--	--	--	1500
LL-38	LL-38_3.5-4.0	5/9/2013	3.5	4.0	--	6.4	--	--	--	--	--	33	7.6	0.077	--	110	--	--	--	--	250
LL-38	LL-38_2.5-3.0	5/9/2013	2.5	3.0	--	7.4	--	--	--	--	--	45	10	0.062	--	140	--	--	--	--	310
LL-38	LL-38_0.0-0.5	5/9/2013	0.0	0.5	--	350	--	--	--	--	--	1100	510	10	--	95	--	--	--	--	1100
LL-41	LL-41_2.5-3.0	5/10/2013	2.5	3.0	--	7.9	--	--	--	--	--	24	5.9	0.096	--	66	--	--	--	--	78
LL-41	LL-41_0.0-0.5	5/10/2013	0.0	0.5	--	110	--	--	--	--	--	1600	330	16	--	110	--	--	--	--	2700
LL-41	LL-41_1.0-1.5	5/10/2013	1.0	1.5	--	74	--	--	--	--	--	770	130	13	--	53	--	--	--	--	440
UL-1	UL-1-5.0	8/15/2007	4.5	5.0	28	390	330	0.27	5	200	8.1	560	410	31	16	62	110	4.3	<1.2	150	830
UL-1	UL-1-0.5	8/15/2007	0.0	0.5	2.8	24	140	0.57	1.7	73	13	210	51	1.6	0.42	69	5.1	0.61	<0.66	76	340
UL-1	UL-1-11.0	8/15/2007	10.5	11.0	<0.63	8.1	170	0.47	<0.32	48	11	34	6.6	0.085	<0.32	70	<0.63	<0.32	<0.63	43	72
UL-2	UL-2-5.0	8/15/2007	4.5	5.0	7.5	280	380	0.34	7.4	72	12	1800	310	7.3	12	54	13	3.5	<1.1	74	2100
UL-2	UL-2-10.5	8/15/2007	10.0	10.5	<0.64	7.5	150	0.48	<0.32	45	13	23	7.7	0.15	<0.32	65	<0.64	<0.32	<0.64	43	55
UL-2	UL-2-0.5	8/15/2007	0.0	0.5	2.1	16	130	0.51	0.42	68	16	58	23	0.69	<0.33	69	4.6	<0.33	<0.67	75	120
UL-3	UL-3-5.0	8/14/2007	4.5	5.0	15	400	36	<0.31	42	39	5.3	3500	470	3.5	7.7	33	95	14	3.3	89	4800
UL-3	UL-3-12.0	8/14/2007	11.5	12.0	<0.61	11	130	0.46	<0.3	39	7.5	25	5.8	<0.024	<0.3	54	<0.61	<0.3	<0.61	42	48
UL-3	UL-3-9.0	8/14/2007	8.5	9.0	2.5	130	240	0.34	3.6	63	11	580	150	11	5.2	45	6.5	0.99	<0.88	54	1200
UL-3	UL-3-0.5	8/14/2007	0.0	0.5	<1.5	44	46	0.43	15	27	27	1100	140	8.9	5.3	84	23	1.4	<1.5	54	2100
UL-4	UL-4-0.5	8/14/2007	0.0	0.5	<0.68	7	120	0.44	0.72	17	6.1	16	25	0.093	1.2	22	<0.68	<0.34	<0.68	19	45
UL-4	UL-4-11.8	8/14/2007	11.3	11.8	<0.6	11	190	0.41	<0.3	69	16	29	6.4	0.094	<0.3	78	<0.6	<0.3	<0.6	36	81
UL-4	UL-4-5.0	8/14/2007	4.5	5.0	<1.2	420	290	0.57	3.6	98	14	1100	180	17	6.7	75	7.9	1.5	<1.2	83	1600
UL-5	UL-5-5.0	8/14/2007	4.5	5.0	<2.1	340	12	<0.42	20	21	6.2	1700	62	6.7	6.6	37	110	1.6	<2.1	39	2600
UL-5	UL-5-11.5	8/14/2007	11.0	11.5	<0.64	30	130	0.6	<0.32	63	9.6	34	6.6	0.12	<0.32	67	<0.64	<0.32	<0.64	44	63
UL-5	UL-5-0.5	8/14/2007	0.0	0.5	<0.69	7.3	130	0.5	0.81	22	6.1	19	25	0.18	1.5	24	<0.69	<0.35	<0.69	25	55
UL-5	UL-5-3.0	8/14/2007	2.5	3.0	<2.1	62	34	0.46	13	31	5	670	170	28	<1	47	110	2.9	<2.1	59	2200
UL-6	UL-6-11.8	8/14/2007	11.3	11.8	<0.63	12	290	0.5	<0.31	52	19	50	10	0.08	0.55	86	0.66	<0.31	<0.63	45	120
UL-6	UL-6-0.5	8/14/2007	0.0	0.5	<2.5	77	130	<0.5	54	180	86	3600	370	<0.1	23	280	20	3.1	<2.5	68	11000
UL-6	UL-6-5.0	8/14/2007	4.5	5.0	4.8	600	310	0.93	11	170	19	2700	240	18	11	120	12	1.7	<1.6	100	4800
UL-7	UL-7-0.5	11/10/2011	0.0	0.5	2.7	67	73	0.21	3.7	41	8	600	150	6.7	3.8	30	8.9	1.9	<0.5	41	600
UL-7	UL-7-2.5	10/24/2011	2.0	2.5	<0.5	16	20	<0.1	1.7	12	1.5	140	120	1.4	0.98	20	8.2	<0.25	<0.5	29	170
UL-7	UL-7-11.5	10/24/2011	11.0	11.5	3.5	230	26	<0.1	16	11	2.7	1400	200	6	3.4	12	50	6	1.7	28	2100
UL-7	UL-7-10	10/24/2011	9.5	10.0	2.9	410	14	<0.1	16	8.6	3.4	1400	160	7.3	2.9	14	47	7.2	2.5	27	2300
UL-9	UL9-2-2.5	2/28/2012	2.0	2.5	--	130	--	--	--	--	--	630	170	7.5	--	40	--	--	--	--	810
UL-10	UL10-2-3	2/28/2012	2.5	3.0	--	21	--	--	--	--	--	100	37	0.84	--	47	--	--	--	--	460
UL-10	UL10-6-6.5	2/28/2012	6.0	6.5	--	1000	--	--	--	--	--	2600	260	27	--	94	--	--	--	--	3300
UL-11	UL11-6.5-7	2/28/2012	6.5	7.0	--	860	--	--	--	--	--	3900	290	27	--	110	--	--	--	--	3900
UL-11	UL11-2-3	2/28/2012	2.5	3.0	--	81	--	--	--	--	--	1100	170	2	--	40	--	--	--	--	1400
UL-12	UL12-8.5-9	2/28/2012	8.5	9.0	--	2800	--	--	--	--	--	4600	470	7.6	--	54	--	--	--	--	7500
UL-12	UL12-2-3	2/28/2012	2.5	3.0	--	9.4	--	--	--	--	--	97	63	0.71	--	13	--	--	--	--	68
UL-12	UL12-6-7	2/28/2012	6.5	7.0	--	170	--	--	--	--	--	530	140	1	--	28	--	--	--	--	570
UL-25	UL-25_5.5-6.0 D	6/12/2013	5.5	6.0	--	430 J	--	--	--	--	--	2000 J	350	4.2 J	--	34	--	--	--	--	3800 J
UL-25	UL-25_9.5-10.0	6/12/2013	9.5	10.0	--	11	--	--	--	--	--	33	7.7	0.046	--	67	--	--	--	--	57
UL-25	UL-25_11.5-12.0	6/12/2013	11.5	12.0	--	5.8	--	--	--	--	--	28	5.8	0.054	--	61	--	--	--	--	53
UL-25	UL-25_3.5-4.0	6/12/2013	3.5	4.0	--	1800	--	--	--	--	--	6600	370	4.6	--	34	--	--	--	--	10000
UL-25	UL-25_11.5-12.0 D	6/12/2013	11.5	12.0	--	5.8	--	--	--	--	--	28	6	0.057	--	66	--	--	--	--	55
UL-25	UL-25_7.5-8.0	6/12/2013	7.5	8.0	--	1300	--	--	--	--	--	2700	470	20	--	55	--	--	--	--	4700
UL-25	UL-25_9.5-10.0 D	6/12/2013	9.5	10.0	--	8.8	--	--	--	--	--	33	6.8	0.067	--	66	--	--	--	--	54

Table 12
Metals in Sediment
Pre-Design Investigation Report
HA-2, Campus Bay, Richmond, California
Concentrations in milligrams per kilogram (mg/kg)

Location	Sample Name	Sample Date	Top Depth (feet bss)	Bottom Depth (feet bss)	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Mercury	Molybdenum	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc
UL-25	UL-25_5.5-6.0	6/12/2013	5.5	6.0	--	610 J	--	--	--	--	--	4600 J	440	11 J	--	32	--	--	--	--	7100 J
UL-26	UL-26_9.5-10.0	6/12/2013	9.5	10.0	--	13	--	--	--	--	--	32	6.8	0.063	--	66	--	--	--	--	56
UL-26	UL-26_3.5-4.0	6/12/2013	3.5	4.0	--	2700	--	--	--	--	--	14000	620	9.9	--	25	--	--	--	--	23000
UL-26	UL-26_7.5-8.0	6/12/2013	7.5	8.0	--	420	--	--	--	--	--	1100	870	140	--	51	--	--	--	--	1000
UL-26	UL-26_5.5-6.0	6/12/2013	5.5	6.0	--	640	--	--	--	--	--	3300	270	4.7	--	32	--	--	--	--	4400
UL-26	UL-26_11.5-12.0	6/12/2013	11.5	12.0	--	9	--	--	--	--	--	35	7.3	0.076	--	78	--	--	--	--	66
UL-27A	UL-27A_3.5-4.0	6/12/2013	3.5	4.0	--	1900	--	--	--	--	--	9700	490	4.7	--	40	--	--	--	--	16000
UL-27A	UL-27A_11.5-12.0	6/12/2013	11.5	12.0	--	7.7	--	--	--	--	--	30	6.5	0.086	--	70	--	--	--	--	66
UL-27A	UL-27A_5.5-6.0	6/12/2013	5.5	6.0	--	380	--	--	--	--	--	450	130	1.3	--	39	--	--	--	--	640
UL-27A	UL-27A_7.5-8.0	6/12/2013	7.5	8.0	--	630	--	--	--	--	--	2300	230	51	--	90	--	--	--	--	5700
UL-27A	UL-27A_9.5-10.0	6/12/2013	9.5	10.0	--	14	--	--	--	--	--	35	8	0.075	--	67	--	--	--	--	66
UL-28	UL-28_7.5-8.0	6/10/2013	7.5	8.0	--	110	--	--	--	--	--	440	150	9.8	--	36	--	--	--	--	680
UL-28	UL-28_9.5-10.0	6/10/2013	9.5	10.0	--	6.9	--	--	--	--	--	22	5.7	0.12	--	72	--	--	--	--	41
UL-28	UL-28_5.5-6.0	6/10/2013	5.5	6.0	--	480	--	--	--	--	--	6100	340	5.2	--	11	--	--	--	--	6200
UL-28	UL-28_11.0-11.5	6/10/2013	11.0	11.5	--	9.3	--	--	--	--	--	31	6.7	0.087	--	83	--	--	--	--	59
UL-28	UL-28_3.5-4.0	6/10/2013	3.5	4.0	--	33	--	--	--	--	--	400	220	18	--	32	--	--	--	--	560
UL-29	UL-29_0.0-0.5	6/11/2013	0.0	0.5	--	21	--	--	--	--	--	22	29	0.2	--	22	--	--	--	--	62
UL-29	UL-29_5.5-6.0	6/11/2013	5.5	6.0	--	33	--	--	--	--	--	200	53	1.1	--	69	--	--	--	--	220
UL-29	UL-29_11.0-11.5	6/11/2013	11.0	11.5	--	7.7	--	--	--	--	--	32	7.8	0.047	--	84	--	--	--	--	58
UL-29	UL-29_9.5-10.0	6/11/2013	9.5	10.0	--	160	--	--	--	--	--	450	95	16	--	50	--	--	--	--	1500
UL-29	UL-29_3.5-4.0	6/11/2013	3.5	4.0	--	56	--	--	--	--	--	180	56	0.41	--	54	--	--	--	--	240
UL-29	UL-29_7.5-8.0	6/11/2013	7.5	8.0	--	450	--	--	--	--	--	3900	590	16	--	49	--	--	--	--	6800
UL-30	UL-30_9.5-10.0	6/12/2013	9.5	10.0	--	470	--	--	--	--	--	2400	280	16	--	64	--	--	--	--	4200
UL-30	UL-30_7.5-8.0	6/12/2013	7.5	8.0	--	1100	--	--	--	--	--	2800	450	14	--	50	--	--	--	--	6300
UL-30	UL-30_11.5-12.0	6/12/2013	11.5	12.0	--	7.1	--	--	--	--	--	34	5.5	0.13	--	78	--	--	--	--	74
UL-30	UL-30_5.5-6.0	6/12/2013	5.5	6.0	--	3200	--	--	--	--	--	4900	610	3.3	--	40	--	--	--	--	8200
UL-30	UL-30_3.5-4.0	6/12/2013	3.5	4.0	--	69	--	--	--	--	--	700	170	3.2	--	56	--	--	--	--	2100
UL-31	UL-31_5.5-6.0	6/12/2013	5.5	6.0	--	2200	--	--	--	--	--	4100	360	7	--	58	--	--	--	--	6800
UL-31	UL-31_3.5-4.0	6/12/2013	3.5	4.0	--	1500	--	--	--	--	--	6300	570	9.8	--	39	--	--	--	--	9900
UL-31	UL-31_7.5-8.0	6/12/2013	7.5	8.0	--	340	--	--	--	--	--	1900	260	21	--	54	--	--	--	--	2300
UL-31	UL-31_11.5-12.0	6/12/2013	11.5	12.0	--	9.1	--	--	--	--	--	34	8.1	0.09	--	80	--	--	--	--	65
UL-31	UL-31_9.5-10.0	6/12/2013	9.5	10.0	--	11	--	--	--	--	--	35	8.4	0.21	--	71	--	--	--	--	65
UL-32	UL-32_7.5-8.0	6/12/2013	7.5	8.0	--	560	--	--	--	--	--	1000	590	24	--	57	--	--	--	--	1100
UL-32	UL-32_3.5-4.0	6/12/2013	3.5	4.0	--	11	--	--	--	--	--	93	30	0.74	--	67	--	--	--	--	150
UL-32	UL-32_9.5-10.0	6/12/2013	9.5	10.0	--	46	--	--	--	--	--	610	76	9.3	--	81	--	--	--	--	480
UL-32	UL-32_11.5-12.0	6/12/2013	11.5	12.0	--	8	--	--	--	--	--	32	7.8	0.13	--	77	--	--	--	--	63
UL-32	UL-32_5.5-6.0	6/12/2013	5.5	6.0	--	870	--	--	--	--	--	8300	770	5.5	--	47	--	--	--	--	14000
UL-33	UL-33_9.5-10.0	6/11/2013	9.5	10.0	--	6.5	--	--	--	--	--	31	7.7	0.17	--	73	--	--	--	--	56
UL-33	UL-33_11.5-12.0	6/11/2013	11.5	12.0	--	4.4	--	--	--	--	--	22	4.2	0.1	--	45	--	--	--	--	40
UL-33	UL-33_3.5-4.0	6/11/2013	3.5	4.0	--	1600	--	--	--	--	--	12000	460	6.6	--	50	--	--	--	--	20000
UL-33	UL-33_5.5-6.0	6/11/2013	5.5	6.0	--	440	--	--	--	--	--	3300	660	13	--	31	--	--	--	--	4700
UL-33	UL-33_7.5-8.0	6/11/2013	7.5	8.0	--	730	--	--	--	--	--	2800	240	14	--	46	--	--	--	--	6600
UL-34	UL-34_5.5-6.0	6/11/2013	5.5	6.0	--	4800	--	--	--	--	--	15000	760	13	--	46	--	--	--	--	28000
UL-34	UL-34_9.5-10.0	6/11/2013	9.5	10.0	--	3.5	--	--	--	--	--	17	4.7	0.087	--	73	--	--	--	--	35
UL-34	UL-34_3.5-4.0	6/11/2013	3.5	4.0	--	42	--	--	--	--	--	730	290	6.5	--	41	--	--	--	--	1300
UL-34	UL-34_0.0-0.5	6/11/2013	0.0	0.5	--	66	--	--	--	--	--	700	190	4.1	--	42	--	--	--	--	1200
UL-34	UL-34_7.5-8.0	6/11/2013	7.5	8.0	--	820	--	--	--	--	--	2100	220	11	--	83	--	--	--	--	4000
UL-34	UL-34_11.5-12.0	6/11/2013	11.5	12.0	--	5.5	--	--	--	--	--	28	6	0.084	--	64	--	--	--	--	50
UL-34	UL-34_11.5-12.0	6/11/2013	11.5	12.0	--	5.5	--	--	--	--	--	28	6	0.084	--	64	--	--	--	--	50

Notes:
< = analyte not detected above the method detection limit; shown value is the laboratory reporting limit.
Sediment data are on a dry weight basis.
-- = not analyzed
bss = Below sediment surface
D = Duplicate sample
J = estimated value

Table 13
Proprietary Pesticides in Sediment
Pre-Design Investigation Report
HA-2, Campus Bay, Richmond, California
Concentrations in micrograms per kilogram (µg/kg)

Location	Sample Name	Sample Date	Top Depth (feet bss)	Bottom Depth (feet bss)	Butylate	Cycloate	EPTC	Fonofos	Molinate	Napropamide	Pebulate	Vernolate
LL-1	LL-1-0.2	8/30/2007	0.0	0.2	250	4,700	1,600	<52	950	<52	14,000	1,900
LL-1	LL-1-2.5	8/30/2007	2.0	2.5	14,000	89,000	1,300,000	<12000	1,700,000	<12000	150,000	180,000
LL-1	LL-1-4.5	8/30/2007	4.0	4.5	<560	<1400	34,000	<560	73,000	<560	1,700	2,400
LL-2	LL-2-0.2	8/30/2007	0.0	0.2	<59	640	320	<59	350	<59	510	280
LL-2	LL-2-2.5	8/30/2007	2.0	2.5	6,100	34,000	45,000	<370	6,900	<370	39,000	47,000
LL-2	LL-2-5.0	8/30/2007	4.5	5.0	35	220	1,100	<23	160	<23	410	480
LL-3	LL-3-0.2	8/30/2007	0.0	0.2	<52	140	180	<52	82	<52	57	73
LL-3	LL-3-2.5	8/30/2007	2.0	2.5	<26	45	350	<26	360	<26	520	240
LL-3	LL-3-4.0	8/30/2007	3.5	4.0	<24	<24	210	<24	260	<24	180	81
LL-4	LL-4-0.2	8/31/2007	0.0	0.2	<54	200	260	<54	230	<54	120	210
LL-4	LL-4-3.0	8/31/2007	2.5	3.0	670	490	7,600	<39	15,000	<39	4,200	5,000
LL-4	LL-4-4.5	8/31/2007	4.0	4.5	<24	<24	310	<24	1,500	<24	<24	<24
LL-5	LL-5-0.2	8/31/2007	0.0	0.2	<42	300	160	<42	130	<42	130	140
LL-5	LL-5-1.5	8/31/2007	1.0	1.5	48	140	3,000	<34	1,700	<34	260	440
LL-5	LL-5-4.0	8/31/2007	3.5	4.0	<26	<26	460	<26	410	<26	<26	<26
LL-6	LL-6-0.5	8/30/2007	0.0	0.5	47	180	260	<45	200	<45	160	140
LL-6	LL-6-2.5	8/30/2007	2.0	2.5	<27	<27	810	<27	580	<27	99	83
LL-6	LL-6-4.0	8/30/2007	3.5	4.0	<26	<26	170	<26	110	<26	<26	<26
LL-14	LL14-1-1.5	3/1/2012	1.0	1.5	2,500	16,000	120,000	<120	18,000	<120	30,000	33,000
LL-14	LL14-3.5-4	3/1/2012	3.5	4.0	95	770	5,200	<59	500	<59	1,200	1,700
LL-15	LL15-1-1.5	3/1/2012	1.0	1.5	<84	210	2,000	<84	4,600	<84	300	1,000
LL-16	LL16-2-2.5	3/1/2012	2.0	2.5	<70	91	1,000	<70	800	<70	2,000	790
LL-16	LL16-3.5-4	3/1/2012	3.5	4.0	<61	<61	370	<61	220	<61	510	190
LL-17	LL17-2.5-3	3/1/2012	2.5	3.0	<64	<64	850	<64	510	<64	<64	<64
LL-18	LL18-1-1.5	3/1/2012	1.0	1.5	<88	<88	1,100	<88	840	<88	410	190
LL-18	LL18-3.5-4	3/1/2012	3.5	4.0	<68	<68	690	<68	590	<68	<68	<68
LL-27	LL-27_0.0-0.5	5/13/2013	0.0	0.5	<180	<180	670	<180	<180	<180	370	<180
LL-27	LL-27_1.0-1.5	5/13/2013	1.0	1.5	<62	<62	<120	<62	<62	<62	<62	<62
LL-27	LL-27_2.5-2.9	5/13/2013	2.5	2.9	<60	<60	190	<60	<60	<60	470	110
LL-28	LL-28_0.5-1.0	5/13/2013	0.5	1.0	960	6,200	2100 J	<230	870	<230	8300 J	3500 J
LL-28	LL-28_0.5-1.0 D	5/13/2013	0.5	1.0	540	4,600	1,700	<240	590	<240	6400 J	2700 J
LL-28	LL-28_1.0-1.5	5/13/2013	1.0	1.5	530	2,300	4,000	<170	1,400	<170	15,000	2900 J
LL-28	LL-28_1.0-1.5 D	5/13/2013	1.0	1.5	600	2,100	4,700	<150	1,600	<150	16,000	4000 J
LL-28	LL-28_2.5-3.0	5/13/2013	2.5	3.0	230	440	7,500	<80	3500 J	<80	16,000	2,800
LL-28	LL-28_2.5-3.0 D	5/13/2013	2.5	3.0	300	440	8,400	<160	5000 J	<160	18,000	3,100
LL-28	LL-28_4.0-4.5 D	5/13/2013	4.0	4.5	<61	<61	760	<61	350	<61	810	110
LL-28	LL-28_4.0-4.5	5/13/2013	4.0	4.5	<61	<61	580	<61	290	<61	810	85
LL-28	LL-28_5.0-5.2	5/13/2013	5.0	5.2	<62	<62	420	<62	220	<62	580	79
LL-28	LL-28_5.0-5.2 D	5/13/2013	5.0	5.2	<60	<60	340	<60	140	<60	500	<60
LL-29	LL-29_0.0-0.5	5/8/2013	0.0	0.5	<180	230	450	<180	<180	<180	180	<180
LL-29	LL-29_1.0-1.5	5/8/2013	1.0	1.5	87	570	310	<83	150	<83	1,100	400
LL-29	LL-29_2.5-3.0	5/8/2013	2.5	3.0	<58	<58	120	<58	<58	<58	<58	<58
LL-30	LL-30_0.0-0.5	5/9/2013	0.0	0.5	<120	190	780	<120	530	<120	320	180
LL-30	LL-30_1.0-1.5	5/9/2013	1.0	1.5	93	150	1,000	<75	410	<75	330	290
LL-30	LL-30_2.5-3.0	5/9/2013	2.5	3.0	<60	<60	440	<60	170	<60	<60	<60
LL-31	LL-31_0.0-0.5	5/8/2013	0.0	0.5	230	490	2,200	<150	1,500	<150	630	680
LL-31	LL-31_1.0-1.5	5/8/2013	1.0	1.5	220	180	2,100	<99	1,800	<99	890	690
LL-31	LL-31_2.5-3.0	5/8/2013	2.5	3.0	<71	<71	440	<71	<71	<71	<71	<71
LL-31	LL-31_4.0-4.7	5/9/2013	4.0	4.7	<68	<68	420	<68	<68	<68	<68	<68 J
LL-32	LL-32_0.0-0.5	5/8/2013	0.0	0.5	490	6,100	8,900	<250	4,000	<250	14,000	2,900
LL-32	LL-32_1.0-1.5	5/8/2013	1.0	1.5	620	450	2,800	<100	940	<100	7,900	6,100

Table 13
Proprietary Pesticides in Sediment
Pre-Design Investigation Report
HA-2, Campus Bay, Richmond, California
Concentrations in micrograms per kilogram (µg/kg)

Location	Sample Name	Sample Date	Top Depth (feet bss)	Bottom Depth (feet bss)	Butylate	Cycloate	EPTC	Fonofos	Molinate	Napropamide	Pebulate	Vernolate
LL-32	LL-32_2.5-3.0	5/8/2013	2.5	3.0	<61	<61	270	<61	81	<61	620	270
LL-32	LL-32_4.0-4.25	5/8/2013	4.0	4.3	<58	<58	170	<58	<58	<58	130	<58
LL-33	LL-33_0.0-0.5	5/13/2013	0.0	0.5	<110	<110	280	<110	<110	<110	<110	<110
LL-33	LL-33_1.0-1.5	5/13/2013	1.0	1.5	600	910	2,600	<210	380	<210	4,200	3,000
LL-33	LL-33_2.5-3.0	5/13/2013	2.5	3.0	420	350	1,900	<88	<88	<88	5,100	3,500
LL-33	LL-33_4.0-4.5	5/13/2013	4.0	4.5	<61	<61	260	<61	<61	<61	420	<61
LL-33	LL-33_5.0-5.25	5/13/2013	5.0	5.3	<62	<62	350	<62	<62	<62	530	<62
LL-34	LL-34_0.0-0.5	5/7/2013	0.0	0.5	15,000	54,000	75,000	<180	26,000	<180	220,000	35,000
LL-34	LL-34_1.0-1.5	5/7/2013	1.0	1.5	1,000	5,200	43,000	<440	33,000	<440	27,000	5,600
LL-34	LL-34_2.5-3.0	5/7/2013	2.5	3.0	<63	<63	380	<63	190	<63	68	<63
LL-34	LL-34_4.0-4.3	5/7/2013	4.0	4.3	<61	<61	280	<61	61	<61	170	<61
LL-35	LL-35_0.0-0.5	5/7/2013	0.0	0.5	<150	1,100	6,600	<150	2,900	<150	1,200	1,100
LL-35	LL-35_1.0-1.5	5/7/2013	1.0	1.5	620	<480	6,600	<120	6,300	<120	3,300	2,700
LL-35	LL-35_2.5-3.0	5/7/2013	2.5	3.0	<63	<63	520	<63	670	<63	<63	<63
LL-35	LL-35_4.0-4.5	5/10/2013	4.0	4.5	<58	<58	340	<58	77	<58	<58	<58
LL-36	LL-36_0.0-0.5	5/7/2013	0.0	0.5	510	6,700	13,000	<150	7,800	<150	18,000	6,400
LL-36	LL-36_1.0-1.5	5/7/2013	1.0	1.5	<68	120	810	<68	400	<68	610	120
LL-36	LL-36_2.5-3.0	5/7/2013	2.5	3.0	<62	<62	200	<62	<62	<62	76	<62
LL-36	LL-36_3.5-4.0	5/10/2013	3.5	4.0	<58	<58	250	<58	<58	<58	<58	<58
LL-37	LL-37_0.0-0.5	5/9/2013	0.0	0.5	<150	250	840	<150	160	<150	210	<150
LL-37	LL-37_1.0-1.5	5/9/2013	1.0	1.5	160	780	2,100	<110	3,000	<110	770	800
LL-37	LL-37_2.5-3.0	5/9/2013	2.5	3.0	<65	<65	510	<65	650	<65	<65	<65
LL-37	LL-37_3.5-4.0	5/9/2013	3.5	4.0	<64	<64	850	<64	620	140	<64	<64
LL-38	LL-38_0.0-0.5	5/9/2013	0.0	0.5	<170	1,000	1,400	<170	430	<170	1,200	740
LL-38	LL-38_1.0-1.5	5/9/2013	1.0	1.5	<79	230	1,300	<79	630	<79	400	310
LL-38	LL-38_2.5-3.0	5/9/2013	2.5	3.0	<72	<72	720	<72	130	<72	<72	<72
LL-38	LL-38_3.5-4.0	5/9/2013	3.5	4.0	<65	<65	330	<65	<65	<65	<65	<65
LL-41	LL-41_0.0-0.5	5/10/2013	0.0	0.5	<250	5,600	2,200	<250	330	<250	18,000	4,000
LL-41	LL-41_1.0-1.5	5/10/2013	1.0	1.5	130	3,000	3,700	<86	720	<86	46,000	4,700
LL-41	LL-41_2.5-3.0	5/10/2013	2.5	3.0	<60	93	290	<60	<60	<60	430	72
UL-1	UL-1-0.5	8/15/2007	0.0	0.5	<26	<26	<65	<26	<26	<26	<65	<26
UL-1	UL-1-5.0	8/15/2007	4.5	5.0	<240	<240	1,800	1,900	<240	<240	36,000	540
UL-1	UL-1-11.0	8/15/2007	10.5	11.0	<25	<25	<62	<25	<25	<25	<62	<25
UL-2	UL-2-0.5	8/15/2007	0.0	0.5	<27	<27	<67	<27	<27	<27	<27	<27
UL-2	UL-2-5.0	8/15/2007	4.5	5.0	<110	<110	670	<110	<110	260	17,000	160
UL-2	UL-2-10.5	8/15/2007	10.0	10.5	<64	<64	99	<64	<64	<64	1,300	<64
UL-3	UL-3-0.5	8/14/2007	0.0	0.5	<60	<60	<150	<60	<60	<60	<60	<60
UL-3	UL-3-5.0	8/14/2007	4.5	5.0	<150	<150	<150	<150	<150	<150	<150	<150
UL-3	UL-3-9.0	8/14/2007	8.5	9.0	<88	<88	<88	<88	<88	<88	160	<88
UL-3	UL-3-12.0	8/14/2007	11.5	12.0	<24	<24	<60	<24	<24	<24	<24	<24
UL-4	UL-4-0.5	8/14/2007	0.0	0.5	<27	<27	<67	<27	<27	<27	<67	<27
UL-4	UL-4-5.0	8/14/2007	4.5	5.0	<47	94	<120	<47	<47	550	2,300	92
UL-4	UL-4-11.8	8/14/2007	11.3	11.8	<24	<24	<60	<24	<24	<24	93	<24
UL-5	UL-5-0.5	8/14/2007	0.0	0.5	<69	<69	<69	<69	<69	<69	<69	<69
UL-5	UL-5-3.0	8/14/2007	2.5	3.0	<83	<83	<210	<83	<83	390	<83	<83
UL-5	UL-5-5.0	8/14/2007	4.5	5.0	140	120	<210	<83	<83	5,400	430	150
UL-5	UL-5-11.5	8/14/2007	11.0	11.5	<25	<25	<64	<25	<25	<25	89	<25
UL-6	UL-6-0.5	8/14/2007	0.0	0.5	340	110	<250	<250	<99	400	<99	<99
UL-6	UL-6-5.0	8/14/2007	4.5	5.0	<160	<160	15,000	<160	<160	<160	240,000	2,400
UL-6	UL-6-11.8	8/14/2007	11.3	11.8	<25	<25	280	<25	<25	<25	1,000	<25
UL-7	UL-7-0.5	11/10/2011	0.0	0.5	<50	<50	<100	<50	<50	<50	<50	<50

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Location	Sample Name	Sample Date	Top Depth (feet bss)	Bottom Depth (feet bss)	Butylate	Cycloate	EPTC	Fonofos	Molinate	Napropamide	Pebulate	Vernolate
UL-7	UL-7-2.5	10/24/2011	2.0	2.5	<50	<50	<100	<50	<50	<50	<50	<50
UL-7	UL-7-10	10/24/2011	9.5	10.0	<51	<51	<100	<51	<51	<51	<51	<51
UL-7	UL-7-11.5	10/24/2011	11.0	11.5	<49	<49	<99	<49	<49	<49	68	<49
UL-9	UL9-2-2.5	2/28/2012	2.0	2.5	<87	<87	4,300	<87	<87	260	8,700	<87
UL-10	UL10-2-3	2/28/2012	2.5	3.0	<160	<160	<320	<160	<160	560	<160	<160
UL-10	UL10-6-6.5	2/28/2012	6.0	6.5	<140	<140	480	<140	<140	<140	8,500	<140
UL-11	UL11-2-3	2/28/2012	2.5	3.0	<220	<220	<450	<220	<220	280	<220	<220
UL-11	UL11-6.5-7	2/28/2012	6.5	7.0	<140	340	<280	<140	<140	1,300	9,300	<140
UL-12	UL12-2-3	2/28/2012	2.5	3.0	<150	<150	<290	<150	<150	<150	<150	<150
UL-12	UL12-6-7	2/28/2012	6.5	7.0	<190	<190	<370	<190	<190	3,200	<190	<190
UL-12	UL12-8.5-9	2/28/2012	8.5	9.0	<160	<160	<320	<160	<160	540	<160	<160
UL-25	UL-25_3.5-4.0	6/12/2013	3.5	4.0	<140	<140	<280	<140	<140	<140	<140	<140
UL-25	UL-25_5.5-6.0	6/12/2013	5.5	6.0	<150	<150	<290	<150	<150	<150	<150	<150
UL-25	UL-25_5.5-6.0 D	6/12/2013	5.5	6.0	<140	<140	<280	<140	<140	220	<140	<140
UL-25	UL-25_7.5-8.0	6/12/2013	7.5	8.0	<170	<170	<330	<170	<170	530	<170	<170
UL-25	UL-25_9.5-10.0 D	6/12/2013	9.5	10.0	<63	<63	<130	<63	<63	<63	<63	<63
UL-25	UL-25_9.5-10.0	6/12/2013	9.5	10.0	<61	<61	<120	<61	<61	<61	<61	<61
UL-25	UL-25_11.5-12.0 D	6/12/2013	11.5	12.0	<63	<63	<130	<63	<63	<63	<63	<63
UL-25	UL-25_11.5-12.0	6/12/2013	11.5	12.0	<63	<63	<130	<63	<63	<63	<63	<63
UL-26	UL-26_3.5-4.0	6/12/2013	3.5	4.0	<150	<150	<300	<150	<150	240	<150	<150
UL-26	UL-26_5.5-6.0	6/12/2013	5.5	6.0	<140	<140	<280	<140	<140	400	<140	<140
UL-26	UL-26_7.5-8.0	6/12/2013	7.5	8.0	<140	<140	990	<140	<140	1,600	930	<140
UL-26	UL-26_9.5-10.0	6/12/2013	9.5	10.0	<61	<61	<120	<61	<61	<61	<61	<61
UL-26	UL-26_11.5-12.0	6/12/2013	11.5	12.0	<61	<61	300	<61	<61	<61	<61	<61
UL-27A	UL-27A_3.5-4.0	6/12/2013	3.5	4.0	<180	<180	<360	<180	<180	320	<180	<180
UL-27A	UL-27A_5.5-6.0	6/12/2013	5.5	6.0	<160	160	690	<160	<160	1,400	220	<160
UL-27A	UL-27A_7.5-8.0	6/12/2013	7.5	8.0	<120	<120	950	<120	<120	<120	580	<120
UL-27A	UL-27A_9.5-10.0	6/12/2013	9.5	10.0	<62	<62	<120	<62	<62	<62	<62	<62
UL-27A	UL-27A_11.5-12.0	6/12/2013	11.5	12.0	<62	<62	<120	<62	<62	<62	<62	<62
UL-28	UL-28_3.5-4.0	6/10/2013	3.5	4.0	180	<170	<340	<170	<170	3800 J	<170	<170
UL-28	UL-28_5.5-6.0	6/10/2013	5.5	6.0	<170	<170	1,300	<170	<170	2,900	1,600	<170
UL-28	UL-28_7.5-8.0	6/10/2013	7.5	8.0	<72	<72	2,700	<72	<72	230	8,200	94
UL-28	UL-28_9.5-10.0	6/10/2013	9.5	10.0	<55	<55	<110	<55	<55	<55	<55	<55
UL-28	UL-28_11.0-11.5	6/10/2013	11.0	11.5	<60	<60	<120	<60	<60	<60	110	<60
UL-29	UL-29_0.0-0.5	6/11/2013	0.0	0.5	<60	<60	<120	<60	<60	<60	<60	<60
UL-29	UL-29_3.5-4.0	6/11/2013	3.5	4.0	<60	<60	330	<60	<60	<60	<60	<60
UL-29	UL-29_5.5-6.0	6/11/2013	5.5	6.0	<64	<64	530	<64	<64	<64	<64	<64
UL-29	UL-29_7.5-8.0	6/11/2013	7.5	8.0	<170	<170	610	<170	<170	660	380	<170
UL-29	UL-29_9.5-10.0	6/11/2013	9.5	10.0	<80	90	380	<80	<80	390	1,200	<80
UL-29	UL-29_11.0-11.5	6/11/2013	11.0	11.5	<62	<62	<120	<62	<62	130	280	<62
UL-30	UL-30_3.5-4.0	6/12/2013	3.5	4.0	<170	<170	<350	<170	<170	570	<170	<170
UL-30	UL-30_5.5-6.0	6/12/2013	5.5	6.0	<180	<180	<370	<180	<180	350	<180	<180
UL-30	UL-30_7.5-8.0	6/12/2013	7.5	8.0	<140	<140	400	<140	<140	700	210	<140
UL-30	UL-30_9.5-10.0	6/12/2013	9.5	10.0	<100	<100	1,000	<100	<100	<100	920	<100
UL-30	UL-30_11.5-12.0	6/12/2013	11.5	12.0	<65	<65	290	<65	<65	<65	<65	<65
UL-31	UL-31_3.5-4.0	6/12/2013	3.5	4.0	<180	<180	<360	<180	<180	470	<180	<180
UL-31	UL-31_5.5-6.0	6/12/2013	5.5	6.0	<150	<150	690	<150	<150	690	1,000	<150
UL-31	UL-31_7.5-8.0	6/12/2013	7.5	8.0	<100	<100	710	<100	<100	<100	590	<100
UL-31	UL-31_9.5-10.0	6/12/2013	9.5	10.0	<61	<61	140	<61	<61	<61	<61	<61
UL-31	UL-31_11.5-12.0	6/12/2013	11.5	12.0	<62	<62	160	<62	<62	<62	<62	<62
UL-32	UL-32_3.5-4.0	6/12/2013	3.5	4.0	<69	<69	<140	<69	<69	<69	<69	<69

Table 13
Proprietary Pesticides in Sediment
Pre-Design Investigation Report
HA-2, Campus Bay, Richmond, California
Concentrations in micrograms per kilogram (µg/kg)

Location	Sample Name	Sample Date	Top Depth (feet bss)	Bottom Depth (feet bss)	Butylate	Cycloate	EPTC	Fonofos	Molinate	Napropamide	Pebulate	Vernolate
UL-32	UL-32_5.5-6.0	6/12/2013	5.5	6.0	<150	<150	660	<150	<150	1,800	1,600	<150
UL-32	UL-32_7.5-8.0	6/12/2013	7.5	8.0	<120	<120	12,000	<120	<120	<120	950,000	3,200
UL-32	UL-32_9.5-10.0	6/12/2013	9.5	10.0	<63	<63	1,200	<63	<63	<63	2,900	<63
UL-32	UL-32_11.5-12.0	6/12/2013	11.5	12.0	<65	<65	340	<65	<65	<65	<65	<65
UL-33	UL-33_3.5-4.0	6/11/2013	3.5	4.0	<200	<200	<390	<200	<200	530	<200	<200
UL-33	UL-33_5.5-6.0	6/11/2013	5.5	6.0	<150	<150	520	<150	<150	350	390	<150
UL-33	UL-33_7.5-8.0	6/11/2013	7.5	8.0	140	360	540	<130	<130	450	4,700	160
UL-33	UL-33_9.5-10.0	6/11/2013	9.5	10.0	<63	<63	<130	<63	<63	<63	180	<63
UL-33	UL-33_11.5-12.0	6/11/2013	11.5	12.0	<61	<61	<120	<61	<61	<61	<61	<61
UL-34	UL-34_0.0-0.5	6/11/2013	0.0	0.5	<160	<160	<330	<160	<160	250	<160	<160
UL-34	UL-34_3.5-4.0	6/11/2013	3.5	4.0	280	<180	<360	<180	<180	1,100	<180	<180
UL-34	UL-34_5.5-6.0	6/11/2013	5.5	6.0	670	320	<430	<220	<220	2,800	<220	<220
UL-34	UL-34_7.5-8.0	6/11/2013	7.5	8.0	700	1,600	540	<170	<170	6,600	11,000	280
UL-34	UL-34_9.5-10.0	6/11/2013	9.5	10.0	<55	<55	<110	<55	<55	<55	560	<55
UL-34	UL-34_11.5-12.0	6/11/2013	11.5	12.0	<59	<59	<120	<59	<59	<59	1,400	<59

Notes:
< = analyte not detected above the method detection limit; shown value is the laboratory reporting limit.
Sediment data are on a dry weight basis.
-- = not analyzed
EPTC = S-ethyl dipropylthiocarbamate
bss = Below sediment surface
D = Duplicate sample
J = estimated value
= EPTC or pebulate detected at a concentration greater than the site-specific sediment screening value of 3,000 µg/kg

Table 14
Organochlorine Pesticides in Sediment
Pre-Design Investigation Report
HA-2, Campus Bay, Richmond, California
Concentrations in micrograms per kilogram (µg/kg)

Location	Sample Name	Sample Date	Top Depth (feet bss)	Bottom Depth (feet bss)	4,4'-DDD	4,4'-DDE	4,4'-DDT	gamma-Chlordane	Heptachlor epoxide
LL-1	LL-1-0.2	8/30/2007	0.0	0.2	87	940	<43	<22	<22
LL-1	LL-1-2.5	8/30/2007	2.0	2.5	<32	<32	<32	<16	<16
LL-1	LL-1-4.5	8/30/2007	4.0	4.5	<4.5	<4.5	<4.5	<2.3	<2.3
LL-2	LL-2-0.2	8/30/2007	0.0	0.2	<48	390	<48	<25	<25
LL-2	LL-2-2.5	8/30/2007	2.0	2.5	<31	<31	<31	<16	<16
LL-2	LL-2-5.0	8/30/2007	4.5	5.0	<3.8	<3.8	<3.8	<1.9	<1.9
LL-3	LL-3-0.2	8/30/2007	0.0	0.2	<43	270 C	<43	<22	<22
LL-3	LL-3-2.5	8/30/2007	2.0	2.5	<4.3	<4.3	<4.3	<2.2	<2.2
LL-3	LL-3-4.0	8/30/2007	3.5	4.0	<3.9	<3.9	<3.9	<2	<2
LL-4	LL-4-0.2	8/31/2007	0.0	0.2	<44	420	<44	<23	<23
LL-4	LL-4-3.0	8/31/2007	2.5	3.0	<32	<32	<32	<17	<17
LL-4	LL-4-4.5	8/31/2007	4.0	4.5	<4	<4	<4	<2	<2
LL-5	LL-5-0.2	8/31/2007	0.0	0.2	<35	970	<35	<18	<18
LL-5	LL-5-1.5	8/31/2007	1.0	1.5	<5.6	<5.6	<5.6	<2.9	<2.9
LL-5	LL-5-4.0	8/31/2007	3.5	4.0	<4.3	<4.3	<4.3	<2.2	<2.2
LL-6	LL-6-0.5	8/30/2007	0.0	0.5	100	400	<37	<19	<19
LL-6	LL-6-2.5	8/30/2007	2.0	2.5	<4.5	<4.5	<4.5	<2.3	<2.3
LL-6	LL-6-4.0	8/30/2007	3.5	4.0	<4.2	<4.2	<4.2	<2.2	<2.2
LL-14	LL14-1-1.5	3/1/2012	1.0	1.5	<7.8	<7.8	<7.8	<4	<4
LL-14	LL14-3.5-4	3/1/2012	3.5	4.0	<3.9	<3.9	<3.9	<2	<2
LL-15	LL15-1-1.5	3/1/2012	1.0	1.5	<5.6	<5.6	<5.6	<2.9	<2.9
LL-16	LL16-2-2.5	3/1/2012	2.0	2.5	<4.6	<4.6	<4.6	<2.4	<2.4
LL-16	LL16-3.5-4	3/1/2012	3.5	4.0	<4.1	<4.1	<4.1	<2.1	<2.1
LL-17	LL17-2.5-3	3/1/2012	2.5	3.0	<4.4	<4.4	<4.4	<2.2	<2.2
LL-18	LL18-1-1.5	3/1/2012	1.0	1.5	<5.8	<5.8	<5.8	<3	<3
LL-18	LL18-3.5-4	3/1/2012	3.5	4.0	<5.4	<5.4	<5.4	<2.8	<2.8
UL-1	UL-1-0.5	8/15/2007	0.0	0.5	14	10	13	<2.2	<2.2
UL-1	UL-1-5.0	8/15/2007	4.5	5.0	5900	640	<320	460 C	<170
UL-1	UL-1-11.0	8/15/2007	10.5	11.0	<4.1	<4.1	<4.1	<2.1	<2.1
UL-2	UL-2-0.5	8/15/2007	0.0	0.5	<13	<13	<13	<6.7	<6.7
UL-2	UL-2-5.0	8/15/2007	4.5	5.0	<7.5	<7.5	<7.5	<3.9	<3.9
UL-2	UL-2-10.5	8/15/2007	10.0	10.5	<4.2	<4.2	<4.2	<2.2	<2.2
UL-3	UL-3-0.5	8/14/2007	0.0	0.5	82	73	<20	<10	<10
UL-3	UL-3-5.0	8/14/2007	4.5	5.0	15 C	10	<10	7	7.8
UL-3	UL-3-9.0	8/14/2007	8.5	9.0	<5.8	<5.8	<5.8	<3	<3
UL-3	UL-3-12.0	8/14/2007	11.5	12.0	<4	<4	<4	<2	<2

Table 14
Organochlorine Pesticides in Sediment
Pre-Design Investigation Report
HA-2, Campus Bay, Richmond, California
Concentrations in micrograms per kilogram (µg/kg)

Location	Sample Name	Sample Date	Top Depth (feet bss)	Bottom Depth (feet bss)	4,4'-DDD	4,4'-DDE	4,4'-DDT	gamma-Chlordane	Heptachlor epoxide
UL-4	UL-4-0.5	8/14/2007	0.0	0.5	<4.4	<4.4	<4.4	<2.3	<2.3
UL-4	UL-4-5.0	8/14/2007	4.5	5.0	<7.8	<7.8	<7.8	<4	<4
UL-4	UL-4-11.8	8/14/2007	11.3	11.8	<3.9	<3.9	<3.9	<2	<2
UL-5	UL-5-0.5	8/14/2007	0.0	0.5	6.8	<4.5	<4.5	<2.3	<2.3
UL-5	UL-5-3.0	8/14/2007	2.5	3.0	33 C	<14	<14	<7	<7
UL-5	UL-5-5.0	8/14/2007	4.5	5.0	16 C	14	<14	<7	<7
UL-5	UL-5-11.5	8/14/2007	11.0	11.5	<4.2	<4.2	<4.2	<2.1	<2.1
UL-6	UL-6-0.5	8/14/2007	0.0	0.5	460	660	<130	<67	<67
UL-6	UL-6-5.0	8/14/2007	4.5	5.0	<11	<11	<11	<5.4	<5.4
UL-6	UL-6-11.8	8/14/2007	11.3	11.8	<4.1	<4.1	<4.1	<2.1	<2.1
UL-7	UL-7-0.5	11/10/2011	0.0	0.5	79	47	16	<8.4	<8.4
UL-7	UL-7-2.5	10/24/2011	2.0	2.5	12	43 #C	<3.3	<1.7	<1.7
UL-7	UL-7-10	10/24/2011	9.5	10.0	75 C	6.3 #	<3.3	<1.7	<1.7
UL-7	UL-7-11.5	10/24/2011	11.0	11.5	160 C	24 C	<3.3	<1.7	<1.7
UL-9	UL9-2-2.5	2/28/2012	2.0	2.5	23 C	<5.8	<5.8	<3	<3
UL-10	UL10-2-3	2/28/2012	2.5	3.0	14 C	<11	<11	<5.4	<5.4
UL-10	UL10-6-6.5	2/28/2012	6.0	6.5	<230	<230	<230	<120	<120
UL-11	UL11-2-3	2/28/2012	2.5	3.0	29 C	<300	<15	<150	<150
UL-11	UL11-6.5-7	2/28/2012	6.5	7.0	<230	<230	<230	<120	<120
UL-12	UL12-2-3	2/28/2012	2.5	3.0	58	14	<9.8	<5.1	<5.1
UL-12	UL12-6-7	2/28/2012	6.5	7.0	<62	<62	<62	<32	<32
UL-12	UL12-8.5-9	2/28/2012	8.5	9.0	120 C	29 C	<11	48 C	26 C

Notes:
Only chemicals with at least one detection are shown on this table.
Sediment data are on a dry weight basis.
< = analyte not detected above the method detection limit; shown value is the laboratory reporting limit.
-- = not analyzed
#= Continuing Calibration Verification (CCV) drift outside limits; average CCV drift within limits per method requirements
bss = Below sediment surface
C= Presence confirmed, but RPD between columns exceeds 40%
DDD = p,p'-Dichlorodiphenyl dichloroethane
DDE = Dichlorodiphenyldichloroethylene
DDT = Dichlordiphenyltrichloroethane

Table 15
PCBs in Sediment
Pre-Design Investigation Report
HA-2, Campus Bay, Richmond, California
Concentrations in micrograms per kilogram (µg/kg)

