ENVIRONMENTAL SITE INVESTIGATION REPORT
EXECUTIVE SUMMARY
Pier 70 Master Plan Area
San Francisco, California

Prepared For:
Port of San Francisco
San Francisco, California

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Project No. 4963.01

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ES.1 INTRODUCTION

Treadwell & Rollo, Inc. (T&R) prepared the Site Investigation (SI) Report (SI Report) to present the results of the SI conducted in the upland portion of the Pier 70 Master Plan Area (Site) in San Francisco, California (Figure ES-1) for the Port of San Francisco (Port). The purpose of the SI was to identify and collect the data needed to support a risk assessment, evaluate potential remedies and mitigation measures, and develop a risk management plan (RMP) to be implemented during and after Site redevelopment. The SI focused on the upland portion of the Site and assessed soil gas, soil, and groundwater impacts. It does not include assessment of hazardous building materials or offshore sediment impacts. This SI Report includes a Human Health Risk Assessment (HHRA) and an Ecological Screening Level Risk Assessment (ESLRA). The SI was performed in general accordance with a work plan which was approved by the San Francisco Bay Regional Water Quality Control Board (Water Board) in a letter dated 15 October 2009, and finalized as the *Site Investigation Work Plan for the Pier 70 Master Plan Area, San Francisco California* (Work Plan) prepared by T&R, dated 29 October 2009. This SI Report presents findings and recommendations regarding the potential impacts of contamination on Site redevelopment and was prepared with oversight by the Water Board and the San Francisco Department of Public Health (SFDPH).

The Pier 70 Master Plan Area (Figure ES-2) is located on the eastern shoreline of San Francisco at Potrero Point (a continuation of serpentinite-based Potrero Hill) and is roughly bounded by 22nd Street to the south, Illinois Street to the west, and San Francisco Bay to the north and east. The Site encompasses approximately 69 acres and is largely underlain by fill material placed seaward of the San Francisco historic shoreline (Figure ES-2) between the late 1800s to early 1900s. The original shoreline was comprised of serpentinite bluffs overlooking mud flats that extended into San Francisco Bay. Much of the land that now makes up the Site was constructed by blasting the serpentinite hills of Potrero Point (Port of San Francisco, 2009a) and placing the resultant rock in the Bay to create new land along the shoreline.

ES.2 BACKGROUND

Since the 1890s, the area has been used for the manufacture, maintenance, and repair of marine vessels by companies including Union Iron Works, Bethlehem Steel, Todd Shipyards, Risden Iron Works, Southwest Marine, SF Drydock, and the US Navy. During World Wars I and II, Bethlehem Steel was one of the largest producers of destroyers and submarine ships. Operations at the Site have included administration and engineering offices, metal foundries, galvanizing shops, warehouses, paint shops,

plating shops, powerhouses including boilers and transformers, dry docks, lumber and steel lay down yards, and ship docking slips and piers (T&R, 2007).

Recent land use has included metals recycling, car crushing and storage, ship repair, and warehousing. Currently, the largest tenant at the Site is BAE Systems San Francisco Ship Repair (BAE), which currently operates a dry dock and ship repair facility on approximately 15 acres of the Site (Figure ES-2). The second largest tenant is Auto Return, which provides towing and car return services for City of San Francisco (Figure ES-3). Other tenants include various storage and warehousing operations, and Sim's metals, a scrap metal yard. Approximately two-thirds of the Site is covered by buildings, pavement, or gravel, with some portions of the Site including weedy patches of vegetation. The shoreline consists of rock or rubble riprap or piers on pilings that extend out over the open water.

This Site is largely located bayward of San Francisco's historic shoreline (Figures ES-2 and ES-3). Previous investigations of properties bayward of the 1852 shoreline have found fill material with elevated levels of metals and petroleum hydrocarbons as a result of the 1906 earthquake and fire. The Pier 70 site is like many sites along San Francisco's waterfront that are comprised primarily of fill material, some of which contains contaminants that exceed California state criteria for hazardous waste and will require special handling and disposal. In accordance with the requirements of San Francisco Health Code Article 22A, a site mitigation and health and safety plan will also be required before construction or off-haul of fill material to designated landfills.

The results of this SI are intended to support redevelopment of the Site in accordance with the *Pier 70 Preferred Master Plan* (Master Plan, Port of San Francisco, 2009a). The Master Plan envisions a redevelopment program that meets the following goals:

- Reuse and rehabilitate maritime historic structures to be recognized in the National Register Historic District;
- Create new shoreline parks and open space;
- Integrate commercial and residential development, and shoreline open space with the existing ship repair and dry dock industry; and
- Develop a land use plan that will respect historic character as well as promote economic development.

The Master Plan divided the Site into Parcels 1 though 9, and into four parks including Crane Cove Park, Slipways Park, Irish Hill and Central Plaza Park (Figure ES-4)[1].