Location	Sample Name	Sample Date	Top Depth (feet bss)	Bottom Depth (feet bss)	Aroclor-1016	Aroclor-1221	Aroclor-1232	Aroclor-1242	Aroclor-1248	Aroclor-1254	Aroclor-1260	Aroclor-1262	Total PCB Aroclors
LL-1	LL-1-0.2	8/30/2007	0.0	0.2	<32	<63	<32	<32	<32	<32	45	--	45
LL-1	LL-1-2.5	8/30/2007	2.0	2.5	<24	<47	<24	<24	<24	<24	<24	--	ND
LL-1	LL-1-4.5	8/30/2007	4.0	4.5	<17	<33	<17	<17	<17	<17	<17	--	ND
LL-2	LL-2-0.2	8/30/2007	0.0	0.2	<35	<71	<35	<35	<35	<35	38	--	38
LL-2	LL-2-2.5	8/30/2007	2.0	2.5	<22	<44	<22	<22	<22	<22	<22	--	ND
LL-2	LL-2-5.0	8/30/2007	4.5	5.0	<14	<28	<14	<14	<14	<14	<14	--	ND
LL-3	LL-3-0.2	8/30/2007	0.0	0.2	<32	<63	<32	<32	<32	<32	40	--	40
LL-3	LL-3-2.5	8/30/2007	2.0	2.5	<16	<32	<16	<16	<16	<16	<16	--	ND
LL-3	LL-3-4.0	8/30/2007	3.5	4.0	<14	<29	<14	<14	<14	<14	<14	--	ND
LL-4	LL-4-0.2	8/31/2007	0.0	0.2	<32	<65	<32	<32	<32	82	40	--	122
LL-4	LL-4-3.0	8/31/2007	2.5	3.0	<24	<47	<24	<24	<24	<24	31	--	31
LL-4	LL-4-4.5	8/31/2007	4.0	4.5	<15	<29	<15	<15	<15	<15	<15	--	ND
LL-5	LL-5-0.2	8/31/2007	0.0	0.2	<26	<51	<26	<26	<26	220	81	--	301
LL-5	LL-5-1.5	8/31/2007	1.0	1.5	<20	<41	<20	<20	<20	<20	<20	--	ND
LL-5	LL-5-4.0	8/31/2007	3.5	4.0	<16	<32	<16	<16	<16	<16	<16	--	ND
LL-6	LL-6-0.5	8/30/2007	0.0	0.5	<27	<55	<27	<27	<27	<27	<27	--	ND
LL-6	LL-6-2.5	8/30/2007	2.0	2.5	<16	<33	<16	<16	<16	<16	<16	--	ND
LL-6	LL-6-4.0	8/30/2007	3.5	4.0	<15	<30	<15	<15	<15	<15	<15	--	ND
LL-30	LL-30_0.0-0.5	5/9/2013	0.0	0.5	<22	<44	<22	<22	<22	<22	<22	--	ND
LL-31	LL-31_0.0-0.5	5/8/2013	0.0	0.5	<28	<56	<28	<28	<28	<28	66	--	66
LL-37	LL-37_0.0-0.5	5/9/2013	0.0	0.5	<28	<56	<28	<28	<28	<28	<28	--	ND
UL-1	UL-1-0.5	8/15/2007	0.0	0.5	<16	<32	<16	<16	<16	23	<16	--	23
UL-1	UL-1-5.0	8/15/2007	4.5	5.0	<810	<1600	<810	<810	<810	<810	1100	--	1100
UL-1	UL-1-11.0	8/15/2007	10.5	11.0	<15	<30	<15	<15	<15	<15	<15	--	ND
UL-2	UL-2-0.5	8/15/2007	0.0	0.5	<16	<32	<16	<16	<16	<16	<16	--	ND
UL-2	UL-2-5.0	8/15/2007	4.5	5.0	<27	<55	<27	<27	<27	<27	<27	--	ND
UL-2	UL-2-10.5	8/15/2007	10.0	10.5	<15	<31	<15	<15	<15	<15	<15	--	ND
UL-3	UL-3-0.5	8/14/2007	0.0	0.5	<36	<73	<36	<36	<36	60	<36	--	60
UL-3	UL-3-5.0	8/14/2007	4.5	5.0	<38	<75	<38	<38	<38	250	<38	--	250
UL-3	UL-3-9.0	8/14/2007	8.5	9.0	<21	<42	<21	<21	<21	<21	<21	--	ND
UL-3	UL-3-12.0	8/14/2007	11.5	12.0	<15	<29	<15	<15	<15	<15	<15	--	ND
UL-4	UL-4-0.5	8/14/2007	0.0	0.5	<16	<32	<16	<16	<16	<16	<16	--	ND
UL-4	UL-4-5.0	8/14/2007	4.5	5.0	<29	<57	<29	<29	<29	<29	<29	--	ND
UL-4	UL-4-11.8	8/14/2007	11.3	11.8	<14	<29	<14	<14	<14	<14	<14	--	ND
UL-5	UL-5-0.5	8/14/2007	0.0	0.5	<17	<33	<17	<17	<17	<17	<17	--	ND
UL-5	UL-5-3.0	8/14/2007	2.5	3.0	<50	<100	<50	<50	150	130	<50	--	280
UL-5	UL-5-5.0	8/14/2007	4.5	5.0	<50	<100	<50	<50	180	170	<50	--	350
UL-5	UL-5-11.5	8/14/2007	11.0	11.5	<15	<31	<15	<15	<15	<15	<15	--	ND
UL-6	UL-6-0.5	8/14/2007	0.0	0.5	<60	<120	<60	<60	1200	950	510	--	2660
UL-6	UL-6-5.0	8/14/2007	4.5	5.0	<39	<77	<39	<39	<39	<39	<39	--	ND
UL-6	UL-6-11.8	8/14/2007	11.3	11.8	<15	<30	<15	<15	<15	<15	<15	--	ND

Table 15
PCBs in Sediment
Pre-Design Investigation Report
HA-2, Campus Bay, Richmond, California
Concentrations in micrograms per kilogram (µg/kg)

Location	Sample Name	Sample Date	Top Depth (feet bss)	Bottom Depth (feet bss)	Aroclor-1016	Aroclor-1221	Aroclor-1232	Aroclor-1242	Aroclor-1248	Aroclor-1254	Aroclor-1260	Aroclor-1262	Total PCB Aroclors
UL-7	UL-7-0.5	11/10/2011	0.0	0.5	<12	<24	<12	<12	<12	<12	<12	<12	ND
UL-7	UL-7-2.5	10/24/2011	2.0	2.5	<12	<24	<12	<12	<12	<12	<12	--	ND
UL-7	UL-7-10	10/24/2011	9.5	10.0	<12	<24	<12	<12	260	<12	<12	--	260
UL-7	UL-7-11.5	10/24/2011	11.0	11.5	<12	<24	<12	<12	130	<12	<12	--	130
UL-9	UL9-2-2.5	2/28/2012	2.0	2.5	<17	<34	<17	<17	<17	<17	<17	--	ND
UL-10	UL10-2-3	2/28/2012	2.5	3.0	<31	<61	<31	<31	<31	<31	<31	--	ND
UL-10	UL10-6-6.5	2/28/2012	6.0	6.5	<27	<53	<27	<27	<27	<27	<27	--	ND
UL-11	UL11-2-3	2/28/2012	2.5	3.0	<43	<87	<43	<43	<43	<43	<43	--	ND
UL-11	UL11-6.5-7	2/28/2012	6.5	7.0	<27	<53	<27	<27	<27	<27	<27	--	ND
UL-12	UL12-2-3	2/28/2012	2.5	3.0	<29	<57	<29	<29	210	<29	<29	--	210
UL-12	UL12-6-7	2/28/2012	6.5	7.0	<36	<72	<36	<36	<36	<36	<36	--	ND
UL-12	UL12-8.5-9	2/28/2012	8.5	9.0	<31	<62	<31	<31	1900	<31	<31	--	1900
UL-26	UL-26_0.0-0.5	6/12/2013	0.0	0.5	<31	<62	<31	<31	<31	<31	<31	--	ND
UL-26	UL-26_9.5-10.0	6/12/2013	9.5	10.0	<14	<29	<14	<14	<14	<14	<14	--	ND
UL-26	UL-26_11.5-12.0	6/12/2013	11.5	12.0	<15	<30	<15	<15	<15	<15	<15	--	ND
UL-27	UL-27_0.0-0.5	5/20/2013	0.0	0.5	<13	<26	<13	<13	<13	<13	<13	--	ND
UL-27A	UL-27A_9.5-10.0	6/12/2013	9.5	10.0	<15	<30	<15	<15	<15	<15	<15	--	ND
UL-27A	UL-27A_11.5-12.0	6/12/2013	11.5	12.0	<15	<30	<15	<15	<15	<15	<15	--	ND
UL-29	UL-29_0.0-0.5	6/11/2013	0.0	0.5	<15	<29	<15	<15	<15	<15	<15	--	ND
UL-29	UL-29_3.5-4.0	6/11/2013	3.5	4.0	<14	<29	<14	<14	<14	<14	<14	--	ND
UL-33	UL-33_3.5-4.0	6/11/2013	3.5	4.0	<48	<96	<48	<48	<48	<48	65	--	65
UL-33	UL-33_5.5-6.0	6/11/2013	5.5	6.0	<36	<73	<36	<36	<36	<36	96	--	96
UL-33	UL-33_7.5-8.0	6/11/2013	7.5	8.0	<32	<65	<32	<32	<32	<32	<32	--	ND
UL-34	UL-34_0.0-0.5	6/11/2013	0.0	0.5	<40	<80	<40	<40	<40	<40	<40	--	ND
UL-34	UL-34_5.5-6.0	6/11/2013	5.5	6.0	<52	<100	<52	<52	<52	<52	<52	--	ND
UL-34	UL-34_7.5-8.0	6/11/2013	7.5	8.0	<41	<83	<41	<41	<41	<41	<41	--	ND

Notes:
Total PCB Aroclors is the sum of detected Aroclors.
Sediment data are on a dry weight basis.
< = analyte not detected above the method detection limit; shown value is the laboratory reporting limit.
-- = not analyzed
bss = Below sediment surface
PCB = polychlorinated biphenyl

Table 16
Metals in Soil
Pre-Design Investigation Report
HA-2, Campus Bay, Richmond, California
Concentrations in milligrams per kilogram (mg/kg)

Location	Sample Name	Sample Date	Top Depth (feet bgs)	Bottom Depth (feet bgs)	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Mercury	Molybdenum	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc
LL-7	LL-7-1.0	6/29/2007	0.5	1.0	2.8	6.2	150	0.53	<0.27	39	8.8	30	70	3.7	<0.27	33	0.57	<0.27	<0.55	32	66
LL-7	LL-7-4.0	6/29/2007	3.5	4.0	1.7	5.2	140	0.8	1.7	49	29	38	7.7	0.026	<0.31	69	0.78	<0.31	<0.62	33	540
LL-7	LL-7-7.0	6/29/2007	6.5	7.0	2.3	9.3	910	0.62	1.9	74	39	38	7	0.05	<0.3	150	1	<0.3	<0.6	47	670
LL-8	LL-8-1.0	6/29/2007	0.5	1.0	3.5	29	180	0.5	0.38	81	17	81	81	0.13	0.47	110	0.73	<0.28	<0.57	35	140
LL-8	LL-8-5.5	6/29/2007	5.0	5.5	3.2	4.8	160	0.61	<0.32	45	14	22	13	0.086	<0.32	51	<0.63	<0.32	<0.63	56	53
LL-9	LL-9-0.5	11/10/2011	0.0	0.5	<0.5 J	4.5	140	0.42	0.59	44	11	30	19	0.19	0.46	56	<0.5	0.26	<0.5	33	84
LL-9	LL-9-1.5	10/26/2011	1.0	1.5	<0.5	7.3	120	0.28	0.41	46	10	21	11	0.14	0.42	53	1.3	0.35	<0.5	33	59
LL-9	LL-9-3.25	10/26/2011	2.8	3.3	1.1	15	150	0.22	6.8	34	5.5	84	240	0.57	1.3	27	2.1	3.4	<0.5	25	630
LL-9R	LL-9R-0.5	5/9/2012	0.0	0.5	<0.45	7.5	160	0.41	0.33	43	11	28	25	0.099	<0.22	56	<0.45	<0.22	<0.45	31	59
LL-9R	LL-9R-2.0	5/9/2012	1.5	2.0	2.3	6.5	97	0.36	0.24	37	10	36	16	0.077	<0.23	32	<0.46	<0.23	<0.46	54	52
LL-9R	LL-9R-8.0	5/9/2012	7.5	8.0	1.6	12	140	0.3	0.37	50	9.6	67	20	0.87	0.57	74	<0.49	<0.25	<0.49	33	130
LL-9R	LL-9R-9.0	5/9/2012	8.5	9.0	<0.47	4.9	93	0.35	<0.23	60	11	20	5.2	0.47	0.99	95	<0.47	<0.23	<0.47	30	36
LL-10	LL-10-0.5	11/10/2011	0.0	0.5	0.53	20	170	0.41	1.2	39	11	150	120	0.56	1.9	36	<0.5	0.9	<0.5	34	280
LL-10	LL-10-1.5	10/25/2011	1.0	1.5	1.9	15	190	0.43	1.2	72	9.4	90	220	0.63	1.9	47	2.1	0.88	<0.5	39	390
LL-10	LL-10-5.5	10/25/2011	5.0	5.5	12	70	190	<0.1	4.2	7	9.1	1100	120	0.89	16	19	<0.5	6.8	<0.5	31	840
LL-10	LL-10-6	10/25/2011	5.5	6.0	<0.5	6.6	92	0.51	0.42	45	8.8	300	15	0.1	<0.25	68	1.3	0.55	<0.5	37	240
LL-11	LL-11-0.5	11/10/2011	0.0	0.5	7.5	470	110	0.41	4.1	100	8.7	790	210	11	3.8	54	20	2.2	<0.5	73	910
LL-11	LL-11-1.5	10/25/2011	1.0	1.5	6.3	440	220	0.31	4.9	65	7.1	1000	190	14	4.6	38	21	3.6	<0.5	65	930
LL-11	LL-11-8	10/25/2011	7.5	8.0	8.5	74	170	0.15	3.1	25	27	850	150	0.9	11	34	19	4.8	<0.5	36	660
LL-12	LL-12-0.5	11/10/2011	0.0	0.5	<0.5	8.8	160	0.39	0.69	45	11	89	55	0.35	0.51	43	<0.5	0.5	<0.5	33	150
LL-12	LL-12-1.5	10/25/2011	1.0	1.5	<0.5	8.4	240	0.5	0.48	53	19	72	36	0.12	0.36	50	<0.5	0.72	<0.5	41	94
LL-12	LL-12-7	10/25/2011	6.5	7.0	<0.5	6.5	160	0.47	<0.25	46	23	15	10	0.043	<0.25	49	1.1	0.35	<0.5	37	26
LL-13	LL-13-0.5	11/10/2011	0.0	0.5	<0.5 J	9.5	150	0.34	0.65	34	8.7	70	37	0.76	0.77	38	<0.5	0.53	<0.5	34	120
LL-13	LL-13-1.5	10/24/2011	1.0	1.5	<0.5	9	110	0.38	0.27	24	8.7	51	16	1.3	<0.25	27	<0.5	0.44	<0.5	34	80
LL-13	LL-13-6	10/24/2011	5.5	6.0	<0.5	5	130	0.39	<0.25	100	11	23	11	0.035	<0.25	31	<0.5	<0.25	<0.5	38	49
LL-19	LL-19-0.5	5/7/2012	0.0	0.5	<0.5	3.5	110	0.36	0.43	40	5.2	130	5.7	<0.018	<0.25	21	<0.5	<0.25	<0.5	27	140
LL-19	LL-19-2.0	5/7/2012	1.5	2.0	<0.45	15	170	0.4	0.4	40	15	37	12	0.62	<0.23	30	<0.45	<0.23	<0.45	36	62
LL-19	LL-19-4.0	5/7/2012	3.5	4.0	<0.48	4.8	97	0.32	<0.24	44	4.7	200	11	0.073	<0.24	31	<0.48	<0.24	<0.48	30	72
LL-19	LL-19-4.5	5/7/2012	4.0	4.5	<0.47	3.9	120	0.23	0.28	35	2.6	270	9.8	0.07	0.77	14	<0.47	<0.24	<0.47	36	44
LL-19	LL-19-5.0	5/7/2012	5.0	5.0	9.1	940	130	<0.92	24	37	11	1900	340	6.3	5.9	44	43	<2.3	<4.6	64	2800
LL-20	LL-20-0.5	5/7/2012	0.5	0.5	5.2	360	140	0.26	7	45	6.3	470	220	16	4	33	28	<0.25	<0.49	51	1400
LL-20	LL-20-2.0	5/7/2012	2.0	2.0	7.6	530	140	0.28	10	49	7.1	620	170	6.2	5.7	36	19	<0.24	<0.49	59	1800
LL-20	LL-20-4.0	5/7/2012	3.5	4.0	6.7	530	120	0.18	7	45	5.1	460	160	12	5.6	26	34	<0.24	<0.49	50	900
LL-20	LL-20-5.5	5/7/2012	5.0	5.5	<0.49	41	160	0.44	0.81	36	9.9	69	55	0.49	1.4	31	2.2	<0.25	<0.49	36	220
LL-21	LL-21-0.5	5/7/2012	0.5	0.5	2.1	23	1200	0.21	1.4	33	7.4	200	290	7.1	1.5	31	6.7	<0.24	<0.47	27	180
LL-21	LL-21-2.0	5/7/2012	2.0	2.0	<0.5	13	12000	0.14	0.58	28	9	270	40	1.3	0.68	38	<0.5	<0.25	<0.5	23	130
LL-21	LL-21-4.0	5/7/2012	4.0	4.0	<0.48	8.1	620	0.47	0.48	53	11	51	77	0.25	<0.24	59	<0.48	<0.24	<0.48	39	140
LL-22	LL-22-0.5	5/7/2012	0.0	0.5	<0.49	31	120	0.3	0.67	58	7.2	150	39	0.76	0.59	60	<0.49	<0.24	<0.49	45	230
LL-22	LL-22-2.0	5/7/2012	1.5	2.0	<0.44	8.1	190	0.49	0.6	30	14	47	21	0.081	0.42	34	<0.44	<0.22	<0.44	34	170
LL-22	LL-22-4.0	5/7/2012	3.5	4.0	<0.5	11	130	0.55	0.38	25	8	35	27	0.17	0.5	23	<0.5	<0.25	<0.5	36	94
LL-23	LL-23-0.5	5/8/2012	0.0	0.5	<0.48	7	150	0.47	0.28	43	11	26	21	0.12	<0.24	47	<0.48	<0.24	<0.48	40	71
LL-23	LL-23-2.0	5/8/2012	1.5	2.0	<0.45	8.7	220	0.55	0.28	49	13	27	7.8	0.11	<0.22	62	<0.45	<0.22	<0.45	41	58
LL-23	LL-23-6.0	5/8/2012	5.5	6.0	<0.49	7.9	97	0.41	<0.24	170	28	35	14	0.052	0.91	190	<0.49	<0.24	<0.49	38	49
LL-23	LL-23-7.0	5/8/2012	6.5	7.0	<0.47	79	130	0.27	0.85	58	8	340	130	4.7	2	41	<0.47	<0.23	<0.47	41	380
LL-23	LL-23-8.0	5/8/2012	7.5	8.0	<0.45	3.7	63	0.35	<0.23	57	8.9	16	4.3	0.14	<0.23	69	<0.45	<0.23	<0.45	27	30
LL-24	LL-24-0.5	5/9/2012	0.0	0.5	1.7	6.5	140	0.43	0.33	37	9.2	25	37	0.072	<0.23	42	<0.47	<0.23	<0.47	35	68
LL-24	LL-24-2.0	5/9/2012	1.5	2.0	<0.46	5.2	63	0.62	<0.23	21	7.3	15	13	0.022	<0.23	26	<0.46	<0.23	<0.46	26	38
LL-24	LL-24-6.5	5/9/2012	6.0	6.5	<0.45	95	91	0.41	3	92	9.5	330	140	4.6	2.2	67	2.2	<0.22	<0.45	48	1100
LL-24	LL-24-9.0	5/9/2012	8.5	9.0	<0.48	40	90	0.31	0.93	54	7.7	200	71	1.6	0.96	44	<0.48	<0.24	<0.48	39	360
LL-25	LL-25_0.0-0.5	5/24/2013	0.0	0.5	--	17	--	--	--	--	--	130	63	0.41	--	59	--	--	--	--	210
LL-25	LL-25_1.5-2.0	5/24/2013	1.5	2.0	--	67	--	--	--	--	--	540	240	0.84	--	45	--	--	--	--	750
LL-25	LL-25_3.5-4.0	5/24/2013	3.5	4.0	--	8	--	--	--	--	--	28	40	0.15	--	130	--	--	--	--	59
LL-25	LL-25_5.5-6.0	5/24/2013	5.5	6.0	--	9.1	--	--	--	--	--	27	6.3	0.15	--	68	--	--	--	--	170
LL-26	LL-26_0.0-0.5	5/24/2013	0.0	0.5	--	88	--	--	--	--	--	370	420	7.1	--	86	--	--	--	--	1800
LL-26	LL-26_1.5-2.0	5/24/2013	1.5	2.0	--	24	--	--	--	--	--	74	39	0.58	--	47	--	--	--	--	150
LL-26	LL-26_3.0-3.5	5/24/2013	3.0	3.5	--	27	--	--	--	--	--	70	88	0.24	--	50	--	--	--	--	330
LL-26	LL-26_5.5-6.0	5/24/2013	5.5	6.0	--	2.3	--	--	--	--	--	11	4.1	0.042	--	37	--	--	--	--	29
LL-39	LL-39_0.0-0.5	5/23/2013	0.0	0.5	--	49	--	--	--	--	--	180	54	1.6	--	54	--	--	--	--	280
LL-39	LL-39_1.5-2.0	5/23/2013	1.5	2.0	--	44	--	--	--	--	--	180	58	2.6	--	56	--	--	--	--	280

Table 16
Metals in Soil
Pre-Design Investigation Report
HA-2, Campus Bay, Richmond, California
Concentrations in milligrams per kilogram (mg/kg)

Location	Sample Name	Sample Date	Top Depth (feet bgs)	Bottom Depth (feet bgs)	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Mercury	Molybdenum	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc
LL-39	LL-39_3.5-4.0	5/23/2013	3.5	4.0	--	4.5	--	--	--	--	--	37	11	0.22	--	44	--	--	--	--	51
LL-39	LL-39_5.5-6.0	5/23/2013	5.5	6.0	--	9.3	--	--	--	--	--	56	120	0.36	--	32	--	--	--	--	230
LL-40	LL-40_0.0-0.5	5/24/2013	0.0	0.5	--	6.3	--	--	--	--	--	25	8.3	0.14	--	82	--	--	--	--	46
LL-40	LL-40_1.5-2.0	5/24/2013	1.5	2.0	--	9.6	--	--	--	--	--	26	18	0.48	--	43	--	--	--	--	49
LL-40	LL-40_3.5-4.0	5/24/2013	3.5	4.0	--	7.3	--	--	--	--	--	16	3	0.15	--	52	--	--	--	--	37
LL-40	LL-40_6.5-7.0	5/24/2013	6.5	7.0	--	12	--	--	--	--	--	84	34	2.7	--	47	--	--	--	--	160
PZ-18A2	PZ-18-0.5	11/10/2011	0.0	0.5	<0.5	8.3	100	0.33	0.47	34	8.1	44	35	0.45	0.39	34	<0.5	0.28	<0.5	38	100
PZ-18A2	PZ-18A2-1.5	10/19/2011	1.0	1.5	0.53	8.3	120	0.28	0.35	31	6.1	30	26	0.35	0.38	31	1.2	0.57	<0.5	37	88
PZ-18A2	PZ-18A2-9.5	10/19/2011	9.0	9.5	1.3	29	240	0.41	1.8	44	10	320	100	0.7	2.3	41	1.7	1.3	<0.5	39	380
PZ-19A2	PZ-19-0.5	11/10/2011	0.0	0.5	<0.5 J	16	120	0.46	0.8	29	9.1	120	35	0.69	0.57	34	<0.5	0.37	<0.5	32	98
PZ-19A2	PZ-19A2-1.5	10/14/2011	1.0	1.5	<0.5	18	130	0.43	1.4	31	8.7	140	36	0.5	1.1	35	<0.5	<0.25	0.54	29	210
PZ-19A2	PZ-19A2-12	10/14/2011	11.5	12.0	<0.5	43	130	0.36	0.84	41	13	120	50	4.2	0.3	44	<0.5	0.39	<0.5	59	200
PZ-19A2	PZ-19A2-15	10/14/2011	14.5	15.0	<0.5	6	110	0.26	<0.25	34	8.5	17	3.7	0.23	0.43	41	<0.5	<0.25	<0.5	32	34
PZ-20A2	PZ-20-0.5	11/10/2011	0.0	0.5	<0.5	6.3	100	0.43	0.76	17	6.7	22	26	0.21	0.81	24	<0.5	<0.25	<0.5	17	53
PZ-20A2	PZ-20A2-1.5	10/13/2011	1.0	1.5	2.1	220	140	0.41	0.79	63	21	450	91	2.1	4.7	64	6.6	1.1	<0.5	51	340
PZ-20B	PZ-20B-10	10/13/2011	9.5	10.0	3.2	210	34	0.24	32	38	20	4200	260	0.65	9.8	51	<0.5	32	<0.5	43	4800
PZ-20B	PZ-20B-11.5	10/13/2011	11.0	11.5	0.57	61	200	0.37	5.9	58	16	650	120	3.1	2.6	57	<0.5	4.3	<0.5	45	1100
PZ-20B	PZ-20B-13.5	10/13/2011	13.0	13.5	0.56	39	120	0.35	1.6	46	12	220	64	4.4	1.5	46	<0.5	1.1	<0.5	38	550
PZ-21A2	PZ-21-0.5	11/10/2011	0.0	0.5	<0.5	0.8	150	0.37	0.31	39	16	52	18	0.19	0.39	44	<0.5	<0.25	<0.5	49	61
PZ-21A2	PZ-21A2-7.5_D	10/12/2011	7.0	7.5	<0.5	25	98	0.21	1	36	8	220	82	7.5	0.82	29	<0.5	0.3	<0.5	32	440
PZ-21A2	PZ-21A2-7.5	10/12/2011	7.0	7.5	<0.5	25	98	0.21	1	36	8	220	82	7.5	0.82	29	<0.5	0.3	<0.5	32	440
PZ-21B	PZ-21B-1.5	10/12/2011	1.0	1.5	<0.5	9.8	170	0.39	0.39	46	14	61	40	0.32	0.41	61	<0.5	<0.25	<0.5	45	94
PZ-22A2	PZ-22-0.5	11/10/2011	0.0	0.5	<0.5	4.9	170	0.43	0.37	43	18	51	50	0.3	0.25	51	<0.5	<0.25	<0.5	40	94
PZ-22B	PZ-22B-1.5	10/10/2011	1.0	1.5	2.4	11	150	0.33	0.25	42	13	48	27	0.2	<0.25	44	<0.5	<0.25	<0.5	37	60
PZ-22B	PZ-22B-7.5	10/10/2011	7.0	7.5	<0.5	8.4	49	0.19	0.76	31	8.1	97	62	11	0.33	24	<0.5	<0.25	<0.5	25	250
PZ-23A2	PZ-23A2-8	10/20/2011	7.5	8.0	0.85	4.4	60	0.39	<0.25	39	12	18	4.3	0.072	<0.25	67	<0.5	0.31	<0.5	19	35
UL-8	UL-8-0.5	11/10/2011	0.0	0.5	<0.5	5.4	140	0.5	0.34	26	9.2	39	12	0.15	0.4	30	<0.5	0.29	<0.5	39	75
UL-8	UL-8-1.5	10/24/2011	1.0	1.5	<0.5	7.8	140	0.47	0.29	23	8.3	25	9.2	0.12	<0.25	23	<0.5	0.26	<0.5	41	58
UL-8	UL-8-8	10/24/2011	7.5	8.0	<0.5	2	27	<0.1	<0.25	27	3.5	12	2.9	<0.02	<0.25	23	<0.5	<0.25	<0.5	21	38
UL-14	UL-14-0.5	5/10/2012	0.0	0.5	<0.44	2.7	60	0.15	<0.22	11	2.7	26	5.9	0.043	0.36	11	<0.44	<0.22	<0.44	17	25
UL-14	UL-14-3.0	5/10/2012	2.5	3.0	<0.48	24	120	0.31	1.6	39	8.2	230	78	0.45	1.1	38	6.3	<0.24	<0.48	53	300
UL-14	UL-14-5.0	5/10/2012	5.0	5.0	25	570	28	<0.092	55	4.2	10	4000	180	2.8	13	7.3	140	10	<0.46	28	6600
UL-14	UL-14-12.0	5/10/2012	11.5	12.0	<0.49	59	110	0.14	1.7	37	7.2	590	130	8.2	3	28	<0.49	<0.24	<0.49	33	2400
UL-15	UL-15-0.5	5/10/2012	0.0	0.5	<4.6	13	110	<0.93	<2.3	96	7.8	100	91	2	<2.3	31	<4.6	<2.3	<4.6	20	88
UL-15	UL-15-3.0	5/10/2012	2.5	3.0	<0.48	9.8	32	0.16	0.59	11	3.8	180	54	2.6	0.43	22	12	<0.24	<0.48	16	460
UL-15	UL-15-4.0	5/10/2012	3.5	4.0	<0.46	20	23	0.14	2.4	18	2.7	250	49	0.46	0.75	23	11	<0.23	<0.46	73	360
UL-15	UL-15-8.5	5/10/2012	8.0	8.5	0.79	40	13	<0.088	29	2.6	0.64	190	31	2.3	0.81	11	26	0.29	<0.44	23	620
UL-15	UL-15-12.0	5/10/2012	11.5	12.0	<4.9	15	32	<0.98	<2.5	9	<2.5	190	46	0.56	<2.5	9.7	6.6	<2.5	<4.9	13	220
UL-16	UL-16-0.5	5/10/2012	0.0	0.5	<0.48	38	160	0.29	3.3	38	8.6	260	72	2.4	2.3	47	<0.48	<0.24	<0.48	37	370
UL-16	UL-16-2.0	5/10/2012	1.5	2.0	<0.5	16	150	0.35	1.7	39	7.4	230	36	1.1	1.3	47	<0.5	<0.25	<0.5	31	320
UL-16	UL-16-6.5	5/10/2012	6.0	6.5	2.1	20	120	0.34	1.5	40	7.4	230	79	4	1.8	35	7.2	<0.24	<0.48	41	310
UL-16	UL-16-11.0	5/10/2012	11.0	11.0	0.81	52	30	<0.093	3.7	18	3.2	430	110	3.7	1.2	19	5.1	0.34	<0.47	21	550
UL-17	UL-17-0.5	5/9/2012	0.5	0.5	8.9	73	210	0.31	4.6	43	9.8	650	320	14	2.9	41	19	<0.24	<0.47	46	750
UL-17	UL-17-2.0	5/9/2012	1.5	2.0	3.2	26	180	0.32	1.8	79	5.9	200	35	1	2	33	<0.46	<0.23	<0.46	31	310
UL-17	UL-17-6.0	5/9/2012	5.5	6.0	<0.46	24	140	0.42	0.52	36	10	93	45	0.87	1.6	41	1.7	<0.23	<0.46	34	150
UL-17	UL-17-11.0	5/9/2012	10.5	11.0	3.9	25	150	0.26	3.2	42	9.5	300	110	2.4	1.1	40	6.5	<0.23	<0.46	38	380
UL-17	UL-17-12.0	5/9/2012	11.5	12.0	<0.49	24	150	0.34	1.7	39	10	210	69	1.1	1.9	39	3.7	<0.24	<0.49	35	270
UL-18	UL-18-0.5	5/9/2012	0.5	0.5	2.3	45	120	0.4	0.35	110	26	51	44	0.39	<0.24	130	<0.49	<0.24	<0.49	41	76
UL-18	UL-18-2.0	5/9/2012	2.0	2.0	<0.46	40	130	0.37	2.5	55	7.1	170	250	1.8	0.65	40	2.4	<0.23	<0.46	51	210
UL-18	UL-18-3.0	5/9/2012	2.5	3.0	<0.47	38	30	0.17	3.6	11	4.3	240	85	3	0.96	18	7.3	0.71	<0.47	21	360
UL-18	UL-18-8.0	5/9/2012	8.0	8.0	<0.5	950	70	0.36	0.96	97	4.2	640	320	4	10	30	12	<0.25	<0.5	92	170
UL-18	UL-18-10.5	5/9/2012	10.0	10.5	<0.45	87	170	0.34	1.8	39	8.6	330	320	1.1	4.1	40	4	<0.23	<0.45	43	240
UL-18	UL-18-11.0	5/9/2012	10.5	11.0	3.4	33	200	0.32	0.63	38	8.8	140	99	0.58	0.89	45	<0.49	<0.24	<0.49	35	100
UL-19	UL-19-0.5	5/8/2012	0.0	0.5	<0.47	44	160	0.38	1.4	62	10	78	55	0.6	0.65	56	<0.47	<0.24	<0.47	45	220
UL-19	UL-19-2.0	5/8/2012	1.5	2.0	<0.5	27	190	0.48	0.47	62	13	80	33	0.83	0.3	60	<0.5	<0.25	<0.5	49	100
UL-19	UL-19-11.0	5/9/2012	10.5	11.0	1.9	8.5	140	0.45	0.31	71	13	45	42	0.22	<0.24	91	<0.48	<0.24	<0.48	41	77
UL-20	UL-20_0.5-1.0	5/23/2013	0.5	1.0	--	9.6	--	--	--	--	--	45	89	0.27	--	110	--	--	--	--	150
UL-20	UL-20_2.5-3.0	5/23/2013	2.5	3.0	--	57	--	--	--	--	--	210	57	0.81	--	45	--	--	--	--	290
UL-20	UL-20_6.5-7.0	5/23/2013	6.5	7.0	--	7.4	--	--	--	--	--	77	60	1	--	69	--	--	--	--	130

Table 16
Metals in Soil
Pre-Design Investigation Report
HA-2, Campus Bay, Richmond, California
Concentrations in milligrams per kilogram (mg/kg)

Location	Sample Name	Sample Date	Top Depth (feet bgs)	Bottom Depth (feet bgs)	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Mercury	Molybdenum	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc
UL-20	UL-20_8.5-9.0	5/23/2013	8.5	9.0	--	140	--	--	--	--	--	1100	250	1.5	--	63	--	--	--	--	1100
UL-20	UL-20_9.0-9.5	5/23/2013	9.0	9.5	--	5.4	--	--	--	--	--	18	44	0.068	--	41	--	--	--	--	51
UL-20	UL-20_12.5-13	5/23/2013	12.5	13.0	--	10	--	--	--	--	--	29	7.6	0.13	--	88	--	--	--	--	63
UL-21	UL-21_0.5-1.0	5/24/2013	0.5	1.0	--	390	--	--	--	--	--	680	170	5.5	--	62	--	--	--	--	540
UL-21	UL-21_2.5-3.0	5/24/2013	2.5	3.0	--	14	--	--	--	--	--	68	34	0.32	--	55	--	--	--	--	150
UL-21	UL-21_6.5-7.0	5/24/2013	6.5	7.0	--	74	--	--	--	--	--	200	69	0.95	--	96	--	--	--	--	230
UL-21	UL-21_9.5-10.0	5/24/2013	9.5	10.0	--	5.2	--	--	--	--	--	32	85	0.2	--	120	--	--	--	--	68
UL-21	UL-21_11.5-12.0	5/24/2013	11.5	12.0	--	70	--	--	--	--	--	47	560	0.11	--	98	--	--	--	--	790
UL-22	UL-22_0.5-1.0	5/24/2013	0.5	1.0	--	7.1	--	--	--	--	--	18	23	0.22	--	25	--	--	--	--	51
UL-22	UL-22_2.5-3.0	5/24/2013	2.5	3.0	--	11	--	--	--	--	--	120	32	0.25	--	76	--	--	--	--	230
UL-22	UL-22_4.5-5.0	5/24/2013	4.5	5.0	--	5.3	--	--	--	--	--	34	42	0.1	--	66	--	--	--	--	170
UL-22	UL-22_5.5-6.0	5/24/2013	5.5	6.0	--	18	--	--	--	--	--	450	35	0.2	--	37	--	--	--	--	110
UL-22	UL-22_8.5-9.0	5/24/2013	8.5	9.0	--	200	--	--	--	--	--	1800	190	0.89	--	10	--	--	--	--	2400
UL-22	UL-22_9.5-10.0	5/24/2013	9.5	10.0	--	17	--	--	--	--	--	160	3.8	<0.02	--	40	--	--	--	--	98
UL-23	UL-23_0.5-1.0	5/24/2013	0.5	1.0	--	22	--	--	--	--	--	49	31	0.3	--	33	--	--	--	--	89
UL-23	UL-23_2.5-3.0	5/24/2013	2.5	3.0	--	30	--	--	--	--	--	120	84	0.17	--	100	--	--	--	--	150
UL-23	UL-23_4.5-5.0	5/24/2013	4.5	5.0	--	83	--	--	--	--	--	290	73	2.7	--	60	--	--	--	--	320
UL-23	UL-23_5.5-6.0	5/24/2013	5.5	6.0	--	39	--	--	--	--	--	84	160	0.22	--	43	--	--	--	--	110
UL-23	UL-23_7.5-8.0	5/24/2013	7.5	8.0	--	96	--	--	--	--	--	1700	100	1.2	--	27	--	--	--	--	3200
UL-23	UL-23_9.5-10.0	5/24/2013	9.5	10.0	--	6.7	--	--	--	--	--	15	12	0.037	--	36	--	--	--	--	38
UL-23	UL-23_10.5-11.0	5/24/2013	10.5	11.0	--	3.4	--	--	--	--	--	17	9.6	0.074	--	44	--	--	--	--	41
UL-24	UL-24_0.5-1.0	5/23/2013	0.5	1.0	--	57	--	--	--	--	--	180	42	0.6	--	42	--	--	--	--	280
UL-24	UL-24_2.5-3.0	5/23/2013	2.5	3.0	--	52	--	--	--	--	--	170	75	1.2	--	70	--	--	--	--	210
UL-24	UL-24_6.0-6.5	5/23/2013	6.0	6.5	--	12	--	--	--	--	--	120	16	0.15	--	32	--	--	--	--	120
UL-24	UL-24_8.0-8.5	5/23/2013	8.0	8.5	--	71	--	--	--	--	--	120	200	0.4	--	41	--	--	--	--	140
UL-24	UL-24_9.5-10.0	5/23/2013	9.5	10.0	--	6.4	--	--	--	--	--	19	14	0.25	--	120	--	--	--	--	36
UL-24	UL-24_12.0-12.5	5/23/2013	12.0	12.5	--	6.6	--	--	--	--	--	37	37	0.19	--	130	--	--	--	--	64
UL-24	UL-24_14.5-15.0	5/23/2013	14.5	15.0	--	6.8	--	--	--	--	--	29	6.1	0.11	--	70	--	--	--	--	58

Notes:
Historical soil data are on an as received basis. 2013 soil data are on a dry weight basis.
< = analyte not detected above the method detection limit; shown value is the laboratory reporting limit.
-- = not analyzed
J = estimated value
bgs = Below ground surface
D = Duplicate sample

Table 17
Proprietary Pesticides in Soil
Pre-Design Investigation Report
HA-2, Campus Bay, Richmond, California
Concentrations in micrograms per kilogram (µg/kg)

Location	Sample Name	Sample Date	Top Depth (feet bgs)	Bottom Depth (feet bgs)	Butylate	Cycloate	EPTC	Fonofos	Molinate	Napropamide	Pebulate	Vernolate
LL-7	LL-7-1.0	6/29/2007	0.5	1.0	<22	<22	<54	<54	<22	<22	<22	<22
LL-7	LL-7-4.0	6/29/2007	3.5	4.0	<25	<25	<62	<62	<25	<25	<25	<25
LL-7	LL-7-7.0	6/29/2007	6.5	7.0	<24	<24	<60	<60	<24	<24	<24	<24
LL-8	LL-8-1.0	6/29/2007	0.5	1.0	<110	<110	<280	<280	<110	<110	<110	<110
LL-8	LL-8-5.5	6/29/2007	5.0	5.5	<25	51	<62	<62	<25	<25	<25	<25
LL-9	LL-9-0.5	11/10/2011	0.0	0.5	<50	<50	<100	<50	<50	<50	<50	<50
LL-9	LL-9-1.5	10/26/2011	1.0	1.5	<50	<50	<99	<50	<50	<50	<50	<50
LL-9	LL-9-3.25	10/26/2011	2.8	3.3	<250	<250	<510	<250	<250	<250	<250	<250
LL-9R	LL-9R-0.5	5/9/2012	0.0	0.5	<50	<50	<100	<50	<50	<50	<50	<50
LL-9R	LL-9R-2.0	5/9/2012	1.5	2.0	<51	<51	<100	<51	<51	<51	<51	<51
LL-9R	LL-9R-8.0	5/9/2012	7.5	8.0	<50	<50	<99	<50	<50	<50	<50	<50
LL-9R	LL-9R-9.0	5/9/2012	8.5	9.0	<50	<50	<100	<100	<50	<100	<50	<50
LL-10	LL-10-0.5	11/10/2011	0.0	0.5	<50	<50	<100	<50	<50	78	<50	<50
LL-10	LL-10-1.5	10/25/2011	1.0	1.5	<50	<50	<100	<50	<50	<50	<50	<50
LL-10	LL-10-5.5	10/25/2011	5.0	5.5	<51	<51	<100	<51	<51	<51	<51	<51
LL-10	LL-10-6	10/25/2011	5.5	6.0	<51	<51	<100	<51	<51	<51	<51	<51
LL-11	LL-11-0.5	11/10/2011	0.0	0.5	<50	<50	<99	<50	<50	<50	<50	<50
LL-11	LL-11-1.5	10/25/2011	1.0	1.5	<50	<50	<99	<50	<50	<50	<50	<50
LL-11	LL-11-8	10/25/2011	7.5	8.0	<49	<49	<99	<49	<49	<49	<49	<49
LL-12	LL-12-0.5	11/10/2011	0.0	0.5	<51	<51	<100	<51	<51	<51	<51	<51
LL-12	LL-12-1.5	10/25/2011	1.0	1.5	<49	<49	<99	<49	<49	<49	<49	<49
LL-12	LL-12-7	10/25/2011	6.5	7.0	<50	<50	<100	<50	<50	<50	<50	<50
LL-13	LL-13-0.5	11/10/2011	0.0	0.5	<100	<100	<200	<100	<100	<100	<100	<100
LL-13	LL-13-1.5	10/24/2011	1.0	1.5	<50	<50	<99	<50	<50	<50	<50	<50
LL-13	LL-13-6	10/24/2011	5.5	6.0	<500	<500	<990	<500	<500	<500	<500	<500
LL-19	LL-19-0.5	5/7/2012	0.0	0.5	<50	<50	<99	<50	<50	<50	<50	<50
LL-19	LL-19-2.0	5/7/2012	1.5	2.0	<50	<50	<100	<50	<50	<50	<50	<50
LL-19	LL-19-4.0	5/7/2012	3.5	4.0	<50	<50	<100	<50	<50	<50	<50	<50
LL-19	LL-19-4.5	5/7/2012	4.0	4.5	<49	<49	<98	<98	<49	<98	<49	<49
LL-19	LL-19-5.0	5/7/2012	5.0	5.0	<50	<50	<100	<100	<50	<100	<50	<50
LL-20	LL-20-0.5	5/7/2012	0.5	0.5	<50	<50	<99	<50	<50	<50	<50	<50
LL-20	LL-20-2.0	5/7/2012	2.0	2.0	<50	<50	<99	<50	<50	<50	<50	<50
LL-20	LL-20-4.0	5/7/2012	3.5	4.0	<50	<50	<99	<50	<50	<50	<50	<50
LL-20	LL-20-5.5	5/7/2012	5.0	5.5	<250	430	<490	<490	<250	<490	<250	<250
LL-21	LL-21-0.5	5/7/2012	0.5	0.5	<50	<50	<99	<50	<50	<50	<50	<50
LL-21	LL-21-2.0	5/7/2012	2.0	2.0	<50	<50	<99	<50	<50	<50	<50	<50
LL-21	LL-21-4.0	5/7/2012	4.0	4.0	<250	<250	<490	<250	<250	<250	<250	<250
LL-22	LL-22-0.5	5/7/2012	0.0	0.5	<49	<49	<99	<49	<49	<49	<49	<49
LL-22	LL-22-2.0	5/7/2012	1.5	2.0	<49	<49	<99	<49	<49	<49	<49	<49
LL-22	LL-22-4.0	5/7/2012	3.5	4.0	<50	<50	<100	<50	<50	<50	<50	<50
LL-23	LL-23-0.5	5/8/2012	0.0	0.5	<50	<50	<100	<50	<50	<50	<50	<50
LL-23	LL-23-2.0	5/8/2012	1.5	2.0	<50	<50	<99	<50	<50	<50	<50	<50
LL-23	LL-23-6.0	5/8/2012	5.5	6.0	<49	160	990	<98	410	<98	730	210
LL-23	LL-23-7.0	5/8/2012	6.5	7.0	<50	<50	110	<50	<50	<50	69	<50
LL-23	LL-23-8.0	5/8/2012	7.5	8.0	<50	<50	<100	<50	<50	<50	<50	<50

Table 17
Proprietary Pesticides in Soil
Pre-Design Investigation Report
HA-2, Campus Bay, Richmond, California
Concentrations in micrograms per kilogram (µg/kg)

Location	Sample Name	Sample Date	Top Depth (feet bgs)	Bottom Depth (feet bgs)	Butylate	Cycloate	EPTC	Fonofos	Molinate	Napropamide	Pebulate	Vernolate
LL-24	LL-24-0.5	5/9/2012	0.0	0.5	<50	<50	<100	<50	<50	<50	<50	<50
LL-24	LL-24-2.0	5/9/2012	1.5	2.0	<51	<51	<100	<51	<51	<51	<51	<51
LL-24	LL-24-6.5	5/9/2012	6.0	6.5	<51	<51	860	<100	310	<100	470	120
LL-24	LL-24-9.0	5/9/2012	8.5	9.0	<50	<50	780	<50	210	<50	190	81
LL-25	LL-25_0.0-0.5	5/24/2013	0.0	0.5	<57	<57	<110	<57	<57	<57	<57	<57
LL-25	LL-25_1.5-2.0	5/24/2013	1.5	2.0	<57	<57	<110	<57	<57	<57	<57	<57
LL-25	LL-25_3.5-4.0	5/24/2013	3.5	4.0	<58	<58	<120	<58	<58	<58	<58	<58
LL-25	LL-25_5.5-6.0	5/24/2013	5.5	6.0	<63	<63	<130	<63	<63	<63	<63	<63
LL-26	LL-26_0.0-0.5	5/24/2013	0.0	0.5	<88	<88	<180	<88	<88	240	<88	<88
LL-26	LL-26_1.5-2.0	5/24/2013	1.5	2.0	<67	<67	<130	<67	<67	<67	<67	<67
LL-26	LL-26_3.0-3.5	5/24/2013	3.0	3.5	<68	<68	<140	<68	<68	<68	<68	<68
LL-26	LL-26_5.5-6.0	5/24/2013	5.5	6.0	<60	<60	<120	<60	<60	<60	<60	<60
LL-39	LL-39_0.0-0.5	5/23/2013	0.0	0.5	<53	<53 J	<110	<53	<53	<53	<53	<53
LL-39	LL-39_1.5-2.0	5/23/2013	1.5	2.0	<56	<56	<110	<56	<56	<56	<56	<56
LL-39	LL-39_3.5-4.0	5/23/2013	3.5	4.0	<57	<57	<110	<57	<57	<57	<57	<57
LL-39	LL-39_5.5-6.0	5/23/2013	5.5	6.0	<55	<55	340	<55	240	<55	<55	<55
LL-40	LL-40_0.0-0.5	5/24/2013	0.0	0.5	<53	<53	<110	<53	<53	<53	<53	<53
LL-40	LL-40_1.5-2.0	5/24/2013	1.5	2.0	<57	<57	<110	<57	<57	<57	<57	<57
LL-40	LL-40_3.5-4.0	5/24/2013	3.5	4.0	<54	<54	<110	<54	<54	<54	<54	<54
LL-40	LL-40_6.5-7.0	5/24/2013	6.5	7.0	<61	<61	<120	<61	<61	<61	<61	<61
PZ-17B	PZ-17-0.5	11/10/2011	0.0	0.5	<49	<49	<98	<49	<49	60	61	<49
PZ-17B	PZ-17B-1.5	10/18/2011	1.0	1.5	<49	<49	<99	<49	<49	<49	<49	<49
PZ-17B	PZ-17B-7.5	10/18/2011	7.0	7.5	<49	<49	130	<49	<49	130	120	<49
PZ-17B	PZ-17B-9.5	10/18/2011	9.0	9.5	320	270	3700	<50	580	330	2200	1800
PZ-18A2	PZ-18-0.5	11/10/2011	0.0	0.5	<150	<150	<300	<150	<150	<150	<150	<150
PZ-18A2	PZ-18A2-1.5	10/19/2011	1.0	1.5	<49	<49	<99	<49	<49	<49	<49	<49
PZ-18A2	PZ-18A2-9.5	10/19/2011	9.0	9.5	<49	<49	<98	<49	<49	<49	<49	<49
PZ-19A2	PZ-19-0.5	11/10/2011	0.0	0.5	<50	<50	<100	<50	<50	<50	<50	<50
PZ-19A2	PZ-19A2-1.5	10/14/2011	1.0	1.5	<50	<50	<99	<50	<50	<50	<50	<50
PZ-19A2	PZ-19A2-12	10/14/2011	11.5	12.0	<50	<50	530	<50	<50	<50	1900	<50
PZ-19A2	PZ-19A2-15	10/14/2011	14.5	15.0	<50	<50	<100	<50	<50	<50	140	<50
PZ-20A2	PZ-20-0.5	11/10/2011	0.0	0.5	<50	<50	<100	<50	<50	<50	<50	120
PZ-20A2	PZ-20A2-1.5	10/13/2011	1.0	1.5	<49	<49	<99	<49	<49	<49	<49	<49
PZ-20B	PZ-20B-10	10/13/2011	9.5	10.0	<50	<50	180	<50	<50	71	130	<50
PZ-20B	PZ-20B-11.5	10/13/2011	11.0	11.5	<50	<50	150	<50	<50	<50	<50	<50
PZ-20B	PZ-20B-13.5	10/13/2011	13.0	13.5	<50	<50	200	<50	<50	<50	190	<50
PZ-21A2	PZ-21-0.5	11/10/2011	0.0	0.5	<50	<50	<99	<50	<50	<50	<50	<50
PZ-21A2	PZ-21A2-7.5	10/12/2011	7.0	7.5	<50	<50	<99	<50	<50	<50	<50	<50
PZ-21A2	PZ-21A2-7.5_D	10/12/2011	7.0	7.5	<50	<50	<99	<50	<50	<50	<50	<50
PZ-21B	PZ-21B-1.5	10/12/2011	1.0	1.5	<50	<50	<99	<50	<50	<50	<50	<50
PZ-22A2	PZ-22-0.5	11/10/2011	0.0	0.5	<50	<50	<100	<50	<50	<50	<50	<50
PZ-22B	PZ-22B-1.5	10/10/2011	1.0	1.5	<50	<50	<100	<50	<50	<50	<50	<50
PZ-22B	PZ-22B-7.5	10/10/2011	7.0	7.5	<50	<50	<100	<50	<50	<50	<50	<50
PZ-23A2	PZ-23A2-8	10/20/2011	7.5	8.0	<50	<50	<100	<50	<50	<50	<50	<50
UL-8	UL-8-0.5	11/10/2011	0.0	0.5	<51	<51	<100	<51	<51	<51	<51	<51
UL-8	UL-8-1.5	10/24/2011	1.0	1.5	<50	<50	<99	<50	<50	<50	<50	<50
UL-8	UL-8-8	10/24/2011	7.5	8.0	<50	<50	<99	<50	<50	<50	<50	<50
UL-14	UL-14-0.5	5/10/2012	0.0	0.5	<51	<51	<100	<51	<51	<51	<51	<51
UL-14	UL-14-3.0	5/10/2012	2.5	3.0	<50	<50	<99	<50	<50	<50	<50	<50

Table 17
Proprietary Pesticides in Soil
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HA-2, Campus Bay, Richmond, California
Concentrations in micrograms per kilogram (µg/kg)

Location	Sample Name	Sample Date	Top Depth (feet bgs)	Bottom Depth (feet bgs)	Butylate	Cycloate	EPTC	Fonofos	Molinate	Napropamide	Pebulate	Vernolate
UL-14	UL-14-5.0	5/10/2012	5.0	5.0	<50	<50	<99	<99	<50	<99	<50	<50
UL-14	UL-14-12.0	5/10/2012	11.5	12.0	<51	<51	<100	<51	<51	<51	<51	<51
UL-15	UL-15-0.5	5/10/2012	0.0	0.5	<50	<50	<100	<50	<50	<50	<50	<50
UL-15	UL-15-3.0	5/10/2012	2.5	3.0	<50	<50	<100	<50	<50	<50	<50	<50
UL-15	UL-15-4.0	5/10/2012	3.5	4.0	<50	<50	<100	<100	<50	<100	<50	<50
UL-15	UL-15-8.5	5/10/2012	8.0	8.5	<51	<51	<100	<100	82	460	<51	<51
UL-15	UL-15-12.0	5/10/2012	11.5	12.0	<50	<50	<99	<50	120	500	<50	<50
UL-16	UL-16-0.5	5/10/2012	0.0	0.5	<50	<50	<99	<50	<50	69	60	<50
UL-16	UL-16-2.0	5/10/2012	1.5	2.0	<49	<49	<99	<49	<49	220	55	<49
UL-16	UL-16-6.5	5/10/2012	6.0	6.5	490	62	<99	<99	<49	57000	<49	<49
UL-16	UL-16-11.0	5/10/2012	11.0	11.0	410	130	<100	<50	<50	19000	2100	78
UL-17	UL-17-0.5	5/9/2012	0.5	0.5	<49	<49	<99	<49	<49	<49	<49	<49
UL-17	UL-17-2.0	5/9/2012	1.5	2.0	<51	<51	<100	<51	<51	<51	<51	<51
UL-17	UL-17-6.0	5/9/2012	5.5	6.0	1300	83000	31000	<200	2400	<200	5100	7800
UL-17	UL-17-11.0	5/9/2012	10.5	11.0	72	2900	1600	<50	260	440	280	490
UL-17	UL-17-12.0	5/9/2012	11.5	12.0	<51	2200	1500	<100	150	460	160	260
UL-18	UL-18-0.5	5/9/2012	0.5	0.5	<50	<50	<100	<50	<50	<50	<50	<50
UL-18	UL-18-2.0	5/9/2012	2.0	2.0	<150	<150	<300	<150	<150	<150	<150	<150
UL-18	UL-18-3.0	5/9/2012	2.5	3.0	<49	<49	<98	<98	<49	<98	<49	<49
UL-18	UL-18-8.0	5/9/2012	8.0	8.0	<49	<49	<99	<99	<49	240	<49	<49
UL-18	UL-18-10.5	5/9/2012	10.0	10.5	<250	<250	<500	<500	<250	<500	540	<250
UL-18	UL-18-11.0	5/9/2012	10.5	11.0	<49	<49	110	<49	<49	170	120	<49
UL-19	UL-19-0.5	5/8/2012	0.0	0.5	<49	<49	<98	<49	<49	<49	<49	<49
UL-19	UL-19-2.0	5/8/2012	1.5	2.0	<50	<50	<100	<50	<50	<50	<50	<50
UL-19	UL-19-11.0	5/9/2012	10.5	11.0	<99	<99	<200	<99	<99	<99	<99	<99
UL-20	UL-20_0.5-1.0	5/23/2013	0.5	1.0	<55	<55	<110	<55	<55	<55	<55	<55
UL-20	UL-20_2.5-3.0	5/23/2013	2.5	3.0	<59	<59	<120	<59	<59	<59	<59	<59
UL-20	UL-20_6.5-7.0	5/23/2013	6.5	7.0	<61	<61	<120	<61	<61	<61	<61	<61
UL-20	UL-20_8.5-9.0	5/23/2013	8.5	9.0	<60	<60	<120	<60	<60	<60	<60	<60
UL-20	UL-20_9.0-9.5	5/23/2013	9.0	9.5	<62	<62	<120	<62	<62	<62	<62	<62
UL-20	UL-20_12.5-13	5/23/2013	12.5	13.0	<62	<62	<120	<62	<62	<62	<62	<62
UL-21	UL-21_0.5-1.0	5/24/2013	0.5	1.0	<56	<56	<110	<56	<56	<56	<56	<56
UL-21	UL-21_2.5-3.0	5/24/2013	2.5	3.0	<61	<61	<120	<61	<61	<61	<61	<61
UL-21	UL-21_6.5-7.0	5/24/2013	6.5	7.0	<62	<62	<120	<62	<62	180	<62	<62
UL-21	UL-21_9.5-10.0	5/24/2013	9.5	10.0	<60	<60	<120	<60	<60	<60	<60	<60
UL-21	UL-21_11.5-12.0	5/24/2013	11.5	12.0	<64	<64	<130	<64	<64	450	300	<64
UL-22	UL-22_0.5-1.0	5/24/2013	0.5	1.0	<55	<55	<110	<55	<55	<55	<55	<55
UL-22	UL-22_2.5-3.0	5/24/2013	2.5	3.0	<59	<59	<120	<59	<59	79	<59	<59
UL-22	UL-22_4.5-5.0	5/24/2013	4.5	5.0	<59	<59	<120	<59	<59	530	<59	<59
UL-22	UL-22_5.5-6.0	5/24/2013	5.5	6.0	<63	<63	<130	<63	<63	340	<63	<63
UL-22	UL-22_8.5-9.0	5/24/2013	8.5	9.0	<62	<62	<120	<62	<62	290	<62	<62
UL-22	UL-22_9.5-10.0	5/24/2013	9.5	10.0	1100 J1	1100 J1	2300 J1	1100 J1	1100 J1	2700 J1	62000 J1	1200 J1
UL-23	UL-23_0.5-1.0	5/24/2013	0.5	1.0	<58	<58	<120	<58	<58	<58	<58	<58
UL-23	UL-23_2.5-3.0	5/24/2013	2.5	3.0	<63	<63	<130	<63	<63	350	<63	<63
UL-23	UL-23_4.5-5.0	5/24/2013	4.5	5.0	<60	110	<120	<60	<60	450	<60	<60
UL-23	UL-23_5.5-6.0	5/24/2013	5.5	6.0	<62	<62	<120	<62	<62	360	<62	<62
UL-23	UL-23_7.5-8.0	5/24/2013	7.5	8.0	63	<63	<130	<63	<63	300	<63	<63
UL-23	UL-23_9.5-10.0	5/24/2013	9.5	10.0	<61	<61	4300	<61	<61	74	6800	79
UL-23	UL-23_10.5-11.0	5/24/2013	10.5	11.0	<62	<62	1500	<62	<62	<62	97	<62

Table 17
Proprietary Pesticides in Soil
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HA-2, Campus Bay, Richmond, California
Concentrations in micrograms per kilogram (µg/kg)

Location	Sample Name	Sample Date	Top Depth (feet bgs)	Bottom Depth (feet bgs)	Butylate	Cycloate	EPTC	Fonofos	Molinate	Napropamide	Pebulate	Vernolate
UL-24	UL-24_0.5-1.0	5/23/2013	0.5	1.0	<55	<55	<110	<55	<55	<55	<55	<55
UL-24	UL-24_2.5-3.0	5/23/2013	2.5	3.0	<55	<55	<110	<55	<55	<55	<55	<55
UL-24	UL-24_6.0-6.5	5/23/2013	6.0	6.5	<61	<61	<120	<61	<61	<61	<61	<61
UL-24	UL-24_8.0-8.5	5/23/2013	8.0	8.5	<57	<57	160	<57	<57	<57	<57	<57
UL-24	UL-24_9.5-10.0	5/23/2013	9.5	10.0	<57	<57	380	<57	<57	<57	<57	<57
UL-24	UL-24_12.0-12.5	5/23/2013	12.0	12.5	<58	<58	200	<58	<58	<58	<58	<58
UL-24	UL-24_14.5-15.0	5/23/2013	14.5	15.0	<60	<60	<120	<60	<60	<60	<60	<60

Notes:
Historical soil data are on an as received basis. 2013 soil data are on a dry weight basis.
< = analyte not detected above the method detection limit; shown value is the laboratory reporting limit.
-- = not analyzed
EPTC = S-ethyl dipropylthiocarbamate
bgs = below ground surface
D = duplicate sample
J = estimated value

Table 18
Organochlorine Pesticides in Soil
Pre-Design Investigation Report
HA-2, Campus Bay, Richmond, California
Concentrations in micrograms per kilogram (µg/kg)

Location	Sample Name	Sample Date	Top Depth (feet bgs)	Bottom Depth (feet bgs)	4,4'-DDD	4,4'-DDE	4,4'-DDT	Aldrin	alpha-Chlordane	beta-BHC	Dieldrin	Endosulfan I	Endosulfan II	Endosulfan sulfate	Endrin	gamma-BHC	gamma-Chlordane	Heptachlor epoxide
LL-7	LL-7-1.0	6/29/2007	0.5	1.0	<11	<11	20	<5.6	<5.6	<5.6	<11	<5.6	<11	<11	<11	<5.6	<5.6	<5.6
LL-7	LL-7-4.0	6/29/2007	3.5	4.0	<4	<4	<4	<2.1	<2.1	<2.1	<4	<2.1	<4	<4	<4	<2.1	<2.1	<2.1
LL-7	LL-7-7.0	6/29/2007	6.5	7.0	<4	<4	<4	<2	<2	<2	<4	<2	<4	<4	<4	<2	<2	<2
LL-8	LL-8-1.0	6/29/2007	0.5	1.0	<11	31	74	<5.8	<5.8	<5.8	100	<5.8	<11	<11	<11	<5.8	<5.8	<5.8
LL-8	LL-8-5.5	6/29/2007	5.0	5.5	11	27	<4.1	<2.1	5.7 C	<2.1	<4.1	<2.1	<4.1	<4.1	<4.1	<2.1	7.2	<2.1
LL-9	LL-9-0.5	11/10/2011	0.0	0.5	<3.3	<3.3	<3.3	<1.7	2.2 C	<1.7	<3.3	<1.7	<3.3	<3.3	<3.3	<1.7	<1.7	<1.7
LL-9	LL-9-1.5	10/26/2011	1.0	1.5	<3.3	<3.3	<3.3	<1.7	<1.7	<1.7	<3.3	<1.7	<3.3 #	<3.3	<3.3	<1.7	<1.7	<1.7
LL-9	LL-9-3.25	10/26/2011	2.8	3.3	4.2	<3.3	<3.3	<1.7	<1.7	<1.7	<3.3	<1.7	<3.3 #	<3.3	<3.3	<1.7	<1.7	<1.7
LL-9R	LL-9R-0.5	5/9/2012	0.0	0.5	<3.3	4.3 #C	16	<1.7	<1.7	<1.7	15 #	<1.7	<3.3	<3.3	<3.3	<1.7	<1.7	<1.7
LL-9R	LL-9R-2.0	5/9/2012	1.5	2.0	<3.3	<3.3	<3.3	<1.7	<1.7	<1.7	<3.3	<1.7	<3.3	<3.3	<3.3	<1.7	<1.7	<1.7
LL-9R	LL-9R-8.0	5/9/2012	7.5	8.0	<3.2	<3.2	<3.2	<1.7	<1.7	<1.7	<3.2	<1.7	<3.2	<3.2	<3.2	<1.7	<1.7	<1.7
LL-9R	LL-9R-9.0	5/9/2012	8.5	9.0	<33 #J	<33 J	<33 J	<17 J	<17 J	<17 J	<33 J	<17 J	<33 J	<33 J	<33 J	<17 J	<17 J	<17 J
LL-10	LL-10-0.5	11/10/2011	0.0	0.5	<17	<17	35	<8.5	<8.5	<8.5	<17	<8.5	<17	<17	<17	<8.5	<8.5	<8.5
LL-10	LL-10-1.5	10/25/2011	1.0	1.5	340 b	59 b	31 #Cb	3.7 b	11 b	<1.7 b	30 Cb	2.6 Cb	<3.3 b	<3.3 b	<3.3 b	<1.7 b	9.3 Cb	<17 b
LL-10	LL-10-5.5	10/25/2011	5.0	5.5	<3.3 b	<3.3 b	<3.3 b	<1.7 b	<1.7 b	<1.7 b	<3.3 b	<1.7 b	<3.3 b	<3.3 b	<3.3 b	<1.7 b	<1.7 b	<1.7 b
LL-10	LL-10-6	10/25/2011	5.5	6.0	<3.3 b	<3.3 b	<3.3 b	<1.7 b	<1.7 b	<1.7 b	<3.3 b	<1.7 b	<3.3 b	<3.3 b	<3.3 b	<1.7 b	<1.7 b	<1.7 b
LL-11	LL-11-0.5	11/10/2011	0.0	0.5	300	68	130	<1.7	67 C	<1.7	<3.3	<1.7	<3.3	<3.3	<3.3	<1.7	59	<1.7
LL-11	LL-11-1.5	10/25/2011	1.0	1.5	75 b	14 Cb	85 b	<1.7 b	21 b	<1.7 b	4.4 Cb	<1.7 b	<3.3 b	<3.3 b	<3.3 b	<1.7 b	21 Cb	<1.7 b
LL-11	LL-11-8	10/25/2011	7.5	8.0	5 b	<3.3 b	4.5 #b	<1.7 b	<1.7 b	<1.7 b	<3.3 b	<1.7 b	<3.3 b	<3.3 b	<3.3 b	<1.7 b	<1.7 b	<1.7 b
LL-12	LL-12-0.5	11/10/2011	0.0	0.5	<3.3	9.8	20	<1.7	2.6 C	<1.7	4	<1.7	<3.3	<3.3	<3.3	<1.7	<1.7	<1.7
LL-12	LL-12-1.5	10/25/2011	1.0	1.5	<3.3	<3.3	3.6 C	<1.7	<1.7	<1.7	<3.3	<1.7	<3.3	<3.3	<3.3	<1.7	<1.7	<1.7
LL-12	LL-12-7	10/25/2011	6.5	7.0	<3.3	<3.3	<3.3	<1.7	<1.7	<1.7	<3.3	<1.7	<3.3	<3.3	<3.3	<1.7	<1.7	<1.7
LL-13	LL-13-0.5	11/10/2011	0.0	0.5	50	<33	170	<17	18	<17	<33	<17	<33	<33	<33	<17	<17	<17
LL-13	LL-13-1.5	10/24/2011	1.0	1.5	<17	<17	57 C	<8.5	<8.5	<8.5	<17	<8.5	<17	<17	<17	<8.5	<8.5	<8.5
LL-13	LL-13-6	10/24/2011	5.5	6.0	<33	<33	<33	<17	<17	<17	<33	<17	<33	<33	<33	<17	<17	<17
LL-19	LL-19-0.5	5/7/2012	0.0	0.5	<3.3	<3.3	<3.3 #	<1.7	<1.7	<1.7	<3.3	<1.7	<3.3	<3.3	<3.3	<1.7	2.5 C	<1.7
LL-19	LL-19-2.0	5/7/2012	1.5	2.0	<3.3	12 #	18	<1.7	<1.7	<1.7	<3.3	<1.7	<3.3	<3.3	<3.3	<1.7	<1.7	<1.7
LL-19	LL-19-4.0	5/7/2012	3.5	4.0	<3.3	<3.3	<3.3	<1.7	<1.7	<1.7	<3.3	<1.7	<3.3	<3.3	<3.3	<1.7	<1.7	<1.7
LL-19	LL-19-4.5	5/7/2012	4.0	4.5	<33 J	<33 J	<33 J	<17 J	<17 J	<17 J	<33 J	<17 J	<33 J	<33 J	<33 J	<17 J	<17 J	<17 J
LL-19	LL-19-5.0	5/7/2012	5.0	5.0	<33 J	190 J	270 J	<17 J	<17 J	<17 J	<33 J	<17 J	<33 J	<33 J	<33 J	<17 J	<17 J	<17 J
LL-20	LL-20-0.5	5/7/2012	0.5	0.5	31	100	110 #	<1.7	6.7 C	<1.7	4.7 C	<1.7	<3.3	<3.3	<3.3	<1.7	5.7	<1.7
LL-20	LL-20-2.0	5/7/2012	2.0	2.0	75 #	7.2	29 #	<1.7	3.3 C	2.9 C	<3.3	<1.7	<3.3	<3.3	<3.3	<1.7	3.4	<1.7
LL-20	LL-20-4.0	5/7/2012	3.5	4.0	2100 #	4800 #C	<33 #	220	920	<17	490 C	94	<33	<33	<33	<17	690	<17
LL-20	LL-20-5.5	5/7/2012	5.0	5.5	<33 J	<33 J	<33 J	<17 J	<17 J	<17 J	<33 J	<17 J	<33 J	<33 J	<33 J	<17 J	<17 J	<17 J
LL-21	LL-21-0.5	5/7/2012	0.5	0.5	110 C	85	1200 #	<8.4	<8.4	<8.4	<16	<8.4	<16	23 C	20 C	<8.4	<8.4	<8.4
LL-21	LL-21-2.0	5/7/2012	2.0	2.0	<3.3	23	55 #	<1.7	<1.7	<1.7	<3.3	<1.7	<3.3	<3.3	<3.3	<1.7	<1.7	<1.7
LL-21	LL-21-4.0	5/7/2012	4.0	4.0	84	<16	23 #	<8.5	9.2	<8.5	<16	<8.5	<16	<16	<16	<8.5	<8.5	<8.5
LL-22	LL-22-0.5	5/7/2012	0.0	0.5	<3.3	4.7	15 #	<1.7	<1.7	<1.7	<3.3	<1.7	<3.3	<3.3	<3.3	<1.7	<1.7	<1.7
LL-22	LL-22-2.0	5/7/2012	1.5	2.0	<16	<16	<16 #	<8.5	<8.5	<8.5	<16	<8.5	<16	<16	<16	<8.5	<8.5	<8.5
LL-22	LL-22-4.0	5/7/2012	3.5	4.0	<3.3	<3.3	<3.3 #	<1.7	<1.7	<1.7	<3.3	<1.7	<3.3	<3.3	<3.3	<1.7	<1.7	<1.7
LL-23	LL-23-0.5	5/8/2012	0.0	0.5	<3.3	17 #	17	<1.7	<1.7	<1.7	5.9	<1.7	<3.3	<3.3	<3.3	<1.7	<1.7	<1.7
LL-23	LL-23-2.0	5/8/2012	1.5	2.0	<3.3	<3.3	<3.3	<1.7	<1.7	<1.7	<3.3	<1.7	<3.3	<3.3	<3.3	<1.7	<1.7	<1.7
LL-23	LL-23-6.0	5/8/2012	5.5	6.0	<33 J	<33 J	<33 J	<17 J	<17 J	<17 J	<33 J	<17 J	<33 J	<33 J	<33 J	<17 J	<17 J	<17 J
LL-23	LL-23-7.0	5/8/2012	6.5	7.0	<3.3	<3.3	<3.3	<1.7	<1.7	<1.7	<3.3	<1.7	<3.3	<3.3	<3.3	<1.7	<1.7	<1.7
LL-23	LL-23-8.0	5/8/2012	7.5	8.0	<3.3	<3.3	<3.3	<1.7	<1.7	<1.7	<3.3	<1.7	<3.3	<3.3	<3.3	<1.7	<1.7	<1.7
LL-24	LL-24-0.5	5/9/2012	0.0	0.5	<3.3	<3.3	<3.3	<1.7	<1.7	<1.7	<3.3	<1.7	<3.3	<3.3	<3.3	<1.7	<1.7	<1.7
LL-24	LL-24-2.0	5/9/2012	1.5	2.0	<3.3	<3.3	<3.3	<1.7	<1.7	<1.7	<3.3	<1.7	<3.3	<3.3	<3.3	<1.7	<1.7	<1.7
LL-24	LL-24-6.5	5/9/2012	6.0	6.5	<34 #J	<34 J	<34 J	<17 J	<17 J	<17 J	<34 J	<17 J	<34 J	<34 J	<34 J	<17 J	<17 J	<17 J
LL-24	LL-24-9.0	5/9/2012	8.5	9.0	8.4	5.1 #	<3.3	<1.7	<1.7	<1.7	<3.3	<1.7	<3.3	<3.3	<3.3	<1.7	<1.7	<1.7
LL-25	LL-25_0.0-0.5	5/24/2013	0.0	0.5	<3.7	5 J	16 J	<1.9	<1.9	<1.9	<3.7	<1.9	<3.7	<3.7	<3.7	<1.9	<1.9	<1.9
LL-25	LL-25_1.5-2.0	5/24/2013	1.5	2.0	<3.7	4.6 J	7.6 J	<1.9	<1.9	<1.9	<3.7	<1.9	<3.7	<3.7	<3.7	<1.9	<1.9	<1.9
LL-25	LL-25_3.5-4.0	5/24/2013	3.5	4.0	<19	<19	<19	<9.6	<9.6	<9.6	<19	<9.6	<19	<19	<19	<9.6	<9.6	<9.6
LL-25	LL-25_5.5-6.0	5/24/2013	5.5	6.0	<4.1	<4.1	<4.1	<2.1	<2.1	<2.1	<4.1	<2.1	<4.1	<4.1	<4.1	<2.1	<2.1	<2.1
LL-26	LL-26_0.0-0.5	5/24/2013	0.0	0.5	68 J	53 J	110	<3	19	<3	16 J	<3	<5.8	<5.8	<5.8	<3	17 J	<3
LL-26	LL-26_1.5-2.0	5/24/2013	1.5	2.0	7.3 J	<4.5	4.6 J	<2.3	<2.3	<2.3	<4.5	<2.3	<4.5	<4.5	<4.5	<2.3	<2.3	<2.3
LL-26	LL-26_3.0-3.5	5/24/2013	3.0	3.5	12 J	24 J	16	<2.3	3 J	<2.3	<4.4	<2.3	<4.4	<4.4	<4.4	<2.3	2.4 J	<2.3
LL-26	LL-26_5.5-6.0	5/24/2013	5.5	6.0	<4	<4	<4	<2.1	<2.1	<2.1	<4	<2.1	<4	<4	<4	<2.1	<2.1	<2.1

Table 18
Organochlorine Pesticides in Soil
Pre-Design Investigation Report
HA-2, Campus Bay, Richmond, California
Concentrations in micrograms per kilogram (µg/kg)

Location	Sample Name	Sample Date	Top Depth (feet bgs)	Bottom Depth (feet bgs)	4,4'-DDD	4,4'-DDE	4,4'-DDT	Aldrin	alpha-Chlordane	beta-BHC	Dieldrin	Endosulfan I	Endosulfan II	Endosulfan sulfate	Endrin	gamma-BHC	gamma-Chlordane	Heptachlor epoxide
PZ-17B	PZ-17-0.5	11/10/2011	0.0	0.5	93	<67	260	<34	<34	<34	<67	<34	<67	<67	<67	<34	<34	<34
PZ-17B	PZ-17B-1.5	10/18/2011	1.0	1.5	110	93 C	350 C	<1.7	2.8	<1.7 #	<3.3	<1.7	6.1	3.9 C	<3.3 #	<1.7	7.5 C	<1.7
PZ-17B	PZ-17B-7.5	10/18/2011	7.0	7.5	400	70 #C	360 C	<8.4	<8.4	<8.4 #	<16	<8.4	19	<16	<16 #	<8.4	17 C	<8.4
PZ-17B	PZ-17B-9.5	10/18/2011	9.0	9.5	540	41 #C	41 C	<17	<17	<17 #	52 C	<17	<33	<33	<33 #	<17	<17	<17
PZ-18A2	PZ-18-0.5	11/10/2011	0.0	0.5	<33	<33	51	<17	<17	<17	<33	<17	<33	<33	<33	<17	<17	<17
PZ-18A2	PZ-18A2-1.5	10/19/2011	1.0	1.5	<33	<33	<33	<17	<17	<17 #	<33	<17	<33	<33	<33 #	<17	<17	<17
PZ-18A2	PZ-18A2-9.5	10/19/2011	9.0	9.5	210 #	<33	<33	<17	<17	51 #C	<33	<17	<33	<33	<33 #	<17	20 C	<17
PZ-19A2	PZ-19-0.5	11/10/2011	0.0	0.5	45	<17	110	<8.5	<8.5	<8.5	<17	<8.5	<17	<17	<17	<8.5	<8.5	<8.5
PZ-19A2	PZ-19A2-1.5	10/14/2011	1.0	1.5	43	<17	43 C	<8.6	<8.6	<8.6	<17	<8.6	<17	<17	<17	<8.6	<8.6	<8.6
PZ-19A2	PZ-19A2-12	10/14/2011	11.5	12.0	33	<17	<17	<8.5	<8.5	<8.5	<17	<8.5	<17	<17	<17	<8.5	<8.5	<8.5
PZ-19A2	PZ-19A2-15	10/14/2011	14.5	15.0	<3.3	<3.3	<3.3	<1.7	<1.7	<1.7	<3.3	<1.7	<3.3	<3.3	<3.3 #	<1.7	<1.7	<1.7
PZ-20A2	PZ-20-0.5	11/10/2011	0.0	0.5	9	3.5	30	<1.7	2.2	<1.7	3.3 C	<1.7	<3.3	<3.3	<3.3	<1.7	<1.7	<1.7
PZ-20A2	PZ-20A2-1.5	10/13/2011	1.0	1.5	16	3.5 C	<3.3	<1.7	11	<1.7	<3.3	<1.7	<3.3	<3.3	<3.3 #	<1.7	7.5 C	<1.7
PZ-20B	PZ-20B-10	10/13/2011	9.5	10.0	63	<16	<16 #	<8.5	<8.5	<8.5	<16	<8.5	<16	<16 #	<16 #	<8.5	<8.5	<8.5
PZ-20B	PZ-20B-11.5	10/13/2011	11.0	11.5	37	<17	<17	<8.6	<8.6	<8.6	<17	<8.6	<17	<17	<17 #	<8.6	<8.6	<8.6
PZ-20B	PZ-20B-13.5	10/13/2011	13.0	13.5	<17	<17	<17	<8.6	<8.6	<8.6	<17	<8.6	<17	<17	<17 #	<8.6	<8.6	<8.6
PZ-21A2	PZ-21-0.5	11/10/2011	0.0	0.5	<3.3	4.9	6.5	<1.7	<1.7	<1.7	<3.3	<1.7	<3.3	<3.3	<3.3	<1.7	<1.7	<1.7
PZ-21A2	PZ-21A2-7.5	10/12/2011	7.0	7.5	<3.3	<3.3	<3.3	<1.7	<1.7	<1.7	<3.3	<1.7	<3.3	<3.3	<3.3	<1.7	<1.7	<1.7
PZ-21A2	PZ-2A2-7.5	10/12/2011	7.0	7.5	<3.3	<3.3	<3.3	<1.7	<1.7	<1.7	<3.3	<1.7	<3.3	<3.3	<3.3	<1.7	<1.7	<1.7
PZ-21B	PZ-21B-1.5	10/12/2011	1.0	1.5	<3.3	7.2 C	18 C	<1.7	<1.7	<1.7	<3.3	<1.7	<3.3	<3.3	<3.3	<1.7	<1.7	<1.7
PZ-22A2	PZ-22-0.5	11/10/2011	0.0	0.5	<3.3	<3.3	<3.3	<1.7	<1.7	<1.7	<3.3	<1.7	<3.3	<3.3	<3.3	<1.7	<1.7	<1.7
PZ-22B	PZ-22B-1.5	10/10/2011	1.0	1.5	<3.3	<3.3	<3.3	<1.7	<1.7	<1.7	<3.3	<1.7	<3.3	<3.3	<3.3	<1.7	<1.7	<1.7
PZ-22B	PZ-22B-7.5	10/10/2011	7.0	7.5	<3.3	<3.3	<3.3	<1.7	<1.7	<1.7	<3.3	<1.7	<3.3	<3.3	<3.3	<1.7	<1.7	<1.7
PZ-23A2	PZ-23A2-8	10/20/2011	7.5	8.0	<3.3	<3.3	<3.3	<1.7	<1.7	<1.7	<3.3	<1.7	<3.3	<3.3	<3.3	<1.7	<1.7	<1.7
UL-8	UL-8-0.5	11/10/2011	0.0	0.5	5.4	9.6	21	<1.7	<1.7	<1.7	<3.3	<1.7	<3.3	<3.3	<3.3	<1.7	<1.7	<1.7
UL-8	UL-8-1.5	10/24/2011	1.0	1.5	6.9	9.6 #C	9.9 C	<1.7	<1.7	<1.7	<3.2	<1.7	<3.2	<3.2	<3.2	<1.7	<1.7	<1.7
UL-8	UL-8-8	10/24/2011	7.5	8.0	<3.3	<3.3	<3.3	<1.7	<1.7	<1.7	<3.3	<1.7	<3.3	<3.3	<3.3	<1.7	<1.7	<1.7
UL-14	UL-14-0.5	5/10/2012	0.0	0.5	<33	<33	<33	<17	<17	<17	<33	<17	<33	<33	<33	<17	<17	<17
UL-14	UL-14-3.0	5/10/2012	2.5	3.0	<33	<33	<33	<17	<17	<17	<33	<17	<33	<33	<33	<17	<17	<17
UL-14	UL-14-5.0	5/10/2012	5.0	5.0	<33 J	<33 J	<33 J	<17 J	<17 J	<17 J	<33 J	<17 J	<33 J	<33 J	<33 J	<17 J	<17 J	<17 J
UL-14	UL-14-12.0	5/10/2012	11.5	12.0	<33	<33	<33	<17	<17	<17	<33	<17	<33	<33	<33	<17	<17	<17
UL-15	UL-15-0.5	5/10/2012	0.0	0.5	880	460 #C	4600 #	<17	31 C	<17	220 C	<17	<33	<33	<33	31	25 C	<17
UL-15	UL-15-3.0	5/10/2012	2.5	3.0	<34	<34	43 C	<17	<17	<17	<34	<17	<34	<34	<34	<17	<17	<17
UL-15	UL-15-4.0	5/10/2012	3.5	4.0	<33 J	<33 J	59 J	<17 J	<17 J	<17 J	<33 J	<17 J	<33 J	<33 J	<33 J	<17 J	<17 J	<17 J
UL-15	UL-15-8.5	5/10/2012	8.0	8.5	120 CJ	<34 J	420 #J	<17 J	<17 J	<17 J	58 J	<17 J	<34 J	<34 J	36 CJ	<17 J	<17 J	<17 J
UL-15	UL-15-12.0	5/10/2012	11.5	12.0	130 C	<33	72	<17	<17	<17	<33	<17	<33	<33	<33	<17	<17	<17
UL-16	UL-16-0.5	5/10/2012	0.0	0.5	200	55	110	<17	<17	<17	<33	<17	<33	<33	<33	<17	18	<17
UL-16	UL-16-2.0	5/10/2012	1.5	2.0	88	<33	<33	<17	<17	<17	<33	<17	<33	<33	<33	<17	<17	<17
UL-16	UL-16-6.5	5/10/2012	6.0	6.5	110 CJ	120 J	<33 J	<17 J	<17 J	<17 J	<33 J	<17 J	<33 J	<33 J	<33 J	<17 J	<17 J	<17 J
UL-16	UL-16-11.0	5/10/2012	11.0	11.0	570 C	410 #	<33	<17	<17	<17	<33	<17	<33	<33	<33	<17	<17	<17
UL-17	UL-17-0.5	5/9/2012	0.5	0.5	90	19 #	33 C	<1.7	6.1 C	2.8	4.6 #C	<1.7	4.4 #C	<3.4	<3.4	<1.7	18 C	7.3 C
UL-17	UL-17-2.0	5/9/2012	1.5	2.0	110	10 #	19 #	<1.7	36	1.8	<3.3	<1.7	<3.3	<3.3	<3.3	<1.7	39	<1.7
UL-17	UL-17-6.0	5/9/2012	5.5	6.0	260 #J	80 #J	210 #J	<17 J	<17 J	<17 J	<33 J	<17 J	<33 J	<33 J	<33 J	<17 J	<17 J	<17 J
UL-17	UL-17-11.0	5/9/2012	10.5	11.0	260 C	36 #C	68 #	<17	19	<17	<33	<17	<33	<33	<33	<17	27 C	<17
UL-17	UL-17-12.0	5/9/2012	11.5	12.0	210 #J	<33 J	89 #CJ	<17 J	<17 J	<17 J	<33 J	<17 J	<33 J	<33 J	<33 J	<17 J	<17 J	<17 J
UL-18	UL-18-0.5	5/9/2012	0.5	0.5	<16	<16	21 #	<8.5	<8.5	<8.5	<16	<8.5	<16	<16	<16	<8.5	<8.5	<8.5
UL-18	UL-18-2.0	5/9/2012	2.0	2.0	440	150 #	170 #	<17	<17	<17	<33	<17	<33	<33	<33	<17	<17	<17
UL-18	UL-18-3.0	5/9/2012	2.5	3.0	610 #CJ	44 #CJ	78 #J	<17 J	<17 J	<17 J	<33 J	<17 J	<33 J	<33 J	<33 J	<17 J	<17 J	<17 J
UL-18	UL-18-8.0	5/9/2012	8.0	8.0	79 #CJ	<33 J	<33 J	<17 J	<17 J	<17 J	<33 J	<17 J	<33 J	<33 J	<33 J	<17 J	<69 J	<17 J
UL-18	UL-18-10.5	5/9/2012	10.0	10.5	2300 J	200 J	1300 J	<17 J	400 J	<17 J	<33 J	60 CJ	<33 J	<33 J	<33 J	<17 #J	410 J	<17 J
UL-18	UL-18-11.0	5/9/2012	10.5	11.0	480 C	44 #	370 #C	<17	97	<17	<33	<17	<33	<33	<33	<17	93 C	<17
UL-19	UL-19-0.5	5/8/2012	0.0	0.5	63	56 #	220 #	<8.5	<8.5	<8.5	<16	<8.5	<16	<16	<16	<8.5	<8.5	<8.5
UL-19	UL-19-2.0	5/8/2012	1.5	2.0	23	58	84 #	<1.7	1.7 C	2.8 C	7.2	<1.7	<3.3	<3.3	11 C	<1.7	5.2	2.3
UL-19	UL-19-11.0	5/9/2012	10.5	11.0	100	<33	<33	<17	<17	<17	<33	<17	<33	<33	<33	<17	<17	<17

Notes:
Only chemicals with at least one detection are shown on this table.
Historical soil data are on an as received basis. 2013 soil data are on a dry weight basis.
< = analyte not detected above the method detection limit; shown value is the laboratory reporting limit.
-- = not analyzed
#= Continuing Calibration Verification (CCV) drift outside limits; average CCV drift within limits per method requirements
b = Samples were prepared outside of hold time.
C= Presence confirmed, but RPD between columns exceeds 40%
J = estimated value
bgs = below ground surface
BHC = Benzene Hexa Chloride
DDD = p,p'-Dichlorodiphenyl dichloroethane
DDE = Dichlorodiphenyldichloroethylene
DDT = Dichlordiphenyltrichloroethane

Table 19
PCBs in Soil
Pre-Design Investigation Report
HA-2, Campus Bay, Richmond, California
Concentrations in micrograms per kilogram (µg/kg)

Location	Sample Name	Sample Date	Top Depth (feet bgs)	Bottom Depth (feet bgs)	Aroclor-1016	Aroclor-1221	Aroclor-1232	Aroclor-1242	Aroclor-1248	Aroclor-1254	Aroclor-1260	Aroclor-1262	Total PCB Aroclors
LL-7	LL-7-1.0	6/29/2007	0.5	1.0	<13	<26	<13	<13	<13	32	34	--	66
LL-7	LL-7-4.0	6/29/2007	3.5	4.0	<15	<29	<15	<15	<15	<15	<15	--	ND
LL-7	LL-7-7.0	6/29/2007	6.5	7.0	<14	<29	<14	<14	<14	<14	<14	--	ND
LL-8	LL-8-1.0	6/29/2007	0.5	1.0	<14	<27	<14	<14	<14	<14	<14	--	ND
LL-8	LL-8-5.5	6/29/2007	5.0	5.5	<15	<30	<15	<15	<15	<15	<15	--	ND
LL-9	LL-9-0.5	11/10/2011	0.0	0.5	<12	<24	<12	<12	<12	<12	16	<12	16
LL-9	LL-9-1.5	10/26/2011	1.0	1.5	<12	<24	<12	<12	<12	<12	<12	--	ND
LL-9	LL-9-3.25	10/26/2011	2.8	3.3	<12	<24	<12	<12	<12	<12	<12	--	ND
LL-9R	LL-9R-0.5	5/9/2012	0.0	0.5	<9.6	<19	<9.6	<9.6	<9.6	42	<9.6	15	57
LL-9R	LL-9R-2.0	5/9/2012	1.5	2.0	<9.5	<19	<9.5	<9.5	<9.5	<9.5	<9.5	<9.5	ND
LL-9R	LL-9R-8.0	5/9/2012	7.5	8.0	<9.4	<19	<9.4	<9.4	<9.4	<9.4	<9.4	<9.4	ND
LL-9R	LL-9R-9.0	5/9/2012	8.5	9.0	<9.7	<19	<9.7	<9.7	<9.7	<9.7	<9.7	--	ND
LL-10	LL-10-0.5	11/10/2011	0.0	0.5	<12	<24	<12	<12	<12	<12	<12	82	82
LL-11	LL-11-0.5	11/10/2011	0.0	0.5	<12	<24	<12	<12	<12	<12	<12	<12	ND
LL-12	LL-12-0.5	11/10/2011	0.0	0.5	<12	<24	<12	<12	<12	<12	<12	38	38
LL-12	LL-12-1.5	10/25/2011	1.0	1.5	<12	<24	<12	<12	<12	<12	<12	--	ND
LL-12	LL-12-7	10/25/2011	6.5	7.0	<12	<24	<12	<12	<12	<12	<12	--	ND
LL-13	LL-13-0.5	11/10/2011	0.0	0.5	<12	<24	<12	<12	<12	<12	<12	<12	ND
LL-13	LL-13-1.5	10/24/2011	1.0	1.5	<12	<24	<12	<12	<12	<12	<12	--	ND
LL-13	LL-13-6	10/24/2011	5.5	6.0	<12	<24	<12	<12	<12	<12	<12	--	ND
LL-23	LL-23-0.5	5/8/2012	0.0	0.5	<9.5	<19	<9.5	<9.5	<9.5	<9.5	11	--	11
LL-23	LL-23-2.0	5/8/2012	1.5	2.0	<9.5	<19	<9.5	<9.5	<9.5	<9.5	<9.5	--	ND
LL-23	LL-23-6.0	5/8/2012	5.5	6.0	<9.6	<19	<9.6	<9.6	<9.6	<9.6	<9.6	--	ND
LL-23	LL-23-7.0	5/8/2012	6.5	7.0	<9.5	<19	<9.5	<9.5	<9.5	<9.5	<9.5	--	ND
LL-23	LL-23-8.0	5/8/2012	7.5	8.0	<9.5	<19	<9.5	<9.5	<9.5	<9.5	<9.5	--	ND
LL-24	LL-24-0.5	5/9/2012	0.0	0.5	<9.5	<19	<9.5	<9.5	<9.5	<9.5	<9.5	<9.5	ND
LL-24	LL-24-2.0	5/9/2012	1.5	2.0	<9.6	<19	<9.6	<9.6	<9.6	<9.6	<9.6	<9.6	ND
LL-24	LL-24-6.5	5/9/2012	6.0	6.5	<9.7	<19	<9.7	<9.7	<9.7	<9.7	<9.7	--	ND
LL-24	LL-24-9.0	5/9/2012	8.5	9.0	<9.7	<19	<9.7	<9.7	<9.7	<9.7	<9.7	<9.7	ND
PZ-17B	PZ-17-0.5	11/10/2011	0.0	0.5	<12	<24	<12	<12	<12	<12	<12	<12	ND
PZ-17B	PZ-17B-1.5	10/18/2011	1.0	1.5	<12	<24	<12	<12	<12	<12	<12	<12	ND
PZ-17B	PZ-17B-7.5	10/18/2011	7.0	7.5	<12	<24	<12	<12	<12	<12	<12	230	230
PZ-17B	PZ-17B-9.5	10/18/2011	9.0	9.5	<12	<24	<12	<12	<12	<12	<12	--	ND
PZ-18A2	PZ-18-0.5	11/10/2011	0.0	0.5	<12	<24	<12	<12	<12	200	<12	<12	200
PZ-18A2	PZ-18A2-1.5	10/19/2011	1.0	1.5	<13	<27	<13	<13	<13	89	<13	--	89
PZ-18A2	PZ-18A2-9.5	10/19/2011	9.0	9.5	<13	<27	<13	<13	<13	<13	<13	--	ND
PZ-19A2	PZ-19-0.5	11/10/2011	0.0	0.5	<12	<24	<12	<12	<12	<12	<12	<12	ND
PZ-19A2	PZ-19A2-1.5	10/14/2011	1.0	1.5	<12	<24	<12	<12	<12	<12	<12	--	ND
PZ-19A2	PZ-19A2-12	10/14/2011	11.5	12.0	<12	<24	<12	<12	<12	<12	<12	--	ND
PZ-19A2	PZ-19A2-15	10/14/2011	14.5	15.0	<12	<24	<12	<12	<12	<12	<12	--	ND
PZ-20A2	PZ-20-0.5	11/10/2011	0.0	0.5	<12	<24	<12	<12	<12	<12	<12	<12	ND
PZ-20A2	PZ-20A2-1.5	10/13/2011	1.0	1.5	<12	<24	<12	<12	<12	<12	<12	--	ND
PZ-20B	PZ-20B-10	10/13/2011	9.5	10.0	<12	<24	<12	<12	<12	<12	<12	--	ND
PZ-20B	PZ-20B-11.5	10/13/2011	11.0	11.5	<12	<24	<12	<12	<12	<12	<12	--	ND
PZ-20B	PZ-20B-13.5	10/13/2011	13.0	13.5	<12	<24	<12	<12	<12	<12	<12	--	ND

Table 19
PCBs in Soil
Pre-Design Investigation Report
HA-2, Campus Bay, Richmond, California
Concentrations in micrograms per kilogram (µg/kg)

Location	Sample Name	Sample Date	Top Depth (feet bgs)	Bottom Depth (feet bgs)	Aroclor-1016	Aroclor-1221	Aroclor-1232	Aroclor-1242	Aroclor-1248	Aroclor-1254	Aroclor-1260	Aroclor-1262	Total PCB Aroclors
PZ-21A2	PZ-21-0.5	11/10/2011	0.0	0.5	<12	<24	<12	<12	<12	<12	<12	<12	ND
PZ-21A2	PZ-21A2-7.5	10/12/2011	7.0	7.5	<12	<24	<12	<12	<12	<12	<12	--	ND
PZ-21A2	PZ-2A2-7.5	10/12/2011	7.0	7.5	<12	<24	<12	<12	<12	<12	<12	--	ND
PZ-21B	PZ-21B-1.5	10/12/2011	1.0	1.5	<12	<24	<12	<12	<12	<12	<12	--	ND
PZ-22A2	PZ-22-0.5	11/10/2011	0.0	0.5	<12	<24	<12	<12	<12	<12	<12	<12	ND
PZ-22B	PZ-22B-1.5	10/10/2011	1.0	1.5	<12	<24	<12	<12	<12	<12	<12	--	ND
PZ-22B	PZ-22B-7.5	10/10/2011	7.0	7.5	<12	<24	<12	<12	<12	<12	<12	--	ND
UL-8	UL-8-0.5	11/10/2011	0.0	0.5	<12	<24	<12	<12	<12	<12	<12	<12	ND
UL-8	UL-8-1.5	10/24/2011	1.0	1.5	<12	<24	<12	<12	<12	<12	<12	--	ND
UL-8	UL-8-8	10/24/2011	7.5	8.0	<12	<24	<12	<12	<12	<12	<12	--	ND
UL-16	UL-16-0.5	5/10/2012	0.0	0.5	<9.7	<19	<9.7	<9.7	<9.7	<9.7	<9.7	--	ND
UL-16	UL-16-2.0	5/10/2012	1.5	2.0	<9.5	<19	<9.5	<9.5	<9.5	<9.5	<9.5	--	ND
UL-16	UL-16-11.0	5/10/2012	11.0	11.0	<9.7	<19	<9.7	<9.7	<9.7	<9.7	<9.7	--	ND
UL-17	UL-17-0.5	5/9/2012	0.5	0.5	<9.7	<19	<9.7	<9.7	510	<9.7	55	<9.7	565
UL-17	UL-17-2.0	5/9/2012	1.5	2.0	<9.5	<19	<9.5	<9.5	<9.5	<9.5	<9.5	<9.5	ND
UL-17	UL-17-6.0	5/9/2012	5.5	6.0	<9.5	<19	<9.5	<9.5	<9.5	<9.5	<9.5	--	ND
UL-17	UL-17-11.0	5/9/2012	10.5	11.0	<9.5	<19	<9.5	<9.5	<9.5	<9.5	<9.5	<9.5	ND
UL-17	UL-17-12.0	5/9/2012	11.5	12.0	<9.6	<19	<9.6	<9.6	<9.6	<9.6	<9.6	--	ND
UL-18	UL-18-0.5	5/9/2012	0.5	0.5	<9.6	<19	<9.6	<9.6	<9.6	<9.6	<9.6	<9.6	ND
UL-18	UL-18-2.0	5/9/2012	2.0	2.0	<9.6	<19	<9.6	<9.6	<9.6	<9.6	30	<9.6	30
UL-18	UL-18-11.0	5/9/2012	10.5	11.0	<9.5	<19	<9.5	<9.5	<9.5	<9.5	<9.5	<9.5	ND
UL-19	UL-19-0.5	5/8/2012	0.0	0.5	<9.6	<19	<9.6	<9.6	<9.6	<9.6	<9.6	--	ND
UL-19	UL-19-2.0	5/8/2012	1.5	2.0	<9.5	<19	<9.5	<9.5	<9.5	<9.5	<9.5	--	ND
UL-19	UL-19-11.0	5/9/2012	10.5	11.0	<9.5	<19	<9.5	<9.5	<9.5	<9.5	<9.5	<9.5	ND

Notes:
Total PCB Aroclors is the sum of only detected Aroclors
Historical soil data are on an as received basis.
< = analyte not detected above the method detection limit; shown value is the laboratory reporting limit.
-- = not analyzed
bgs = Below ground surface
PCB = polychlorinated biphenyl
ND = Total not calculated because individual analytes not detected above laboratory reporting limits

Table 20
Metals in Groundwater
Pre-Design Investigation Report
HA-2, Campus Bay, Richmond, California
Concentrations in micrograms per liter (µg/L)

Location	Sample Name	Sample Date	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Mercury	Molybdenum	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc
5x Saltwater Aquatic Criteria (µg/L)			**--**	**180**	**--**	**--**	**--**	**--**	**--**	**16**	**41**	**5**	**--**	**41**	**--**	**--**	**--**	**--**	**410**
LL-39	LL-39_12-15	5/23/2013	--	20	--	--	--	--	--	<1	<1	--	--	9.7	--	--	--	--	<20
LL-39	LL-39_22-25	5/24/2013	--	<1	--	--	--	--	--	<1	<1	--	--	8	--	--	--	--	21
MW-16A	MW-16A	6/26/2003	<60	130	48	<2	<5	<10	<20	<10	<3	<0.2	<20	32	<5	<5	7.4	<10	<20
MW-16A	MW-16A	8/29/2003	<60	51	49	<2	<5	<10	<20	<10	<30	<0.2	<20	22	<50	<5	170	<10	<20
MW-16A	D-MW16	8/29/2003	<60	<50	49	<2	<5	<10	<20	<10	<30	<0.2	<20	<20	<50	<5	130	<10	<20
MW-16A	MW-16A	10/24/2003	<60	110	16	<2	<5	<10	<20	<10	<3	<0.2	<20	38	<5	<5	<5	<10	<20
MW-16A	MW-16A-D	10/24/2003	<60	84	14	<2	<5	<10	<20	<10	<3	<0.2	<20	32	<5	<5	<5	<10	<20
MW-16A	MW-16A	1/30/2004	<60	120	20	<2	<5	<10	<20	<10	<3	<0.2	<20	<20	<5	<5	<5	<10	<20
MW-16A	MW-16A-D	1/30/2004	<60	14	20	<2	<5	<10	<20	<10	<3	<0.2	<20	<20	<5	<5	<5	<10	<20
MW-16A	MW-16A	4/16/2004	<60	68	21	<2	<5	<10	<20	<10	<3	<0.2	<20	<20	5.3	<5	<5	<10	<20
MW-16A	MW-16A	7/23/2004	<60	150	33	<2	<5	<10	<20	<10	<3	<0.2	<20	<20	<5	<5	<5	<10	<20
MW-16A	MW-16A	10/14/2004	<60	150	24	<2	<5	<10	<20	<10	<3	<0.2	<20	38	<5	<5	<5	<10	28
MW-16A	MW-16A	2/9/2005	<60	25	18	<2	<5	<10	<20	<10	<3	<0.2	<20	<20	<5	<5	<5	<10	<20
MW-16A	MW-16A	6/7/2005	<60	240	18	<2	<5	<10	<20	<10	<3	<0.2	<20	<20	<5	<5	<5	<10	<20
MW-16A	MW-16A	8/12/2005	<60	100	23	<2	<5	<10	<20	<10	<3	<0.2	<20	<20	<5	<5	<5	<10	<20
MW-16A	MW-16D	8/12/2005	<60	110	23	<2	<5	<10	<20	<10	<3	<0.2	<20	<20	<5	<5	<5	<10	<20
MW-16A	MW-16A	11/11/2005	<60	110	18	<2	<5	<10	<20	<10	<3	<0.2	<20	23	<5	<5	<5	<10	21
MW-16A	MW-16A-D	11/11/2005	<60	110	18	<2	<5	<10	<20	<10	<3	<0.2	<20	20	5.3	<5	<5	<10	<20
MW-16A	MW-16A	2/9/2006	<60	220	23	<2	<5	<10	<20	<10	<3	<0.2	<20	<20	<5	<5	<5	<10	<20
MW-16A	MW-16A-D	2/9/2006	<60	240	23	<2	<5	<10	<20	<10	<3	<0.2	<20	<20	<5	<5	<5	<10	<20
MW-16A	MW-16A	5/11/2006	<60	250	24	<2	<5	<10	<20	<10	<3	<0.2	<20	<20	<5	<5	<5	<10	<20
MW-16A	MW-16A	8/17/2006	<60	260	31	<2	<5	<10	<20	<10	<3	<0.2	<20	<20	<5	<5	<5	<10	<20
MW-16A	MW-16A-D	8/17/2006	<60	270	32	<2	<5	<10	<20	<10	<3	<0.2	<20	<20	<5	<5	<5	<10	<20
MW-16A	MW-16A	11/13/2006	<60	330	35	<2	<5	<10	<20	<10	<3	<0.2	<20	<20	<5	<5	<5	<10	<20
MW-16A	MW-16A	2/7/2007	<10	290	35	<2	<5	<5	<5	<5	<3	<0.2	<5	<5	<10	<5	<10	<5	<20
MW-16A	MW-16A	5/8/2007	<10	270	26	<2	<5	<5	<5	<5	<3	<0.2	<5	<5	<10	<5	<10	<5	<20
MW-16A	MW-16A	8/13/2007	--	230	--	--	<5	--	--	<5	<3	<0.2	--	9.9	<10	--	--	--	<20
MW-16A	MW-16A	11/8/2007	<10	330	33	<2	<5	<5	<5	<5	4.5	<0.2	<5	<5	<10	<5	11	<5	<20
MW-16A	MW-16A	2/5/2009	<10	240	28	<2	<5	<5	<5	<5	<3	<0.2	<5	<5	<10	<5	<10	<5	<20
MW-16A	MW-16A	5/6/2009	<10	290	28	<2	<5	<5	<5	<5	<3	<0.2	<5	<5	<10	<5	<10	<5	<20
MW-16A	MW-16A	8/7/2009	<10	240	26	<2	<5	<5	<5	<5	<3.1	<0.2	8.8	7	<10	<5	<10	<5	<20
MW-16A	MW-16A	11/5/2009	24	270	29	<2	<5	<5	<5	<5	<3	<0.2	<5	<5	<10	<5	<10	<5	<20
MW-16A	MW-16A	2/4/2010	<10	190	30	<2	<5	<5	<5	<5	<5	<0.2	9	<5	17	<5	<10	<5	<20
MW-16A	MW-16A	5/10/2010	<10	270	33	<2	<5	<5	<5	<5	<5	<0.2	5.5	5.2	<10	<5	12	<5	<20
MW-16A	MW-16A	8/4/2010	<10	250	47	<2	<5	<5	<5	<5	<5	<0.2	<5	<5	12	<5	<10	<5	<20
MW-16A	MW-16A	11/4/2010	<1	280	56	<1	<1	<1	1.1	<1	<1	<0.2	2.4	2.3	<1	<1	<1	<1	54 M2 M3
MW-16A	MW-16A	5/1/2012	<10	330	33	<2	<5	<5	<5	<5	<5	<0.2	15	<5	<10	<5	<10	<5	<20
MW-16A	MW-16A	5/23/2013	--	180	--	--	--	--	--	<1	<1	<0.2	--	5.7	--	--	--	--	<20
MW-16B	MW-16B	5/11/2006	<60	8.5	910	<2	<5	<10	<20	<10	<3	<0.2	<20	<20	<5	<5	5.7	<10	<20
MW-16B	MW-16B	11/13/2006	<60	6.9	740	<2	<5	<10	<20	<10	<3	<0.2	<20	<20	<5	<5	<5	<10	<20
MW-16B	MW-16B	2/7/2007	<10	<5	470	<2	<5	<5	<5	<5	<3	<0.2	<5	<5	<10	<5	<10	<5	<20
MW-16B	MW-16B	5/8/2007	<10	<5	210	<2	<5	<5	<5	<5	<3	<0.2	<5	<5	<10	<5	<10	<5	<20
MW-16B	MW-16B	8/13/2007	--	<6.1	--	--	<5	--	--	<5	<3	<0.2	--	<5	<10	--	--	--	<20
MW-16B	MW-16B	11/8/2007	20	<6.1	380	<2	<5	<5	<5	<5	<3	<0.2	<5	<5	<10	<5	11	<5	<20
MW-16B	MW-16B	2/5/2009	<10	<5	260	<2	<5	<5	<5	<5	<3	<0.2	<5	<5	<10	<5	<10	<5	<20
MW-16B	MW-16BD	2/5/2009	<1	1.3	290	<1	<1	<1	<1	<1	<1	<0.2	1.2	<1	<1	<1	<1	2.6	<5
MW-16B	MW-16B	5/6/2009	<10	6.8	210	<2	<5	<5	<5	<5	<3	<0.2	<5	<5	<10	<5	<10	<5	<20
MW-16B	MW-16B	8/7/2009	<10	14	310	<2	<5	<5	<5	6.7	<3.1	<0.2	8.1	<5	<10	<5	<10	<5	<20
MW-16B	MW-16B	11/5/2009	27	<5	270	<2	<5	<5	<5	<5	<3	<0.2	<5	<5	<10	<5	<10	<5	<20
MW-16B	MW-16B	2/4/2010	<10	<5	180	<2	<5	<5	<5	15	<5	<0.2	7.5	<5	<10	<5	<10	<5	<20
MW-16B	MW-16B	5/10/2010	<10	<5	190	<2	<5	<5	<5	15	<5	<0.2	<5	<5	<10	<5	21	<5	<20
MW-16B	MW-16B	8/4/2010	<10	<5	320	<2	<5	<5	<5	<5	<5	<0.2	<5	<5	15	<5	14	<5	<20
MW-16B	MW-16B	11/5/2010	<1	1.1	310	<1	<1	<1	<1	2.5	<1	<0.2	<1	<1	<1	<1	<1	2.4	10
MW-16B	MW-16B	5/2/2012	<10	<5	97	<2	<5	<5	<5	<5	<5	<0.2	<5	<5	<10	<5	<10	<5	<20
MW-17	MW-17	6/26/2003	<60	66	21	<2	<5	<10	<20	<10	<3	<0.2	<20	<20	<5	<5	<5	<10	<20
MW-17	MW-17	8/29/2003	<60	<500	25	<2	<5	<10	<20	<10	<30	<0.2	<20	<20	<50	<5	84	<10	<20
MW-17	MW-17	10/24/2003	<60	61	14	<2	<5	<10	<20	<10	<3	<0.2	<20	<20	<5	<5	<5	<10	<20
MW-17	MW-17	1/30/2004	<60	58	18	<2	<5	<10	<20	<10	<3	<0.2	<20	<20	<5	<5	<5	<10	<20