ES.3 OBJECTIVES

The objectives of the SI are to:

- Update the initial Site Conceptual Model (SCM) using SI data;
- Collect and analyze soil gas, soil, and groundwater samples to provide chemical concentration data needed to support the HHRA, ESLRA, and FS;
- Collect soil chemical concentration data required by Article 22A to estimate hazardous waste soil volumes that could require special handling and disposal at designated landfills; and,
- Identify and collect the data needed to develop a RMP to be implemented during Site redevelopment.

ES.4 POTENTIAL SOURCE AREAS

Potential source areas of environmental concern have been identified based on the historic operations described above and more recent land uses documented for Pier 70. Contaminants of potential concern (COPCs) are either naturally-occurring constituents or contaminants introduced into environmental media (i.e. soil, soil gas, groundwater) by site construction or site use that pose a potential for adverse impact to people, plants, animals, or the environment. Shipbuilding, maintenance and repair operations on Pier 70 that are considered potential contaminant source areas include: metal foundries, galvanizing shops, machinery warehouses, plating shops, power generating facilities (boiler rooms and transformers), planning mills, flange shops, and steel yards. Various environmental investigations have been conducted at the Site to address different objectives including characterization of areas for future land use development, regulatory compliance requirements, and source-specific characterization and delineation of known areas of contamination. Potential source areas are illustrated on Figure ES-5. Contamination associated with the former manufactured gas plant (MGP) operatrions at the Potrero Power Plan site located south of Pier 70 has migrated north and appears to be present beneath portions of Parcel 8 and Slipways Park. PG&E is currently investigating the extent of MPG-related contaminants in the area (AMEC,

[1] The SI used the August 2009 draft Master Plan definition of parcels 1 through 8, with a ninth parcel comprising the ship repair area. As finalized in April 2010, the Master Plan grouped these eight into four parcels. See Exhibit 2 to the Pier 70 Preferred Master Plan, April 2010.

2010). Soil and groundwater in the impacted area contain polycyclic aromatic hydrocarbons (PAHs), benzene, toluene, ethylbenzene, xylenes (BTEX), petroleum hydrocarbons, and metals.

Previous soil and groundwater investigation results were compared to Regional Water Quality Control Board (Water Board) Commercial and Residential Environmental Screening Levels (ESLs) for both soil and groundwater (Water Board, 2008, Table B). Groundwater results were also compared to vapor intrusion ESLs (Water Board, 2008, Table E-1). The historical data comparison to ESLs indicated that metals, volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), PAHs, polychlorinated biphenyls (PCBs), pesticides, and total petroleum hydrocarbons (TPH) are present, in some instances at concentrations that exceed ESLs.

ES.5 SITE CONCEPTUAL MODEL

Results from previous investigations, conducted prior to this SI found metals, TPH, PAHs, and PCBs in subsurface soil. Metals, TPH, PAHs, and VOCs have also been detected in groundwater. Soil gas samples had not been collected previously. The likely sources of these COPCs are the historic Bay fill material, former fuel use and storage, and shipbuilding and other industrial operations previously conducted at the Site. Chemicals may have been placed during Bay infilling, spilled at the ground surface or released in the subsurface soil and leached to shallow groundwater. Based on this previous information, an initial SCM was developed and presented in the Work Plan to understand the potential sources of contamination, COPCs, potentially affected media (soil, soil gas, and groundwater), and transport and exposure pathways that could potentially impact human or ecological receptors. The SCM synthesizes what is known to date into a snapshot that communicates the Site physical setting and COPC release or exposure mechanisms. Based on the findings of this SI, the initial SCM was updated and the current SCM is presented in Figure ES-6.

ES.6 REMEDIAL ACTION OBJECTIVES

Remedial Action Objectives (RAOs) are media-specific (soil gas, soil, and groundwater) goals for protecting human health and the environment consistent with future land use described in the Master Plan which include commercial and limited residential land use.

COPCs in soil gas include VOCs and methane. The soil gas RAOs for protection of human health include:

- Prevent or minimize future site users' exposure to VOCs in soil gas exceeding appropriate screening levels through inhalation of VOCs volatilized from the subsurface into outdoor air.
- Prevent or minimize future site users' exposure to VOCs in soil gas exceeding appropriate screening levels through inhalation of VOCs volatilized from the subsurface into indoor air.
- Prevent or minimize construction workers' exposure to methane in trenches or excavations at concentrations exceeding 5% of the lower explosive limit (LEL) or 15% of the upper explosion limit (UEL).
- Prevent or minimize future site users' exposure to methane via migration through building foundations into indoor air.

The follow RAOs apply to soil:

- Prevent or minimize human (commercial, recreational or residential site users, construction workers) and ecological receptors' contacting, ingesting, or inhaling contaminated soil and dust.
- Prevent or minimize COPCs from leaching from soil into groundwater.

The following RAOs apply to groundwater:

- Prevent COPC-contaminated groundwater from migrating into the San Francisco Bay.
- Protect ecological and recreational human receptors in the San Francisco Bay from ingestion of or dermal contact with contaminated groundwater.
- Prevent or minimize human (commercial, recreational or residential site users, construction workers) inhalation of VOCs (exceeding appropriate screening levels) that have volatilized from groundwater into outdoor or indoor air.