Table 20
Metals in Groundwater
Pre-Design Investigation Report
HA-2, Campus Bay, Richmond, California
Concentrations in micrograms per liter (µg/L)

Location	Sample Name	Sample Date	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Mercury	Molybdenum	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc
5x Saltwater Aquatic Criteria (µg/L)			**--**	**180**	**--**	**--**	**--**	**--**	**--**	**16**	**41**	**5**	**--**	**41**	**--**	**--**	**--**	**--**	**410**
MW-17	MW-17	4/16/2004	<60	30	19	<2	<5	<10	<20	<10	<3	<0.2	<20	<20	<5	<5	<5	<10	<20
MW-17	MW-17	7/23/2004	<60	34	22	<2	<5	<10	<20	<10	<3	<0.2	<20	<20	<5	<5	<5	<10	<20
MW-17	MW-17	10/14/2004	<60	14	28	<2	<5	<10	<20	<10	<3	<0.2	<20	<20	<5	<5	<5	<10	<20
MW-17	MW-17	2/9/2005	<60	58	25	<2	<5	<10	<20	<10	<3	<0.2	<20	<20	<5	<5	<5	<10	<20
MW-17	MW-17	6/7/2005	<60	55	36	<2	<5	<10	<20	<10	<3	<0.2	<20	<20	<5	<5	<5	<10	<20
MW-17	MW-17	8/12/2005	<60	40	28	<2	<5	<10	<20	<10	<3	<0.2	<20	<20	<5	<5	7.8	<10	<20
MW-17	MW-17	11/11/2005	<60	98	25	<2	<5	<10	<20	<10	<3	<0.2	<20	<20	<5	<5	<5	<10	<20
MW-17	MW-17	2/9/2006	<60	120	40	<2	<5	<10	<20	<10	<3	<0.2	<20	<20	<5	<5	<5	<10	<20
MW-17	MW-17	5/11/2006	<60	130	38	<2	<5	<10	<20	<10	<3	<0.2	<20	<20	<5	<5	<5	<10	<20
MW-17	MW-17	8/17/2006	<60	150	36	<2	<5	<10	<20	<10	<3	<0.2	<20	<20	<5	5.6	<5	<10	<20
MW-17	MW-17	11/13/2006	<60	180	43	<2	<5	<10	<20	<10	<3	<0.2	<20	<20	<5	<5	5.5	<10	<20
MW-17	MW-17	2/7/2007	<10	110	43	<2	<5	<5	<5	<5	<3	<0.2	<5	5.7	<10	<5	<10	<5	<20
MW-17	MW-17	5/8/2007	<10	110	43	<2	<5	<5	<5	<5	<3	<0.2	<5	<5	<10	<5	<10	<5	<20
MW-17	MW-17	8/13/2007	--	93	--	--	<5	--	--	<5	<3	<0.2	--	6.8	<10	--	--	--	<20
MW-17	MW-17	11/9/2007	<10	120	36	<2	<5	<5	<5	<5	<3	<0.2	<5	6.7	<10	<5	<10	<5	<20
MW-17	MW-17	2/5/2009	<10	180	41	<2	<5	<5	<5	<5	<3	<0.2	<5	<5	<10	<5	<10	<5	<20
MW-17	MW-17	5/6/2009	<10	190	44	<2	<5	<5	<5	<5	<3	<0.2	<5	<5	<10	<5	<10	<5	<20
MW-17	MW-17	8/7/2009	<10	230	35	<2	<5	<5	<5	<5	<3.1	<0.2	7.9	<5	<10	<5	<10	<5	<20
MW-17	MW-17	11/3/2009	18	170	51	<2	<5	<5	<5	<5	<3.1	<0.2	<5	<5	<10	<5	<10	<5	<20
MW-17	MW-17	2/5/2010	<10	240	49	<2	<5	<5	<5	<5	<5	<0.2	7.8	<5	<10	<5	<10	<5	<20
MW-17	MW-17	5/5/2010	<10	390	59	<2	<5	<5	<5	<5	<5	<0.2	5	<5	<10	<5	<10	<5	<20
MW-17	MW-17	8/6/2010	<10	350	59	<2	<5	<5	<5	<5	<5	<0.2	<5	<5	<10	<5	16	<5	<20
MW-17	MW-17	11/5/2010	<1	470	93	<1	<1	<1	3.8	3.4	<1	<0.2	2.2	<1	<1	<1	<1	<1	10
MW-17	MW-17	5/2/2012	<10	300	130	<2	<5	<5	<5	<5	<5	<0.2	<5	<5	<10	<5	<10	<5	<20
MW-17	MW-17	5/23/2013	--	440	--	--	--	--	--	<1	<1	<0.2	--	2.7	--	--	--	--	<20
PZ-14	PZ-14	11/3/2009	<10	170	140	<2	<5	<5	<5	8	<3.1	<0.2	<5	<5	<10	<5	<10	<5	<20
PZ-14	PZ-14D	11/3/2009	<1	180	140	<1	<1	<1	3	<1	<1	<0.2	1.5	5.8	<1	<1	<1	1.6	<5
PZ-14	PZ-14	2/5/2010	<10	220	140	<2	<5	6.8	<5	12	<5	<0.2	11	<5	<10	<5	<10	<5	<20
PZ-14	PZ-14	5/5/2010	<10	260	140	<2	<5	<5	<5	<5	<5	<0.2	<5	<5	<10	<5	<10	<5	<20
PZ-14	PZ-14	8/6/2010	<10	530	170	<2	<5	<5	<5	<5	<5	<0.2	<5	<5	<10	<5	<10	<5	<20
PZ-14	PZ-14D	8/6/2010	<10	540	170	<2	<5	<5	<5	<5	<5	<0.2	<5	5.6	<10	<5	<10	<5	<20
PZ-14	PZ-14	11/2/2010	<100 M1	640 M2	110	<20	<50	<50	<50	<50	68	<0.2	<50	<50	<100 M3	<50 M2 M3	<100 M2	<50	<200
PZ-14	PZ-14	5/2/2012	<10	290	190	<2	<5	<5	<5	<5	<5	<0.2	<5	7.5	<10	<5	<10	<5	<20
PZ-14	PZ-14	5/23/2013	--	520	--	--	--	--	--	<1	<1	<0.2	--	2.2	--	--	--	--	<20
PZ-14	PZ-14D	5/23/2013	--	500	--	--	--	--	--	<1	<1	<0.2	--	3.4	--	--	--	--	<20
PZ-15	PZ-15	11/3/2009	<10	22	25	<2	<5	<5	<5	5.4	<3.1	<0.2	13	5.9	<10	<5	<10	10	<20
PZ-15	PZ-15	2/5/2010	<10	16	27	<2	<5	<5	<5	6.5	<5	<0.2	14	<5	<10	<5	<10	6.8	<20
PZ-15	PZ-15	5/5/2010	<10	15	36	<2	<5	<5	<5	<5	<5	<0.2	7.7	19	<10	<5	<10	5.2	<20
PZ-15	PZ-15	8/6/2010	<10	12	53	<2	<5	<5	<5	<5	<5	<0.2	9.2	7.1	<10	<5	<10	6.2	<20
PZ-15	PZ-15	11/2/2010	<100 M1	<50 M2	<50	<20	<50	<50	<50	<50	<50	<0.2	<50	<50	<100 M3	<50 M2 M3	<100 M2	<50	<200
PZ-15	PZ-15	5/1/2012	<10	9.2	84	<2	<5	6.2	<5	<5	<5	<0.2	5.2	24	11	<5	<10	<5	42
PZ-15	PZ-15	5/24/2013	--	5.7	--	--	--	--	--	<1	<1	<0.2	--	<1 J	--	--	--	--	<20
PZ-16	PZ-16	11/3/2009	<10	<5	22	<2	<5	<5	<5	5.9	<3.1	<0.2	27	<5	<10	<5	<10	5.4	<20
PZ-16	PZ-16	2/5/2010	<10	<5	19	<2	<5	<5	<5	10 F	<5	<0.2	29 F	<5	<10	<5	<10	<5	<20
PZ-16	PZ-16D	2/5/2010	<1	2.2	19	<1	<1	<1	<1	1.2 F	<1	<0.2	21 F	3.1	<1	<1	<1	5.5	5.5
PZ-16	PZ-16	5/5/2010	<10	<5	19	<2	<5	<5	<5	<5	<5	<0.2	21	<5	<10	<5	<10	<5	<20
PZ-16	PZ-16	8/6/2010	<10	<5	22	<2	<5	<5	<5	<5	<5	<0.2	21	<5	<10	<5	<10	5.6	<20
PZ-16	PZ-16	11/2/2010	<10 M1	<50 M2	20	<2	<5	<5	<5	<50	<50	<0.2	19	<5	<10 M3	<5 M2 M3	<10 M2	6.2	<20
PZ-16	PZ-16	5/24/2013	--	3.1	--	--	--	--	--	<1	<1	<0.2	--	<1 J	--	--	--	--	<20
PZ-17A1	PZ-17A1	11/2/2011	<10	30	64	<2	<5	<5	<5	<5	<5	<0.2	<5	<5	<10	<5	<10	<5	<20
PZ-17A1	PZ-17A1	4/30/2012	<10	14	64	<2	<5	<5	<5	<5	<5	<0.2	<5	<5	<10	<5	<10	6.7	<20
PZ-17A2	PZ-17A2	11/3/2011	<10	19	34	<2	<5	<5	8.2	5.3	<5	<0.2	25	52	<10	<5	<10	<5	43
PZ-17A2	PZ-17A2	5/1/2012	<10	<5	35	<2	<5	<5	<5	<5	<5	<0.2	5.5	19	<10	<5	<10	<5	20
PZ-17B	PZ-17B	11/2/2011	<10	<7.1	37	<2	<5	<5	<5	<5	<5	<0.2	6.7	11	<10	<5	<10	<5	<20
PZ-17B	PZ-17B	4/30/2012	<10	5.3	27	<2	<5	<5	<5	<5	<5	<0.2	<5	<5	<10	<5	<10	<5	<20
PZ-18A1	PZ-18A1	11/3/2011	<10	71	360	<2	<5	8.9	<5	<5	<5	<0.2	17	12	<10	<5	<10	<5	<20
PZ-18A1	PZ-18A1	5/1/2012	<10	57	540	<2	<5	11	5.5	<5	<5	<0.2	<5	12	20	6.2	<10	<5	<20
PZ-18A2	PZ-18A2	11/3/2011	<10	45	220	<2	<5	13	22	<5	<5	<0.2	13	39	<10	<5	<10	<5	<20

Table 20
Metals in Groundwater
Pre-Design Investigation Report
HA-2, Campus Bay, Richmond, California
Concentrations in micrograms per liter (µg/L)

Location	Sample Name	Sample Date	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Mercury	Molybdenum	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc
5x Saltwater Aquatic Criteria (µg/L)			**--**	**180**	**--**	**--**	**--**	**--**	**--**	**16**	**41**	**5**	**--**	**41**	**--**	**--**	**--**	**--**	**410**
PZ-18A2	PZ-18A2	5/1/2012	<10	10	240	<2	<5	9.3	22	<5	<5	<0.2	<5	42	17	6.3	<10	<5	29
PZ-19A1	PZ-19A1	11/3/2011	<10	81	190	<2	<5	<5	<5	<5	<5	<0.2	6.1	5.3	<10	<5	<10	<5	26
PZ-19A1	PZ-19A1	5/2/2012	<10	61	75	<2	<5	<5	<5	<5	<5	<0.2	<5	<5	<10	<5	<10	<5	<20
PZ-19A1	PZ-19A1	5/23/2013	--	43	--	--	--	--	--	<1	<1	<0.2	--	2.6	--	--	--	--	<20
PZ-19A2	PZ-19A2	11/2/2011	<10	<7.1	36	<2	<5	<5	<5	<5	<5	<0.2	29	7.2	<10	<5	<10	<5	<20
PZ-19A2	PZ-19A2	5/2/2012	<10	<5	38	<2	<5	<5	<5	<5	<5	<0.2	22	<5	<10	<5	<10	<5	<20
PZ-19A2	PZ-19A2-D	5/2/2012	<10	<5	37	<2	<5	<5	<5	<5	<5	<0.2	22	<5	<10	<5	<10	<5	<20
PZ-19A2	PZ-19A2	5/23/2013	--	3.8	--	--	--	--	--	<1	<1	<0.2	--	5	--	--	--	--	<20
PZ-20A1	PZ-20A1	11/3/2011	<10	71	140	<2	<5	<5	6.9	98	<5	<0.2	<5	10	<10	<5	<10 J	<5	270
PZ-20A1	PZ-20A1	5/2/2012	<10	98	94	<2	<5	<5	<5	<5	<5	<0.2	<5	<5	<10	<5	<10	<5	40
PZ-20A1	PZ-20A1	5/24/2013	--	81	--	--	--	--	--	28	11	<0.2	--	<1 J	--	--	--	--	170
PZ-20A2	PZ-20A2	11/2/2011	<10	150	330	<2	<5	<5	<5	<5	<5	<0.2	<5	<5	<10	<5	<10	<5	<20
PZ-20A2	PZ-20A2	5/1/2012	<10	100	230	<2	<5	<5	<5	<5	<5	<0.2	<5	<5	<10	6	<10	<5	<20
PZ-20A2	PZ-20A2	5/23/2013	--	90	--	--	--	--	--	<1	<1	<0.2	--	<1	--	--	--	--	<20
PZ-20A2	PZ-20A2	8/15/2013	--	95	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PZ-20B	PZ-20B	11/2/2011	<10	<7.1	39	<2	<5	<5	<5	<5	<5	<0.2	12	6.3	<10	<5	<10	<5	<20
PZ-20B	PZ-20B	5/1/2012	<10	7	17	<2	<5	<5	<5	<5	<5	<0.2	<5	<5	<10	<5	<10	<5	<20
PZ-21A1	PZ-21A1	11/3/2011	<10	17	80	<2	<5	<5	<5	<5	<5	<0.2	17	12	<10	<5	<10 J	7.1	<20
PZ-21A1	PZ-21A1	5/2/2012	<10	7.8	96	<2	<5	<5	<5	<5	<5	<0.2	15	18	<10	<5	<10	17	<20
PZ-21A1	PZ-21A1	5/24/2013	--	9	--	--	--	--	--	<1	<1	<0.2	--	<1 J	--	--	--	--	<20
PZ-21A2	PZ-21A2	11/3/2011	<10	14	90	<2	<5	14	16	<5	<5	<0.2	11	36	<10	<5	<10	<5	<20
PZ-21A2	PZ-21A2-D	11/3/2011	<10	12	85	<2	<5	13	15	<5	<5	<0.2	11	34	<10	<5	<10	<5	<20
PZ-21A2	PZ-21A2	5/1/2012	<10	<5	51	<2	<5	10	11	<5	<5	<0.2	<5	34	19	<5	<10	<5	<20
PZ-21A2	PZ-21A2	5/24/2013	--	3.9	--	--	--	--	--	<1	<1	<0.2	--	<1	--	--	--	--	<20
PZ-21B	PZ-21B	11/2/2011	<10	<7.1	52	<2	<5	<5	<5	<5	<5	<0.2	10	5.6	<10	<5	<10	<5	<20
PZ-21B	PZ-21B	5/1/2012	<10	<5	52	<2	<5	<5	<5	<5	<5	<0.2	<5	<5	<10	<5	<10	<5	<20
PZ-22A1	PZ-22A1	11/4/2011	<10	<7.1	50	<2	<5	<5	<5	<5	<5	<0.2	24	7.7	<10	<5	<10	6.9	<20
PZ-22A1	PZ-22A1	5/2/2012	<10	10	43	<2	<5	<5	5.6	<5	<5	<0.2	16	23	<10	<5	<10	<5	<20
PZ-22A1	PZ-22A1	5/24/2013	--	11	--	--	--	--	--	<1	<1	0.34	--	<1 J	--	--	--	--	28
PZ-22A2	PZ-22A2	11/3/2011	<10	<6.1	28	<2	<5	<5	<5	<5	<5	<0.2	29	6	<10	<5	<10	6.5	<20
PZ-22A2	PZ-22A2	5/1/2012	<10	<5	33	<2	<5	<5	<5	<5	<5	<0.2	19	7	<10	<5	<10	7.9	<20
PZ-22A2	PZ-22A2-D	5/1/2012	<10	<5	34	<2	<5	<5	<5	<5	<5	<0.2	19	6.8	<10	<5	<10	7.7	<20
PZ-22A2	PZ-22A2	5/24/2013	--	2	--	--	--	--	--	<1	<1	<0.2	--	7.8 J	--	--	--	--	41
PZ-22B	PZ-22B	11/3/2011	<10	<6.1	37	<2	<5	<5	<5	<5	<5	<0.2	29	<5	<10	<5	<10	<5	<20
PZ-22B	PZ-22B	5/1/2012	<10	<5	34	<2	<5	<5	<5	<5	<5	<0.2	19	<5	<10	<5	<10	<5	<20
PZ-23A1	PZ-23A1	11/4/2011	<10	7.8	20	<2	<5	<5	<5	<5	<5	<0.2	13	9.1	<10	<5	<10	<5	<20
PZ-23A1	PZ-23A1	5/2/2012	<10	<5	33	<2	<5	<5	<5	<5	<5	<0.2	9.4	6.9	<10	<5	<10	<5	<20
PZ-23A2	PZ-23A2	11/4/2011	<10	<6.1	44	<2	<5	<5	<5	<5	<5	<0.2	7.4	6	<10	<5	<10	<5	<20
PZ-23A2	PZ-23A2-D	11/4/2011	<10	<6.1	44	<2	<5	<5	<5	<5	<5	<0.2	7.6	6.5	<10	<5	<10	<5	<20
PZ-23A2	PZ-23A2	5/2/2012	<10	<5	59	<2	<5	<5	<5	<5	<5	<0.2	<5	<5	<10	<5	<10	5.9	<20
UL-24	UL-24_10-14	5/23/2013	--	260	--	--	--	--	--	<1	<1	--	--	4.2	--	--	--	--	<20
UL-24	UL-24_16-18	5/23/2013	--	2.9	--	--	--	--	--	<1	1.1	--	--	35	--	--	--	--	<20
UL-24	UL-24_24-28	5/24/2013	--	<1	--	--	--	--	--	<1	<1	--	--	6.8	--	--	--	--	26

Notes:
< = analyte not detected above the method detection limit; shown value is the laboratory reporting limit.
-- = not analyzed
J = estimated value
D = Duplicate sample
F = The primary and duplicate sample result relative percent difference (RPD) is >30%
M1 = Matrix sample (MS) or matrix sample duplicate (MSD) percent recovery was outside quality control limit (low) (BS/BSD or LCS were within limits)
M2 = MS or MSD percent recovery was outside quality control limit (high) (BS/BSD were within limits)
M3 = MS/MSD relative percent difference (RPD) was outside quality control limit (high) (BS/BSD were within limits)
= analyte detected at a concentration greater than the 5x Saltwater Aquatic Criteria (or dectection limit was greater than the criteria)

Table 21
Proprietary Pesticides in Groundwater
Pre-Design Investigation Report
HA-2, Campus Bay, Richmond, California
Concentrations in micrograms per liter (µg/L)

Location	Sample Name	Sample Date	Butylate	Cycloate	EPTC	Molinate	Napropamide	Pebulate	Vernolate
5x Saltwater Aquatic Criteria (µg/L)			**280**	**240**	**220**	**180**	**240**	**120**	**NC**
LL-39	LL-39_12-15	5/23/2013	<2.5	<2.5	1100	830	<2.5	150	5.9
LL-39	LL-39_22-25	5/24/2013	<2.5	<2.5	550	<2.5	<2.5	330	4.6
MW-16A	MW-16A	3/20/2003	<1	<1	17	1.4	<1	2	<1
MW-16A	MW-16A	6/26/2003	<1	<1	3.6	1	2	3.5	<1
MW-16A	D-MW16	8/29/2003	<1	<1	22	1.6	2.2	1.4	<1
MW-16A	MW-16A	8/29/2003	<1	<1	24	1.7	2.2	1.3	<1
MW-16A	MW-16A	10/24/2003	<1	<1	44	2.9	1	<1	<1
MW-16A	MW-16A-D	10/24/2003	<1	<1	64	4.2	1.3	1.2	<1
MW-16A	MW-16A	1/30/2004	<1	<1	<2	<1	1.1	2.1	<1
MW-16A	MW-16A-D	1/30/2004	<1	<1	<2	<1	1.1	2.2	<1
MW-16A	MW-16A	4/16/2004	<1	<1	<2	<1	1	1.4	<1
MW-16A	MW-16A	7/23/2004	<1	<1	58	5.3	<1	2.2	<1
MW-16A	MW-16A	10/14/2004	<1	<1	80	4.7	<1	1.3	<1
MW-16A	MW-16A	2/9/2005	<1	<1	9.8	<1	<1	2.3	<1
MW-16A	MW-16A	6/7/2005	<1	<1	<2	<1	<1	1.4	<1
MW-16A	MW-16A	8/12/2005	<1	<1	41	3.7	<2.5	3.2	<1
MW-16A	MW-16D	8/12/2005	<1	<1	45	4	<2.5	2.8	<1
MW-16A	MW-16A	11/11/2005	<1	<1	190	23	<1	1.6	<1
MW-16A	MW-16A	2/9/2006	<1	<1	4.4	<1	1.2	1.7	<1
MW-16A	MW-16A	5/11/2006	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
MW-16A	MW-16A	8/17/2006	<1	<1	21	3	<1	2.3	<1
MW-16A	MW-16A-D	8/17/2006	<1	<1	22	3.1	<1	2.3	<1
MW-16A	MW-16A	11/13/2006	<1	<1	14	2.4	1.2	1.6	<1
MW-16A	MW-16A	2/7/2007	<1	<1	1.2	<1	<1	1.6	<1
MW-16A	MW-16A	5/8/2007	<1	<1	<2.5	<1	<1	<1	<1
MW-16A	MW-16A	8/13/2007	<1	<1	75	11	<2.5	4.8	<1
MW-16A	MW-16A	11/8/2007	<2.5	<2.5	21	<2.5	<2.5	<2.5	<2.5
MW-16A	MW-16A	2/8/2008	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
MW-16A	MW-16A	5/9/2008	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
MW-16A	MW-16A	8/8/2008	<2.5	<2.5	170	29	<2.5	<2.5	<2.5
MW-16A	MW-16AD	8/8/2008	<2.5	<2.5	200	29	<2.5	<2.5	<2.5
MW-16A	MW-16A	11/7/2008	<2.5	<2.5	91	12	<2.5	<2.5	<2.5
MW-16A	MW-16A	2/5/2009	<2.5	<2.5	5.3	<2.5	<2.5	<2.5	<2.5
MW-16A	MW-16A	5/6/2009	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
MW-16A	MW-16A	8/7/2009	<2.5	<2.5	110	19	<2.5	2.5	<2.5
MW-16A	MW-16A	11/5/2009	<2.5	<2.5	16	2.8	<2.5	<2.5	<2.5
MW-16A	MW-16A	2/4/2010	<2.5	<2.5	3.1	<2.5	<2.5	<2.5	<2.5
MW-16A	MW-16A	5/10/2010	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
MW-16A	MW-16A	8/4/2010	<2.5	<2.5	<5	<2.5	<2.5	3	<2.5
MW-16A	MW-16A	11/4/2010	<2.5	<2.5	<5	<2.5	<2.5	<2.5	<2.5
MW-16A	MW-16A	4/18/2011	<2.5	<2.5	<5	<2.5	<2.5	<2.5	<2.5
MW-16A	MW-16A	10/12/2011	--	--	--	--	--	--	--
MW-16A	MW-16A	11/2/2011	<2.5	<2.5	<5	<2.5	<2.5	<2.5	<2.5
MW-16A	MW-16A	4/4/2012	<5	<5	<5	<5	<5	<5	<5

Table 21
Proprietary Pesticides in Groundwater
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Concentrations in micrograms per liter (µg/L)

Location	Sample Name	Sample Date	Butylate	Cycloate	EPTC	Molinate	Napropamide	Pebulate	Vernolate
5x Saltwater Aquatic Criteria (µg/L)			**280**	**240**	**220**	**180**	**240**	**120**	**NC**
MW-16A	MW-16A	5/1/2012	<5	<5	<5	<5	<5	<5	<5
MW-16A	MW-16A	10/8/2012	<5	<5	<5	<5	<5	<5	<5
MW-16A	MW-16A	4/2/2013	<5	<5	<5	<5	<5	<5	<5
MW-16A	MW-16A	5/23/2013	<2.5	<2.5	<5	<2.5	<2.5	<2.5	<2.5
MW-16B	MW-16B	5/11/2006	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
MW-16B	MW-16B	8/17/2006	<1	<1	<1	<1	<1	<1	<1
MW-16B	MW-16B	11/13/2006	<1	<1	<1	<1	<1	<1	<1
MW-16B	MW-16B	2/7/2007	<1	<1	<1	<1	<1	<1	<1
MW-16B	MW-16B	5/8/2007	<1	<1	<2.5	<1	<1	<1	<1
MW-16B	MW-16B	8/13/2007	<1	<1	<2.5	<1	<1	<1	<1
MW-16B	MW-16B	11/8/2007	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
MW-16B	MW-16B	2/8/2008	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
MW-16B	MW-16B	5/9/2008	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
MW-16B	MW-16B	8/8/2008	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
MW-16B	MW-16B	11/7/2008	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
MW-16B	MW-16B	2/5/2009	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
MW-16B	MW-16BD	2/5/2009	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
MW-16B	MW-16B	5/6/2009	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
MW-16B	MW-16B	8/7/2009	<2.5	<2.5	<5	<2.5	<2.5	<2.5	<2.5
MW-16B	MW-16B	11/5/2009	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
MW-16B	MW-16B	2/4/2010	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
MW-16B	MW-16B	5/10/2010	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
MW-16B	MW-16B	8/4/2010	<2.5	<2.5	<5	<2.5	<2.5	<2.5	<2.5
MW-16B	MW-16B	11/5/2010	<2.5	<2.5	<5	<2.5	<2.5	<2.5	<2.5
MW-16B	MW-16B	4/12/2011	<2.5	<2.5	<5	<2.5	<2.5	<2.5	<2.5
MW-16B	MW-16B	10/12/2011	--	--	--	--	--	--	--
MW-16B	MW-16B	11/2/2011	<2.5	<2.5	<5	<2.5	<2.5	<2.5	<2.5
MW-16B	MW-16B	4/4/2012	<5	<5	<5	<5	<5	<5	<5
MW-16B	MW-16B	5/2/2012	<5	<5	<5	<5	<5	<5	<5
MW-16B	MW-16B	10/8/2012	<5	<5	<5	<5	<5	<5	<5
MW-16B	MW-16B	4/2/2013	<5	<5	<5	<5	<5	<5	<5
MW-17	MW-17	3/20/2003	<1	<1	51	2.2	17	15	1.3
MW-17	MW-17	6/26/2003	<1	<1	50	3.4	7.1	18	<1
MW-17	MW-17	8/29/2003	<1	<1	35	3.4	3.9	10	<1
MW-17	MW-17	10/24/2003	<1	<1	52	1.8	6.8	7.5	<1
MW-17	MW-17	1/30/2004	<1	<1	24	3.4	7.1	28	<1
MW-17	MW-17	4/16/2004	<1	<1	25	3.1	6.7	23	<1
MW-17	MW-17	7/23/2004	<1	<1	22	4.2	8.3	23	<1
MW-17	MW-17	10/14/2004	<1	<1	36	1.3	1.8	6.3	<1
MW-17	MW-17	2/9/2005	<1	<1	34	1.6	6.9	25	5.8
MW-17	MW-17	6/7/2005	<1	<1	51	3.4	4.9	23	<1
MW-17	MW-17	8/12/2005	<1	<1	77	3.5	5.2	18	<1
MW-17	MW-17	11/11/2005	<1	<1	91	3.7	6.6	15	<1
MW-17	MW-17	2/9/2006	<1	<1	51	2.6	5.7	21	<1

Table 21
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Concentrations in micrograms per liter (µg/L)

Location	Sample Name	Sample Date	Butylate	Cycloate	EPTC	Molinate	Napropamide	Pebulate	Vernolate
5x Saltwater Aquatic Criteria (µg/L)			**280**	**240**	**220**	**180**	**240**	**120**	**NC**
MW-17	MW-17	5/11/2006	<2.5	<2.5	77	3.4	8.2	31	<2.5
MW-17	MW-17	8/17/2006	<1	<1	69	3	3.1	21	<1
MW-17	MW-17	11/13/2006	<1	<1	55	3.2	5.1	20	<1
MW-17	MW-17	2/7/2007	<1	<1	56	2.5	3.7	16	<1
MW-17	MW-17	5/8/2007	<1	<1	51	2.4	8.6	20	<1
MW-17	MW-17	8/13/2007	<1	<1	61	2	5.6	13	<1
MW-17	MW-17	11/9/2007	<2.5	<2.5	33	<2.5	<2.5	13	<2.5
MW-17	MW-17	2/8/2008	<2.5	<2.5	50	3.2	5.1	23	<2.5
MW-17	MW-17	5/9/2008	<2.5	<2.5	50	2.7	2.6	17	<2.5
MW-17	MW-17	8/8/2008	<2.5	<2.5	52	<2.5	4.6	12	<2.5
MW-17	MW-17	11/7/2008	<2.5	<2.5	31	<2.5	3.7	13	<2.5
MW-17	MW-17	2/5/2009	<2.5	<2.5	46	<2.5	4.4	19	<2.5
MW-17	MW-17	5/6/2009	<2.5	<2.5	51	<2.5	5	21	<2.5
MW-17	MW-17	8/7/2009	<2.5	<2.5	71	3	4.4	11	<2.5
MW-17	MW-17	11/3/2009	<2.5	<2.5	36	<2.5	11	14	<2.5
MW-17	MW-17	2/5/2010	<2.5	<2.5	65	3.4	5.9	27	<2.5
MW-17	MW-17	5/5/2010	<2.5	<2.5	52	2.6	3.8	22	<2.5
MW-17	MW-17	8/6/2010	<2.5	<2.5	74	3.1	4.6	15	<2.5
MW-17	MW-17	11/5/2010	<2.5	<2.5	40	<2.5	4.8	21	<2.5
MW-17	MW-17	4/12/2011	<2.5	<2.5	46	<2.5	2.8	14	<2.5
MW-17	MW-17	10/12/2011	<2.5	<2.5	53	<2.5	<2.5	15	<2.5
MW-17	MW-17	4/4/2012	<5	<5	38	<5	<5	13	<5
MW-17	MW-17	5/2/2012	<5	<5	35	<5	<5	15	<5
MW-17	MW-17	10/8/2012	<5	<5	35	<5	<5	12	<5
MW-17	MW-17	4/2/2013	<5	<5	38	<5	5.1	13	<5
MW-17	MW-17	5/23/2013	<2.5	<2.5	44	<2.5	3.7	9.5	<2.5
PZ-14	PZ-14	11/3/2009	<2.5	<2.5	60	<2.5	26	150	<2.5
PZ-14	PZ-14D	11/3/2009	<2.5	<2.5	49	<2.5	26	170	<2.5
PZ-14	PZ-14	2/5/2010	<2.5	<2.5	81	2.8	33	260	3
PZ-14	PZ-14	5/5/2010	<2.5	<2.5	71	<2.5	24	220	<2.5
PZ-14	PZ-14	8/6/2010	<2.5	<2.5	58	<2.5	20	180	<2.5
PZ-14	PZ-14D	8/6/2010	<2.5	<2.5	61	<2.5	21	180	<2.5
PZ-14	PZ-14	11/2/2010	<2.5	<2.5	58	<2.5	21	190	<2.5
PZ-14	PZ-14	4/12/2011	<2.5	<2.5	50	<2.5	15	140	<2.5
PZ-14	PZ-14	10/12/2011	<2.5	<2.5	60	<2.5	17	140	<2.5
PZ-14	PZ-14	4/4/2012	<5	<5	40	<5	14	130	<5
PZ-14	PZ-14	5/2/2012	<5	<5	38	<5	16	150	<5
PZ-14	PZ-14	10/8/2012	<5	<5	52	<5	19	180	<5
PZ-14	PZ-14	4/2/2013	<5	<5	59	<5	26	200	<5
PZ-14	PZ-14	5/23/2013	<2.5	<2.5	62	<2.5	18	160	<2.5
PZ-15	PZ-15	11/3/2009	3	19	220	37	<2.5	88	39
PZ-15	PZ-15	2/5/2010	3.8	22	300	46	<2.5	120	56
PZ-15	PZ-15	5/5/2010	3.1	19	220	38	<2.5	96	44
PZ-15	PZ-15	8/6/2010	3.2	18	230	41	<2.5	99	50

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Concentrations in micrograms per liter (µg/L)

Location	Sample Name	Sample Date	Butylate	Cycloate	EPTC	Molinate	Napropamide	Pebulate	Vernolate
5x Saltwater Aquatic Criteria (µg/L)			**280**	**240**	**220**	**180**	**240**	**120**	**NC**
PZ-15	PZ-15	11/2/2010	3.2	19	230	37	<2.5	100	49
PZ-15	PZ-15	4/12/2011	2.8	18	180	41	<2.5	89	42
PZ-15	PZ-15	10/10/2011	<2.5	15	260	34	<2.5	110	51
PZ-15	PZ-15	4/9/2012	<5	13	160	27	<5	73	32
PZ-15	PZ-15	5/1/2012	<5	13	140	27	<5	79	33
PZ-15	PZ-15	10/8/2012	<5	18	220	41	<5	110	47
PZ-15	PZ-15	4/9/2013	<5	16	160	30	<5	100	38
PZ-15	PZ-15	5/24/2013	5.1	20	190	32	<2.5	140	39
PZ-16	PZ-16	11/3/2009	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
PZ-16	PZ-16	2/5/2010	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
PZ-16	PZ-16D	2/5/2010	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
PZ-16	PZ-16	5/5/2010	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
PZ-16	PZ-16	8/6/2010	<2.5	<2.5	<5	<2.5	<2.5	<2.5	<2.5
PZ-16	PZ-16	11/2/2010	<2.5	<2.5	<5	<2.5	<2.5	<2.5	<2.5
PZ-16	PZ-16	4/12/2011	<2.5	<2.5	<5	<2.5	<2.5	<2.5	<2.5
PZ-16	PZ-16	10/10/2011	<2.5	<2.5	<5	<2.5	<2.5	<2.5	<2.5
PZ-16	PZ-16	4/9/2012	<5	<5	<5	<5	<5	<5	<5
PZ-16	PZ-16	10/8/2012	<5	<5	<5	<5	<5	<5	<5
PZ-16	PZ-16	4/9/2013	<5	<5	<5	<5	<5	<5	<5
PZ-16	PZ-16	5/24/2013	<2.5	<2.5	<5	<2.5	<2.5	<2.5	<2.5
PZ-17A1	PZ-17A1	11/2/2011	<2.5	4.7	360	96	23	91	9.9
PZ-17A1	PZ-17A1	4/30/2012	<5	<5	250	110	14	83	9.3
PZ-17A2	PZ-17A2	11/3/2011	<2.5	<2.5	86	5.6	2.7	5.3	<2.5
PZ-17A2	PZ-17A2	5/1/2012	<5	<5	77	11	<5	6.5	<5
PZ-17B	PZ-17B	11/2/2011	<2.5	<2.5	100	<2.5	<2.5	4.7	<2.5
PZ-17B	PZ-17B	4/30/2012	<5	<5	96	<5	<5	<5	<5
PZ-18A1	PZ-18A1	11/3/2011	<2.5	<2.5	44	5.7	<2.5	10	<2.5
PZ-18A1	PZ-18A1	5/1/2012	<5	<5	22	<5	<5	<5	<5
PZ-18A2	PZ-18A2	11/3/2011	<2.5	<2.5	62	4.5	<2.5	14	<2.5
PZ-18A2	PZ-18A2	5/1/2012	<5	<5	21	<5	<5	<5	<5
PZ-19A1	PZ-19A1	11/3/2011	<2.5	3.4	93	3.3	4.1	120	<2.5
PZ-19A1	PZ-19A1	5/2/2012	<5	<5	55	<5	<5	91	<5
PZ-19A1	PZ-19A1	5/23/2013	<2.5	<2.5	54	<2.5	<2.5	63	<2.5
PZ-19A2	PZ-19A2	11/2/2011	19	2.8	2100	<2.5	14	2000	71
PZ-19A2	PZ-19A2	5/2/2012	12	<5	1200	<5	6.8	1900	45
PZ-19A2	PZ-19A2-D	5/2/2012	11	<5	970	<5	5.6	1800	43
PZ-19A2	PZ-19A2	5/23/2013	27	2.9	2400	<2.5	7.9	2600	83 J
PZ-19A2	PZ-19A2-	5/23/2013	26	<25	2200	<25	<25	2300	59 J
PZ-20A1	PZ-20A1	11/3/2011	<2.5 bR	<2.5 bR	<2.5 bR	<2.5 bR	9.3 bJ	<2.5 bR	<2.5 bR
PZ-20A1	PZ-20A1	5/2/2012	<5	<5	<5	<5	6.1	<5	<5
PZ-20A1	PZ-20A1	5/24/2013	<2.5	<2.5	<5	<2.5	7.2	<2.5	<2.5
PZ-20A2	PZ-20A2	11/2/2011	<2.5	<2.5	26	<2.5	9	78	<2.5
PZ-20A2	PZ-20A2	5/1/2012	<5	<5	11	<5	6.3	45	<5
PZ-20A2	PZ-20A2	5/23/2013	<2.5	<2.5	21	<2.5	4.8	43	<2.5

Table 21
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Concentrations in micrograms per liter (µg/L)

Location	Sample Name	Sample Date	Butylate	Cycloate	EPTC	Molinate	Napropamide	Pebulate	Vernolate
5x Saltwater Aquatic Criteria (µg/L)			**280**	**240**	**220**	**180**	**240**	**120**	**NC**
PZ-20B	PZ-20B	11/2/2011	<2.5	<2.5	<5	<2.5	<2.5	<2.5	<2.5
PZ-20B	PZ-20B	5/1/2012	<5	<5	<5	<5	<5	<5	<5
PZ-21A1	PZ-21A1	11/3/2011	4.6 bJ	24 bJ	390 bJ	33 bJ	<5 bR	490 bJ	64 bJ
PZ-21A1	PZ-21A1	5/2/2012	<5	27	300	25	<5	240	54
PZ-21A1	PZ-21A1	5/24/2013	6.6	34	470	33	<2.5	320	67
PZ-21A2	PZ-21A2	11/3/2011	<2.5	15	320	19	<2.5	310	26
PZ-21A2	PZ-21A2-D	11/3/2011	<2.5	14	430	19	<2.5	290	26
PZ-21A2	PZ-21A2	5/1/2012	<5	10	210	17	<5	230	19
PZ-21A2	PZ-21A2	5/24/2013	2.9	14	220	9.5	<2.5	230	25
PZ-21B	PZ-21B	11/2/2011	<2.5	6.9	150	7.7	<2.5	53	14
PZ-21B	PZ-21B	5/1/2012	<5	<5	62	6.5	<5	18	6.1
PZ-22A1	PZ-22A1	11/4/2011	<2.5	<2.5	40	39	<2.5	19	5.2
PZ-22A1	PZ-22A1	5/2/2012	<5	<5	8.7	11	<5	7.2	<5
PZ-22A1	PZ-22A1	5/24/2013	<2.5	<2.5	62	33	<2.5	17	3.7
PZ-22A2	PZ-22A2	11/3/2011	<2.5	<2.5	100	<2.5	<2.5	27	5.9
PZ-22A2	PZ-22A2	5/1/2012	<5	<5	71	<5	<5	30	5.8
PZ-22A2	PZ-22A2-D	5/1/2012	<5	<5	68	<5	<5	29	6.1
PZ-22A2	PZ-22A2	5/24/2013	<2.5	<2.5	100	<2.5	<2.5	28	7
PZ-22B	PZ-22B	11/3/2011	<2.5	<2.5	70	16	<2.5	13	<2.5
PZ-22B	PZ-22B	5/1/2012	<5	<5	35	16	<5	9.9	<5
PZ-23A1	PZ-23A1	11/4/2011	<2.5	<2.5	<5	<2.5	<2.5	<2.5	<2.5
PZ-23A1	PZ-23A1	5/2/2012	<5	<5	<5	<5	<5	<5	<5
PZ-23A2	PZ-23A2	11/4/2011	<2.5	<2.5	<5	<2.5	<2.5	<2.5	<2.5
PZ-23A2	PZ-23A2-D	11/4/2011	<2.5	<2.5	<5	<2.5	<2.5	<2.5	<2.5
PZ-23A2	PZ-23A2	5/2/2012	<5	<5	<5	<5	<5	<5	<5
UL-24	UL-24_10-14	5/23/2013	<2.5	<2.5	980	3.5	16	360	4.7
UL-24	UL-24_16-18	5/23/2013	<2.5	<2.5	420	<2.5	18	150	2.8
UL-24	UL-24_24-28	5/24/2013	<2.5	<2.5	53	<2.5	3.6	13	<2.5

Notes:
< = analyte not detected above the method detection limit; shown value is the laboratory reporting limit.
-- = not analyzed
EPTC = S-ethyl dipropylthiocarbamate
J = estimated value
D = Duplicate sample
b = sample analyzed outside of hold time
R = The sample results are rejected as unusable. The analyte may or may not be present in the sample.
= analyte detected at a concentration greater than the 5x Saltwater Aquatic Criteria

Table 22
Organochlorine Pesticides in Groundwater
Pre-Design Investigation Report
HA-2, Campus Bay, Richmond, California
Concentrations in micrograms per liter (µg/L)

Location	Sample Name	Sample Date	4,4'-DDT	alpha-BHC	beta-BHC	delta-BHC
MW-16A	MW-16A	10/12/2011	<0.1	27 CJ	7.7 CJ	4.9 CJ
MW-16A	MW-16A	5/1/2012	<0.1	<0.05	<0.05	<0.05
MW-16B	MW-16B	10/12/2011	<0.1	<0.05	<0.05	<0.05
MW-16B	MW-16B	5/2/2012	<0.1	<0.05	<0.05	<0.05
MW-17	MW-17	11/3/2009	<0.1	<0.05	<0.05	<0.05
MW-17	MW-17	2/5/2010	<0.09	<0.05	<0.05	<0.05
MW-17	MW-17	5/5/2010	<0.09	<0.05	<0.05	<0.05
MW-17	MW-17	8/6/2010	<0.09	<0.05	<0.05	<0.05
MW-17	MW-17	11/5/2010	<0.09	<0.05	<0.05	<0.05
MW-17	MW-17	4/12/2011	<0.09	<0.05	<0.05	<0.05
MW-17	MW-17	10/12/2011	<0.09	<0.05	<0.05	<0.05
MW-17	MW-17	4/4/2012	<0.1	<0.05	<0.05	<0.05
MW-17	MW-17	5/2/2012	<0.1	<0.05	<0.05	<0.05
MW-17	MW-17	10/8/2012	<0.09	<0.05	<0.05	<0.05
MW-17	MW-17	4/2/2013	<0.09	<0.05	<0.05	<0.05
PZ-14	PZ-14	11/3/2009	<0.09	<0.05	<0.05	<0.05
PZ-14	PZ-14D	11/3/2009	<0.09	<0.05	<0.05	<0.05
PZ-14	PZ-14	2/5/2010	<0.09	<0.05	<0.05	<0.05
PZ-14	PZ-14	5/5/2010	<0.09	<0.05	<0.05	<0.05
PZ-14	PZ-14	8/6/2010	<0.09	<0.05	<0.05	<0.05
PZ-14	PZ-14D	8/6/2010	<0.09	<0.05	<0.05	<0.05
PZ-14	PZ-14	11/2/2010	<0.09	<0.05	0.07 #CR2	<0.05
PZ-14	PZ-14	4/12/2011	0.1 C	<0.05	<0.05	<0.05
PZ-14	PZ-14	10/12/2011	<0.09	<0.05	<0.05	<0.05
PZ-14	PZ-14	4/4/2012	<0.09	<0.05	<0.05	<0.05
PZ-14	PZ-14	5/2/2012	<0.09	<0.05	<0.05	<0.05
PZ-14	PZ-14	10/8/2012	<0.09	<0.05	<0.05	<0.05
PZ-14	PZ-14	4/2/2013	<0.09	<0.05	<0.05	<0.05
PZ-15	PZ-15	11/3/2009	<0.09	<0.05	<0.05	<0.05
PZ-15	PZ-15	2/5/2010	<0.09	<0.05	<0.05	<0.05
PZ-15	PZ-15	5/5/2010	<0.09	<0.05	<0.05	<0.05
PZ-15	PZ-15	8/6/2010	<0.1	<0.05	<0.05	<0.05
PZ-15	PZ-15	11/2/2010	<0.09	<0.05	<0.05	<0.05
PZ-15	PZ-15	4/12/2011	<0.09	<0.05	<0.05	<0.05
PZ-15	PZ-15	10/10/2011	<0.1	<0.05	<0.05	<0.05
PZ-15	PZ-15	4/9/2012	<0.1	<0.05	<0.05	<0.05
PZ-15	PZ-15	5/1/2012	<0.1	<0.05	<0.05	<0.05
PZ-15	PZ-15	10/8/2012	<0.09	<0.05	<0.05	<0.05
PZ-15	PZ-15	4/9/2013	0.1 #	<0.05	<0.05	<0.05
PZ-16	PZ-16	11/3/2009	<0.09	<0.05	<0.05	<0.05
PZ-16	PZ-16	2/5/2010	<0.09	<0.05	<0.05	<0.05
PZ-16	PZ-16	5/5/2010	<0.09	<0.05	<0.05	<0.05
PZ-16	PZ-16D	2/5/2010	<0.09	<0.05	<0.05	<0.05
PZ-16	PZ-16	8/6/2010	<0.1	<0.05	<0.05	<0.05
PZ-16	PZ-16	11/2/2010	<0.09	<0.05	<0.05	<0.05
PZ-16	PZ-16	4/12/2011	<0.1	<0.05	<0.05	<0.05
PZ-16	PZ-16	10/10/2011	<0.09	<0.05	<0.05	<0.05
PZ-16	PZ-16	4/9/2012	<0.09	<0.05	<0.05	<0.05
PZ-16	PZ-16	10/8/2012	<0.09	<0.05	<0.05	<0.05
PZ-16	PZ-16	4/9/2013	<0.09	<0.05	<0.05	<0.05
PZ-19A1	PZ-19A1	11/3/2011	<0.1	<0.05	<0.05	<0.05
PZ-19A1	PZ-19A1	5/2/2012	<0.1	<0.05	<0.05	<0.05
PZ-19A2	PZ-19A2	11/2/2011	<0.1	<0.05	0.2 CJ	<0.05
PZ-19A2	PZ-19A2	5/2/2012	<0.1	<0.05	0.08	<0.05

Table 22
Organochlorine Pesticides in Groundwater
Pre-Design Investigation Report
HA-2, Campus Bay, Richmond, California
Concentrations in micrograms per liter (µg/L)

Location	Sample Name	Sample Date	4,4'-DDT	alpha-BHC	beta-BHC	delta-BHC
PZ-19A2	PZ-19A2-D	5/2/2012	<0.1	<0.05	0.1	<0.05
PZ-20A1	PZ-20A1	11/3/2011	<0.1 bR	<0.05 bR	<0.05 bR	<0.05 bR
PZ-20A1	PZ-20A1	5/2/2012	<0.1	<0.05	<0.05	<0.05
PZ-20A2	PZ-20A2	11/2/2011	<0.09	<0.05	<0.05	<0.05
PZ-20A2	PZ-20A2	5/1/2012	<0.1	<0.05	<0.05	<0.05
PZ-20B	PZ-20B	11/2/2011	<0.1	<0.05	<0.05	<0.05
PZ-20B	PZ-20B	5/1/2012	<0.1	<0.05	<0.05	<0.05
PZ-21A1	PZ-21A1	11/3/2011	<0.1 bR	<0.05 bR	<0.05 bR	<0.05 bR
PZ-21A1	PZ-21A1	5/2/2012	<0.09	<0.05	<0.05	<0.05
PZ-21A2	PZ-21A2	11/3/2011	<0.09	<0.05	<0.05	<0.05
PZ-21A2	PZ-21A2-D	11/3/2011	<0.1	<0.05	<0.05	<0.05
PZ-21A2	PZ-21A2	5/1/2012	<0.1	<0.05	<0.05	<0.05
PZ-21B	PZ-21B	11/2/2011	<0.09	<0.05	<0.05	<0.05
PZ-21B	PZ-21B	5/1/2012	<0.1	<0.05	<0.05	<0.05
PZ-22A1	PZ-22A1	11/4/2011	<0.1	<0.05	<0.05	<0.05
PZ-22A1	PZ-22A1	5/2/2012	<0.1	<0.05	<0.05	<0.05
PZ-22A2	PZ-22A2	11/3/2011	<0.09	<0.05	<0.05	<0.05
PZ-22A2	PZ-22A2	5/1/2012	<0.1	<0.05	<0.05	<0.05
PZ-22A2	PZ-22A2-D	5/1/2012	<0.09	<0.05	<0.05	<0.05
PZ-22B	PZ-22B	11/3/2011	<0.09	<0.05	<0.05	<0.05
PZ-22B	PZ-22B	5/1/2012	<0.09	<0.05	<0.05	<0.05
PZ-23A1	PZ-23A1	11/4/2011	<0.1	<0.05	<0.05	<0.05
PZ-23A1	PZ-23A1	5/2/2012	<0.09	<0.05	<0.05	<0.05
PZ-23A2	PZ-23A2	11/4/2011	<0.09	<0.05	<0.05	<0.05
PZ-23A2	PZ-23A2-D	11/4/2011	<0.09	<0.05	<0.05	<0.05
PZ-23A2	PZ-23A2	5/2/2012	<0.09	<0.05	<0.05	<0.05

Notes:
Only chemicals with at least one detection are shown on this table.
< = analyte not detected above the method detection limit; shown value is the laboratory reporting limit.
-- = not analyzed
BHC = Benzene Hexa Chloride
DDT = Dichlordiphenyltrichloroethane
J = estimated value
D = Duplicate sample
b = sample analyzed outside of hold time
R = The sample results are rejected as unusable. The analyte may or may not be present in the sample.
C= Presence confirmed, but RPD between columns exceeds 40%

Table 23
2013 Geochemical Parameters in Groundwater
Pre-Design Investigation Report
HA-2, Campus Bay, Richmond, California

Sample Location	Sample Date	Acidity (as CaCO3)	Alkalinity, Bicarbonate	Alkalinity, Carbonate	Alkalinity, Hydroxide	Calcium	Chloride	Ferrous Iron (Fe+2)	Iron	Magnesium	Manganese	Nitrogen, Nitrate	Nitrogen, Nitrite	Potassium	Sodium	Sulfate	Total Dissolved Solids	Total Suspended Solids	Conductivity	Dissolved Oxygen	Oxidation Reduction Potential	pH	Temperature	Turbidity
	Units	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µS	mg/L	mV	pH Units	° C	NTU
MW-16A	5/23/2013	54,000	<1000	<1000	<1000	680,000	6,100,000	88,000	79,000	170,000	3,600	<1000	<1000	72,000	2,700,000	970,000	12,000,000 J	140,000 J	12,513	0.13	-122	6.7	14.2	18
MW-17	5/23/2013	21,000	83,000	<2000	<2000	1,200,000	7,100,000	21,000	17,000	180,000	6,100	<1000	<1000	32,000	3,200,000	1,200,000	13,800,000 J	66,000 J	20,340	0.22	-85	6.8	15.4	13
PZ-14	5/23/2013	57,000	320,000	<10000	<10000	1,000,000	4,600,000	32,000	27,000	210,000	14,000	<500	<500	20,000	1,300,000	1,200,000	10,500,000 J	100,000 J	14,223	2.50	-103	6.7	16.6	10
PZ-15	5/24/2013	210,000	450,000	<4000	<4000	89,000	960,000	<100	270	130,000	39,000	<250	<250	40,000	880,000	1,100,000	3,660,000 J	15,000 J	5,378	0.15	27	7.0	16.1	7
PZ-16	5/24/2013	180,000	490,000	<4000	<4000	15,000	680,000	130	<50	28,000	270	3,300	<250	3,500	640,000	290,000	2,040,000 J	17,000 J	3,422	0.11	176	7.2	15.8	15
PZ-19A1	5/23/2013	45,000	410,000	<10000	<10000	530,000	8,700,000	19,000	17,000	550,000	10,000	<1000	<1000	73,000	4,300,000	1,200,000	15,300,000 J	56,000 J	25,665	1.90	-90	6.7	16.3	11
PZ-19A2	5/23/2013	15,000	140,000	<5000	<5000	92,000	1,100,000	170	160	69,000	4,900	<250	<250	2,100	660,000	300,000	2,340,000 J	7,000 J	4,046	0.14	23	7.4	16.1	6
PZ-20A1	5/24/2013	430,000	1,200,000	<4000	<4000	810,000	10,000,000	4,700	7,000	470,000	11,000	<2500	<2500	90,000	5,300,000	1,700,000	4,110,000 J	74,000 J	30,821	3.00	-72	6.4	17.2	12
PZ-20A2	5/23/2013	22,000	260,000	<2000	<2000	1,000,000	11,000,000	9,400	8,300	430,000	8,600	<1000	<1000	69,000	5,100,000	1,600,000	19,800,000 J	43,000 J	28,621	1.00	-106	7.0	15.8	7
PZ-21A1	5/24/2013	170,000	540,000	<4000	<4000	47,000	650,000	<250	120	59,000	8,500	<250	<250	18,000	710,000	600,000	2,500,000 J	10,000 J	3,521	1.30	-99	7.4	16.5	8
PZ-21A2	5/24/2013	120,000	460,000	<4000	<4000	280,000	1,600,000	160	<50	250,000	1,700	<500	<500	4,000	620,000	700,000	3,790,000 J	10,000 J	6,047	2.70	-1	6.5	16.0	8
PZ-22A1	5/24/2013	46,000	410,000	<4000	<4000	53,000	870,000	520	1,300	68,000	1,600	<500	<500	31,000	1,300,000	1,000,000	18,900,000 J	79,000 J	5,970	2.30	-131	7.1	17.1	6
PZ-22A2	5/24/2013	190,000	420,000	<4000	<4000	37,000	180,000	<100	490	38,000	36,000	2,000	<100	830	250,000	170,000	990,000 J	<5,000 J	1,574	0.06	129	7.3	16.0	10

Notes:
< = analyte not detected
mV = millivolts
mg/L = Milligrams per liter
µS = microSiemens
µg/L = micrograms per liter
D = Duplicate sample
C^o = degrees Celsius
CaCO3 = calcium carbonate
J = estimated value
mV = millivolts
NTU = nephelometric turbidity unit
µS = microSiemens
Temperature, dissolved oxygen, pH, conductivity, and oxidation reduction potential (ORP) were measured in the field with a water quality meter. Turbidity was measured in the field with a turbidity meter.

Table 24
Historical Geochemical Parameters in Groundwater
Pre-Design Investigation Report
HA-2, Campus Bay, Richmond, California

Location	Sample Name	Sample Date	Alkalinity, Bicarbonate	Alkalinity, Carbonate	Alkalinity, Hydroxide	Chloride	Dissolved Oxygen	Dissolved Sulfide	Ferrous Iron (Fe+2)	Iron	Manganese	Oxidation Reduction Potential	pH	Sulfate	Sulfide	Total Dissolved Solids
		Units	µg/L	µg/L	µg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L	mV	SU	µg/L	µg/L	µg/L
MW-16A	MW-16A	3/20/2003	--	--	--	--	--	--	--	--	--	73.5	6.4	--	--	--
MW-16A	MW-16A	6/26/2003	--	--	--	--	--	--	78,000	--	--	-106	6.5	--	<40	--
MW-16A	MW-16A	8/29/2003	--	--	--	--	0.5	--	37,000	--	--	-34.5	6.5	--	<40	--
MW-16A	D-MW16	8/29/2003	--	--	--	--	--	--	--	--	--	--	6.6	--	--	--
MW-16A	MW-16A	10/24/2003	--	--	--	--	3.5	--	29,000	--	--	-11	6.4	--	<40	--
MW-16A	MW-16A-D	10/24/2003	--	--	--	--	--	--	--	--	--	--	6.4	--	--	--
MW-16A	MW-16A	1/30/2004	--	--	--	--	0.8	--	39,000	--	--	-95.2	6.5	--	<40	--
MW-16A	MW-16A-D	1/30/2004	--	--	--	--	--	--	--	--	--	--	6.5	--	--	--
MW-16A	MW-16A	4/16/2004	--	--	--	--	8.1	--	37,000	--	--	-95.2	6.54	--	<40	--
MW-16A	MW-16A	7/23/2004	--	--	--	--	--	--	63,000	--	--	-67.7	6.4	--	<40	--
MW-16A	MW-16A	10/14/2004	--	--	--	--	0.42	--	40,000	--	--	337.2	6.44	--	<40	--
MW-16A	MW-16A	2/9/2005	--	--	--	--	0.78	--	64,000	--	--	-95.4	6.4	--	<40	--
MW-16A	MW-16A	6/7/2005	--	--	--	--	0.12	--	42,000	--	--	-152.2	6.32	--	<40	--
MW-16A	MW-16A	8/12/2005	--	--	--	--	0.54	--	26,000	--	--	-106.8	6.4	--	<40	--
MW-16A	MW-16D	8/12/2005	--	--	--	--	--	--	24,000	--	--	--	6.4	--	<40	--
MW-16A	MW-16A	11/11/2005	--	--	--	--	--	--	99,000	--	--	-22.7	6.2	--	<40	--
MW-16A	MW-16A-D	11/11/2005	--	--	--	--	--	--	--	--	--	--	6.2	--	--	--
MW-16A	MW-16A	2/9/2006	--	--	--	--	0.08	--	48,000	--	--	-84.7	5.63	--	120	--
MW-16A	MW-16A-D	2/9/2006	--	--	--	--	--	--	--	--	--	--	6.5	--	--	--
MW-16A	MW-16A	5/11/2006	--	--	--	--	0.39	<40	50,000	--	--	-63.6	6.58	--	--	1,610,000
MW-16A	MW-16A	8/17/2006	--	--	--	--	2.78	<40	53,000	--	--	-38.2	6.8	--	--	--
MW-16A	MW-16A-D	8/17/2006	--	--	--	--	--	<40	51,000	--	--	--	6.8	--	--	--
MW-16A	MW-16A	11/13/2006	--	--	--	--	3.5	<40	44,000	--	--	-120.4	6.7	--	--	2,700,000
MW-16A	MW-16A	2/7/2007	--	--	--	--	0.14	<40	57,000	--	--	-95.9	6.69	--	--	--
MW-16A	MW-16A	5/8/2007	--	--	--	--	--	<40	56,000	--	--	--	6.5	--	--	--
MW-16A	MW-16A	5/10/2007	--	--	--	--	--	--	--	--	--	-242.8	6.29	--	--	--
MW-16A	MW-16A	8/13/2007	130000	<1000	<1000	640000	--	<40	76,000	63,000	3,500	62.8	6.6	1,200,000	<40 J	2,900,000
MW-16A	MW-16	11/8/2007	--	--	--	--	0.91	<40	56,000	--	--	-107.5	6.66	--	--	--
MW-16A	MW-16A	2/8/2008	--	--	--	--	0.38	<40	48,000	--	--	-94.8	6.31	--	--	--
MW-16A	MW-16A	5/9/2008	--	--	--	--	0.56	<40	55,000	--	--	-85.5	6.51	--	--	--
MW-16A	MW-16A	8/8/2008	--	--	--	--	0.4	<40	62,000	--	--	-84.8	6.6	--	--	--
MW-16A	MW-16A	11/7/2008	--	--	--	--	0.07	<40	36,000	--	--	-78.9	6.42	--	--	--
MW-16A	MW-16A	2/5/2009	--	--	--	--	0.67	<40	63,000	--	--	-133.8	6.5 J	--	--	--
MW-16A	MW-16A	5/6/2009	--	--	--	--	0.2	<40	46,000	--	--	-170.2	6.14	--	--	--
MW-16A	MW-16A	8/7/2009	--	--	--	--	0.21	<40	56,000	--	--	-112.1	6.45	--	--	--
MW-16A	MW-16A	11/5/2009	--	--	--	--	7.89	<40	58,000	--	--	-155.2	7.1 H	--	--	--
MW-16A	MW-16A	2/4/2010	--	--	--	--	0.03	<40	67,000	--	--	-71.2	6.47	--	--	--
MW-16A	MW-16A	5/10/2010	--	--	--	--	0.14	<40	37,000	--	--	-80.8	6.61	--	--	--
MW-16A	MW-16A	8/4/2010	--	--	--	--	0.4	<40	63,000	--	--	-92.7	6.41	--	--	--
MW-16A	MW-16A	11/4/2010	--	--	--	--	4.62	<40	79,000	--	--	-105.9	13.76	--	--	--
MW-16A	MW-16A	4/18/2011	--	--	--	--	--	<40	39,000	--	--	--	--	--	--	--
MW-16A	MW-16A	10/12/2011	--	--	--	--	--	<40	78,000	--	--	--	--	--	--	--
MW-16A	MW-16A	11/2/2011	95000	<4000	<4000	7,100,000	0.28	--	--	--	--	-47.3	6.39	1,300,000	--	13,100,000
MW-16A	MW-16A	4/4/2012	--	--	--	--	--	<40	68,000	--	--	--	--	--	--	--
MW-16A	MW-16A	5/1/2012	74000	<1000	<1000	3,200,000	--	--	--	--	--	--	--	890,000	--	6,330,000
MW-16A	MW-16A	10/8/2012	--	--	--	13,000,000	--	<40	94,000	--	--	--	--	--	--	22,800,000
MW-16A	MW-16A	4/2/2013	--	--	--	--	--	<40	18,000	--	--	--	--	--	--	--
MW-16B	MW-16B	5/11/2006	--	--	--	--	0.88	<40	<100	--	--	135.7	7.19	--	--	<50000 R
MW-16B	MW-16B	8/17/2006	150000	<4000	<4000	2,800,000	0.99	<40	170	230	2,500	60.1	6.16	140,000	--	4,800,000
MW-16B	MW-16B	11/13/2006	--	--	--	--	1.29	<40	<100	--	--	112	7.09	--	--	4,360,000
MW-16B	MW-16B	2/7/2007	--	--	--	--	0.18	<40	<100	--	--	-42.6	7.4	--	--	--
MW-16B	MW-16B	5/8/2007	--	--	--	--	--	<40	<100	--	--	--	7	--	--	--
MW-16B	MW-16B	5/10/2007	--	--	--	--	--	--	--	--	--	-18.1	6.71	--	--	--
MW-16B	MW-16B	8/13/2007	160000	<1000	<1000	2,800,000	--	<40	150	<100	2,500	--	6.82	170,000	<40 J	4,500,000
MW-16B	MW-16B	11/8/2007	--	--	--	--	0.56	<40	110	--	--	-0.2	7.2	--	--	--
MW-16B	MW-16B	2/8/2008	--	--	--	--	0.44	<40	<100	--	--	13.9	6.78	--	--	--
MW-16B	MW-16B	5/9/2008	--	--	--	--	0.57	<40	<100	--	--	254.9	6.89	--	--	--
MW-16B	MW-16B	8/8/2008	--	--	--	--	0.4	<40	<100	--	--	151.1	6.96	--	--	--
MW-16B	MW-16B	11/7/2008	--	--	--	--	0.1	<40	<100	--	--	88.1	6.9	--	--	--
MW-16B	MW-16B	2/5/2009	--	--	--	--	0.24	<40	<100	--	--	8.3	6.81	--	--	--

Table 24
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Location	Sample Name	Sample Date	Alkalinity, Bicarbonate	Alkalinity, Carbonate	Alkalinity, Hydroxide	Chloride	Dissolved Oxygen	Dissolved Sulfide	Ferrous Iron (Fe+2)	Iron	Manganese	Oxidation Reduction Potential	pH	Sulfate	Sulfide	Total Dissolved Solids
		Units	µg/L	µg/L	µg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L	mV	SU	µg/L	µg/L	µg/L
MW-16B	MW-16BD	2/5/2009	--	--	--	--	--	<40	<100	--	--	--	7.1 J	--	--	--
MW-16B	MW-16B	5/6/2009	--	--	--	--	0.25	<40	<100	--	--	-176.8	9.6	--	--	--
MW-16B	MW-16B	8/7/2009	--	--	--	--	0.73	<40	<100	--	--	-38.3	7.1 H	--	--	--
MW-16B	MW-16B	11/5/2009	--	--	--	--	6.49	<40 M	<100	--	--	-178.6	7.5 H	--	--	--
MW-16B	MW-16B	2/4/2010	--	--	--	--	0.05	<40	<100	--	--	3.5	6.98	--	--	--
MW-16B	MW-16B	5/10/2010	--	--	--	--	0.95	<40	<100	--	--	27.5	6.88	--	--	--
MW-16B	MW-16B	8/4/2010	--	--	--	--	0.06	<40	<100	--	--	36.5	6.89	--	--	--
MW-16B	MW-16B	11/5/2010	--	--	--	--	0.18	<40	<100	--	--	13.8	7 H	--	--	--
MW-16B	MW-16B	4/12/2011	--	--	--	--	--	<40	<100	--	--	--	--	--	--	--
MW-16B	MW-16B	10/12/2011	--	--	--	--	--	<40	<100	--	--	--	--	--	--	--
MW-16B	MW-16B	11/2/2011	170000	<6700	<6700	2,600,000	0.44	--	--			214.5	6.62	210,000	--	5,360,000
MW-16B	MW-16B	4/4/2012	--	--	--	--	--	<40	<100	--	--	--	--	--	--	--
MW-16B	MW-16B	5/2/2012	170000	<6700	<6700	2,300,000	--	--	--			--	--	380,000	--	4,900,000
MW-16B	MW-16B	10/8/2012	--	--	--	2,700,000	--	<40	16,000			--	--	--	--	4,590,000
MW-16B	MW-16B	4/2/2013	--	--	--	--	--	<40	<100	--	--	--	--	--	--	--
MW-17	MW-17	3/20/2003	--	--	--	--	--	--	--	--	--	106.5	7.24	--	--	--
MW-17	MW-17	6/26/2003	--	--	--	--	--	--	26,000	--	--	-75.8	7.4	--	<40	--
MW-17	MW-17	8/29/2003	--	--	--	--	0.39	--	5,600	--	--	-104.6	7.54	--	<40	--
MW-17	MW-17	10/24/2003	--	--	--	--	3.8	--	4,500	--	--	-8.4	6.8	--	<40	--
MW-17	MW-17	1/30/2004	--	--	--	--	0.93	--	2,300	--	--	-214.2	7.9	--	80	--
MW-17	MW-17	4/16/2004	--	--	--	--	--	--	2,600	--	--	-152.4	8	--	190	--
MW-17	MW-17	7/23/2004	--	--	--	--	--	--	3,300	--	--	-224.9	7.71	--	60	--
MW-17	MW-17	10/14/2004	--	--	--	--	0.37	--	9,100	--	--	224.4	6.8	--	<40	--
MW-17	MW-17	2/9/2005	--	--	--	--	0.36	--	2,800	--	--	-258.3	7.77	--	40	--
MW-17	MW-17	6/7/2005	--	--	--	--	0.13	--	5,000	--	--	-219.8	7.2	--	50	--
MW-17	MW-17	8/12/2005	--	--	--	--	0.15	--	5,400	--	--	-134.7	7.45	--	<40	--
MW-17	MW-17	11/11/2005	--	--	--	--	3.96	--	16,000	--	--	-74.4	6.7	--	60	--
MW-17	MW-17	2/9/2006	--	--	--	--	0.05	--	10,000	--	--	-94.3	6.12	--	50	--
MW-17	MW-17	5/11/2006	--	--	--	--	0.25	90	12,000	--	--	-79.9	7.1	--	--	2,510,000
MW-17	MW-17	8/17/2006	--	--	--	--	0.64	60	11,000	--	--	-82.9	7.2	--	--	--
MW-17	MW-17	11/13/2006	--	--	--	--	2.62	60	8,600	--	--	-160	7.1	--	--	3,320,000
MW-17	MW-17	2/7/2007	--	--	--	--	0.16	<40	7,900	--	--	-180.4	7.25	--	--	--
MW-17	MW-17	5/8/2007	--	--	--	--	--	40	6,900	--	--	--	6.9	--	--	--
MW-17	MW-17	5/10/2007	--	--	--	--	--	--	--	--	--	-151.5	7.55	--	--	--
MW-17	MW-17	8/13/2007	63000	<1000	<1000	680,000	--	<40	9,000	7,500	2,700	-80.4	6.9	1,400,000	<40 J	3,000,000
MW-17	MW-17	11/9/2007	--	--	--	--	0.58	90	1,400	--	--	-153	7.2	--	--	--
MW-17	MW-17	2/8/2008	--	--	--	--	0.43	90	1,800	--	--	-112.1	6.71	--	--	--
MW-17	MW-17	5/9/2008	--	--	--	--	0.65	70	11,000	--	--	-120	6.78	--	--	--
MW-17	MW-17	8/8/2008	--	--	--	--	0.31	<40	7,800	--	--	-22.7	6.19	--	--	--
MW-17	MW-17	11/7/2008	--	--	--	--	0.07	<40	5,800	--	--	-58	6.72	--	--	--
MW-17	MW-17	2/5/2009	--	--	--	--	0.2	<40	11,000	--	--	-156.8	6.9 J	--	--	--
MW-17	MW-17	5/6/2009	--	--	--	--	0.22	<40	12,000	--	--	-221.7	6.8 H	--	--	--
MW-17	MW-17	8/7/2009	--	--	--	--	0.54	<40	14,000	--	--	-97.8	6.65	--	--	--
MW-17	MW-17	11/3/2009	88000	<4000	<4000	1,800,000	0.05	<40	9,600	--	--	-83.1	6.82	1,200,000	--	4,940,000
MW-17	MW-17	2/5/2010	--	--	--	--	0.06	<40	14,000	--	--	-229.4	7.43	--	--	--
MW-17	MW-17	5/5/2010	--	--	--	--	0.07	50	17,000	--	--	-90.2	6.79	--	--	--
MW-17	MW-17	8/6/2010	--	--	--	--	0.15	<40	16,000	--	--	-82.5	6.77	--	--	--
MW-17	MW-17	11/5/2010	--	--	--	--	0.24	60	18,000	--	--	-181.9	6.7 H	--	--	--
MW-17	MW-17	4/12/2011	--	--	--	--	--	60	19,000	--	--	--	--	--	--	--
MW-17	MW-17	10/12/2011	--	--	--	--	--	40	16,000	--	--	--	--	--	--	--
MW-17	MW-17	11/2/2011	120000	<4000	<4000	5,300,000	0.38	--	--	--	--	-392.1	9.23	1,300,000	--	11,100,000
MW-17	MW-17	4/4/2012	--	--	--	--	--	<40	17,000	--	--	--	--	--	--	--
MW-17	MW-17	5/2/2012	62000	<1000	<1000	5,700,000	--	--	--	--	--	--	--	1,200,000	--	15,800,000
MW-17	MW-17	10/8/2012	--	--	--	8,800,000	--	<40	22,000	--	--	--	--	--	--	16,600,000
MW-17	MW-17	4/2/2013	--	--	--	--	--	<40	16,000	--	--	--	--	--	--	--
PZ-14	PZ-14	11/3/2009	600000	<6700	<6700	1,800,000	0.12	170	960	--	--	-13.6	6.93	920,000	--	4,690,000
PZ-14	PZ-14D	11/3/2009	590000	<6700	<6700	1,800,000	--	130	960	--	--	--	7.2 H	920,000	--	4,740,000
PZ-14	PZ-14	2/5/2010	--	--	--	--	7.1	70	3,800	--	--	54.8	7.1 H	--	--	--
PZ-14	PZ-14	5/5/2010	--	--	--	--	0.07	<40	4,800	--	--	-88.8	7.08	--	--	--
PZ-14	PZ-14	8/6/2010	--	--	--	--	0.17	<40	8,600	--	--	-89.8	6.82	--	--	--

Table 24
Historical Geochemical Parameters in Groundwater
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Location	Sample Name	Sample Date	Alkalinity, Bicarbonate	Alkalinity, Carbonate	Alkalinity, Hydroxide	Chloride	Dissolved Oxygen	Dissolved Sulfide	Ferrous Iron (Fe+2)	Iron	Manganese	Oxidation Reduction Potential	pH	Sulfate	Sulfide	Total Dissolved Solids
		Units	µg/L	µg/L	µg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L	mV	SU	µg/L	µg/L	µg/L
PZ-14	PZ-14D	8/6/2010	--	--	--	--	--	<40	8,200	--	--	--	--	--	--	--
PZ-14	PZ-14	11/2/2010	--	--	--	--	0.14	<40	13,000	--	--	-167.4	6.82	--	--	--
PZ-14	PZ-14	4/12/2011	--	--	--	--	--	<40	11,000	--	--	--	--	--	--	--
PZ-14	PZ-14	10/12/2011	--	--	--	--	--	<40	16,000	--	--	--	--	--	--	--
PZ-14	PZ-14	11/2/2011	380000	<6700	<6700	3,300,000	0.31	--	--	--	--	-200.4	7.15	1,300,000	--	7,170,000
PZ-14	PZ-14	4/4/2012	--	--	--	--	--	<40	20,000	--	--	--	--	--	--	--
PZ-14	PZ-14	5/2/2012	480000	<10000	<10000	4,000,000	--	--	--	--	--	--	--	1,100,000	--	9,120,000
PZ-14	PZ-14	10/8/2012	--	--	--	4,100,000	--	<40	<100	--	--	--	--	--	--	8,700,000
PZ-14	PZ-14	4/2/2013	--	--	--	--	--	<40	29,000	--	--	--	--	--	--	--
PZ-15	PZ-15	11/3/2009	390000	<6700	<6700	260,000	0.1	<40	<100	--	--	52.6	7.46	510,000	--	1,550,000
PZ-15	PZ-15	2/5/2010	--	--	--	--	5.57	40	<100	--	--	-295.5	8.49	--	--	--
PZ-15	PZ-15	5/5/2010	--	--	--	--	0.08	<40	<100	--	--	-17.6	7.31	--	--	--
PZ-15	PZ-15	8/6/2010	--	--	--	--	0.07	40	<100	--	--	-35.5	7.37	--	--	--
PZ-15	PZ-15	11/2/2010	--	--	--	--	0.17	100	<100	--	--	-184.2	7.52	--	--	--
PZ-15	PZ-15	4/12/2011	--	--	--	--	--	<40	<100	--	--	--	--	--	--	--
PZ-15	PZ-15	10/10/2011	--	--	--	--	--	50	<100	--	--	--	--	--	--	--
PZ-15	PZ-15	11/3/2011	410000	<10000	<10000	420,000	0.65	--	--	--	--	-105.9	7.2	910,000	--	2,580,000
PZ-15	PZ-15	4/9/2012	--	--	--	--	--	<40	<100	--	--	--	--	--	--	--
PZ-15	PZ-15	5/1/2012	360000	<10000	<10000	480,000	--	--	--	--	--	--	--	880,000	--	3,890,000
PZ-15	PZ-15	10/8/2012	--	--	--	540,000	--	140	<100	--	--	--	--	--	--	2,600,000
PZ-15	PZ-15	4/9/2013	--	--	--	--	--	<40	<100	--	--	--	--	--	--	--
PZ-16	PZ-16	11/3/2009	490000	<6700	<6700	1,000,000	0.09	<40	<100	--	--	78.4	7.01	400,000	--	2,590,000
PZ-16	PZ-16	2/5/2010	--	--	--	--	7.3	<40	<100	--	--	51	7.3 H	--	--	--
PZ-16	PZ-16D	2/5/2010	--	--	--	--	--	<40	<100	--	--	--	7.2 H	--	--	--
PZ-16	PZ-16	5/5/2010	--	--	--	--	0.12	<40	<100	--	--	23.6	7.15	--	--	--
PZ-16	PZ-16	8/6/2010	--	--	--	--	0.06	<40	<100	--	--	14.4	7.19	--	--	--
PZ-16	PZ-16	11/2/2010	--	--	--	--	0.33	<40	<100	--	--	141.7	7.25	--	--	--
PZ-16	PZ-16	4/12/2011	--	--	--	--	--	<40	<100	--	--	--	--	--	--	--
PZ-16	PZ-16	10/10/2011	--	--	--	--	--	<40	<100	--	--	--	--	--	--	--
PZ-16	PZ-16	4/9/2012	--	--	--	--	--	<40	<100	--	--	--	--	--	--	--
PZ-16	PZ-16	10/8/2012	--	--	--	820,000	--	<40	<100	--	--	--	--	--	--	2,430,000
PZ-16	PZ-16	4/9/2013	--	--	--	--	--	<40	<100	--	--	--	--	--	--	--
PZ-17A1	PZ-17A1	11/2/2011	280000	<6700	<6700	2,800,000	0.48	--	--	--	--	-104.8	6.41	1,000,000	--	5,900,000
PZ-17A1	PZ-17A1	4/30/2012	330000	<10000	<10000	5,200,000	--	--	--	--	--	--	--	1,200,000	--	11,000,000
PZ-17A2	PZ-17A2	11/3/2011	780000	<10000	<10000	1,100,000	0.36	--	--	--	--	-21.2	6.88	2,000,000	--	4,710,000
PZ-17A2	PZ-17A2	5/1/2012	820000	<10000	<10000	900,000	--	--	--	--	--	--	--	1,800,000	--	4,710,000
PZ-17B	PZ-17B	11/2/2011	450000	<6700	<6700	550,000	0.7	--	--	--	--	-7.9	6.96	2,200,000	--	4,050,000
PZ-17B	PZ-17B	4/30/2012	500000	<10000	<10000	580,000	--	--	--	--	--	--	--	2,000,000	--	4,140,000
PZ-18A1	PZ-18A1	11/3/2011	770000	<10000	<10000	5,900,000	0.17	--	--	--	--	-72.6	8.28	570,000	--	11,500,000
PZ-18A1	PZ-18A1	5/1/2012	810000	<10000	<10000	7,200,000	--	--	--	--	--	--	--	560,000	--	13,300,000
PZ-18A2	PZ-18A2	11/3/2011	800000	<10000	<10000	5,100,000	0.22	--	--	--	--	-32.1	8	590,000	--	10,500,000
PZ-18A2	PZ-18A2	5/1/2012	830000	<10000	<10000	6,700,000	--	--	--	--	--	--	--	560,000	--	12,600,000
PZ-19A1	PZ-19A1	11/3/2011	350000	<10000	<10000	10,000,000	--	--	--	--	--	-43.4	6.81	1,500,000	--	18,300,000
PZ-19A1	PZ-19A1	5/2/2012	350000	<10000	<10000	4,000,000	--	--	--	--	--	--	--	770,000	--	8,480,000
PZ-19A2	PZ-19A2	11/2/2011	110000	<4000	<4000	640,000	0.25	--	--	--	--	-50.6	7.49	380,000	--	1,770,000
PZ-19A2	PZ-19A2	5/2/2012	160000	<6700	<6700	750,000	--	--	--	--	--	--	--	330,000	--	1,960,000
PZ-19A2	PZ-19A2-D	5/2/2012	160000	<6700	<6700	760,000	--	--	--	--	--	--	--	340,000	--	1,980,000
PZ-20A1	PZ-20A1	11/3/2011	320000	<10000 J	<10000 J	8,800,000	4.21	--	--	--	--	-32.2	6.68	1,600,000	--	1,710,000
PZ-20A1	PZ-20A1	5/2/2012	360000	<10000	<10000	8,600,000	--	--	--	--	--	--	--	1,400,000	--	17,400,000
PZ-20A2	PZ-20A2	11/2/2011	250000	<6700	<6700	7,900,000	0.23	--	--	--	--	-353.3	8.17	1,400,000	--	15,200,000
PZ-20A2	PZ-20A2	5/1/2012	280000	<10000	<10000	9,200,000	--	--	--	--	--	--	--	1,400,000	--	17,700,000
PZ-21A1	PZ-21A1	11/3/2011	470000	32000	<10000 J	510,000	4.21	--	--	--	--	125.3	6.68	660,000	--	1,650,000
PZ-21A1	PZ-21A1	5/2/2012	510000	<10000	<10000	480,000	--	--	--	--	--	--	--	580,000	--	2,260,000
PZ-21A2	PZ-21A2	5/1/2012	480000	<10000	<10000	1,000,000	--	--	--	--	--	--	--	670,000	--	3,190,000
PZ-22A1	PZ-22A1	11/4/2011	1.2e+006	<10000	<10000	1,100,000	1.25	--	--	--	--	-22.9	7.39	950,000	--	4,290,000
PZ-21A2	PZ-21A2-D	11/3/2011	460000	<10000	<10000	950,000	0.4	--	--	--	--	-22.3	6.53	760,000	--	3,380,000
PZ-22A1	PZ-22A1	5/2/2012	460000	<10000	<10000	800,000	--	--	--	--	--	--	--	780,000	--	2,820,000
PZ-22A2	PZ-22A2	11/3/2011	420000	<10000	<10000	190,000	0.49	--	--	--	--	8.5	7.26	190,000	--	1,060,000
PZ-22A2	PZ-22A2	5/1/2012	410000	<10000	<10000	170,000	--	--	--	--	--	--	--	180,000	--	1,020,000
PZ-22A2	PZ-22A2-D	5/1/2012	410000	<10000	<10000	170,000	--	--	--	--	--	--	--	170,000	--	1,040,000

Table 24
Historical Geochemical Parameters in Groundwater
Pre-Design Investigation Report
HA-2, Campus Bay, Richmond, California

Location	Sample Name	Sample Date	Alkalinity, Bicarbonate	Alkalinity, Carbonate	Alkalinity, Hydroxide	Chloride	Dissolved Oxygen	Dissolved Sulfide	Ferrous Iron (Fe+2)	Iron	Manganese	Oxidation Reduction Potential	pH	Sulfate	Sulfide	Total Dissolved Solids
		Units	µg/L	µg/L	µg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L	mV	SU	µg/L	µg/L	µg/L
PZ-23A1	PZ-23A1	11/4/2011	360000	<10000	<10000	250,000	0.16	--	--	--	--	165.3	6.8	460,000	--	1,490,000
PZ-23A1	PZ-23A1	5/2/2012	420000	<10000	<10000	250,000	--	--	--	--	--	--	--	390,000	--	1,480,000
PZ-23A2	PZ-23A2	11/4/2011	320000	<10000	<10000	83,000	0.12	--	--	--	--	187.5	7.18	94,000	--	640000
PZ-23A2	PZ-23A2-D	11/4/2011	310000	<10000	<10000	83,000	--	--	--	--	--	--	--	92,000	--	640000
PZ-23A2	PZ-23A2	5/2/2012	320000	<10000	<10000	95,000	--	--	--	--	--	--	--	140,000	--	750000

Notes:
< = analyte not detected
J = estimated value
µg/L = micrograms per liter
D = Duplicate sample
mg/L = milligrams per liter
mV = millivolts
SU = standard unit
Dissolved oxygen, pH, and oxidation reduction potential (ORP) were measured in the field with a water quality meter.

Table 25
Metals in Pore Water
Pre-Design Investigation Report
HA-2, Campus Bay, Richmond, California
Concentrations in micrograms per liter (µg/L)

Location	Sample Name	Sample Date	Top Depth (feet bss)	Bottom Depth (feet bss)	Arsenic	Copper	Lead	Mercury	Nickel	Zinc
LL-28	LL-28-0.0-1.0-PW	8/13/2013	0.0	1.0	210	2.9	<1	--	26	300
LL-28	LL-28-1.0-2.7-PW	8/14/2013	1.0	2.7	64	1.6	2.4	--	2.8	27
LL-29	LL-29-0.0-1.5-PW	8/6/2013	0.0	1.5	88	<1	<1	--	3.3	<5
LL-31	LL-31_0.0-1.6_PW	5/23/2013	0.0	1.6	510	<1	<1	<0.2	<1	<20
LL-32	LL-32-0.0-1.5-PW	8/6/2013	0.0	1.5	290	<1	<1	--	12	55
LL-33	LL-33-1.0-3.0-PW	8/6/2013	1.0	3.0	310	5.3	<1	--	15	31
LL-34	LL-34-0.0-1.5-PW	8/6/2013	0.0	1.5	270	3.8	1.2	--	8.6	24
LL-37	LL-37-0.0-1.5-PW	8/6/2013	0.0	1.5	210	3.1	1.6	--	14	53
LL-38	LL-38-0.0-1.5-PW	8/9/2013	0.0	1.5	200	<1	<1	--	<1 J	9.1
UL-25	UL-25-7.0-8.0-PW	8/15/2013	7.0	8.0	57	<1	<1	--	5.9	61
UL-26	UL-26-3.4-6.8-PW	6/25/2013	3.4	6.8	43	4	1.1	<0.2	3.4	21
UL-28	UL-28-3.6-7.4PW	6/19/2013	3.6	6.7	330	12	<1	<0.2	7.1	19
UL-30	UL-30-4.3-7.6-PW	6/27/2013	4.3	7.6	290	<1	<1	<0.2	4.5	<16
UL-31	UL-31-4.0-6.0-PW	8/15/2013	4.0	6.0	260	2.9	<1	--	3.7	<5
UL-33	UL-33-3.5-4.5-PW	8/14/2013	3.5	4.5	7.2	<1	<1	--	9.3	23
UL-34	UL-34-5.5-6.5-PW	8/20/2013	5.5	6.5	200	<1	<1	--	2.5	<5
UL-34	UL-34-3.5-4.5-PW	8/20/2013	3.5	4.5	2.9	<1	<1	--	4.3	<5
UL-34	UL-34-7.0-8.0-PW	8/21/2013	7.0	8.0	1600	1.6	<1	--	<1	5.4

Notes:
< = analyte not detected above the method detection limit; shown value is the laboratory reporting limit.
-- = not analyzed
bss = below sediment surface
J = estimated value

Table 26
Proprietary Pesticides in Pore Water
Pre-Design Investigation Report
HA-2, Campus Bay, Richmond, California
Concentrations in micrograms per liter (µg/L)

Location	Sample Name	Sample Date	Top Depth (feet bss)	Bottom Depth (feet bss)	Butylate	Cycloate	EPTC	Molinate	Napropamide	Pebulate	Vernolate
LL-28	LL-28-0.0-1.0-PW	8/13/2013	0.0	1.0	<13	34	460	240	<13 J	600	140
LL-28	LL-28-1.0-2.7-PW	8/14/2013	1.0	2.7	18	<50	2400	1300	<2.5 J	2200	350
LL-29	LL-29-0.0-1.5-PW	8/6/2013	0.0	1.5	2.6	29	45	35	<2.5	31	20
LL-31	LL-31_0.0-2.0_PW	5/23/2013	0.0	2.0	4.8	3.9	270	260	0.12	27	27
LL-32	LL-32-0.0-1.5-PW	8/6/2013	0.0	1.5	26	29	340	150	<2.5	340	340
LL-33	LL-33-1.0-3.0-PW	8/6/2013	1.0	3.0	17	21	110	17	<2.5	190	180
LL-34	LL-34-0.0-1.5-PW	8/6/2013	0.0	1.5	4	29	440	340	<2.5	83	42
LL-37	LL-37-0.0-1.5-PW	8/6/2013	0.0	1.5	91	430	5900	3500	3.8	2300	480
LL-38	LL-38-0.0-1.5-PW	8/9/2013	0.0	1.5	<2.5	9.6	52	38	<2.5	16	13
UL-26	UL-26-3.4-6.8-PW	6/25/2013	3.4	6.8	<2.5	<2.5	6.3	<2.5	20 J	<2.5	<2.5
UL-28	UL-28-3.6-7.4PW	6/19/2013	3.6	6.7	<2.5	<2.5	35	<2.5	34 J	66	<2.5
UL-30	UL-30-4.3-7.6-PW	6/27/2013	4.3	7.6	<2.5	<2.5	21	<2.5	7.7	11	<2.5
UL-31	UL-31-4.0-6.0-PW	8/15/2013	4.0	6.0	<2.5	4.3	<5 J	<2.5	22 J	5.7	<2.5
UL-32	UL-32-7.5-8.5-PW	8/13/2013	7.5	8.5	<2.5	<2.5	300	<2.5	9.3 J	4500	21
UL-34	UL-34-7.0-8.0-PW	8/21/2013	7.0	8.0	<3.8 J	8.1 J	85 J	<3.8 J	59 J	300 J	5.6 J

Notes:
< = analyte not detected above the method detection limit; shown value is the laboratory reporting limit.
-- = not analyzed
bss = below sediment surface
EPTC = S-ethyl dipropylthiocarbamate
J = estimated value

Table 27
Geochemical Parameters in Pore Water
Pre-Design Investigation Report
HA-2, Campus Bay, Richmond, California
Concentrations in micrograms per liter (µg/L)

Location	Sample Name	Sample Date	Acidity (as CaCO3)	Alkalinity, Bicarbonate	Alkalinity, Carbonate	Alkalinity, Hydroxide	Calcium	Chloride	Ferrous Iron (Fe+2)	Iron	Magnesium	Manganese	Nitrogen, Nitrate	Nitrogen, Nitrite	Potassium	Sodium	Sulfate	Total Dissolved Solids
LL-31	LL-31_0.0-1.6_PW	5/23/2013	380,000	27,000	<1000	<1000	430,000	1,300,000	330,000	330,000	470,000	12,000	<500	<500	68,000	1,200,000	4,700,000	8,240,000 J
UL-26	UL-26-3.4-6.8-PW	6/25/2013	<32,000 U	<2000	26,000	14,000	1,000,000	4,200,000	<100	160	<500	<5	<500	<500	25,000	1,800,000	970,000	9,100,000 J
UL-28	UL-28-3.6-7.4PW	6/19/2013	<11,000 U	<1000	<1000	<1000	1,600,000	5,900,000	380	8,100	13,000	110	<500	<500	25,000	2,100,000	1,400,000	11,500,000
UL-30	UL-30-4.3-7.6-PW	6/27/2013	<8,000 U	23,000	<1000	<1000	1,300,000	4,400,000	190	<100	3,000	57	<500	<500	19,000	1,900,000	1,500,000	9,840,000

Notes:
< = analyte not detected
J = estimated value
CaCO3 = calcium carbonate

Figures

Figures

SOURCE: THOMAS BROS MAP - Bay Area 2001

Approximate Campus Bay Property Boundary

Approximate Habitat Area (HA) Boundaries

0 .5 mile

NOVEMBER 2014

CAMPUS BAY SITE
RICHMOND, CALIFORNIA
PRE-DESIGN INVESTIGATION REPORT

SITE VICINITY MAP

ARCADIS

FIGURE
1

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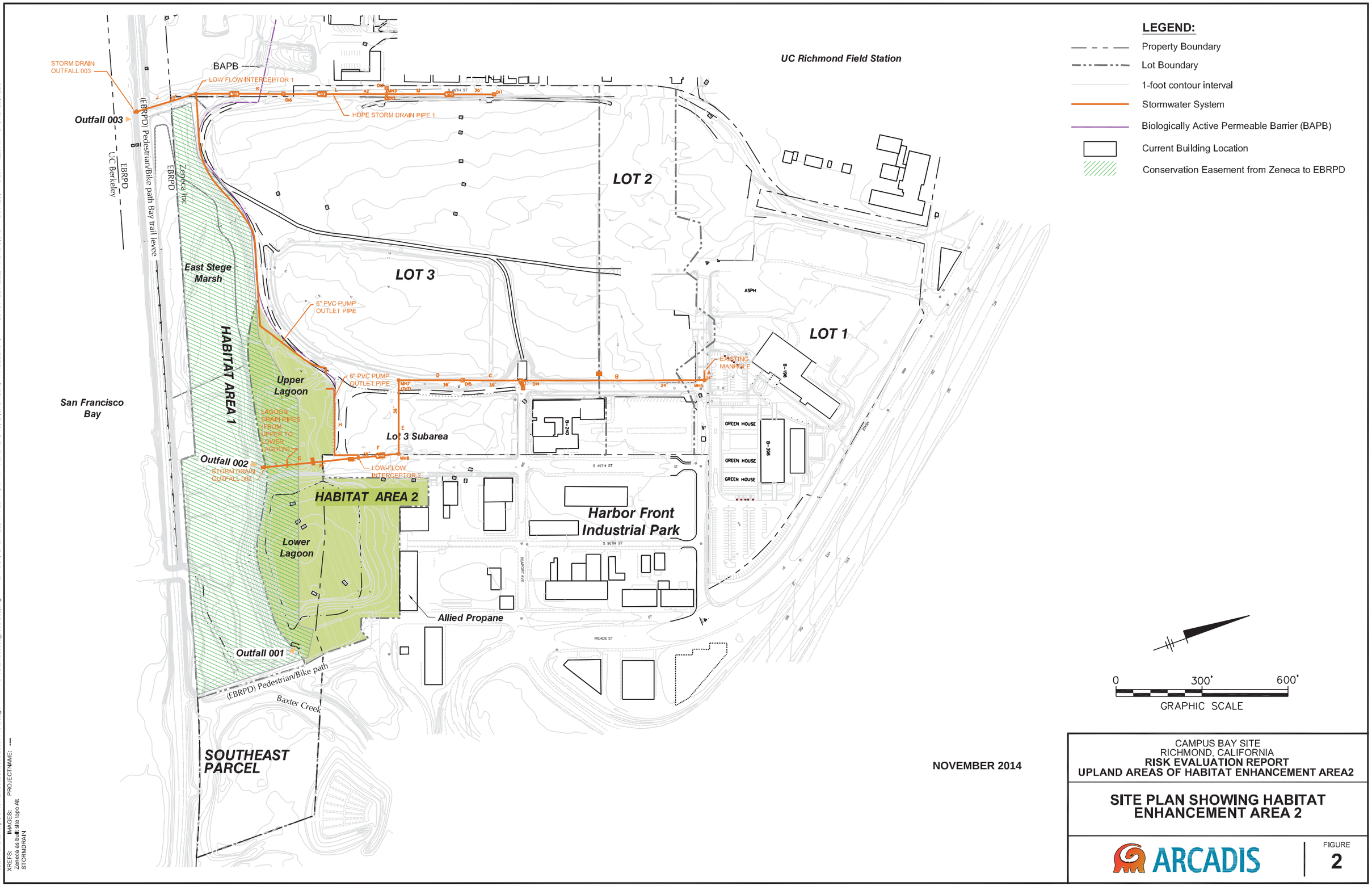

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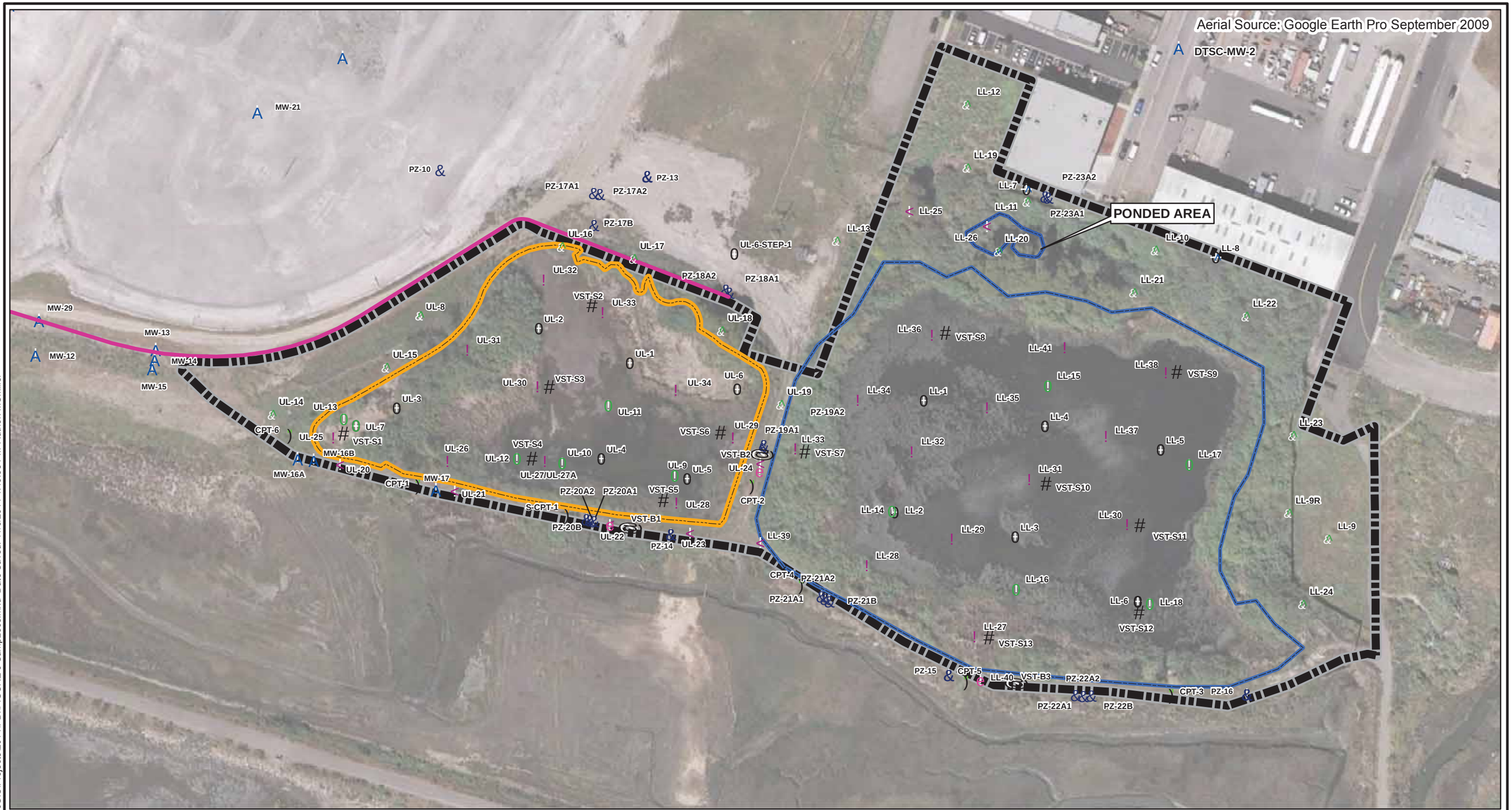
CAMPUS BAY SITE
RICHMOND, CALIFORNIA
RISK EVALUATION REPORT
UPLAND AREAS OF HABITAT ENHANCEMENT AREA2