Groundwater at the Site is not considered a potential future source of drinking water. As a result, risk to human health through the drinking water exposure pathway was not evaluated in the HHRA. No RAOs were developed for ecological receptor exposure to soil gas because there is little potential for significant exposure or impact to plant or animals from soil gas.

ES.7 SITE INVESTIGATION APPROACH

The SI sampling was conducted using an iterative approach in two phases. Phase 1 was conducted to identify the presence of contamination in the potential source areas, and to close data gaps that exist for parcels at the Site where no environmental investigations have been conducted. Phase 2 was conducted to further delineate the nature and lateral and vertical extent of contamination found during Phase 1, and to collect sufficient data to complete the HHRA, ESLRA, waste characterization, FS and RMP. The sampling results were used to assess the presence or absence of COPCs in soil, soil gas and groundwater at each potential source area and to characterize subsurface conditions across the Site.

T&R conducted Phase 1 activities during August through November 2009. Phase 1 activities included pre-investigation permitting and underground utility clearance; advancement of 62 exploratory borings and six test pit excavations; soil and grab groundwater sampling; installation, development and surveying of eight monitoring wells, groundwater monitoring well gauging and sampling; groundwater level fluctuation evaluation; soil gas sampling at 24 locations, and installation and sampling of six semi-permanent soil gas monitoring probes (Figure ES-7).

T&R reviewed the Phase 1 sampling results with the Port and Water Board and prepared a Work Plan addendum dated 24 November 2009 describing the proposed Phase 2 investigation. The Water Board reviewed and approved the Phase 2 Work Plan addendum in the letter dated 7 December 2009.

Phase 2 activities were performed during December 2009 through April 2010. Phase 2 activities included pre-investigation permitting and underground utility clearance; advancement of 30 exploratory borings; soil, grab groundwater, and non-aqueous phase liquid (NAPL) sampling; installation of two additional monitoring wells; gauging and sampling 13 monitoring wells; and soil gas sampling at nine locations. Phase 1 and 2 sampling locations are shown on Figures ES-7 and ES-8, respectively. The soil sampling program was designed to evaluate subsurface conditions by obtaining detailed lithologic descriptions of soil and rock encountered during drilling, collecting soil samples for geotechnical parameter testing, and collecting soil samples at sufficient depths and extent to define the lateral and vertical extent of contaminants exceeding ESLs.

The groundwater sampling program included collection of grab groundwater samples, and the installation and sampling of groundwater wells to evaluate groundwater conditions at the Site. Soil and grab groundwater sampling results were evaluated to determine where monitoring wells should be installed.

During Phase 1, eight groundwater monitoring wells were installed, developed, and sampled to further characterize potential impacts. Two additional monitoring wells were installed during Phase 2 at locations chosen based upon evaluation of Phase 1 and 2 investigation results. The 10 monitoring wells installed as part of this investigation were sampled during Phase 2 along with three pre-existing wells: two located in Crane Cove Park (GWDG3 and GWDG4) and one located in Slipways Park (MW-28A) as shown on Figure ES-8.

The soil gas sampling program was designed to evaluate the potential for vapor intrusion into buildings proposed for Site redevelopment. Soil gas probes that can be used for repetitive soil gas sampling were installed in former demolition debris and fill disposal areas to collect data required for closure in accordance with State regulations for disposal facilities. To assess appropriate soil gas sampling and soil gas probe installation depths, groundwater levels in two monitoring wells (CCMW-01 and SPMW-01) located near the shoreline were continuously monitored over one full tidal cycle to evaluate groundwater level fluctuation and choose appropriate soil gas sampling and soil gas probe installation depths.

T&R modified some activities or sampling locations proposed in the Work Plan based upon field conditions, and conducted investigation activities in addition to those proposed in the Work Plan, including collecting additional shallow soil samples (0 to 10 feet below ground surface, excavating test pits in Crane Cove Park, observing AMEC Geomatrix' (AMEC's) dense non-aqueous phase liquid (DNAPL) investigation at Slipways Park related to former MGP operations and sampling soil from borings advanced by AMEC. Field methodologies, sampling procedures, analytical plan, and data quality objectives are described in detail in Section 4 of the SI Report along with additional activities and deviations from the Work Plan.

ES.8 SITE INVESTIGATION RESULTS

The Site physical setting; subsurface conditions; soil gas, soil, and groundwater analytical results and screening level exceedances; and non-aqueous phase petroleum hydrocarbons observed in soil and groundwater are detailed in Section 5 of the SI Report and summarized below. A boring completion summary is presented on Figure ES-9 and indicates early refusal at boring locations in the southwest portion of the Site where bedrock is present within 4 feet of the ground surface. Early refusal was also met in Parcel 1 at P1SB-01 due to the presence of concrete, and in Parcel 9 at P9SB-03 likely due to the presence of subsurface riprap that comprises the sea wall. Figure ES-9 also indicates locations where oily residue was observed in soil, and where NAPL consisting of heavy degraded petroleum hydrocarbons was

present in groundwater. The area of investigation for potential impacts from former MGP operations at the adjacent Potrero Power Plant site is also shown on Figure ES-9.

Soil

TPH in shallow soil exceeds ESLs at a small number of locations within each Parcel with the exception of Parcel 7 (Figure ES-10). TPH exceedances are likely associated with fill material and localized releases from historic above and underground fuel storage tanks, historic shipbuilding or industrial activities. In deep soil, TPH exceeding ESLs is limited to Parcel 9 and Slipways Park (Figure ES-11). The deep soil TPH contamination in Slipways Park and Parcel 9 is likely associated with the former MGP located south of Slipways Park, and above ground and underground storage tank (AST/UST) releases, respectively.

The PAH ESL exceedances are ubiquitous and laterally discontinuous in shallow soil (Figure ES-12), and are likely associated with contaminants present in Bay fill material. In deep soil, PAHs exceeding ESLs are limited to Parcels 8 and 9 and the southern end of Slipways Park (Figure 13). The deep soil PAH contamination in Parcels 8 and 9 is primarily associated with the former MGP and AST/UST releases, respectively.

In shallow soil, metals including arsenic, cadmium, chromium, copper, lead, mercury, vanadium, and zinc are present throughout the Site at concentrations exceeding ESLs (Figure ES-14). Many of those (arsenic, cadmium, copper, chromium, nickel, vanadium, and zinc) are components of serpentine bedrock present beneath the Site and in the fill material. Localized areas of elevated metal concentrations may be associated with historic shipbuilding and industrial activities such as plating welding or metal fabrication. Metal ESL exceedances in deep soil are limited (Figure ES-15) and are likely associated with Bay fill material and serpentine bedrock.

Asbestos was present in some soil samples at low levels (between 1% and 2%). Concentrations of naturally-occurring asbestos in soil at the Site are related to the native serpentine rock in the fill material rather than to contamination from hazardous materials formerly used at the Site.

Soil was analyzed for characteristics used determine waste classification, which would apply to any soil removed from the Site for off-site disposal. In shallow soil, metals are present at levels that would be regulated under California Hazardous Waste criteria in areas indicated on Figure ES-16. At approximately 20 percent of the soil sampling locations, if removed from the Site, the soil would be classified as

California-regulated hazardous waste due to total or soluble metals concentrations. None of the shallow soil sample results exceeded federal criteria for classification as hazardous waste; the remainder would be non-hazardous None of the samples of deeper soil (greater than 10 feet bgs) would be characterized as state or federally-regulated hazardous waste.

Groundwater

TPH was reported above ESLs in grab groundwater samples collected from Crane Cove Park, Parcel 9, Parcel 4, and Central Plaza Park, and are likely associated with the presence of TPH in fill material from historic industrial operations (Figure ES-17). Heavily degraded petroleum hydrocarbons were present in soil in borings at Parcel 9, and at Parcel 4 near the former UST/AST fuel storage area east of Building 113. TPH exceedances were not reported above ESLs in any of the monitoring wells with the exception in TMW-28A in Slipways Park. At Slipways Park, TPH exceedances are likely associated with the former MGP located to the south.

PAH exceedances were reported in grab groundwater samples collected from Crane Cove Park, Parcel 9, Parcel 2, Parcel 4 and Central Plaza Park (Figure ES-18). The PAH exceedances in grab groundwater samples are likely associated with the leaching of PAHs from fill material, localized releases from former aboveground and underground fuel storage tanks, historic shipbuilding or industrial activities, and the presence of NAPL in soil borings at Parcel 9. PAH exceedances are limited to two monitoring wells only (one at Crane Cove Park and one at Slipways Park). PAH exceedances at these locations are likely associated with leaching of PAH contaminated fill material at former slipways, and, in Slipways Park, the former MGP located to the south.

Dissolved and total metals in groundwater exceeded ESLs in Parcels, 1, 2, 3, 6, 8 and 9 and in Crane Cove, Central Plaza and Slipways parks (Figure ES-19). The metals in groundwater are likely associated with the Bay fill material and with historic industrial activities such as plating and welding and metal fabrication.

Non-Aqueous Phase Liquid (NAPL)

A mixture of degraded petroleum hydrocarbons is present as NAPL in soil and as globules in groundwater within a portion of Parcel 9. The lateral extent of potential NAPL appears to be approximately 350 feet wide and 800 feet long (Figure ES-20). During the field investigation, visible hydrocarbon staining was observed in soil in P9SB-01, P9SB-02, P9SB-03, P9SB-05, P9SB-07, P9SB-08, P9SB-09A, P9SB-

09B/P9MW-03, P9SB-12, and P9SB-13. Visible heavily degraded NAPL was observed in groundwater samples from P9SB-04/P9MW-02, P9SB-06/P9MW-01, P9SB-07, P9SB-09A, P9SB-10, and P9SB-11.