SITE PLAN SHOWING HABITAT ENHANCEMENT AREA 2

ARCADIS

FIGURE
2



LEGEND

- A EXISTING MONITORING WELL
- & EXISTING PIEZOMETER
- 0 SEDIMENT SAMPLE LOCATIONS (2007)
- ^ SOIL SAMPLE LOCATIONS (2007)
- 0 SEDIMENT SAMPLE LOCATIONS (2011 AND 2012)
- ^ SOIL SAMPLE LOCATIONS (2011 AND 2012)
- < SOIL SAMPLE LOCATION (2013)
- BERM VST LOCATION (2013)
- CPT LOCATION (2013)
- e SOIL SAMPLE AND GEOTECHNICAL BORING (2013)
- SEISMIC CPT LOCATION (2013)
- ! SEDIMENT SAMPLE LOCATION (2013)
- # SEDIMENT VST LOCATION (2013)
- HABITAT AREA 2
- UPPER LAGOON - VEGETATED WETLAND
- LOWER LAGOON - VEGETATED WETLAND
- BIOLOGICALLY ACTIVE PERMEABLE BARRIER (BAPB)

CPT = CONE PENETRATION TEST
VST = VANE SHEAR TEST

NOVEMBER 2014

0 100 200 Feet
GRAPHIC SCALE

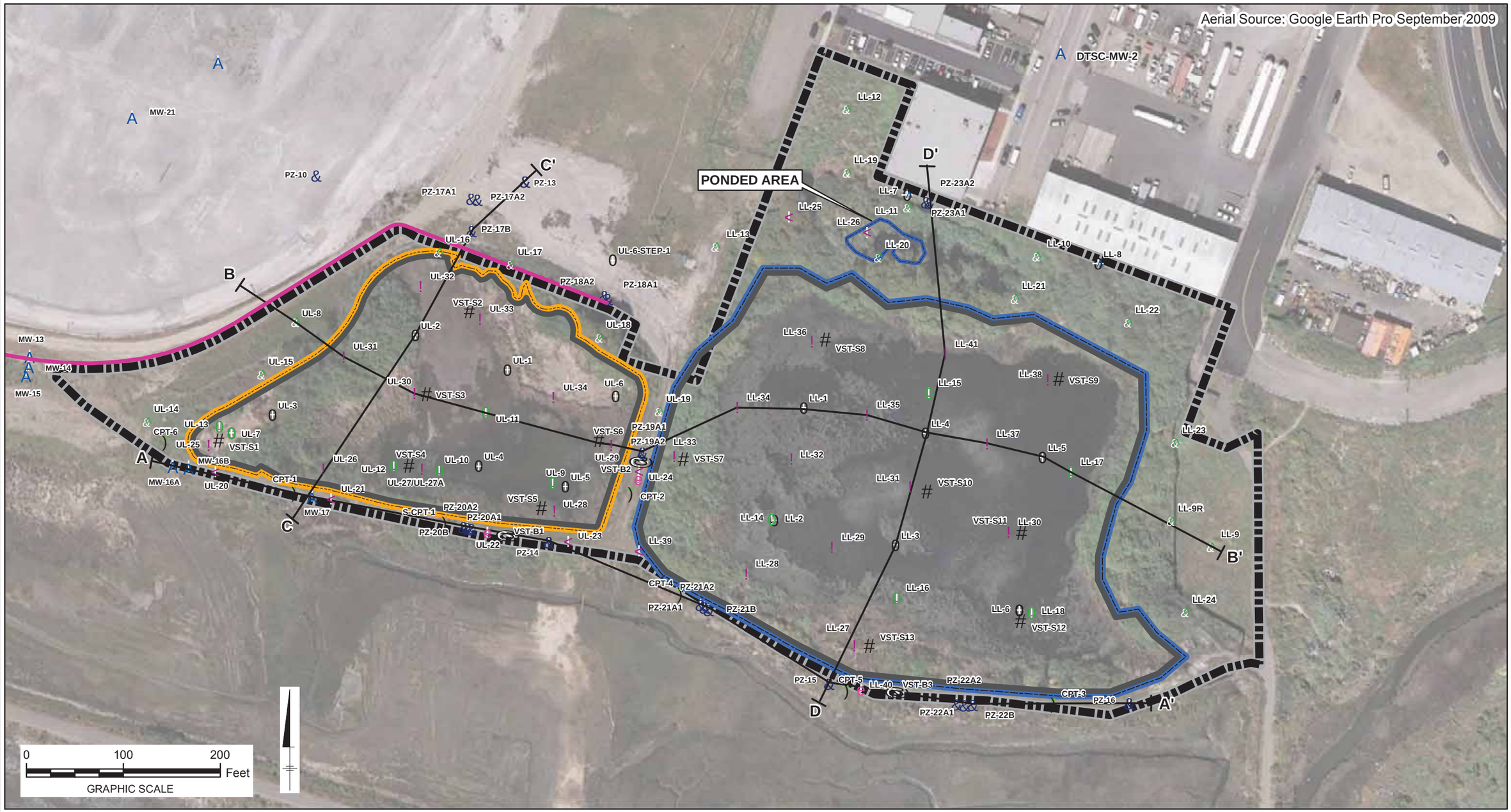
CAMPUS BAY SITE
RICHMOND, CALIFORNIA
PRE-DESIGN INVESTIGATION REPORT

PRE-DESIGN INVESTIGATION AND HISTORICAL SAMPLE LOCATIONS

ARCADIS

FIGURE 3

Path: K:\001_EMV\09358_MSOU\GIS\ArcGIS\Projects\2014\PDI\FIGURE 3 SampLocs.mxd Date Saved: 11/6/2014 1:45:38 PM Author: MSMiller



LEGEND

- A — EXISTING MONITORING WELL
- & — EXISTING PIEZOMETER
- 0 — SEDIMENT SAMPLE LOCATIONS (2007)
- ^ — SOIL SAMPLE LOCATIONS (2007)
- 0 — SEDIMENT SAMPLE LOCATIONS (2011 AND 2012)
- ^ — SOIL SAMPLE LOCATIONS (2011)
- < — SOIL SAMPLE LOCATION (2013)
- BERM VST LOCATION (2013)
- CPT LOCATION (2013)
- e — SOIL SAMPLE AND GEOTECHNICAL BORING (2013)
- SEISMIC CPT LOCATION (2013)
- ! — SEDIMENT SAMPLE LOCATION (2013)
- # — SEDIMENT VST LOCATION (2013)
- HABITAT AREA 2
- PRESUMPTIVE REMEDY AREA
- UPPER LAGOON - VEGETATED WETLAND
- LOWER LAGOON - VEGETATED WETLAND
- BIOLOGICALLY ACTIVE PERMEABLE BARRIER (BAPB)

NOVEMBER 2014

NOTES:

1. FOR HABITAT AREA 2, SEDIMENT IS DEFINED AS NON-NATIVE MATERIAL WITHIN THE VEGETATED WETLAND BOUNDARIES OF THE UPPER AND LOWER LAGOON, AND SOIL IS DEFINED AS MATERIALS OUTSIDE OF THE LAGOON WETLAND BOUNDARIES. THE SOIL AND SEDIMENT SAMPLE LOCATIONS HAVE DIFFERENT SYMBOLS.
2. WETLANDS WERE DELINEATED BY ARCADIS IN MAY 2012 (ARCADIS 2012)

CAMPUS BAY SITE
RICHMOND, CALIFORNIA

PRE-DESIGN INVESTIGATION REPORT

GEOLOGIC CROSS-SECTION LOCATION MAP

ARCADIS

FIGURE
4

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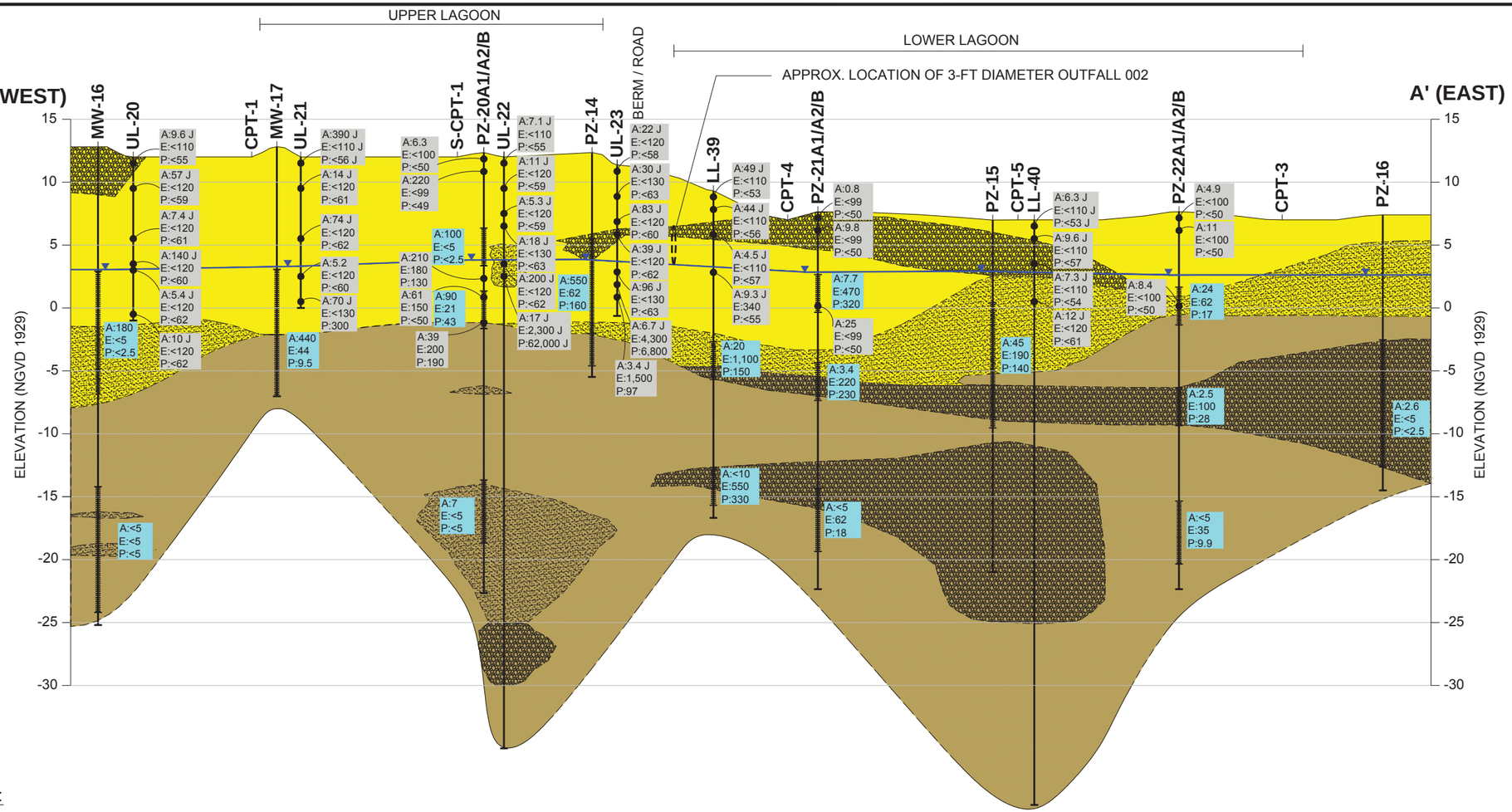
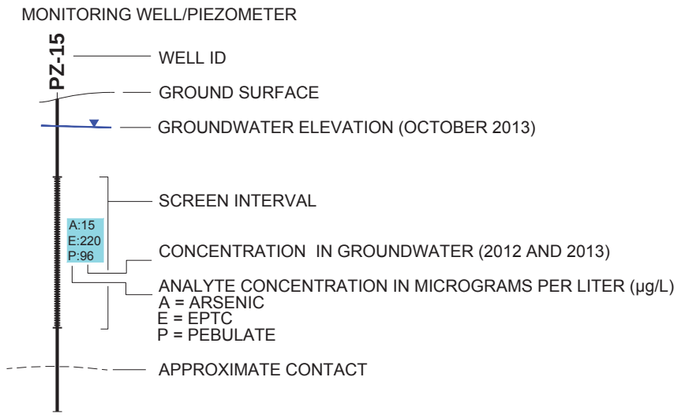
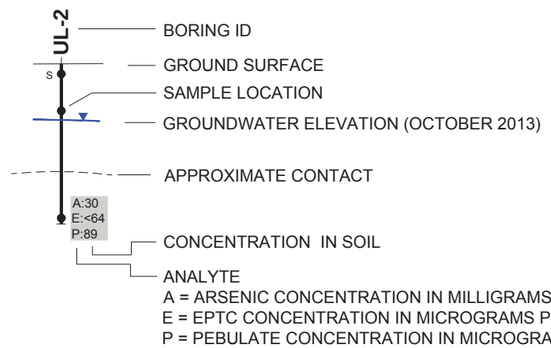


LEGEND:

MONITORING WELL/PIEZOMETER



SOIL BORING



BERM FILL: CLAY, CLAYEY SAND, AND CLAYEY GRAVEL WITH SAND LAYERS

NATIVE MATERIAL: BAY MUD (CLAY) WITH ALLUVIUM DEPOSITS (INTERBEDDED GRAVEL, SAND, SILT, AND CLAY)

SAND (FILL OR NATIVE)

SILTY AND CLAY GRAVELS (FILL OR NATIVE)

NOTES:

1. CONTACT BETWEEN GEOLOGIC UNITS SHOWN ON CROSS SECTION ARE APPROXIMATE AND INFERRED BETWEEN BORING LOCATIONS.
2. INVESTIGATION LOCATIONS ARE PROJECTED A MAXIMUM OF APPROXIMATELY 25 FEET.

0 100'
HORIZONTAL SCALE

0 10'
VERTICAL SCALE

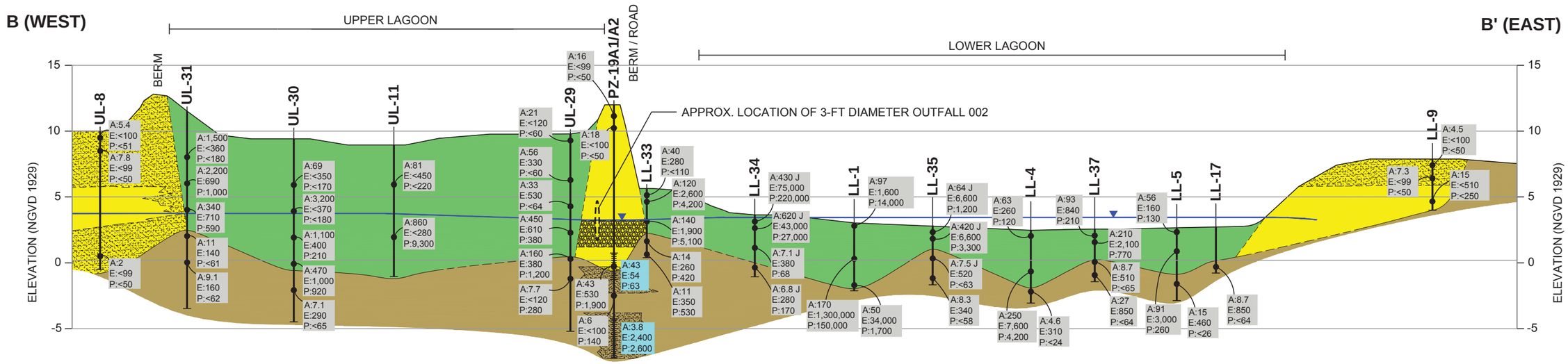
NOVEMBER 2014

CAMPUS BAY SITE
RICHMOND, CALIFORNIA
PRE-DESIGN INVESTIGATION REPORT

GEOLOGIC CROSS SECTION A - A'

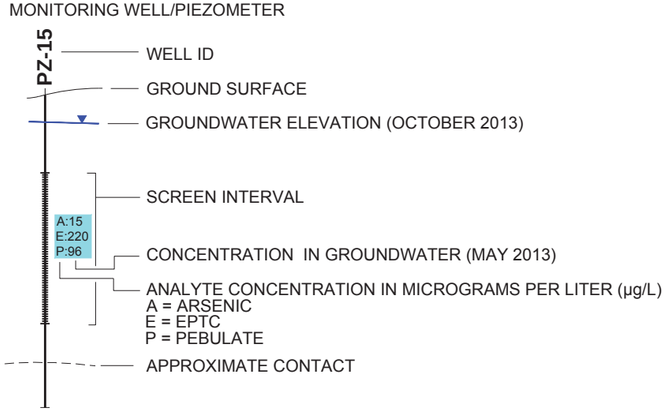
ARCADIS

FIGURE
5

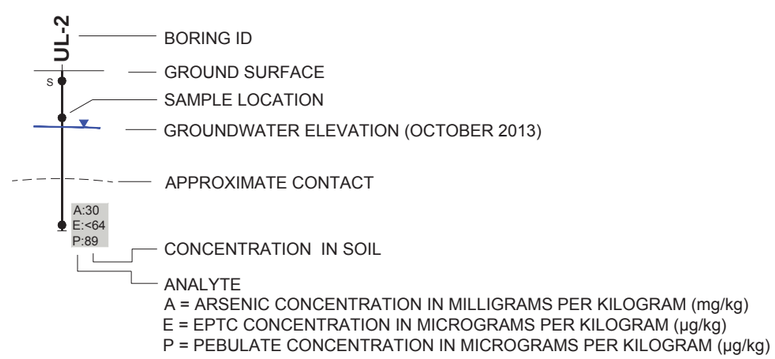


LEGEND:

MONITORING WELL/PIEZOMETER



SOIL BORING



- BERM FILL: CLAY, CLAYEY SAND, AND CLAYEY GRAVEL WITH SAND LAYERS
- NATIVE MATERIAL: BAY MUD (CLAY) WITH ALLUVIUM DEPOSITS (INTERBEDDED GRAVEL, SAND SILT, AND CLAY)
- LAGOON SEDIMENTS (NON-NATIVE): CLAY, SILTY CLAY, AND ORGANIC CLAY
- SAND (FILL OR NATIVE)
- SILTY AND CLAY GRAVELS (FILL OR NATIVE)

NOTES:

1. CONTACT BETWEEN GEOLOGIC UNITS SHOWN ON CROSS SECTION ARE APPROXIMATE AND INFERRED BETWEEN BORING LOCATIONS.
2. INVESTIGATION LOCATIONS ARE PROJECTED A MAXIMUM OF APPROXIMATELY 25 FEET.

0 8' VERTICAL SCALE

0 80' HORIZONTAL SCALE

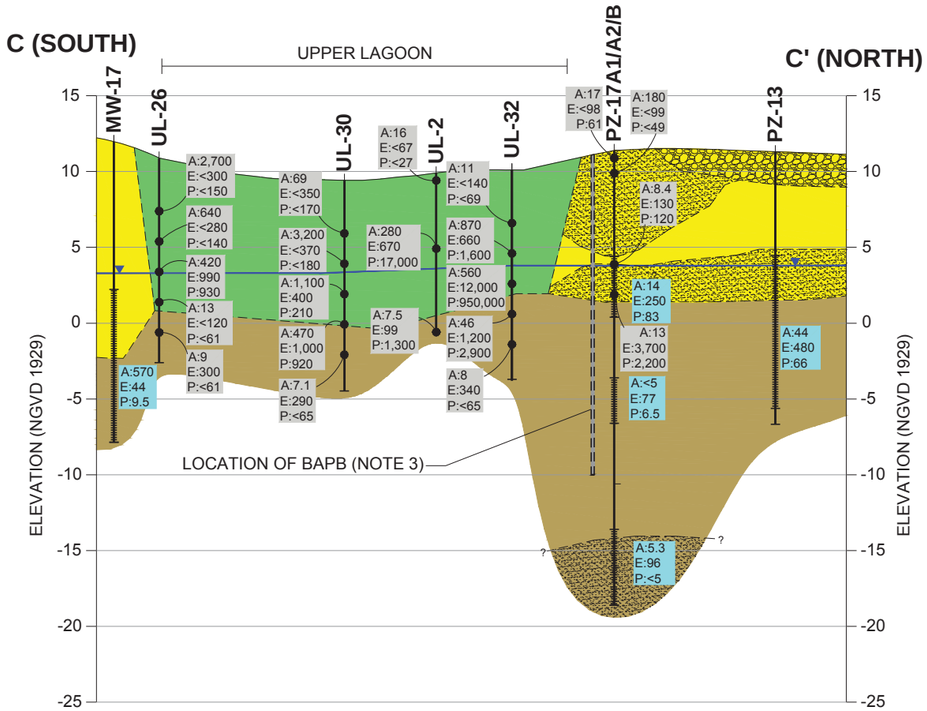
NOVEMBER 2014

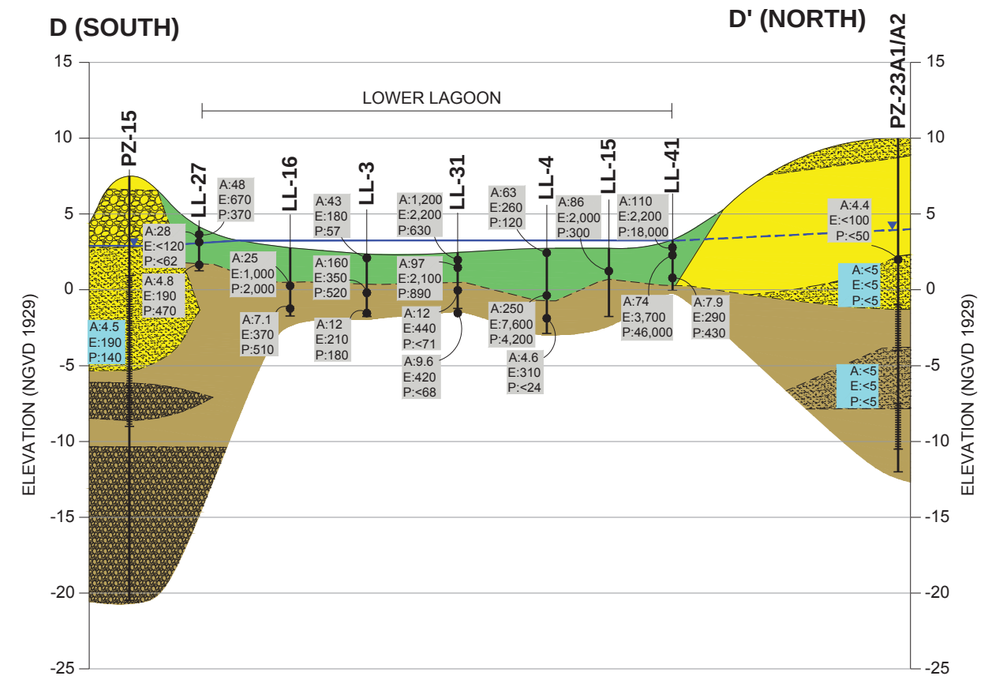
CAMPUS BAY SITE
RICHMOND, CALIFORNIA
PRE-DESIGN INVESTIGATION REPORT

GEOLOGIC CROSS SECTION B - B'

ARCADIS

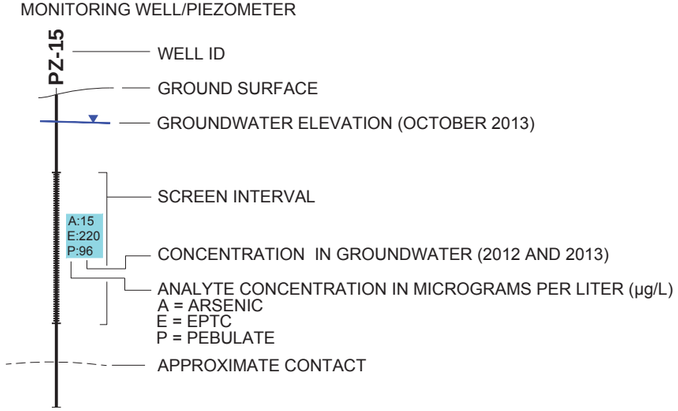
FIGURE
6



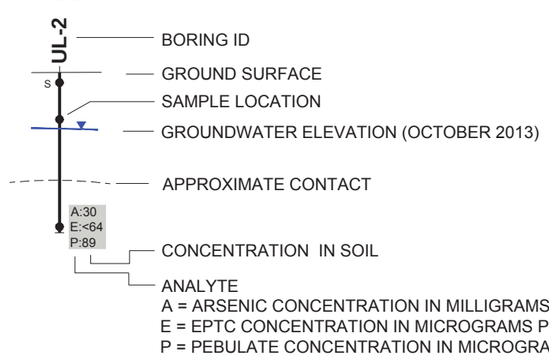


LEGEND:

MONITORING WELL/PIEZOMETER



SOIL BORING



NOTES:

1. CONTACT BETWEEN GEOLOGIC UNITS SHOWN ON CROSS SECTION ARE APPROXIMATE AND INFERRED BETWEEN BORING LOCATIONS.
2. INVESTIGATION LOCATIONS ARE PROJECTED A MAXIMUM OF APPROXIMATELY 25 FEET.
3. BAPB CONFIGURATION AND LOCATION ARE APPROXIMATE.

BERM FILL: CLAY, CLAYEY SAND, AND CLAYEY GRAVEL WITH SAND LAYERS

NATIVE MATERIAL: BAY MUD (CLAY) WITH ALLUVIUM DEPOSITS (INTERBEDDED GRAVEL, SAND SILT, AND CLAY)

LAGOON SEDIMENTS (NON-NATIVE): CLAY, SILTY CLAY, AND ORGANIC CLAY

SAND (FILL OR NATIVE)

SILTY AND CLAY GRAVELS (FILL OR NATIVE)

0 10' VERTICAL SCALE

0 100' HORIZONTAL SCALE

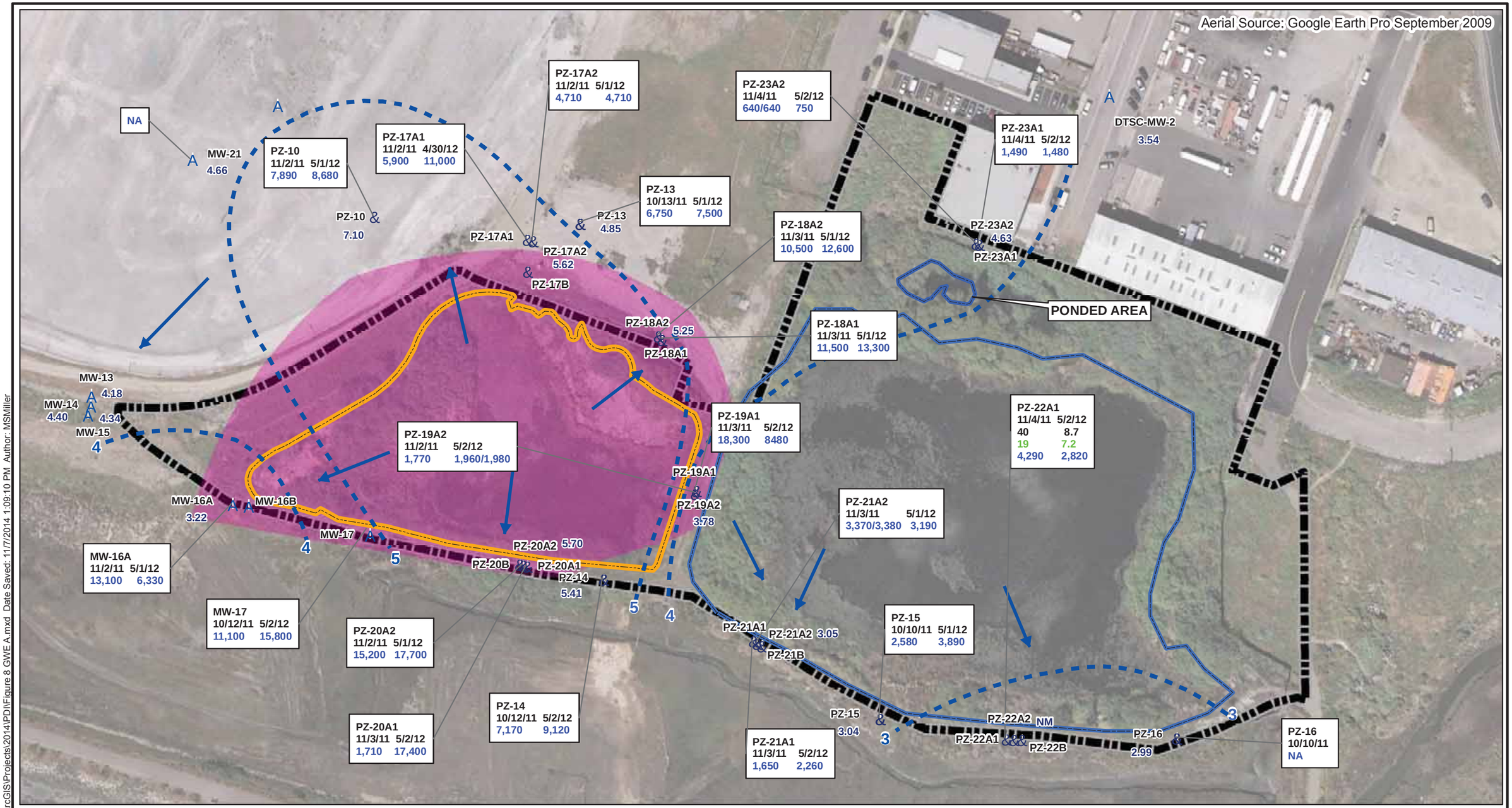
NOVEMBER 2014

CAMPUS BAY SITE
RICHMOND, CALIFORNIA
PRE-DESIGN INVESTIGATION REPORT

GEOLOGIC CROSS SECTION C - C' AND GEOLOGIC CROSS SECTION D - D'

ARCADIS

FIGURE
7



LEGEND

- & EXISTING PIEZOMETER
- A EXISTING MONITORING WELL
- UPPER LAGOON - VEGETATED WETLAND
- LOWER LAGOON - VEGETATED WETLAND
- 4 GROUNDWATER ELEVATION CONTOUR
- INTERPRETED FLOW PATH
- HABITAT AREA 2
- GROUNDWATER TDS > 10,000 (mg/L)

NOTE:
ELEVATIONS PROVIDED IN FEET NGVD 1929

PZ-14
10/12/11 5/2/12 — Sample Date
7,170 9,120 — TDS (mg/L)

TDS = TOTAL DISSOLVED SOLIDS
mg/L = MILLIGRAMS PER LITER
NA = NOT ANALYZED

NOVEMBER 2014

0 100 200 Feet
GRAPHIC SCALE

CAMPUS BAY SITE, RICHMOND, CALIFORNIA
PRE-DESIGN INVESTIGATION REPORT

GROUNDWATER ELEVATION CONTOURS AND TDS, A1/A2 INTERVAL, LOW TIDE, FALL 2011

ARCADIS

FIGURE
8

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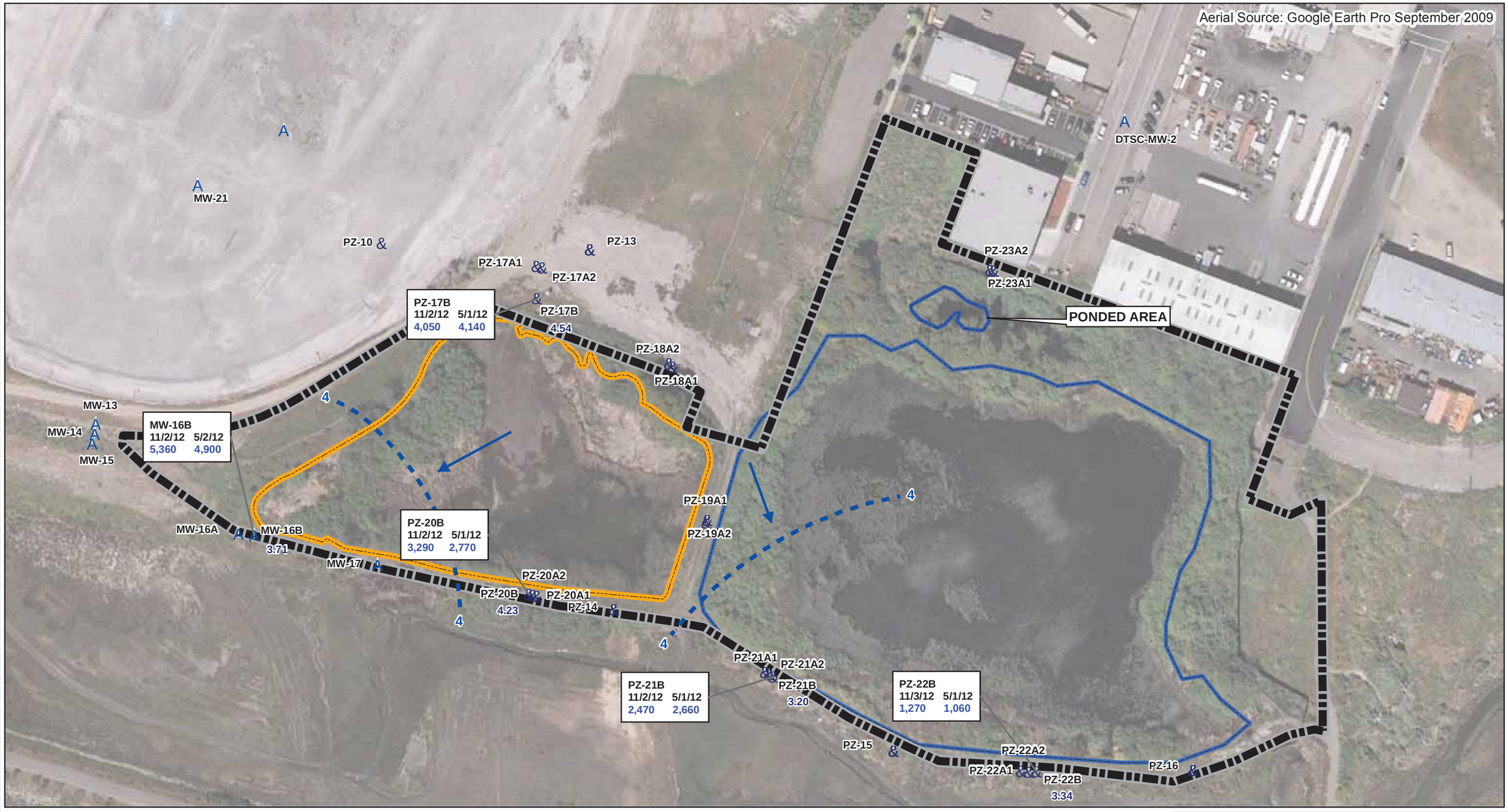


LEGEND

- & EXISTING PIEZOMETER
- A EXISTING MONITORING WELL
- 4 GROUNDWATER ELEVATION CONTOUR
- INTERPRETED FLOW PATH
- UPPER LAGOON - VEGETATED WETLAND
- LOWER LAGOON - VEGETATED WETLAND
- HABITAT AREA 2

NOTE:
ELEVATIONS PROVIDED IN FEET NGVD 1929

PZ-21B
11/2/12 5/1/12 — Sample Date
2,470 2,660 — TDS (mg/L)

TDS = TOTAL DISSOLVED SOLIDS
mg/L = MILLIGRAMS PER LITER

NOVEMBER 2014

0 100 200 Feet
GRAPHIC SCALE

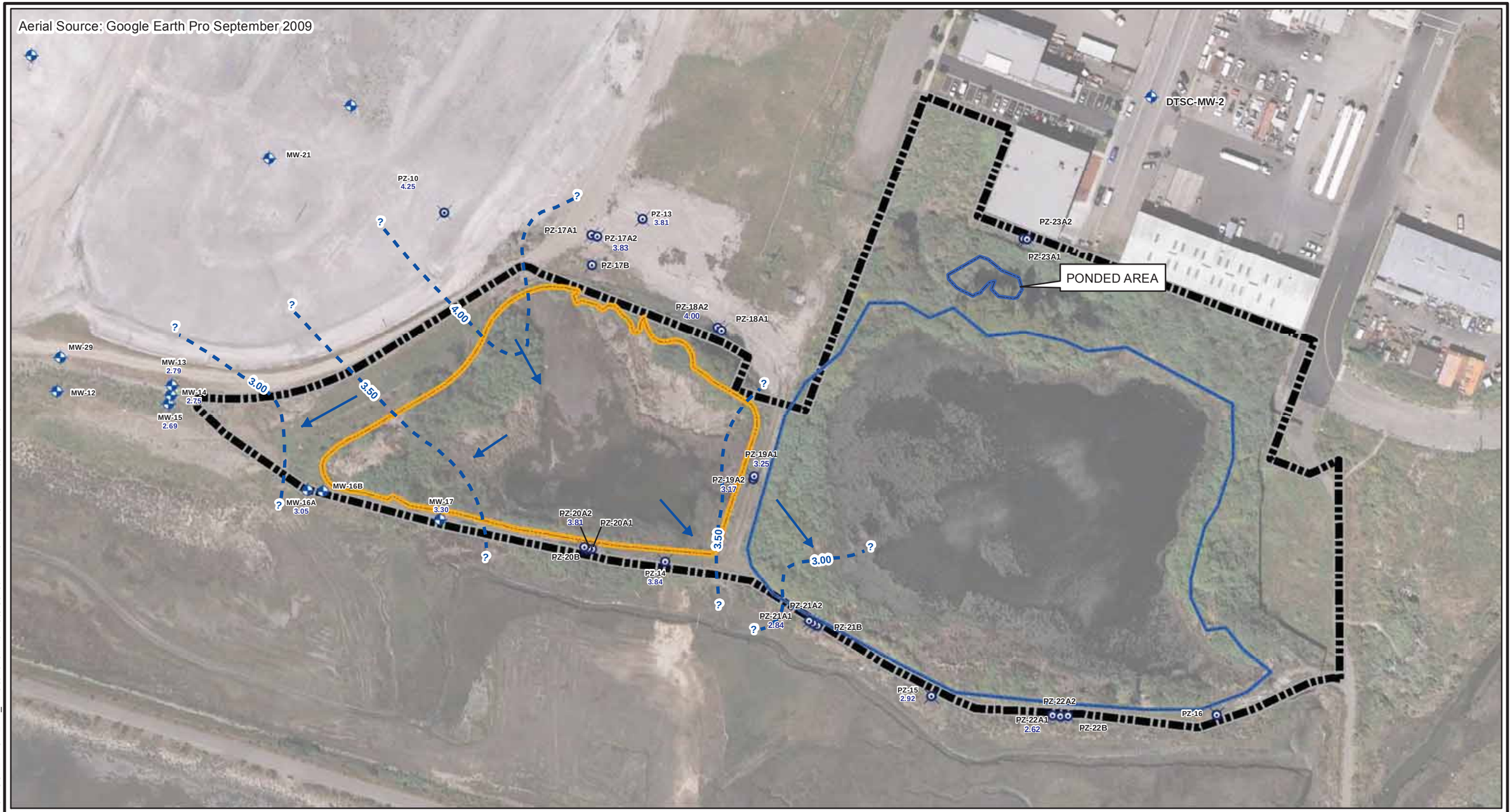
CAMPUS BAY SITE, RICHMOND, CALIFORNIA
PRE-DESIGN INVESTIGATION REPORT

GROUNDWATER ELEVATION CONTOURS AND TDS, B INTERVAL, LOW TIDE, FALL 2011

ARCADIS

FIGURE
9

Path: K:\001_EMV\09358_MSOU\GIS\ArcGIS\Projects\2014\PDI\Figure 9 GWE B Zone.mxd Date Saved: 11/7/2014 1:21:56 PM Author: MSMiller



LEGEND

A EXISTING MONITORING WELL

& EXISTING PIEZOMETER

HABITAT AREA 2

UPPER LAGOON - VEGETATED WETLAND

LOWER LAGOON - VEGETATED WETLAND

GROUNDWATER ELEVATION CONTOUR

INTERPRETED FLOW PATH

NOTE:
ELEVATIONS PROVIDED IN FEET NGVD 1929.

NOVEMBER 2014

0 100 200 Feet

GRAPHIC SCALE

CAMPUS BAY SITE, RICHMOND, CALIFORNIA

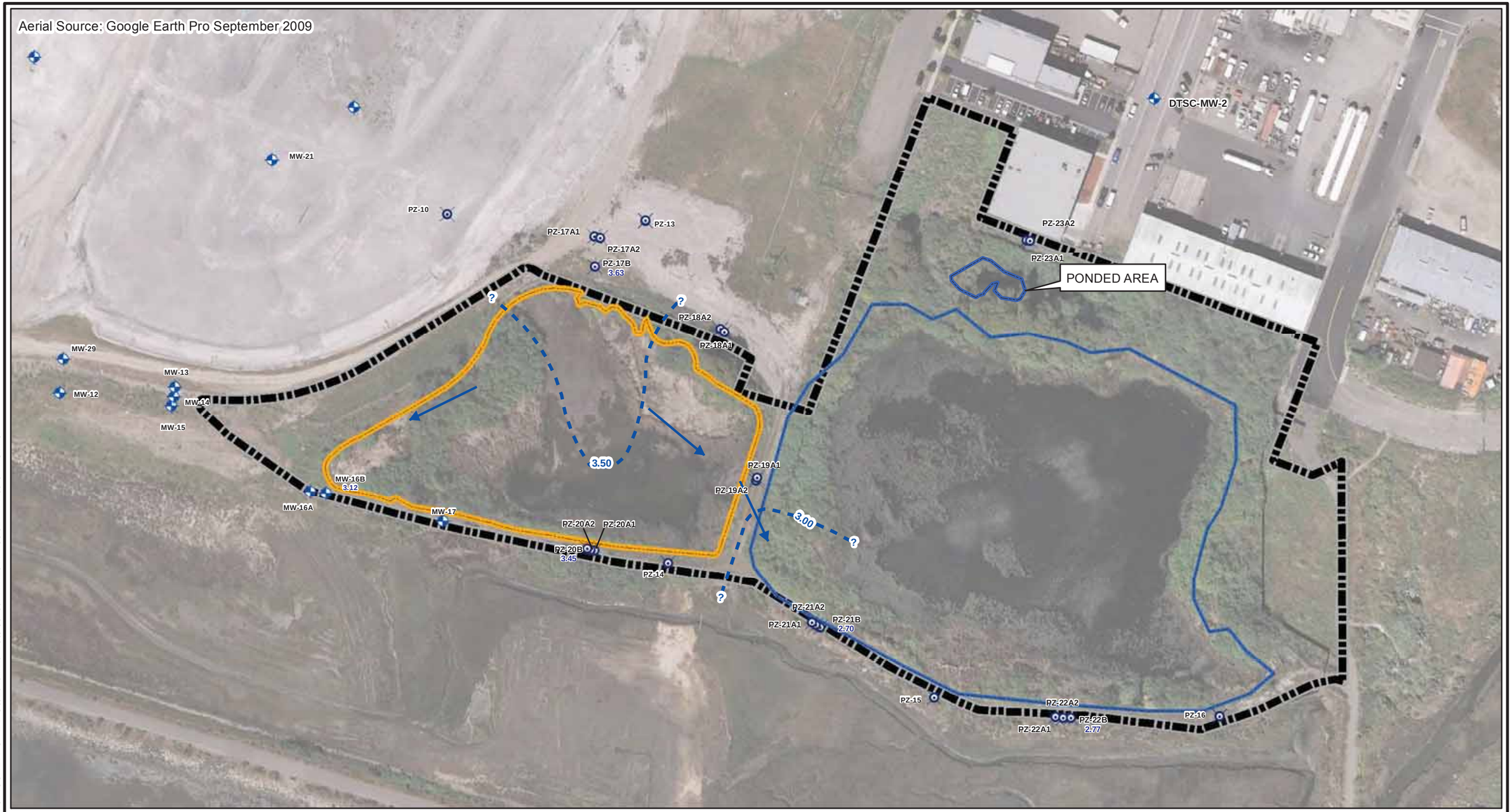
PRE-DESIGN INVESTIGATION REPORT

GROUNDWATER ELEVATION CONTOURS - A1/A2 INTERVAL OCTOBER 2013

ARCADIS

FIGURE 10

Path: C:\Users\msmiller\Desktop\CB Home\FIGURE X GWE A1_A2 Oct 2013.mxd Date Saved: 4/17/2014 10:28:01 AM Author: MSMiller



LEGEND

- A & EXISTING MONITORING WELL
- EXISTING PIEZOMETER
- HABITAT AREA 2
- UPPER LAGOON - VEGETATED WETLAND
- LOWER LAGOON - VEGETATED WETLAND
- GROUNDWATER ELEVATION CONTOUR

NOTE:
ELEVATIONS PROVIDED IN FEET NGVD 1929.