The vertical extent of NAPL in soil appears to extend from the shallowest depth at which it was encountered, six feet below ground surface (bgs) in boring P9SB06, to a maximum of nine feet bgs in boring P9SB-04/P9MW-02. NAPL was typically observed as globules near the top of groundwater in borings P9SB-04/P9MW02, P9SB-09A, P9SB-06/P9MW-01, P9SB-07, and P9SB-11. NAPL was also observed during the installation and well development activities of monitoring wells P9MW-01 and P9MW-02. However, NAPL has not been observed during purging and groundwater sampling activities. This degraded oily material is not present in sufficient quantity to form a separate phase or continuous layer floating on the groundwater.

The physical properties of the NAPL (discussed in detail in Section 5.2.6 of the SI Report) indicate that the NAPL in Parcel 9 is nonvolatile, insoluble, highly viscous, and essentially immobile. Evaluation of the mobility of the NAPL, including composition, specific gravity, interfacial tension, and percent pore saturation in soil, indicates that the NAPL in Parcel 9 will not migrate into the Bay. Sampling results from monitoring wells installed at the Bay margin indicate that NAPL is not present, consistent with the conclusion that NAPL is not migrating to the shoreline.

Soil Gas

Soil gas impacts at the Site are minimal with the following two exceptions. At Parcel 2, benzene exceeds the ESL at one location north of Building 36. The source of benzene at this location is uncertain and benzene was not detected at elevated concentrations in groundwater. At Parcel 8, naphthalene exceeds the ESL at one location. The source of the naphthalene may be PAHs in the fill material related to the former MGP south of Parcel 8.

Methane was not present at the Site at concentrations exceeding California state regulations (Title 27) or explosive limits. The maximum methane concentration detected at the Site is 1,200 µg/L at semi-permanent vapor probe P6SGP-01. This maximum methane level is equal to 0.183%, well below the 1.25% for protection of indoor air quality in overlying structures, and well below the 5% LEL limits in Title 27.

ES.9 HUMAN HEALTH RISK ASSESSMENT RESULTS

The purpose of the HHRA was to evaluate potential human exposures and health risks associated with construction during redevelopment and anticipated future land use, with current Site conditions at Pier 70, and to identify areas within the Site that require mitigation in support of decision-making regarding future construction and property development. Numerous investigations were conducted at the Pier 70 Site to characterize the nature and extent of chemicals in groundwater and soil. The data collected as part of this SI, as well as the applicable historical investigation data provide the basis for the HHRA.

Based upon the planned future uses at the Site, potentially exposed populations include residents (adults and children), commercial workers (including retail, commercial and industrial workers), park visitors (adults and children) and construction workers. These future site users could be exposed to soil (through ingestion, dermal contact, and dust inhalation), soil gas (through inhalation of volatile constituents in indoor and outdoor air) and groundwater (construction workers only, during subsurface construction such as trenching or excavation).

To assess risk in future land uses scenarios posed by residual chemicals in soil, soil gas, and groundwater at the Site were within acceptable risk ranges based on future land uses, risks were estimated using calculated Exposure Point Concentrations (EPCs) for each chemical in each media, and back-calculating risks for each receptor on a parcel-by-parcel basis. In the Feasibility Study, Risk-Based Target Concentrations (RBTCs) for the applicable media and receptor will be compared to residual chemical concentrations to guide remedial decisions during Site redevelopment. RBTCs represent the concentration of a chemical that can remain in the soil, soil gas, or groundwater and still be protective of human health for future land uses.

For evaluating potential cancer risk associated with exposure to contaminants, a lifetime incremental increase in cancer risk in the range of $1x10^{-4}$ to $1x10^{-6}$ is generally considered to be acceptable[2]. These values correspond to one additional cancer case in 10,000 people ($1x10^{-4}$) and one additional case in one-million people ($1x10^{-6}$) above the baseline lifetime cancer risk. The $1x10^{-6}$ risk level is generally used at a point of departure for considering if remedial measures should be taken at a site. With a risk of $1x10^{-4}$ or greater, an evaluation of remedial measures is required. When risks fall in the range of $1x10^{-4}$ to $1x10^{-6}$ (often referred to as the “risk management range”) the regulatory agencies will decide whether

[2] USEPA, 1990. "National Oil and Hazardous Substances Pollution Contingency Plan." Federal Register Volume 55, No. 46, p. 8,666. April 9.

an evaluation of viable remedial actions is warranted. For non-cancer health impacts risk is expressed as a Hazard Index (HI), which is an indicator of the probability of potential risk of non-cancer adverse health effects. A HI less than 1 is generally considered acceptable risk; a HI greater than 1 requires evaluation for potential risk management measures[3].

As part of the site investigation and risk assessment at Pier 70, cancer risks and non-cancer hazard indices (HIs) were calculated for each parcel and estimated for future receptors based on future redevelopment plans. At Parcels 1 and 3, future development plans are for residential or commercial uses. Total lifetime cancer risks for the resident and commercial worker were within the risk management range of $1x10^{-6}$ to 1×10^{-4}. Non-cancer HIs were less than one for the adult resident and commercial worker at Parcel 1, but higher than 1 at Parcel 3. The non-cancer HIs for the child resident were greater than the target HI of 1 at Parcels 1 and 3. Non-cancer HIs greater than 1 for residents (both the adult and child) and commercial workers are attributable to the incidental ingestion of metals in soil.

For the parcels slated for future commercial development (1 through 8, and the former MGP subsurface investigation area (MGP investigation area)[4]), total lifetime cancer risks were generally within the risk management range of 1×10^{-6} to 1×10^{-4} for the future commercial scenario, except at Parcel 4. At Parcel 4, total cancer risk for the commercial worker was 2×10^{-4}, exceeding the upper end of the risk management range. The cancer risk was mainly attributable to dermal contact with and incidental ingestion of arsenic and benzo(a)pyrene in soil. At Parcel 4, arsenic was present at elevated concentrations at two locations (G-47-EE2000 and G-48-EE2000) in the 0 to 0.5 feet bgs depth interval. Removal of these two arsenic concentrations from the dataset used to calculate the EPC decreases the calculated total lifetime cancer risk by an order of magnitude. Therefore, it is anticipated that if these soils are removed during site development, total cancer risk will be in the risk management range of 1×10^{-6} to 1×10^{-4}. Commercial worker HIs were at or less than 1 at most parcels (Parcels 1, 4, 5,6,7,8, and the MGP investigation area) and slightly greater than 1 at Parcels 2, 3, and 9. Elevated HIs at these parcels were due to incidental ingestion of metals in soil. No single chemical exceeded an HI of 1.

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3 USEPA, 1989. "Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual (Part A)." Interim Final. Office of Emergency and Remedial Response. EPA-540/1-89/002. Washington, D.C. December.

4 The highest concentrations of PAHs, BTEX, petroleum hydrocarbons, and metals are found in the eastern half of Parcel 8 and the southern portion of Slipways Park, and are qualitatively and quantitatively different from the nature and extent of contamination present throughout the rest of these parcels. Consequently, a separate exposure area was designated in the HHRA and referred to as the "MGP Investigation Area".

Total cancer risks for park visitors at Central Plaza Park, Crane Cove Park, and Slipways Park were within the risk management range of 1×10^{-6} to 1×10^{-4}. For adult park visitors, all HIs were below 1. For the child park visitor HIs were 1 at Central Plaza Park and greater than 1 at Crane Cove Park and Slipways Park. The cancer risk drivers at the parks were primarily incidental ingestion of and dermal contact with metals and PAHs (mainly benzo(a)pyrene) in soil. At Central Plaza Park, the arsenic EPC of 11 mg/kg is comparable to the arsenic soil background concentration of 11.5 mg/kg established for the adjacent Potrero Power Plant site (AMEC, 2009). Without the inclusion of arsenic in the risk calculations, total cancer risk was in the 1×10^{-6} risk range. Non-cancer HIs greater than 1 were attributable to the incidental ingestion of metals in soil.

For the construction worker, estimated cancer risks were within the risk management range of 1×10^{-6} to 1×10^{-4} at all parcels evaluated except at the MGP investigation area. At the MGP investigation area, risk to the construction worker was 3×10^{-4}, greater than the upper end of the risk management range. The primary risk drivers at the MGP investigation area were PAHs, primarily benzo(a)pyrene in soil, through the incidental ingestion and dermal contact routes of exposure. Construction worker HIs were greater than 1 at all parcels except Parcel 8, where the HI was equal to 1 though limited data were available and results may have been influenced by the small data set. Elevated HIs at the majority of parcels were due to inhalation of metals on particulates and incidental ingestion of metals in soil.

For all potentially-exposed populations, most of the total cancer risk at the Pier 70 Site is attributable to exposure to COPCs in shallow soil. The cancer risk attributable to inhalation of VOCs in soil gas, through migration of soil gas to indoor or outdoor air, was less than 1×10^{-6} for all parcels evaluated, and for almost all site users: residents, commercial workers, and recreational park visitors, with the exception of Parcel 4. At Parcel 4 the cancer attributable to VOCs in soil gas was 1×10^{-5}, based on benzene at ethylbenzene results from a 1997 grab groundwater sample. For all parcels, TPH and VOCs in soil gas contributed no non-cancer risk to commercial and residential receptors (HIs less than 1).

Future construction workers at the Pier 70 Site will be subject to the highest cancer risks from exposure to metals and PAHs in soil and groundwater during site redevelopment. However, occupational exposure to chemicals is regulated under CalOSHA and it is expected that workers will be required to wear personal protective equipment during dust-generating activities such as excavation and trenching and to prevent potential contact with groundwater that has infiltrated into excavations. Dust control measures will be implemented as required by Federal, State, and local regulations, thus further reducing worker exposure to chemicals on particulates.