INTERPRETED FLOW PATH

NOVEMBER 2014

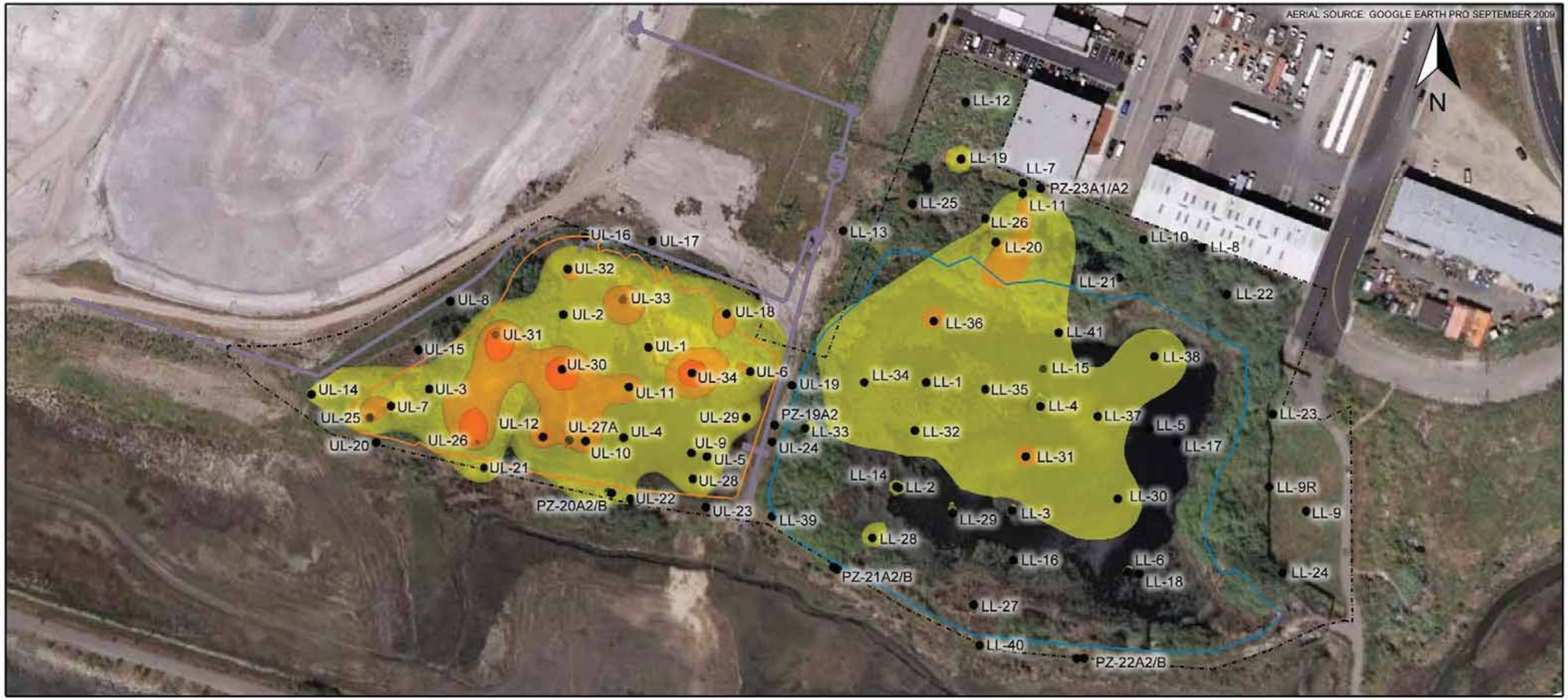
0 100 200 Feet
GRAPHIC SCALE

CAMPUS BAY SITE, RICHMOND, CALIFORNIA
PRE-DESIGN INVESTIGATION REPORT

GROUNDWATER ELEVATION CONTOURS - B INTERVAL OCTOBER 2013

ARCADIS

FIGURE 11



0 100 200 Feet

GRAPHIC SCALE

HABITAT AREA 2
UPPER LAGOON BOUNDARY
LOWER LAGOON BOUNDARY
STORMWATER SYSTEM
SAMPLE LOCATION

ARSENIC CONCENTRATION CONTOURS
- ARSENIC 100 mg/kg TO 500 mg/kg
- ARSENIC 500 mg/kg TO 1,000 mg/kg
- ARSENIC >1,000 mg/kg

NOTES:
1. SOIL AND SEDIMENT DATA FROM 2007 TO 2013 ARE SHOWN ON THIS FIGURE. THE CONCENTRATION CONTOURS WERE MODELED IN THE MINING VISUALIZATION SYSTEM USING KRIGING AND REPRESENT THE ESTIMATED 3D EXTENT OF ARSENIC.
2. mg/kg = MILLIGRAMS PER KILOGRAM

NOVEMBER 2014

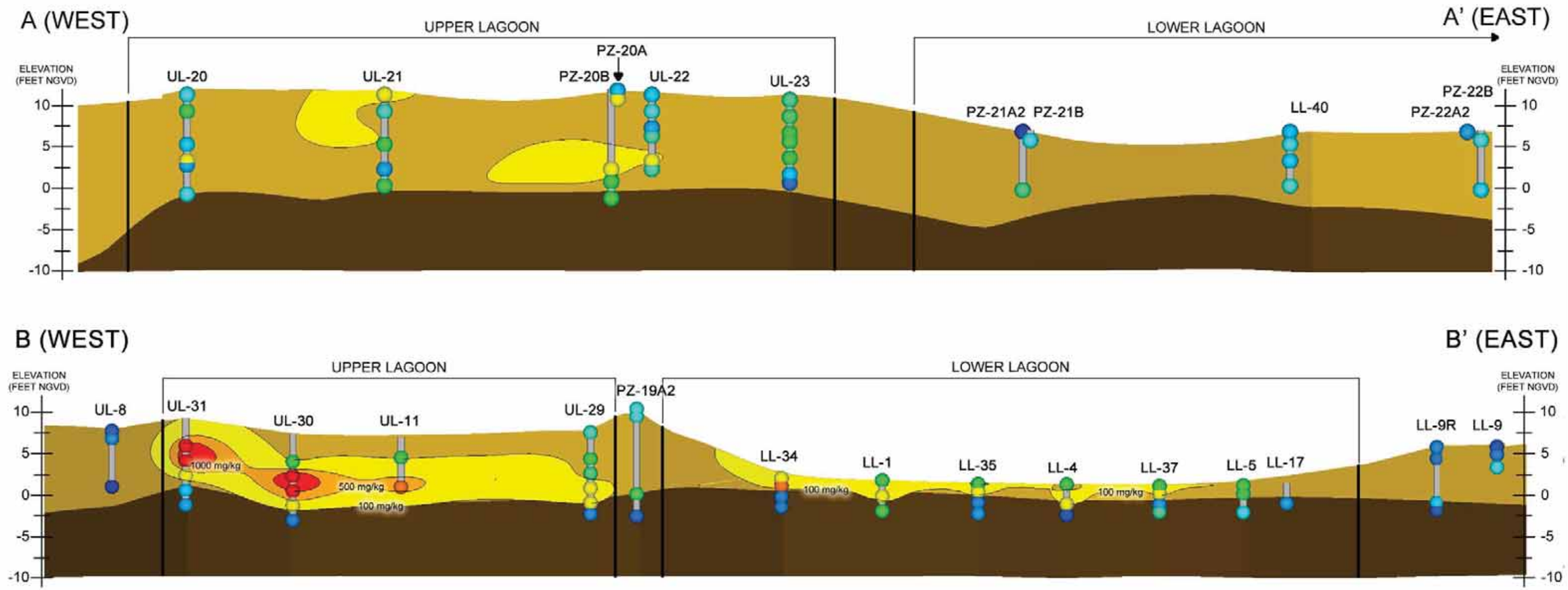
CAMPUS BAY SITE
RICHMOND, CALIFORNIA
PRE-DESIGN INVESTIGATION REPORT

CONCENTRATIONS OF ARSENIC IN SOIL AND SEDIMENT

ARCADIS

FIGURE
12

G:\ENVCAD\Emeryville\ACT\EM009358\0038\00007\Pre-Design INV RPT\CDR\EM009358_0038 C12.cdr



ARSENIC CONCENTRATION COLOR SCALE

- >1,000 mg/kg
- 500 mg/kg
- 100 mg/kg
- 10 mg/kg
- 1 mg/kg

LAGOON BOUNDARY

SAMPLE LOCATION (COLOR INDICATES RELATIVE CONCENTRATION)

BERM FILL OR LAGOON SEDIMENTS

NATIVE MATERIAL: BAY MUD (CLAY) WITH ALLUVIUM DEPOSITS (INTERBEDDED GRAVEL, SAND SILT, AND CLAY)

ARSENIC CONCENTRATION CONTOURS

- ARSENIC 100 mg/kg TO 500 mg/kg
- ARSENIC 500 mg/kg TO 1,000 mg/kg
- ARSENIC >1,000 mg/kg

Feet

0 100 200

HORIZONTAL SCALE

NOTES:

1. SOIL AND SEDIMENT DATA FROM 2007 TO 2013 ARE SHOWN ON THIS FIGURE. THE CONCENTRATION CONTOURS WERE MODELED IN THE MINING VISUALIZATION SYSTEM USING KRIGING AND REPRESENT THE ESTIMATED 3D EXTENT OF ARSENIC.
2. THE RELATIVE CONCENTRATION OF EACH SOIL OR SEDIMENT LOCATION IS INDICATED BY A RELATIVE COLOR SCALE.
3. CONTACT BETWEEN GEOLOGIC UNITS SHOWN ON CROSS-SECTION ARE APPROXIMATE AND INFERRED BETWEEN BORING LOCATIONS.
4. mg/kg = MILLIGRAMS PER KILOGRAM

NOVEMBER 2014

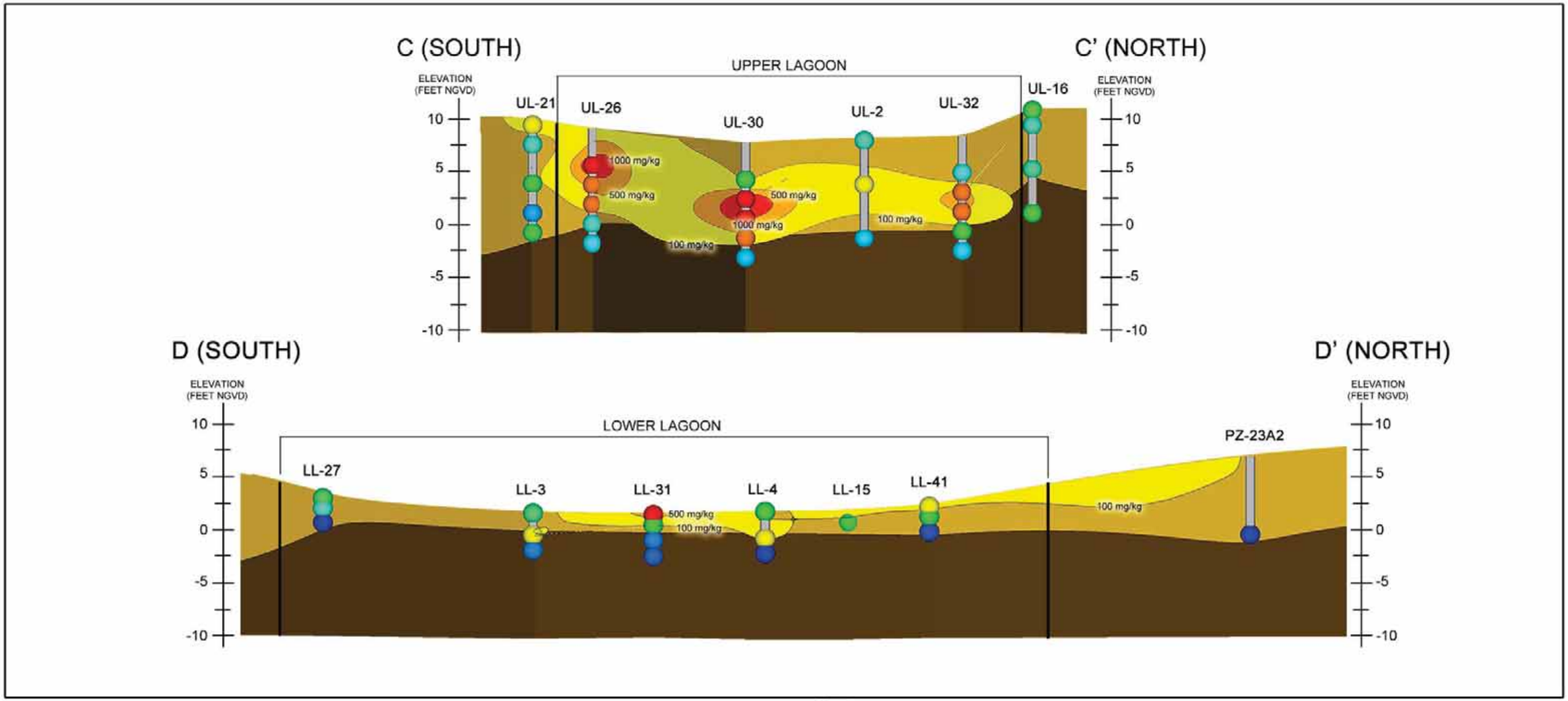
CAMPUS BAY SITE
RICHMOND, CALIFORNIA
PRE-DESIGN INVESTIGATION REPORT

CONCENTRATIONS OF ARSENIC IN SOIL AND SEDIMENT, CROSS-SECTIONS A-A' and B-B'

ARCADIS

FIGURE
13

G:\ENVCAD\Emeryville\ACT\EM009358\0038\00007\Pre-Design INV RPT\CDR\EM009358_0038 C13.cdr



ARSENIC CONCENTRATION COLOR SCALE

- >1,000 mg/kg
- 500 mg/kg
- 100 mg/kg
- 10 mg/kg
- 1 mg/kg

LAGOON BOUNDARY

SAMPLE LOCATION (COLOR INDICATES RELATIVE CONCENTRATION)

BERM FILL OR LAGOON SEDIMENTS

NATIVE MATERIAL: BAY MUD (CLAY) WITH ALLUVIUM DEPOSITS (INTERBEDDED GRAVEL, SAND SILT, AND CLAY)

ARSENIC CONCENTRATION CONTOURS

- ARSENIC 100 mg/kg TO 500 mg/kg
- ARSENIC 500 mg/kg TO 1,000 mg/kg
- ARSENIC >1,000 mg/kg

Feet: 0, 100, 200

HORIZONTAL SCALE

NOTES:

1. SOIL AND SEDIMENT DATA FROM 2007 TO 2013 ARE SHOWN ON THIS FIGURE. THE CONCENTRATION CONTOURS WERE MODELED IN THE MINING VISUALIZATION SYSTEM USING KRIGING AND REPRESENT THE ESTIMATED 3D EXTENT OF ARSENIC.
2. THE RELATIVE CONCENTRATION OF EACH SOIL OR SEDIMENT LOCATION IS INDICATED BY A RELATIVE COLOR SCALE.
3. CONTACT BETWEEN GEOLOGIC UNITS SHOWN ON CROSS-SECTION ARE APPROXIMATE AND INFERRED BETWEEN BORING LOCATIONS.
4. mg/kg = MILLIGRAMS PER KILOGRAM

NOVEMBER 2014

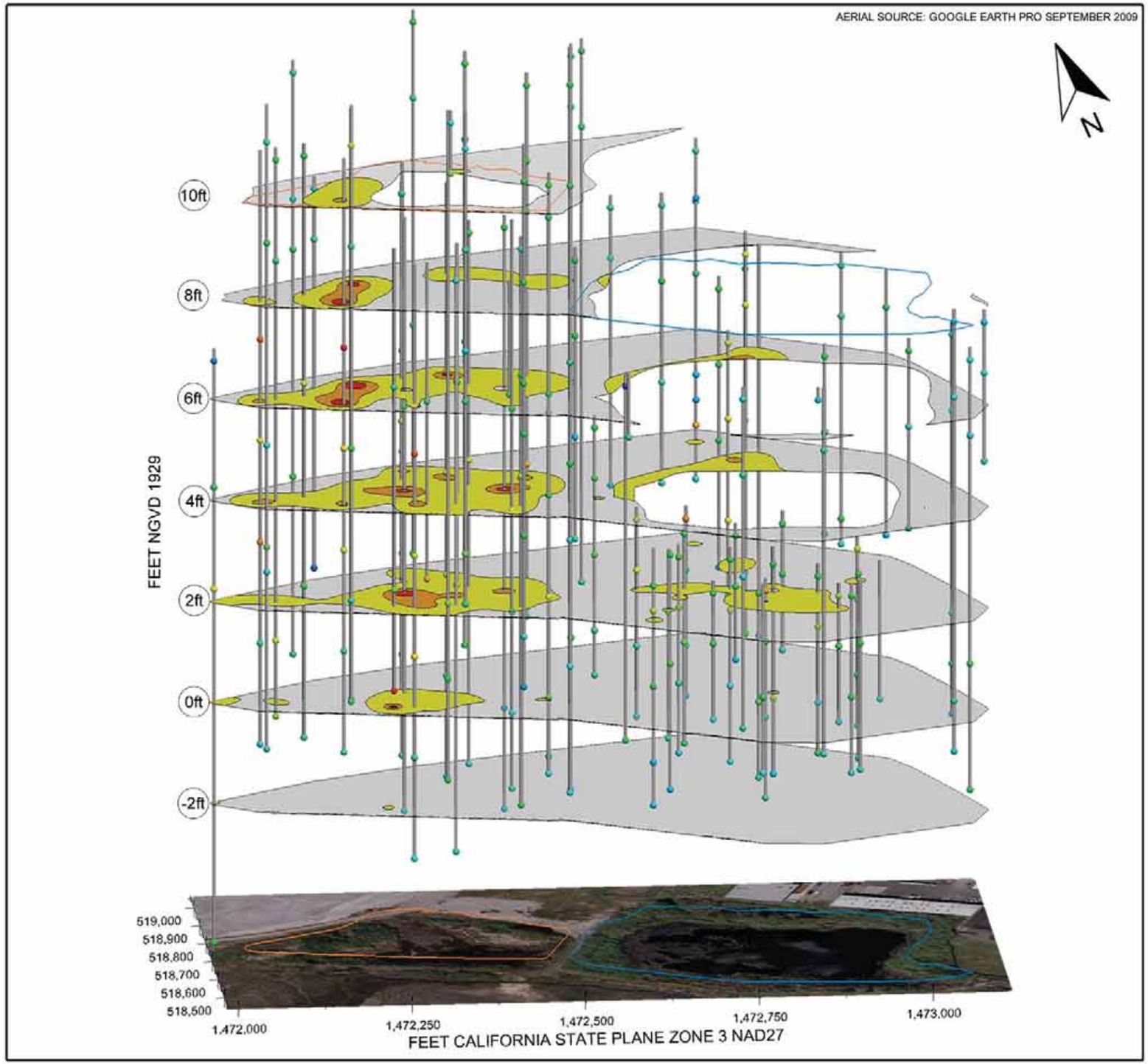
CAMPUS BAY SITE
RICHMOND, CALIFORNIA
PRE-DESIGN INVESTIGATION REPORT

CONCENTRATIONS OF ARSENIC IN SOIL AND SEDIMENT, CROSS-SECTIONS C-C' and D-D'

ARCADIS

FIGURE **14**

G:\ENVCAD\EmeryvilleACT\EM009358\0038\00007\Pre-Design INV RPT\CDR\EM009358_0038 C14.cdr



ARSENIC CONCENTRATION COLOR SCALE

- >1,000 mg/kg
- 500 mg/kg
- 100 mg/kg
- 10 mg/kg
- 1 mg/kg

UPPER LAGOON BOUNDARY

LOWER LAGOON BOUNDARY

SAMPLE LOCATION (COLOR INDICATES RELATIVE CONCENTRATION)

ARSENIC CONCENTRATION CONTOURS

- ARSENIC 100 mg/kg TO 500 mg/kg
- ARSENIC 500 mg/kg TO 1,000 mg/kg
- ARSENIC >1,000 mg/kg

NOTES:

1. SOIL AND SEDIMENT DATA FROM 2007 TO 2013 ARE SHOWN ON THIS FIGURE. THE CONCENTRATION CONTOURS WERE MODELED IN THE MINING VISUALIZATION SYSTEM USING KRIGING AND REPRESENT THE ESTIMATED 3D EXTENT OF ARSENIC.
2. THE RELATIVE CONCENTRATION OF EACH SOIL OR SEDIMENT LOCATION IS INDICATED BY A RELATIVE COLOR SCALE.
3. mg/kg = MILLIGRAMS PER KILOGRAM

NOVEMBER 2014

CAMPUS BAY SITE
RICHMOND, CALIFORNIA
PRE-DESIGN INVESTIGATION REPORT

CONCENTRATIONS OF ARSENIC IN SOIL AND SEDIMENT IN 3-D

ARCADIS

FIGURE
15

G:\ENVCAD\Emeryville\ACT\EM009358\0038\00007\Pre-Design INV RPT\CDR\EM009358_0038 C15.cdr

0 100 200 Feet
GRAPHIC SCALE

HABITAT AREA 2
UPPER LAGOON BOUNDARY
LOWER LAGOON BOUNDARY
STORMWATER SYSTEM
SAMPLE LOCATION

EPTC CONCENTRATION CONTOURS
- EPTC 1,000 µg/kg TO 3,000 µg/kg
- EPTC 3,000 µg/kg TO 10,000 µg/kg
- EPTC >10,000 µg/kg

NOTES:
1. SOIL AND SEDIMENT DATA FROM 2007 TO 2013 ARE SHOWN ON THIS FIGURE. THE CONCENTRATION CONTOURS WERE MODELED IN THE MINING VISUALIZATION SYSTEM USING KRIGING AND REPRESENT THE ESTIMATED 3D EXTENT OF EPTC.
2. µg/kg = MICROGRAMS PER KILOGRAM

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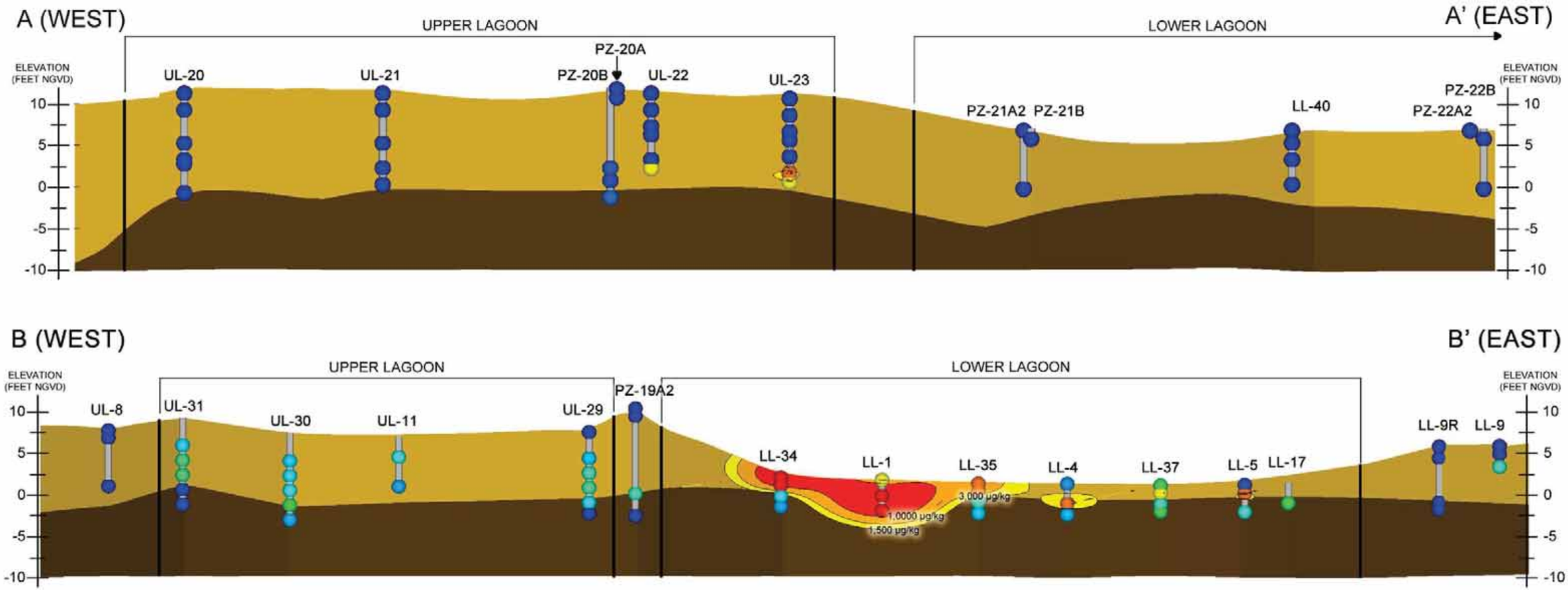
CAMPUS BAY SITE
RICHMOND, CALIFORNIA
PRE-DESIGN INVESTIGATION REPORT

CONCENTRATIONS OF EPTC IN SOIL AND SEDIMENT

ARCADIS

FIGURE
16

G:\ENVCAD\Emeryville\ACT\EM009358\0038\00007\Pre-Design INV RPT\CDR\EM009358_0038 C16.cdr



EPTC CONCENTRATION COLOR SCALE

- >10,000 µg/kg
- 3,000 µg/kg
- 1,500 µg/kg
- 1,000 µg/kg
- 100 µg/kg

LAGOON BOUNDARY

SAMPLE LOCATION (COLOR INDICATES RELATIVE CONCENTRATION)

BERM FILL OR LAGOON SEDIMENTS

NATIVE MATERIAL: BAY MUD (CLAY) WITH ALLUVIUM DEPOSITS (INTERBEDDED GRAVEL, SAND SILT, AND CLAY)

EPTC CONCENTRATION CONTOURS

- EPTC 1,000 µg/kg TO 3,000 µg/kg
- EPTC 3,000 µg/kg TO 10,000 µg/kg
- EPTC >10,000 µg/kg

Feet

0 100 200

HORIZONTAL SCALE

NOTES:

1. SOIL AND SEDIMENT DATA FROM 2007 TO 2013 ARE SHOWN ON THIS FIGURE. THE CONCENTRATION CONTOURS WERE MODELED IN THE MINING VISUALIZATION SYSTEM USING KRIGING AND REPRESENT THE ESTIMATED 3D EXTENT OF EPTC.
2. THE RELATIVE CONCENTRATION OF EACH SOIL OR SEDIMENT LOCATION IS INDICATED BY A RELATIVE COLOR SCALE. SAMPLE LOCATIONS AND CONTOURS WHICH ARE ORANGE OR RED INDICATE A CONCENTRATION GREATER THAN THE SITE SPECIFIC SEDIMENT SCREENING LEVEL OF 3,000 µg/kg.
3. CONTACT BETWEEN GEOLOGIC UNITS SHOWN ON CROSS-SECTION ARE APPROXIMATE AND INFERRED BETWEEN BORING LOCATIONS.
4. µg/kg = MICROGRAMS PER KILOGRAM

NOVEMBER 2014

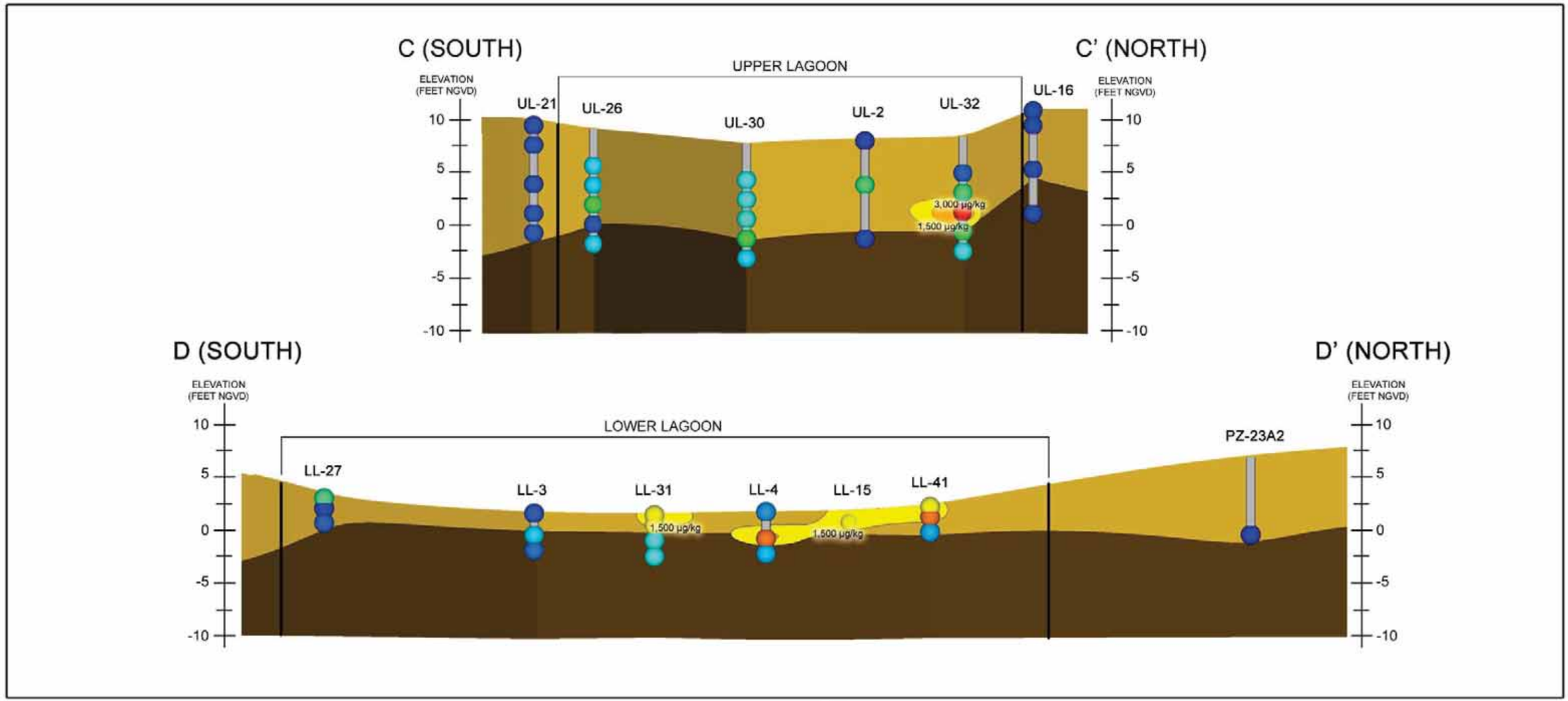
CAMPUS BAY SITE
RICHMOND, CALIFORNIA
PRE-DESIGN INVESTIGATION REPORT

CONCENTRATIONS OF EPTC IN SOIL AND SEDIMENT, CROSS-SECTIONS A-A' and B-B'

ARCADIS

FIGURE
17

G:\ENVCAD\EmeryvilleACT\EM009358\0038\00007\Pre-Design INV RPT\CDR\EM009358_0038 C17.cdr



EPTC CONCENTRATION COLOR SCALE

- >10,000 µg/kg
- 3,000 µg/kg
- 1,500 µg/kg
- 1,000 µg/kg
- 100 µg/kg

LAGOON BOUNDARY

SAMPLE LOCATION (COLOR INDICATES RELATIVE CONCENTRATION)

BERM FILL OR LAGOON SEDIMENTS

NATIVE MATERIAL: BAY MUD (CLAY) WITH ALLUVIUM DEPOSITS (INTERBEDDED GRAVEL, SAND SILT, AND CLAY)

EPTC CONCENTRATION CONTOURS

- EPTC 1,000 µg/kg TO 3,000 µg/kg
- EPTC 3,000 µg/kg TO 10,000 µg/kg
- EPTC >10,000 µg/kg

Feet: 0, 100, 200

HORIZONTAL SCALE

NOTES:

1. SOIL AND SEDIMENT DATA FROM 2007 TO 2013 ARE SHOWN ON THIS FIGURE. THE CONCENTRATION CONTOURS WERE MODELED IN THE MINING VISUALIZATION SYSTEM USING KRIGING AND REPRESENT THE ESTIMATED 3D EXTENT OF EPTC.
2. THE RELATIVE CONCENTRATION OF EACH SOIL OR SEDIMENT LOCATION IS INDICATED BY A RELATIVE COLOR SCALE.
3. CONTACT BETWEEN GEOLOGIC UNITS SHOWN ON CROSS-SECTION ARE APPROXIMATE AND INFERRED BETWEEN BORING LOCATIONS.
4. µg/kg = MICROGRAMS PER KILOGRAM

NOVEMBER 2014

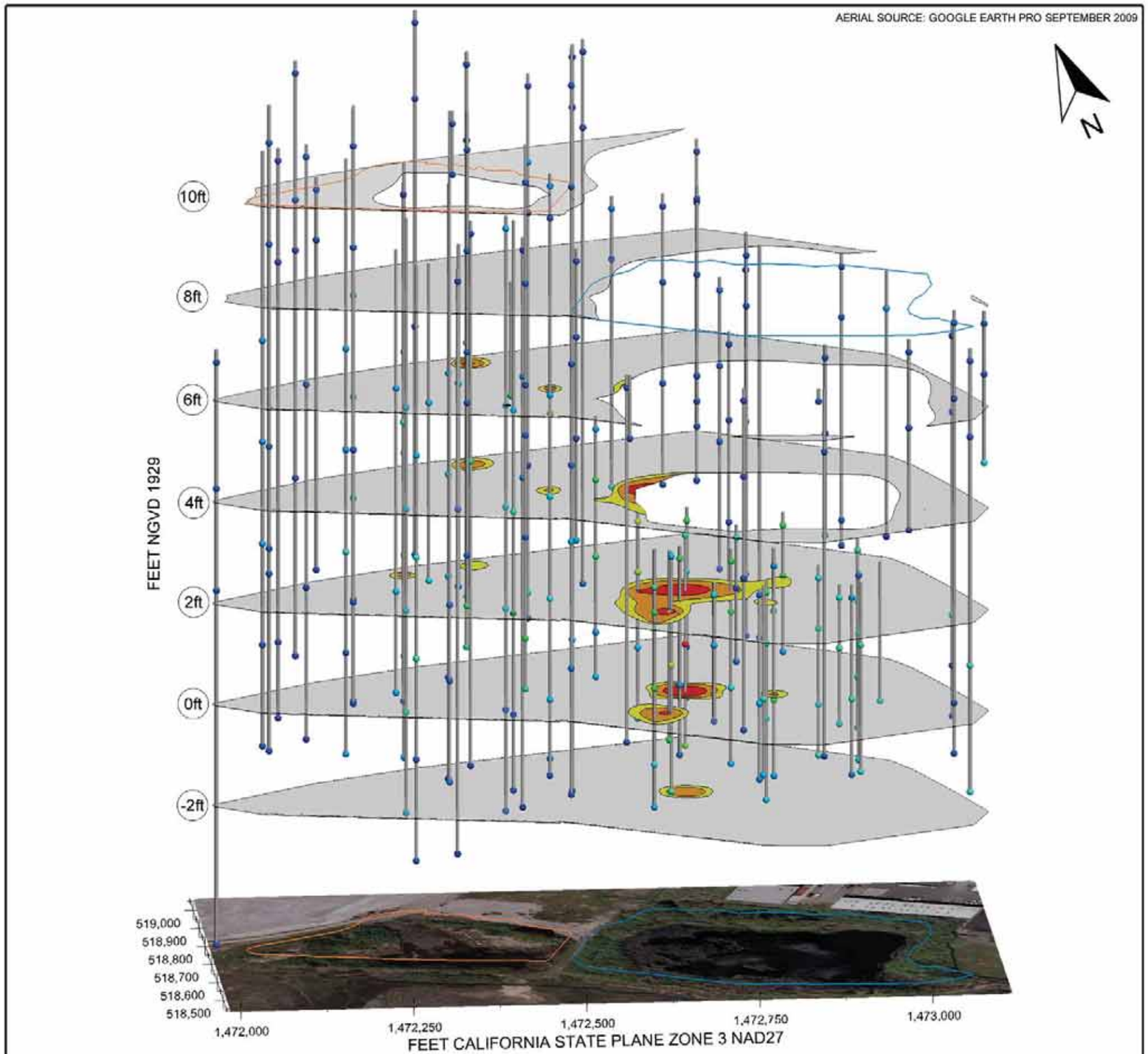
CAMPUS BAY SITE
RICHMOND, CALIFORNIA
PRE-DESIGN INVESTIGATION REPORT

CONCENTRATIONS OF EPTC IN SOIL AND SEDIMENT, CROSS-SECTIONS C-C' and D-D'

ARCADIS

FIGURE **18**

G:\ENVCAD\EmeryvilleACT\EM009358\0038\0007\Pre-Design INV RPT\CDR\EM009358_0038 C18.cdr



EPTC CONCENTRATION COLOR SCALE

- >10,000 µg/kg
- 3,000 µg/kg
- 1,500 µg/kg
- 1,000 µg/kg
- 100 µg/kg

UPPER LAGOON BOUNDARY
LOWER LAGOON BOUNDARY
SAMPLE LOCATION (COLOR INDICATES RELATIVE CONCENTRATION)

EPTC CONCENTRATION CONTOURS
- EPTC 1,000 µg/kg TO 3,000 µg/kg
- EPTC 3,000 µg/kg TO 10,000 µg/kg
- EPTC >10,000 µg/kg

NOTES:

1. SOIL AND SEDIMENT DATA FROM 2007 TO 2013 ARE SHOWN ON THIS FIGURE. THE CONCENTRATION CONTOURS WERE MODELED IN THE MINING VISUALIZATION SYSTEM USING KRIGING AND REPRESENT THE ESTIMATED 3D EXTENT OF EPTC.
2. THE RELATIVE CONCENTRATION OF EACH SOIL OR SEDIMENT LOCATION IS INDICATED BY A RELATIVE COLOR SCALE. SAMPLE LOCATIONS AND CONTOURS WHICH ARE ORANGE OR RED INDICATE A CONCENTRATION GREATER THAN THE SITE SPECIFIC SEDIMENT SCREENING LEVEL OF 3,000 µg/kg.
3. µg/kg = MICROGRAMS PER KILOGRAM

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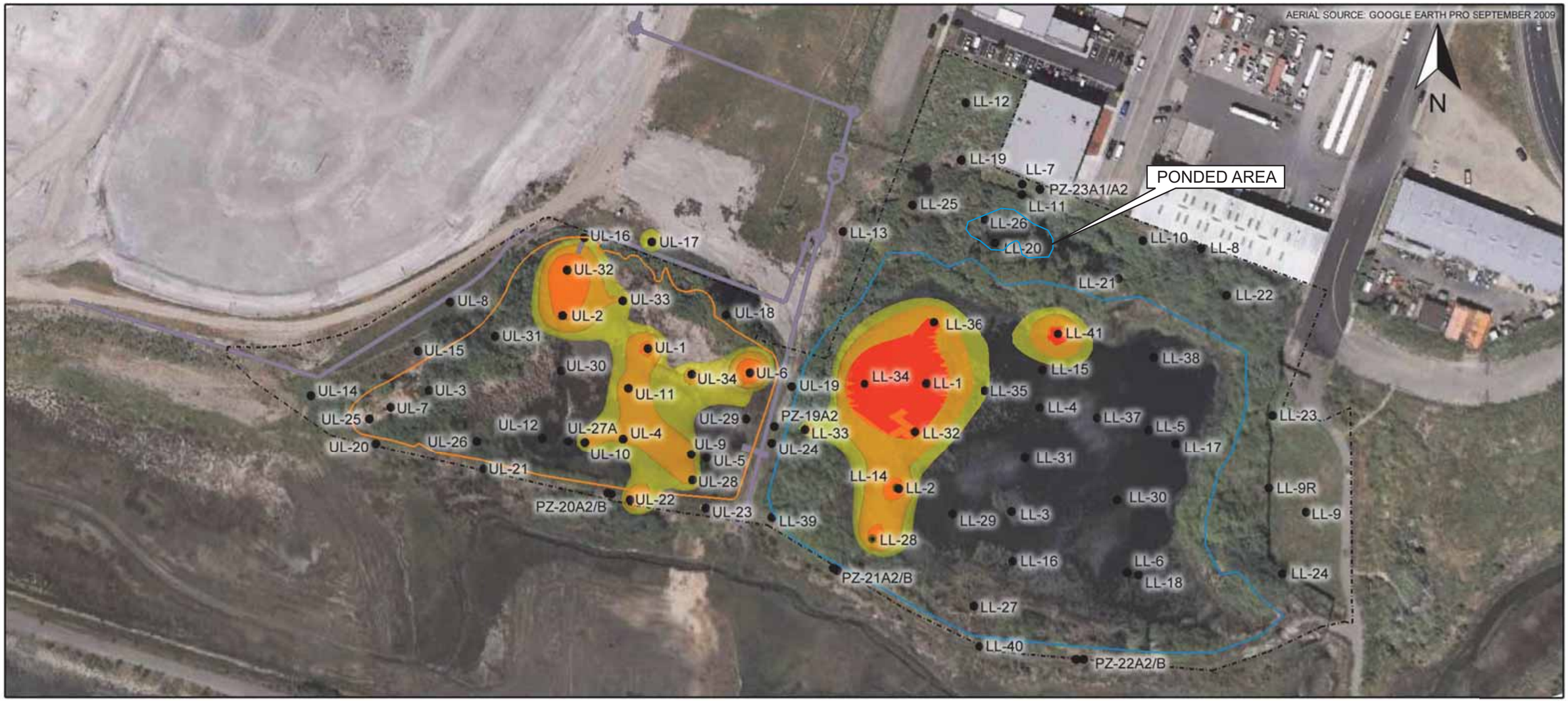
CAMPUS BAY SITE
RICHMOND, CALIFORNIA
PRE-DESIGN INVESTIGATION REPORT

CONCENTRATIONS OF EPTC IN SOIL AND SEDIMENT 3-D MODEL

ARCADIS

FIGURE
19

G:\ENVCAD\EmeryvilleACT\EM009358\0038\00007\Pre-Design INV RPT\CDR\EM009358_0038 C19.cdr



0 100 200 Feet
GRAPHIC SCALE

HABITAT AREA 2
UPPER LAGOON BOUNDARY
LOWER LAGOON BOUNDARY
STORMWATER SYSTEM
SAMPLE LOCATION

PEBULATE CONCENTRATION CONTOURS
- PEBULATE 1,000 µg/kg TO 3,000 µg/kg
- PEBULATE 3,000 µg/kg TO 10,000 µg/kg
- PEBULATE >10,000 µg/kg

NOTES:
1. SOIL AND SEDIMENT DATA FROM 2007 TO 2013 ARE SHOWN ON THIS FIGURE. THE CONCENTRATION CONTOURS WERE MODELED IN THE MINING VISUALIZATION SYSTEM USING KRIGING AND REPRESENT THE ESTIMATED 3D EXTENT OF PEBULATE.
2. µg/kg = MICROGRAMS PER KILOGRAM

NOVEMBER 2014

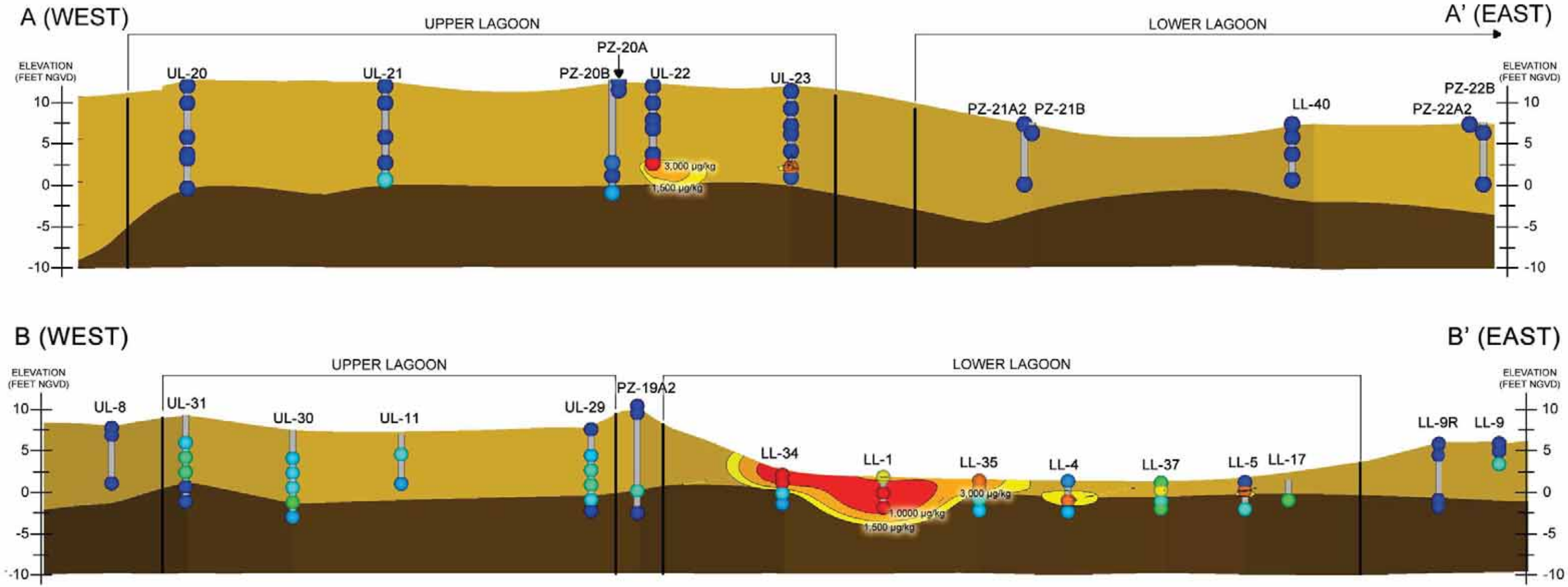
CAMPUS BAY SITE
RICHMOND, CALIFORNIA
PRE-DESIGN INVESTIGATION REPORT

CONCENTRATIONS OF PEBULATE IN SOIL AND SEDIMENT

ARCADIS

FIGURE
20

G:\ENVCAD\EmeryvilleACT\EM009358\0038\00007\Pre-Design INV RPT\CDR\EM009358_0038 C20.cdr



PEBULATE CONCENTRATION COLOR SCALE

- >10,000 µg/kg
- 3,000 µg/kg
- 1,500 µg/kg
- 1,000 µg/kg
- 100 µg/kg

LAGOON BOUNDARY

SAMPLE LOCATION (COLOR INDICATES RELATIVE CONCENTRATION)

BERM FILL OR LAGOON SEDIMENTS

NATIVE MATERIAL: BAY MUD (CLAY) WITH ALLUVIUM DEPOSITS (INTERBEDDED GRAVEL, SAND SILT, AND CLAY)

PEBULATE CONCENTRATION CONTOURS

- PEBULATE 1,000 µg/kg TO 3,000 µg/kg
- PEBULATE 3,000 µg/kg TO 10,000 µg/kg
- PEBULATE >10,000 µg/kg

Feet

0 100 200

HORIZONTAL SCALE

NOTES:

1. SOIL AND SEDIMENT DATA FROM 2007 TO 2013 ARE SHOWN ON THIS FIGURE. THE CONCENTRATION CONTOURS WERE MODELED IN THE MINING VISUALIZATION SYSTEM USING KRIGING AND REPRESENT THE ESTIMATED 3D EXTENT OF PEBULATE.
2. THE RELATIVE CONCENTRATION OF EACH SOIL OR SEDIMENT LOCATION IS INDICATED BY A RELATIVE COLOR SCALE. SAMPLE LOCATIONS AND CONTOURS WHICH ARE ORANGE OR RED INDICATE A CONCENTRATION GREATER THAN THE SITE SPECIFIC SEDIMENT SCREENING LEVEL OF 3,000 µg/kg.
3. CONTACT BETWEEN GEOLOGIC UNITS SHOWN ON CROSS-SECTION ARE APPROXIMATE AND INFERRED BETWEEN BORING LOCATIONS.
4. µg/kg = MICROGRAMS PER KILOGRAM

NOVEMBER 2014

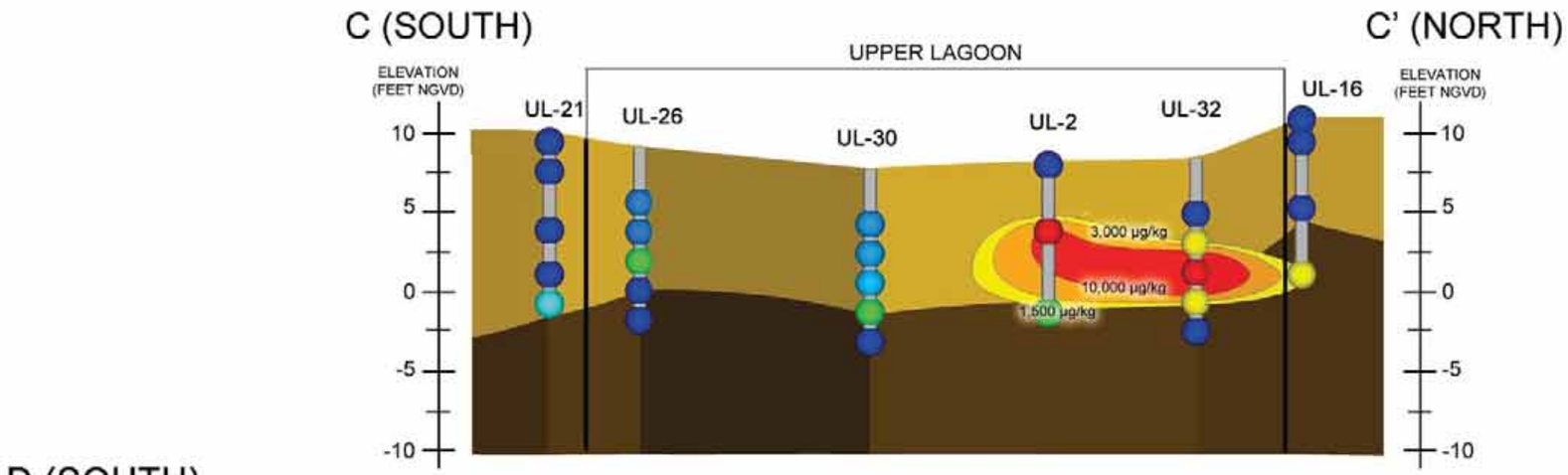
CAMPUS BAY SITE
RICHMOND, CALIFORNIA
PRE-DESIGN INVESTIGATION REPORT

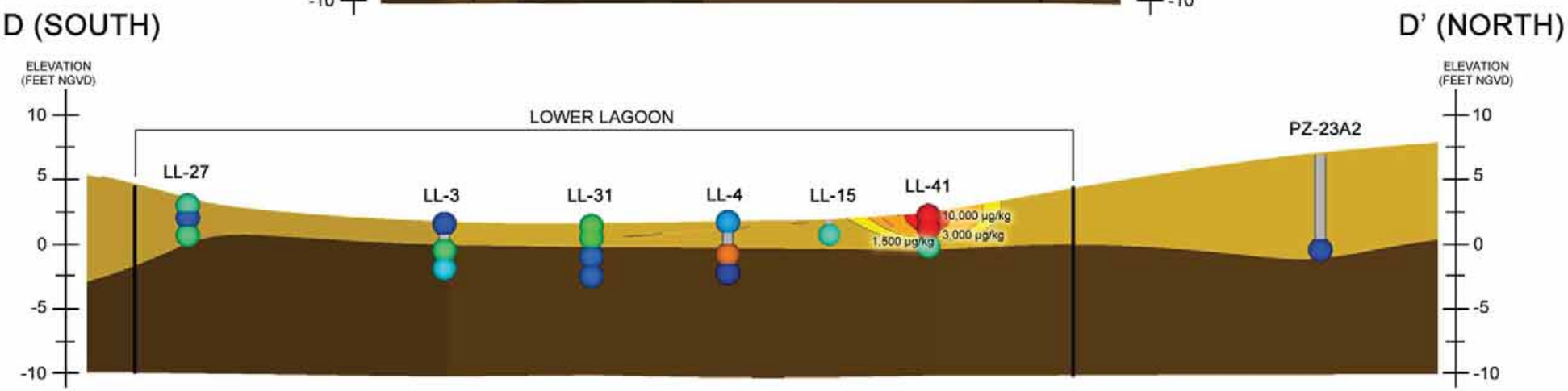
CONCENTRATIONS OF PEBULATE IN SOIL AND SEDIMENT, CROSS-SECTIONS A-A' and B-B'

ARCADIS

FIGURE
21

G:\ENVCAD\Emeryville\ACT\EM009358\0038\00007\Pre-Design INV RPT\CDR\EM009358_0038 C21.cdr





PEBULATE CONCENTRATION COLOR SCALE

- >10,000 µg/kg
- 3,000 µg/kg
- 1,500 µg/kg
- 1,000 µg/kg
- 100 µg/kg

LAGOON BOUNDARY

SAMPLE LOCATION (COLOR INDICATES RELATIVE CONCENTRATION)

BERM FILL OR LAGOON SEDIMENTS

NATIVE MATERIAL: BAY MUD (CLAY) WITH ALLUVIUM DEPOSITS (INTERBEDDED GRAVEL, SAND SILT, AND CLAY)

PEBULATE CONCENTRATION CONTOURS

- PEBULATE 1,000 µg/kg TO 3,000 µg/kg
- PEBULATE 3,000 µg/kg TO 10,000 µg/kg
- PEBULATE >10,000 µg/kg

Feet: 0, 100, 200

HORIZONTAL SCALE

NOTES:

1. SOIL AND SEDIMENT DATA FROM 2007 TO 2013 ARE SHOWN ON THIS FIGURE. THE CONCENTRATION CONTOURS WERE MODELED IN THE MINING VISUALIZATION SYSTEM USING KRIGING AND REPRESENT THE ESTIMATED 3D EXTENT OF PEBULATE.
2. THE RELATIVE CONCENTRATION OF EACH SOIL OR SEDIMENT LOCATION IS INDICATED BY A RELATIVE COLOR SCALE.
3. CONTACT BETWEEN GEOLOGIC UNITS SHOWN ON CROSS-SECTION ARE APPROXIMATE AND INFERRED BETWEEN BORING LOCATIONS.
4. µg/kg = MICROGRAMS PER KILOGRAM

NOVEMBER 2014

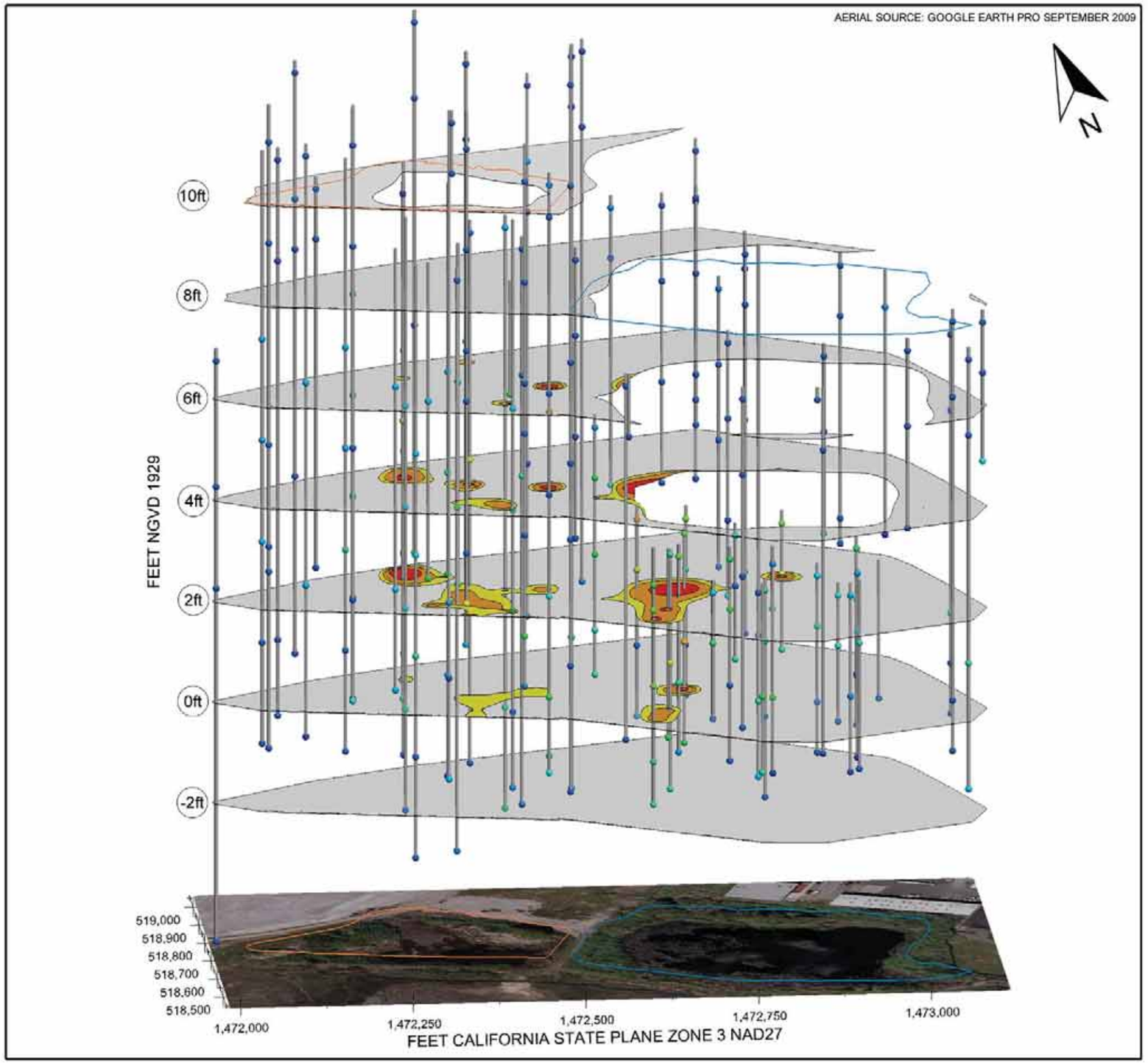
CAMPUS BAY SITE
RICHMOND, CALIFORNIA
PRE-DESIGN INVESTIGATION REPORT

CONCENTRATIONS OF PEBULATE IN SOIL AND SEDIMENT, CROSS-SECTIONS C-C' and D-D'