Grading, importing soil and new construction will cover or remove and replace surface soil, thereby greatly reducing exposures to existing Site soils in the landscaped areas of the future commercial, multi-family residential, and open space/park developments. The rest of the Site will be paved or covered with buildings, thus eliminating any direct contact with surface soil. A RMP will provide specifications and details as to how risk will be mitigated and managed during construction within the Pier 70 Site. Following Site development, direct contact with surface soil is not likely for residents, outdoor commercial workers, and recreational visitors.

ES.10 ECOLOGICAL SCREENING LEVEL RISK ASSESSMENT

The ESLRA conducted as part of this site investigation and risk assessment followed a conservative approach, and identified whether the Site could pose a potential ecological risk. The ESLRA concludes that the potential exists for unacceptable risk to terrestrial organisms from several contaminants present on Pier 70. Numerous metals exist in concentrations above ecological screening levels, and therefore, these metals pose a potential risk to terrestrial ecological receptors. Total cyanide and some dissolved metals occur at concentrations in groundwater that pose a potential risk to aquatic life should they migrate to the Bay.

Pyrene is the only PAH to pose a potential risk to terrestrial ecological receptors. No furans, dioxins or VOCs are present in sufficient amounts to be considered a potential ecological risk. PCBs (Aroclors 1254 and 1260) and TPH pose a potentially unacceptable risk to terrestrial ecological receptors. The only organic constituents concluded to potentially pose an unacceptable risk to aquatic life in the Bay via the migration of groundwater are PAHs and TPH.

In its current state, Pier 70 provides limited habitat for terrestrial wildlife and plants. Most of the Site is paved or contains buildings. The open space to be created in Central Park Plaza, Crane Cove Park, and Slipways Park may enhance the Site's attractiveness to wildlife that might occur along the waterfront. New open space development will include landscaping, to varying extent depending on the purpose and design of the different parks, and may include native plants. However, new park construction will also include paving and covering ground surface, and will likely require replacement of existing surface soil with imported soil to support new landscaping. Once redevelopment is complete, most of the Site will be paved or covered, eliminating plants' and animals' exposure to Site soil, thereby minimizing potential risks.

ES.11 SUMMARY AND CONCLUSIONS

This environmental site investigation at Pier 70 characterized upland Site conditions, and the HHRA and ESLRA identified potential health risks that contamination could pose to future Site users. The risk assessment findings do not suggest significant potential for risk to current site occupants or visitors, or a need for soil or groundwater remediation that would substantially, adversely impact the feasibility of future development as envisioned in the Master Plan.

Soil at the Site is typical of Bay fill deposits: It contains naturally-occurring asbestos and heavy metals, as well as introduced metals, PAHs, TPH, and PCBs. Shallow soil in some areas exhibits characteristics of California-regulated hazardous waste (Figure ES-16). Metals, including arsenic, cadmium, chromium, copper, lead, mercury, vanadium, and zinc are present in soil throughout the site at concentrations exceeding ESLs. Naturally-occurring asbestos and most of the metals (arsenic, cadmium, copper, chromium, nickel, vanadium, and zinc) are components of serpentine bedrock present beneath the Site and in the fill material. Concentrations of these constituents found in soil at Pier 70 are likely to be significantly attributable to the presence of native serpentine rock in the fill material rather than primarily attributable to contamination from hazardous materials formerly used at the site. The concentrations of metals found in soil at Pier 70 are within the range of those found in fill soils throughout the Port or other filled land, such as the Oakland Army Base, Eastshore State Park, and Mission Bay area. PAHs are also ubiquitous in soil at Pier 70 at concentrations commonly found in Bayshore fill. PAHs are associated with a wide variety of industrial operations and are the primary component of MGP waste.

VOCs in groundwater and soil gas are generally below applicable ESLs established for evaluating risk of vapor intrusion into indoor air, if buildings exist or are constructed over contaminated land.

A mixture of degraded petroleum hydrocarbons is present as NAPL in soil and as globules in groundwater within a portion of Parcel 9 (Figure ES-20). This material is not present in sufficient quantity to form a separate or continuous layer floating on the groundwater. It is not volatile or soluble in groundwater, as evidenced by the absent or low concentrations of dissolved TPH, VOCs, and PAHs in groundwater samples, and negligible concentrations of VOCs in soil gas samples collected in the vicinity. The physical properties of the NAPL measured as part of this SI, including composition, specific gravity, interfacial tension, and percent pore saturation in soil, indicate that the NAPL in Parcel 9 is nonvolatile, insoluble, highly viscous, and essentially immobile. Sampling results from monitoring wells installed at the Bay

margin indicate that NAPL is not present, consistent with the conclusion that NAPL is not migrating to the shoreline.

Soil and groundwater in the southeast portion of Pier 70, adjacent to the Potrero Power Plant have elevated concentrations of PAHs in shallow soil within 0 to 10 feet below ground surface. Pacific Gas and Electric (PG&E) is investigating environmental impacts associated with MGP operations formerly located at the adjacent Potrero Power Plant and also provided results from soil borings that they advanced within the Pier 70 Site. Those samples contained extremely high concentrations of PAHs, which increased with depth. The highest concentrations were found in the deepest samples, at 20 feet bgs. PG&E's assessment of the extent that DNAPL that has migrated onto Port property is ongoing and PG&E plans additional investigation of the extent of DNAPL impacts at Pier 70.