ARCADIS

FIGURE **22**

G:\ENVCAD\EmeryvilleACT\EM009358\0038\00007\Pre-Design INV RPT\CDR\EM009358_0038 C22.cdr



PEBULATE CONCENTRATION COLOR SCALE

- >10,000 µg/kg
- 3,000 µg/kg
- 1,500 µg/kg
- 1,000 µg/kg
- 100 µg/kg

UPPER LAGOON BOUNDARY

LOWER LAGOON BOUNDARY

SAMPLE LOCATION (COLOR INDICATES RELATIVE CONCENTRATION)

PEBULATE CONCENTRATION CONTOURS

- PEBULATE 1,000 µg/kg TO 3,000 µg/kg
- PEBULATE 3,000 µg/kg TO 10,000 µg/kg
- PEBULATE >10,000 µg/kg

NOTES:

1. SOIL AND SEDIMENT DATA FROM 2007 TO 2013 ARE SHOWN ON THIS FIGURE. THE CONCENTRATION CONTOURS WERE MODELED IN THE MINING VISUALIZATION SYSTEM USING KRIGING AND REPRESENT THE ESTIMATED 3D EXTENT OF PEBULATE.
2. THE RELATIVE CONCENTRATION OF EACH SOIL OR SEDIMENT LOCATION IS INDICATED BY A RELATIVE COLOR SCALE. SAMPLE LOCATIONS AND CONTOURS WHICH ARE ORANGE OR RED INDICATE A CONCENTRATION GREATER THAN THE SITE SPECIFIC SEDIMENT SCREENING LEVEL OF 3,000 µg/kg.
3. µg/kg = MICROGRAMS PER KILOGRAM

NOVEMBER 2014

CAMPUS BAY SITE
RICHMOND, CALIFORNIA
PRE-DESIGN INVESTIGATION REPORT

CONCENTRATIONS OF PEBULATE IN SOIL AND SEDIMENT 3-D MODEL

ARCADIS

FIGURE
23

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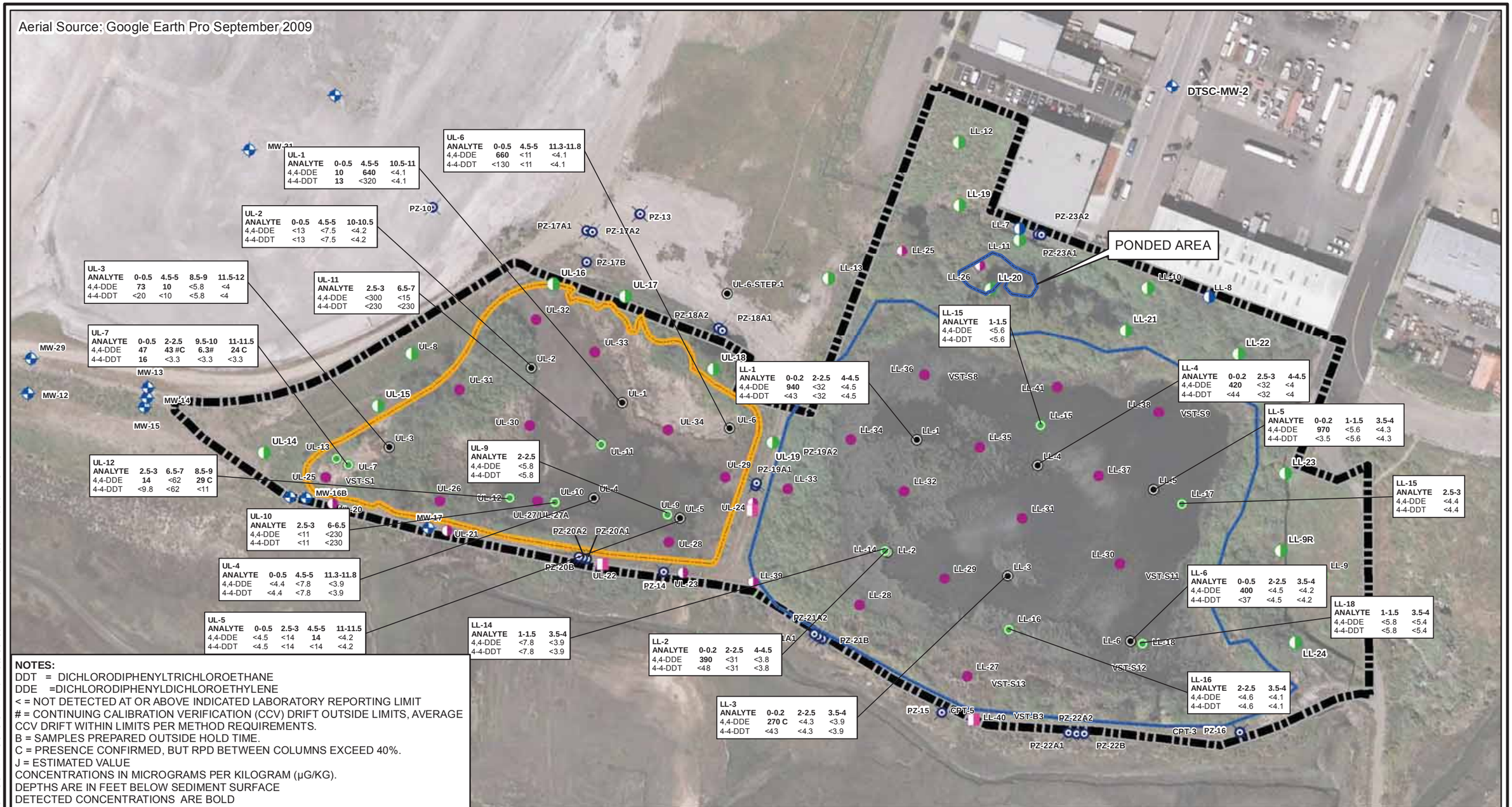


NOTES:

DDT = DICHLORODIPHENYLTRICHLOROETHANE
DDE =DICHLORODIPHENYLDICHLOROETHYLENE
< = NOT DETECTED AT OR ABOVE INDICATED LABORATORY REPORTING LIMIT
# = CONTINUING CALIBRATION VERIFICATION (CCV) DRIFT OUTSIDE LIMITS, AVERAGE CCV DRIFT WITHIN LIMITS PER METHOD REQUIREMENTS.
B = SAMPLES PREPARED OUTSIDE HOLD TIME.
C = PRESENCE CONFIRMED, BUT RPD BETWEEN COLUMNS EXCEED 40%.
J = ESTIMATED VALUE
CONCENTRATIONS IN MICROGRAMS PER KILOGRAM (µG/KG).
DEPTHS ARE IN FEET BELOW SEDIMENT SURFACE
DETECTED CONCENTRATIONS ARE BOLD

LEGEND

- A — EXISTING MONITORING WELL
- & — EXISTING PIEZOMETER
- 0 — SEDIMENT SAMPLE LOCATIONS (2007)
- ^ — SOIL SAMPLE LOCATIONS (2007)
- 0 — SEDIMENT SAMPLE LOCATIONS (2011 AND 2012)
- ^ — SOIL SAMPLE LOCATIONS (2011 AND 2012)
- < — SOIL SAMPLE LOCATION (2013)
- e — SOIL SAMPLE AND GEOTECHNICAL BORING (2013)
- ! — SEDIMENT SAMPLE LOCATION (2013)
- HABITAT AREA 2
- UPPER LAGOON - VEGETATED WETLAND
- LOWER LAGOON - VEGETATED WETLAND

LOCATION ID — SAMPLE DEPTH IN FEET (BEGINNING TO END)

LL-18
ANALYTE 1-1.5 3.5-4
4,4-DDE <5.8 <5.4
4-4-DDT <5.8 <5.4

CONCENTRATION RESULT

NOVEMBER 2014

0 100 200 Feet
GRAPHIC SCALE

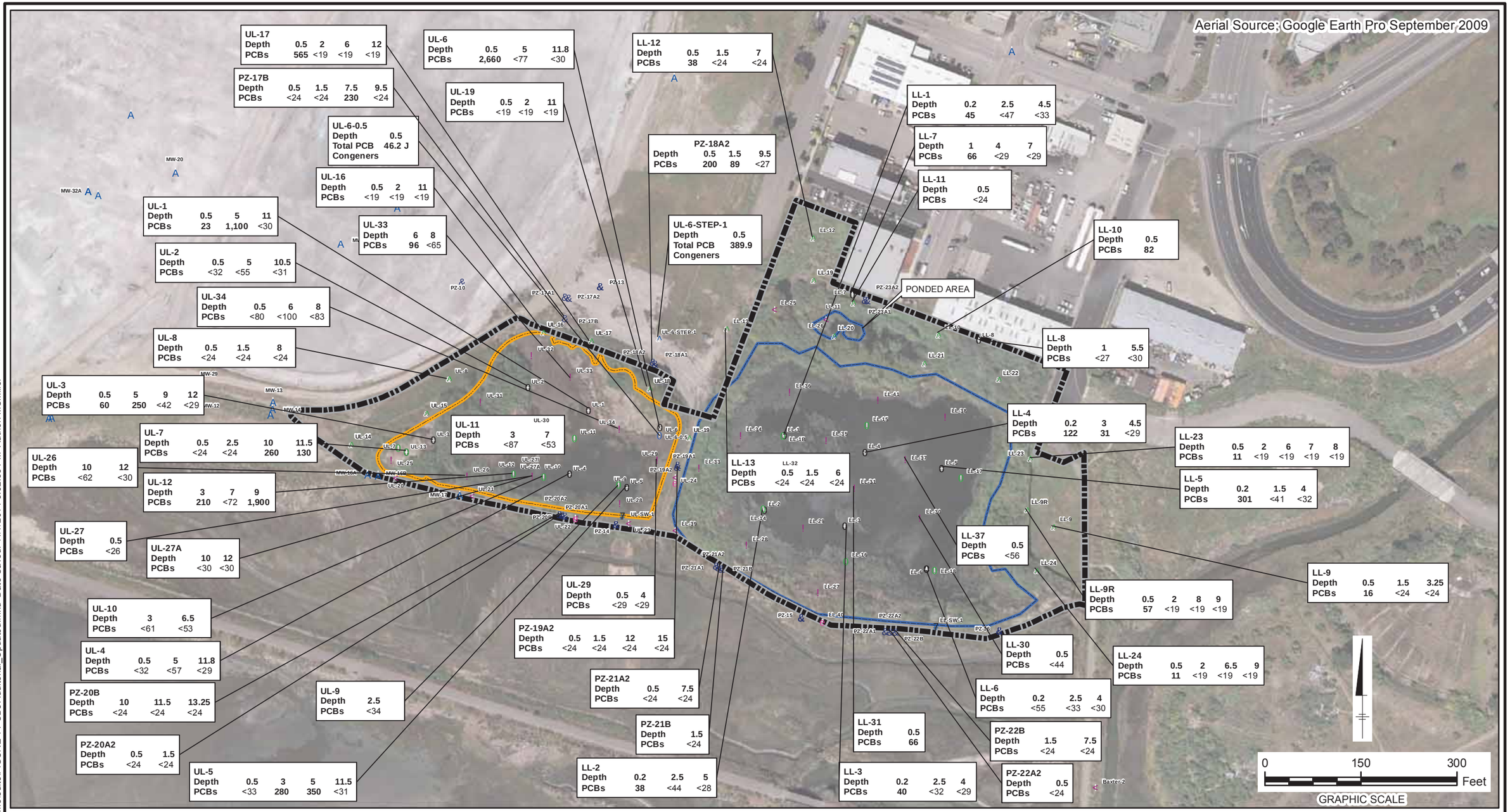
CAMPUS BAY SITE, RICHMOND, CALIFORNIA
PRE-DESIGN INVESTIGATION REPORT

CONCENTRATIONS OF OCPS IN SEDIMENT

ARCADIS

FIGURE 24

Path: C:\Users\msmiller\Desktop\CB Home\FIGURE X_OCPs_SED.mxd Date Saved: 4/17/2014 10:54:00 AM Author: MSMiller



LEGEND

- A MONITORING WELL
- & PIEZOMETER
- 0 SEDIMENT SAMPLE LOCATIONS (2007)
- 0 SEDIMENT SAMPLE LOCATION (2009)
- 0 SEDIMENT SAMPLE LOCATIONS (2011 AND 2012)
- ^ SOIL SAMPLE LOCATIONS (2010)
- ^ SOIL SAMPLE LOCATIONS (2011 AND 2012)
- < SOIL SAMPLE LOCATION (2013)
- e SOIL SAMPLE AND GEOTECHNICAL BORING (2013)
- ! SEDIMENT SAMPLE LOCATION (2013)
- HABITAT AREA 2
- UPPER LAGOON - VEGETATED WETLAND
- LOWER LAGOON - VEGETATED WETLAND

NOTES:

DETECTED CONCENTRATIONS ARE BOLD

CONCENTRATIONS IN MICROGRAMS PER KILOGRAM (µG/KG).

DEPTHS ARE IN FEET BELOW GROUND OR SEDIMENT SURFACE.

PCB = POLYCHLORINATED BIPHENYL.

UNLESS OTHERWISE STATED, THE DATA FOR PCBs ARE TOTAL PCB AROCLORS.

< = ANALYTE NOT DETECTED (HIGHEST AROCLOR REPORTING LIMIT LISTED)

J = ESTIMATED VALUE

ALL SEDIMENT DATA ON A DRY WEIGHT BASIS. HISTORICAL SOIL DATA ARE ON AN AS RECEIVED BASIS.

NOVEMBER 2014

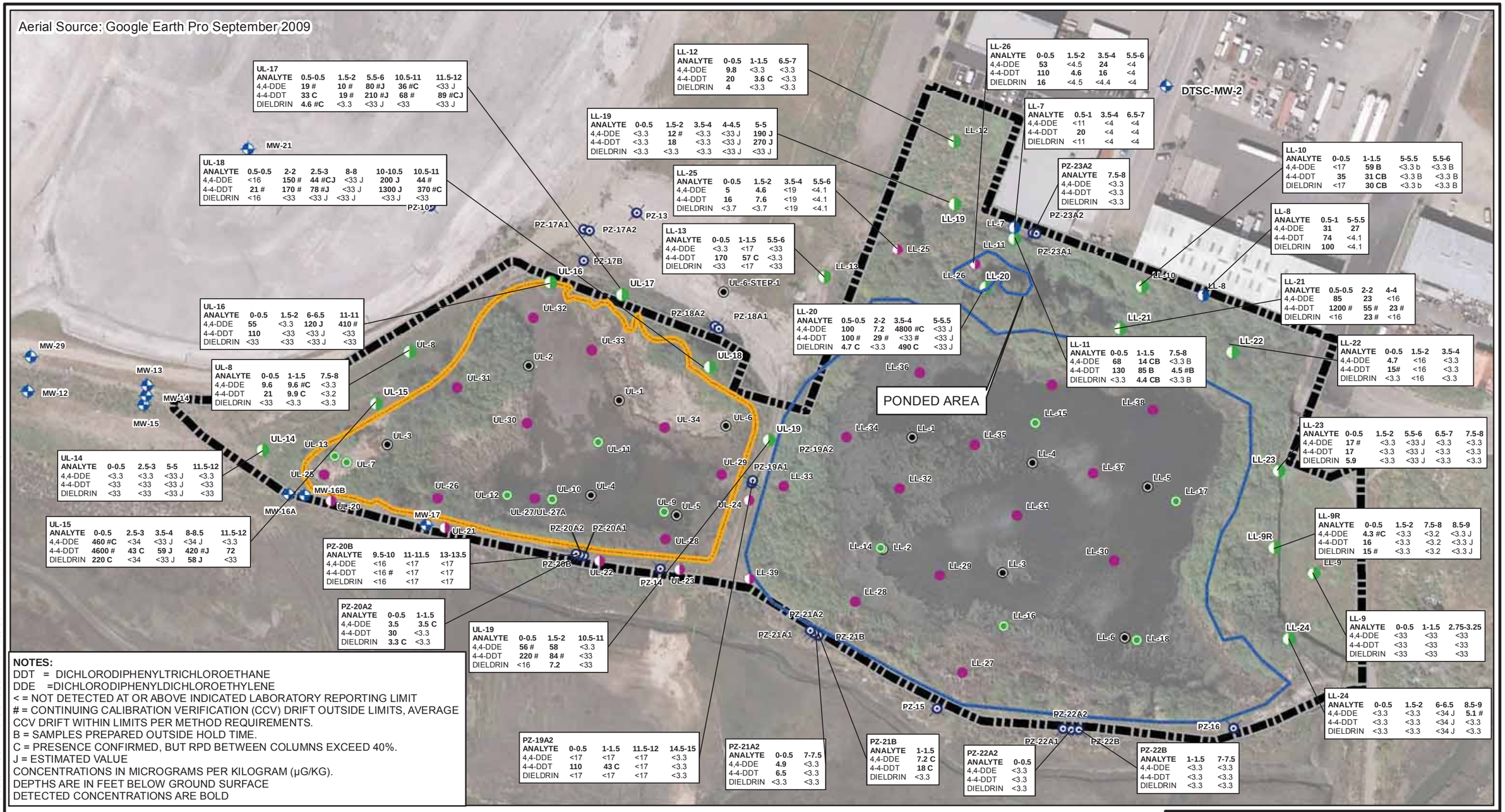
CAMPUS BAY SITE, RICHMOND, CALIFORNIA

PRE-DESIGN INVESTIGATION REPORT

CONCENTRATIONS OF PCBS IN SOIL AND SEDIMENT

ARCADIS

FIGURE 25



UL-17

ANALYTE	0.5-0.5	1.5-2	5.5-6	10.5-11	11.5-12
4,4-DDE	19 #	10 #	80 #J	36 #C	<33 J
4-4-DDT	33 C	19 #	210 #J	68 #	89 #CJ
DIELDRIN	4.6 #C	<3.3	<33 J	<33	<33 J

UL-18

ANALYTE	0.5-0.5	2-2	2.5-3	8-8	10-10.5	10.5-11
4,4-DDE	<16	150 #	44 #CJ	<33 J	200 J	44 #
4-4-DDT	21 #	170 #	78 #J	<33 J	1300 J	370 #C
DIELDRIN	<16	<33	<33 J	<33 J	<33 J	<33

UL-16

ANALYTE	0-0.5	1.5-2	6-6.5	11-11
4,4-DDE	55	<3.3	120 J	410 #
4-4-DDT	110	<33	<33 J	<33
DIELDRIN	<33	<33	<33 J	<33

UL-8

ANALYTE	0-0.5	1-1.5	7.5-8
4,4-DDE	9.6	9.6 #C	<3.3
4-4-DDT	21	9.9 C	<3.2
DIELDRIN	<33	<3.3	<3.3

UL-14

ANALYTE	0-0.5	2.5-3	5-5	11.5-12
4,4-DDE	<3.3	<3.3	<33 J	<3.3
4-4-DDT	<33	<33	<33 J	<33
DIELDRIN	<33	<33	<33 J	<33

UL-15

ANALYTE	0-0.5	2.5-3	3.5-4	8-8.5	11.5-12
4,4-DDE	460 #C	<34	<33 J	<34 J	<3.3
4-4-DDT	4600 #	43 C	59 J	420 #J	72
DIELDRIN	220 C	<34	<33 J	58 J	<33

PZ-20B

ANALYTE	9.5-10	11-11.5	13-13.5
4,4-DDE	<16	<17	<17
4-4-DDT	<16 #	<17	<17
DIELDRIN	<16	<17	<17

PZ-20A2

ANALYTE	0-0.5	1-1.5
4,4-DDE	3.5	3.5 C
4-4-DDT	30	<3.3
DIELDRIN	3.3 C	<3.3

UL-19

ANALYTE	0-0.5	1.5-2	10.5-11
4,4-DDE	56 #	58	<3.3
4-4-DDT	220 #	84 #	<33
DIELDRIN	<16	7.2	<33

LL-12

ANALYTE	0-0.5	1-1.5	6.5-7
4,4-DDE	9.8	<3.3	<3.3
4-4-DDT	20	3.6 C	<3.3
DIELDRIN	4	<3.3	<3.3

LL-19

ANALYTE	0-0.5	1.5-2	3.5-4	4-4.5	5-5
4,4-DDE	<3.3	12 #	<3.3	<33 J	190 J
4-4-DDT	<3.3	18	<3.3	<33 J	270 J
DIELDRIN	<3.3	<3.3	<3.3	<33 J	<33 J

LL-25

ANALYTE	0-0.5	1.5-2	3.5-4	5.5-6
4,4-DDE	5	4.6	<19	<4.1
4-4-DDT	16	7.6	<19	<4.1
DIELDRIN	<3.7	<3.7	<19	<4.1

LL-13

ANALYTE	0-0.5	1-1.5	5.5-6
4,4-DDE	<3.3	<17	<33
4-4-DDT	170	57 C	<3.3
DIELDRIN	<33	<17	<33

LL-20

ANALYTE	0.5-0.5	2-2	3.5-4	5-5.5
4,4-DDE	100	7.2	4800 #C	<33 J
4-4-DDT	100 #	29 #	<33 #	<33 J
DIELDRIN	4.7 C	<3.3	490 C	<33 J

LL-26

ANALYTE	0-0.5	1.5-2	3.5-4	5.5-6
4,4-DDE	53	<4.5	24	<4
4-4-DDT	110	4.6	16	<4
DIELDRIN	16	<4.5	<4.4	<4

LL-7

ANALYTE	0.5-1	3.5-4	6.5-7
4,4-DDE	<11	<4	<4
4-4-DDT	20	<4	<4
DIELDRIN	<11	<4	<4

PZ-23A2

ANALYTE	7.5-8
4,4-DDE	<3.3
4-4-DDT	<3.3
DIELDRIN	<3.3

LL-10

ANALYTE	0-0.5	1-1.5	5-5.5	5.5-6
4,4-DDE	<17	59 B	<3.3 b	<3.3 B
4-4-DDT	35	31 CB	<3.3 B	<3.3 B
DIELDRIN	<17	30 CB	<3.3 b	<3.3 B

LL-8

ANALYTE	0.5-1	5-5.5
4,4-DDE	31	27
4-4-DDT	74	<4.1
DIELDRIN	100	<4.1

LL-21

ANALYTE	0.5-0.5	2-2	4-4
4,4-DDE	85	23	<16
4-4-DDT	1200 #	55 #	23 #
DIELDRIN	<16	23 #	<16

LL-11

ANALYTE	0-0.5	1-1.5	7.5-8
4,4-DDE	68	14 CB	<3.3 B
4-4-DDT	130	85 B	4.5 #B
DIELDRIN	<3.3	4.4 CB	<3.3 B

LL-22

ANALYTE	0-0.5	1.5-2	3.5-4
4,4-DDE	4.7	<16	<3.3
4-4-DDT	15#	<16	<3.3
DIELDRIN	<3.3	<16	<3.3

LL-23

ANALYTE	0-0.5	1.5-2	5.5-6	6.5-7	7.5-8
4,4-DDE	17 #	<3.3	<33 J	<3.3	<3.3
4-4-DDT	17	<3.3	<33 J	<3.3	<3.3
DIELDRIN	5.9	<3.3	<33 J	<3.3	<3.3

LL-9R

ANALYTE	0-0.5	1.5-2	7.5-8	8.5-9
4,4-DDE	4.3 #C	<3.3	<3.2	<3.3 J
4-4-DDT	16	<3.3	<3.2	<3.3 J
DIELDRIN	15 #	<3.3	<3.2	<3.3 J

LL-9

ANALYTE	0-0.5	1-1.5	2.75-3.25
4,4-DDE	<33	<33	<33
4-4-DDT	<33	<33	<33
DIELDRIN	<33	<33	<33

LL-24

ANALYTE	0-0.5	1.5-2	6-6.5	8.5-9
4,4-DDE	<3.3	<3.3	<34 J	5.1 #
4-4-DDT	<3.3	<3.3	<34 J	<3.3
DIELDRIN	<3.3	<3.3	<34 J	<3.3

PZ-19A2

ANALYTE	0-0.5	1-1.5	11.5-12	14.5-15
4,4-DDE	<17	<17	<17	<3.3
4-4-DDT	110	43 C	<17	<3.3
DIELDRIN	<17	<17	<17	<3.3

PZ-21A2

ANALYTE	0-0.5	7-7.5
4,4-DDE	4.9	<3.3
4-4-DDT	6.5	<3.3
DIELDRIN	<3.3	<3.3

PZ-21B

ANALYTE	1-1.5
4,4-DDE	7.2 C
4-4-DDT	18 C
DIELDRIN	<3.3

PZ-22A2

ANALYTE	0-0.5
4,4-DDE	<3.3
4-4-DDT	<3.3
DIELDRIN	<3.3

PZ-22B

ANALYTE	1-1.5	7-7.5
4,4-DDE	<3.3	<3.3
4-4-DDT	<3.3	<3.3
DIELDRIN	<3.3	<3.3

NOTES:

DDT = DICHLORODIPHENYLTRICHLOROETHANE
DDE =DICHLORODIPHENYLDICHLOROETHYLENE
< = NOT DETECTED AT OR ABOVE INDICATED LABORATORY REPORTING LIMIT
# = CONTINUING CALIBRATION VERIFICATION (CCV) DRIFT OUTSIDE LIMITS, AVERAGE CCV DRIFT WITHIN LIMITS PER METHOD REQUIREMENTS.
B = SAMPLES PREPARED OUTSIDE HOLD TIME.
C = PRESENCE CONFIRMED, BUT RPD BETWEEN COLUMNS EXCEED 40%.
J = ESTIMATED VALUE
CONCENTRATIONS IN MICROGRAMS PER KILOGRAM (µG/KG).
DEPTHS ARE IN FEET BELOW GROUND SURFACE
DETECTED CONCENTRATIONS ARE BOLD

LEGEND

- A — EXISTING MONITORING WELL
- & — EXISTING PIEZOMETER
- 0 — SEDIMENT SAMPLE LOCATIONS (2007)
- ^ — SOIL SAMPLE LOCATIONS (2007)
- 0 — SEDIMENT SAMPLE LOCATIONS (2011 AND 2012)
- ^ — SOIL SAMPLE LOCATIONS (2011 AND 2012)
- < — SOIL SAMPLE LOCATION (2013)
- e — SOIL SAMPLE AND GEOTECHNICAL BORING (2013)
- ! — SEDIMENT SAMPLE LOCATION (2013)
- HABITAT AREA 2
- UPPER LAGOON - VEGETATED WETLAND
- LOWER LAGOON - VEGETATED WETLAND

LOCATION ID

SAMPLE DEPTH IN FEET (BEGINNING TO END)

PZ-21A2

ANALYTE	0-0.5	7-7.5
4,4-DDE	4.9	<3.3
4-4-DDT	6.5	<3.3
DIELDRIN	<3.3	<3.3

CONCENTRATION RESULT

NOVEMBER 2014

0 100 200 Feet

GRAPHIC SCALE

CAMPUS BAY SITE, RICHMOND, CALIFORNIA

PRE-DESIGN INVESTIGATION REPORT

CONCENTRATIONS OF OCPS IN SOIL

ARCADIS

FIGURE 26

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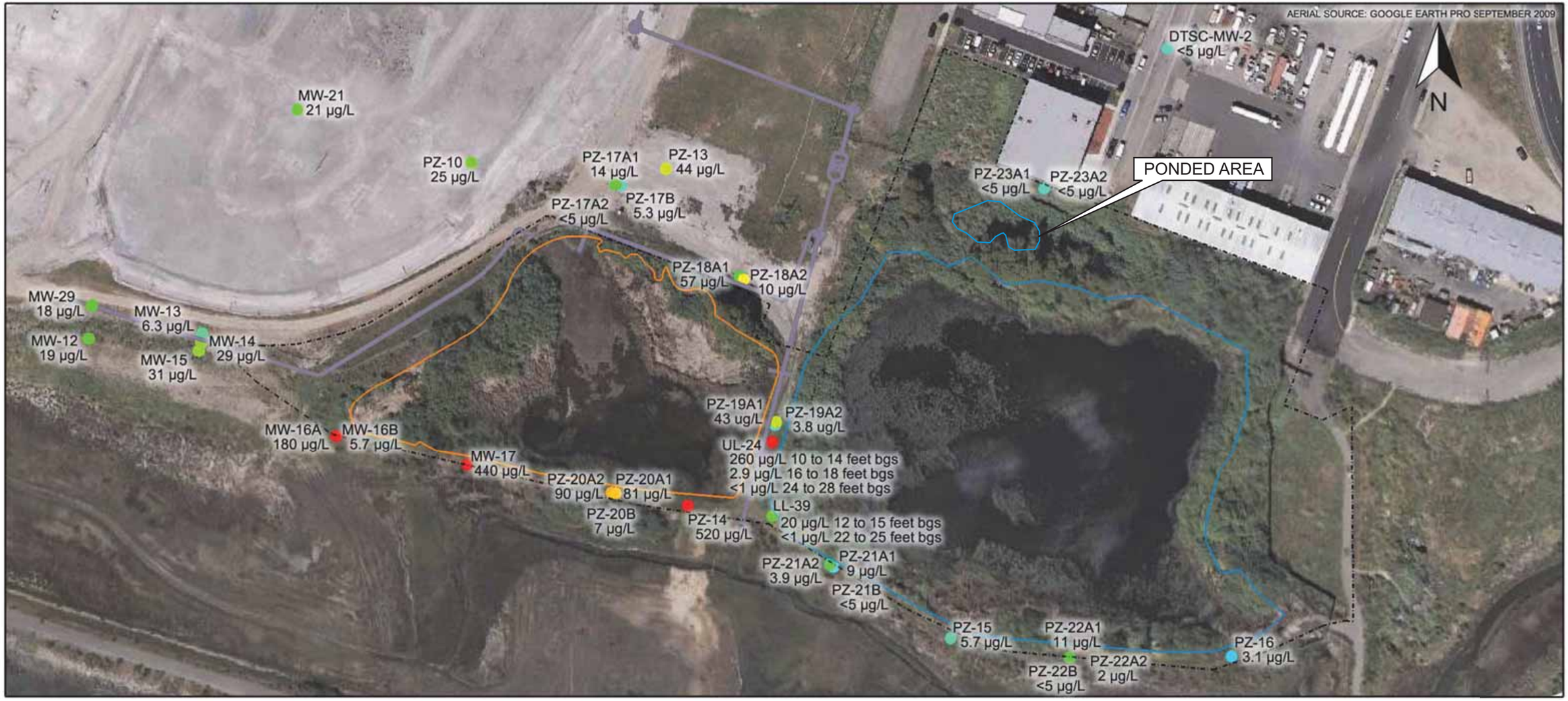

ARSENIC CONCENTRATION COLOR SCALE

- >180 µg/l
- 100 µg/l
- 10 µg/l
- 1 µg/l

- HABITAT AREA 2
- UPPER LAGOON BOUNDARY
- LOWER LAGOON BOUNDARY
- STORMWATER SYSTEM
- SAMPLE LOCATION (COLOR INDICATES RELATIVE CONCENTRATION)

0 100 200 Feet
GRAPHIC SCALE

NOTES:

1. GROUNDWATER DATA SHOWN ON THIS FIGURE ARE FROM APRIL AND MAY 2013 WHERE DATA IS AVAILABLE. GROUNDWATER DATA FROM APRIL AND MAY 2012 ARE SHOWN FOR WELLS PZ-10, PZ-17A1/A2/B, PZ-18A1/A2, PZ-23A1/A2, PZ-20B, PZ-21B, AND PZ-22B. GROUNDWATER DATA FROM NOVEMBER 2010 ARE SHOWN FOR MW-21.
2. GRAB GROUNDWATER SAMPLES WERE COLLECTED IN MAY 2013 AT UL-24 AT 10 TO 14 FEET BGS, 16 TO 18 FEET BGS, AND 24 TO 28 BGS AND AT LL-39 AT 12 TO 15 FEET BGS AND 22 TO 25 FEET BGS
3. < = NOT DETECTED AT OR ABOVE INDICATED LABORATORY REPORTING LIMIT
4. µg/L = MICROGRAMS PER LITER
5. BGS = BELOW GROUND SURFACE

NOVEMBER 2014

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CONCENTRATIONS OF ARSENIC IN GROUNDWATER

ARCADIS

FIGURE
27

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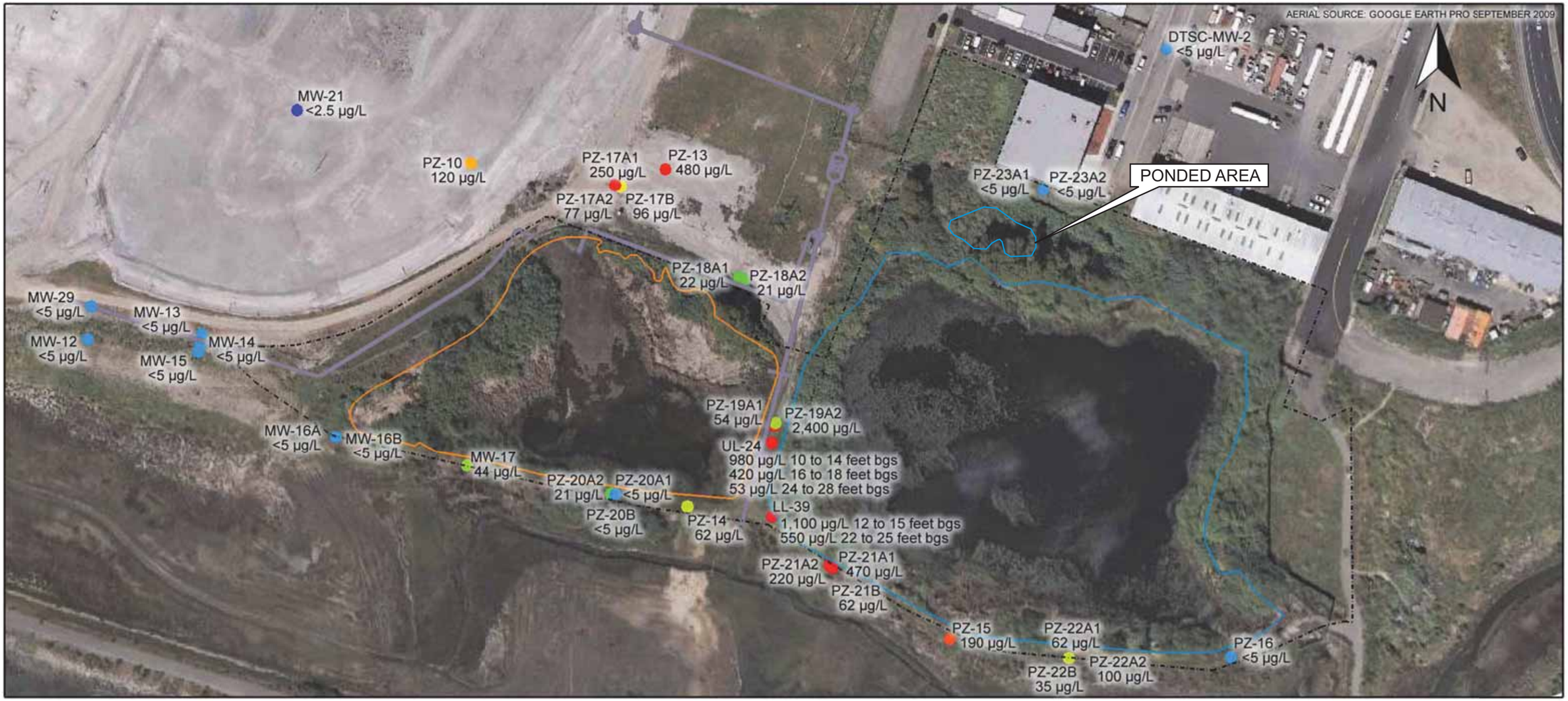

EPTC CONCENTRATION COLOR SCALE

- >220 µg/l
- 100 ug/l
- 10 µg/l
- 1 µg/l

- HABITAT AREA 2
- UPPER LAGOON BOUNDARY
- LOWER LAGOON BOUNDARY
- STORMWATER SYSTEM
- SAMPLE LOCATION (COLOR INDICATES RELATIVE CONCENTRATION)

0 100 200 Feet
GRAPHIC SCALE

NOTES:
1. GROUNDWATER DATA SHOWN ON THIS FIGURE ARE FROM APRIL AND MAY 2013 WHERE DATA IS AVAILABLE. GROUNDWATER DATA FROM APRIL AND MAY 2012 ARE SHOWN FOR WELLS PZ-10, PZ-17A1/A2/B, PZ-18A1/A2, PZ-23A1/A2, PZ-20B, PZ-21B, AND PZ-22B. GROUNDWATER DATA FROM NOVEMBER 2010 ARE SHOWN FOR MW-21.
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3. < = NOT DETECTED AT OR ABOVE INDICATED LABORATORY REPORTING LIMIT
4. µg/L = MICROGRAMS PER LITER
5. BGS = BELOW GROUND SURFACE

NOVEMBER 2014

CAMPUS BAY SITE
RICHMOND, CALIFORNIA
PRE-DESIGN INVESTIGATION REPORT

CONCENTRATIONS OF EPTC IN GROUNDWATER

ARCADIS

FIGURE
28

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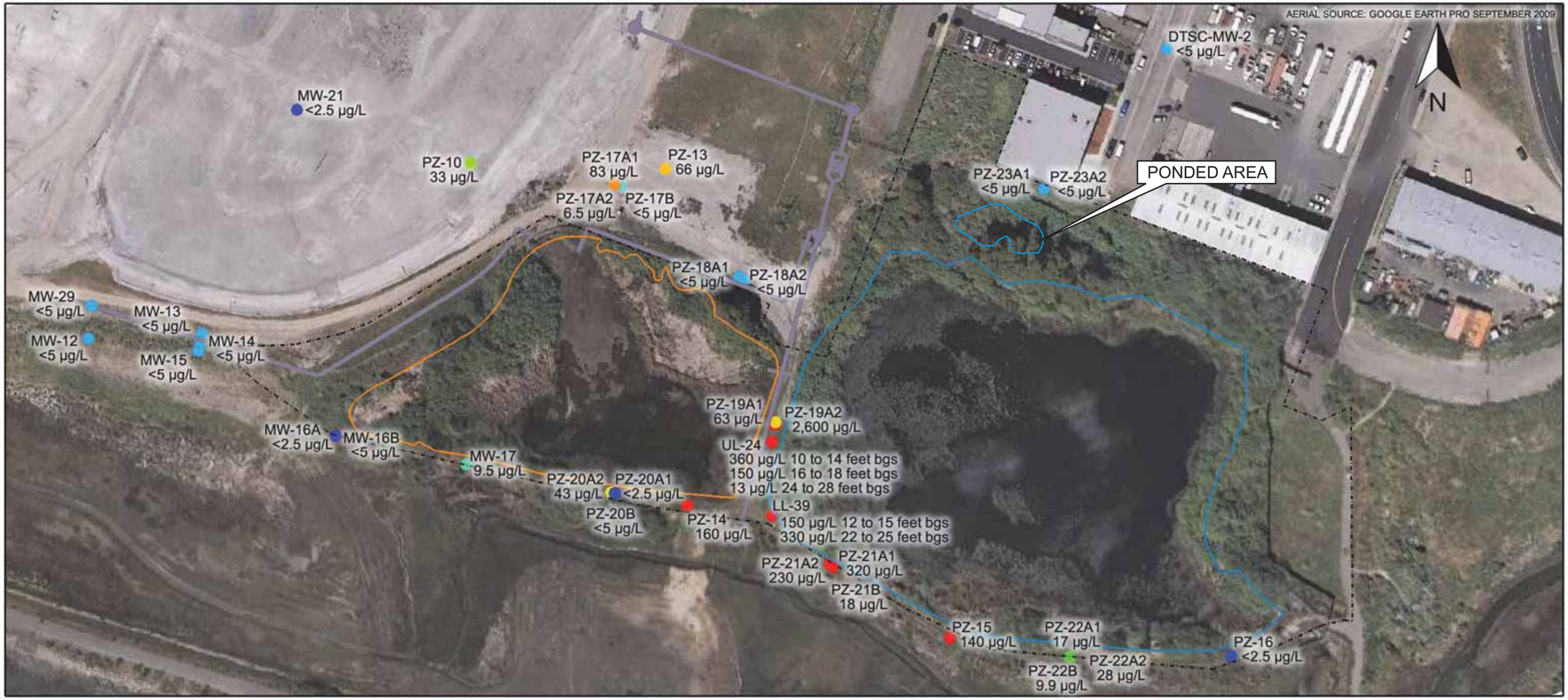

PEBULATE CONCENTRATION COLOR SCALE

- >120 µg/l
- 100 µg/l
- 10 µg/l
- 1 µg/l

- HABITAT AREA 2
- UPPER LAGOON BOUNDARY
- LOWER LAGOON BOUNDARY
- STORMWATER SYSTEM
- SAMPLE LOCATION (COLOR INDICATES RELATIVE CONCENTRATION)

0 100 200 Feet
GRAPHIC SCALE

NOTES:
1. GROUNDWATER DATA SHOWN ON THIS FIGURE ARE FROM APRIL AND MAY 2013 WHERE DATA IS AVAILABLE. GROUNDWATER DATA FROM APRIL AND MAY 2012 ARE SHOWN FOR WELLS PZ-10, PZ-17A1/A2/B, PZ-18A1/A2, PZ-23A1/A2, PZ-20B, PZ-21B, AND PZ-22B. GROUNDWATER DATA FROM NOVEMBER 2010 ARE SHOWN FOR MW-21.
2. GRAB GROUNDWATER SAMPLES WERE COLLECTED IN MAY 2013 AT UL-24 AT 10 TO 14 FEET BGS, 16 TO 18 FEET BGS, AND 24 TO 28 BGS AND AT LL-39 AT 12 TO 15 FEET BGS AND 22 TO 25 FEET BGS
3. < = NOT DETECTED AT OR ABOVE INDICATED LABORATORY REPORTING LIMIT
4. µg/L = MICROGRAMS PER LITER
5. BGS = BELOW GROUND SURFACE

NOVEMBER 2014

CAMPUS BAY SITE
RICHMOND, CALIFORNIA
PRE-DESIGN INVESTIGATION REPORT

CONCENTRATIONS OF PEBULATE IN GROUNDWATER

ARCADIS

FIGURE
29

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ARSENIC CONCENTRATION COLOR SCALE

- >180 µg/l
- 100 µg/l
- 10 µg/l
- 1 µg/l

- HABITAT AREA 2
- UPPER LAGOON BOUNDARY
- LOWER LAGOON BOUNDARY
- STORMWATER SYSTEM
- SAMPLE LOCATION (COLOR INDICATES RELATIVE CONCENTRATION)

0 100 200 Feet
GRAPHIC SCALE

NOTES:
1. PORE WATER DATA SHOWN ON THIS FIGURE ARE FROM MAY TO AUGUST 2013
2. THE PORE WATER SAMPLE DEPTH IS PROVIDED IN FEET BELOW SEDIMENT SURFACE. THE DEPTH RANGE FOR PORE WATER SAMPLES INDICATE THE DEPTH RANGE OF SEDIMENT FROM WHICH PORE WATER WAS EXTRACTED.
3. µg/L = MICROGRAMS PER LITER
4. BSS = BELOW SEDIMENT SURFACE

NOVEMBER 2014

CAMPUS BAY SITE
RICHMOND, CALIFORNIA
PRE-DESIGN INVESTIGATION REPORT

CONCENTRATIONS OF ARSENIC IN PORE WATER

ARCADIS

FIGURE
30

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EPTC CONCENTRATION COLOR SCALE

- >220 µg/l
- 100 µg/l
- 10 µg/l
- 1 µg/l

HABITAT AREA 2

UPPER LAGOON BOUNDARY

LOWER LAGOON BOUNDARY

STORMWATER SYSTEM

SAMPLE LOCATION (COLOR INDICATES RELATIVE CONCENTRATION)

0 100 200 Feet

GRAPHIC SCALE

NOTES:
1. PORE WATER DATA SHOWN ON THIS FIGURE ARE FROM MAY TO AUGUST 2013
2. THE PORE WATER SAMPLE DEPTH IS PROVIDED IN FEET BELOW SEDIMENT SURFACE. THE DEPTH RANGE FOR PORE WATER SAMPLES INDICATE THE DEPTH RANGE OF SEDIMENT FROM WHICH PORE WATER WAS EXTRACTED.
3. < = NOT DETECTED AT OR ABOVE INDICATED LABORATORY REPORTING LIMIT
4. µg/L = MICROGRAMS PER LITER
5. BSS = BELOW SEDIMENT SURFACE

NOVEMBER 2014

CAMPUS BAY SITE
RICHMOND, CALIFORNIA
PRE-DESIGN INVESTIGATION REPORT

CONCENTRATIONS OF EPTC IN PORE WATER

ARCADIS

FIGURE
31

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PEBULATE CONCENTRATION COLOR SCALE

- >120 µg/l
- 100 µg/l
- 10 µg/l
- 1 µg/l

HABITAT AREA 2

UPPER LAGOON BOUNDARY

LOWER LAGOON BOUNDARY

STORMWATER SYSTEM

SAMPLE LOCATION (COLOR INDICATES RELATIVE CONCENTRATION)

0 100 200 Feet

GRAPHIC SCALE

NOTES:

1. PORE WATER DATA SHOWN ON THIS FIGURE ARE FROM MAY TO AUGUST 2013
2. THE PORE WATER SAMPLE DEPTH IS PROVIDED IN FEET BELOW SEDIMENT SURFACE. THE DEPTH RANGE FOR PORE WATER SAMPLES INDICATE THE DEPTH RANGE OF SEDIMENT FROM WHICH PORE WATER WAS EXTRACTED.
3. < = NOT DETECTED AT OR ABOVE INDICATED LABORATORY REPORTING LIMIT
4. µg/L = MICROGRAMS PER LITER
5. BSS = BELOW SEDIMENT SURFACE

NOVEMBER 2014

CAMPUS BAY SITE
RICHMOND, CALIFORNIA
PRE-DESIGN INVESTIGATION REPORT

CONCENTRATIONS OF PEBULATE IN PORE WATER

ARCADIS

FIGURE
32

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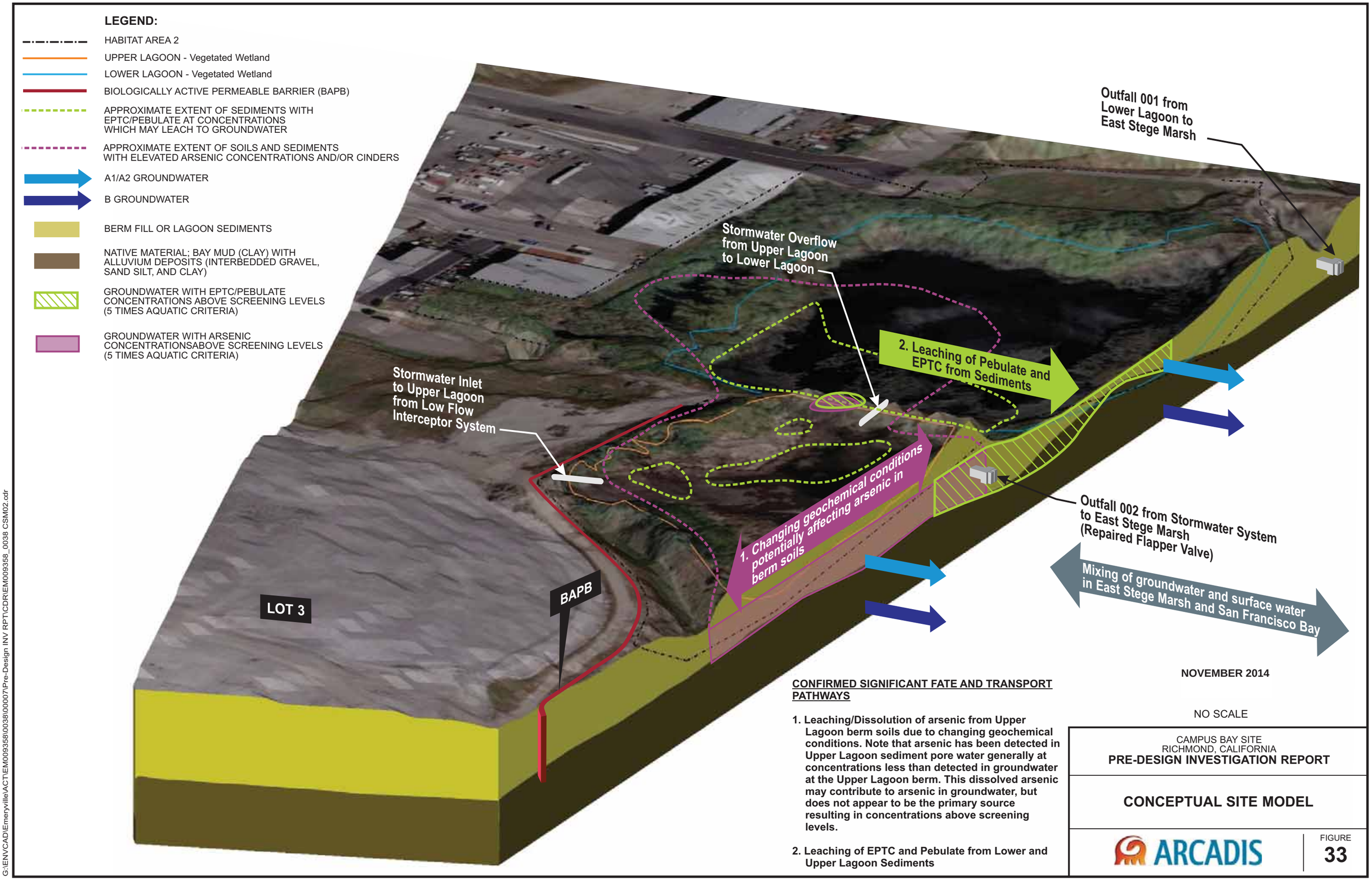

CONFIRMED SIGNIFICANT FATE AND TRANSPORT PATHWAYS

1. Leaching/Dissolution of arsenic from Upper Lagoon berm soils due to changing geochemical conditions. Note that arsenic has been detected in Upper Lagoon sediment pore water generally at concentrations less than detected in groundwater at the Upper Lagoon berm. This dissolved arsenic may contribute to arsenic in groundwater, but does not appear to be the primary source resulting in concentrations above screening levels.

2. Leaching of EPTC and Pebulate from Lower and Upper Lagoon Sediments

NOVEMBER 2014

NO SCALE

CAMPUS BAY SITE
RICHMOND, CALIFORNIA
PRE-DESIGN INVESTIGATION REPORT

CONCEPTUAL SITE MODEL

ARCADIS

FIGURE
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