The HHRA evaluated potential human exposures and health risks associated with current Site conditions at Pier 70, and identified areas within the Pier 70 property that require mitigation during future construction and property development. The highest risks identified were to construction workers from exposure to metals and PAHs in soil and groundwater during site development activities. For other receptors, risk is within the acceptable risk range, or exposure pathways are incomplete. Following Site development, direct contact with surface soil is not likely for residents, commercial workers, and recreational visitors. Future site cover, i.e. hardscaped buildings, roads, sidewalks and/or soil cover including landscaping and parks, will eliminate key exposure pathways at the Site.

The ESLRA evaluated the need for additional site-specific ecological risk assessment and/or mitigation of potential ecological risk. The ESLRA was limited to the upland portion of the Site and did not evaluate potential impact to offshore habitat. Potential risks to terrestrial organisms result from exposure to pyrene, PCBs, and TPH in shallow soil. As discussed above for human receptors, future Site development will generally mitigate exposure to shallow soil. Potential risks to marine organisms from exposure to cyanide and dissolved metals in groundwater were also identified, though the estimate of risks associated with contaminant migration to the Bay may be overly conservative. To fully assess ecological risks offshore, groundwater impacts must be considered in conjunction with an offshore biological survey and surface water and sediment quality.

The next step in the Pier 70 Environmental Investigation process will be to evaluate remediation and mitigation of potential health risks. This evaluation will consider potentially applicable remediation alternatives with respect to effectiveness in achieving cleanup goals, consistency with development

objectives, cost, and duration. Potentially feasible remedies may include engineering controls (e.g. removing, replacing, or capping soil) to reduce potential risks and institutional controls (e.g. deed restrictions, soil management measures) to manage potential health risks. A risk management plan will provide specifications and details on how risk will be mitigated and managed during future construction, operation and maintenance.

Treadwell&Rollo
A LANGAN COMPANY

FIGURES

Base map: The Thomas Guide
San Francisco County
1999

0 1/4 1/2 Mile

Approximate scale

PIER 70 ENVIRONMENTAL SITE INVESTIGATION
San Francisco, California

SITE LOCATION MAP

Treadwell&Rollo

Date 09/27/10	Project No. 4963.01	Figure ES-1

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N

Legend

- Parcel Boundary
- Pier 70 Site Area
- Road Edge
- Building
- Approximate 1869 Shoreline

Notes:

1. Digital orthophotos from California Spatial Information Library (CASIL) UC Davis, *ca.* 2005, http://archive.casil.ucdavis.edu/casil/.
2. Site boundary, parcels, and acreages from ROMA Design Group, Draft Preferred Pier 70 Master Plan, 17 July 2009.
3. Approximate 1869 Shoreline based upon Board of Tidelands Commissioners, *Map of the Salt Marsh and Tide Lands and Lands Lying Under Water South of Second Street and Situate in the City and County of San Francisco*, 1869.
4. Map displayed in California State Plane Coordinate System, Zone III, North American Datum of 1983 (NAD83), US Survey Feet.

0 150 300 600

Feet

PIER 70 ENVIRONMENTAL SITE INVESTIGATION
San Francisco, California

SITE PLAN

Date 9/14/2010	Project 4963.01	Figure ES-2

Treadwell&Rollo

Treadwell & Rollo, C:\GIS\4963 - Pier 70\arcmap_doc\2009\4963-01-001.mxd

Concrete Plant
Commercial
Construction Materials
Fishing
Auto Towing
49
Alliance Petroleum Products
18th Street
19th Street
50
110
Unoccupied
109
111
38
119
120
BAE Ship Repair
36
40
Former Scrap Metal
Illinois Street
3rd Street
Minnesota Street
Tennessee Street
101
102
104
105
103
107
108
Parking Lot
6
19
20th Street
Radio Tower
Metal Reccyling
113
114
Port Maintenance
14
115
116
117
Self Storage
Delancey St. Foundation
Commercial
21
Artist Studios
11
2
Warehousing
60
Storage Lot
San Francisco Bay
Irish Hill
12
Vehicle Storage
15
22nd Street
Potrero Power Plant

N

Legend

- Approximate 1869 Shoreline

Surface Feature

- Fence
- Other
- Road Edge
- Building
- Pier 70 Site Area

Notes:

1. Buildings, surface features, and road edges digitized from digital orthophotos 10SEG535775.tif and 10SEG535790, California Spatial Information Library (CASIL) UC Davis, ca 2005, http://archive.casil.ucdavis.edu/casil/.
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4. Map displayed in California State Plane Coordinate System, Zone III, North American Datum of 1983 (NAD83), US Survey Feet.

0 150 300 600
Feet

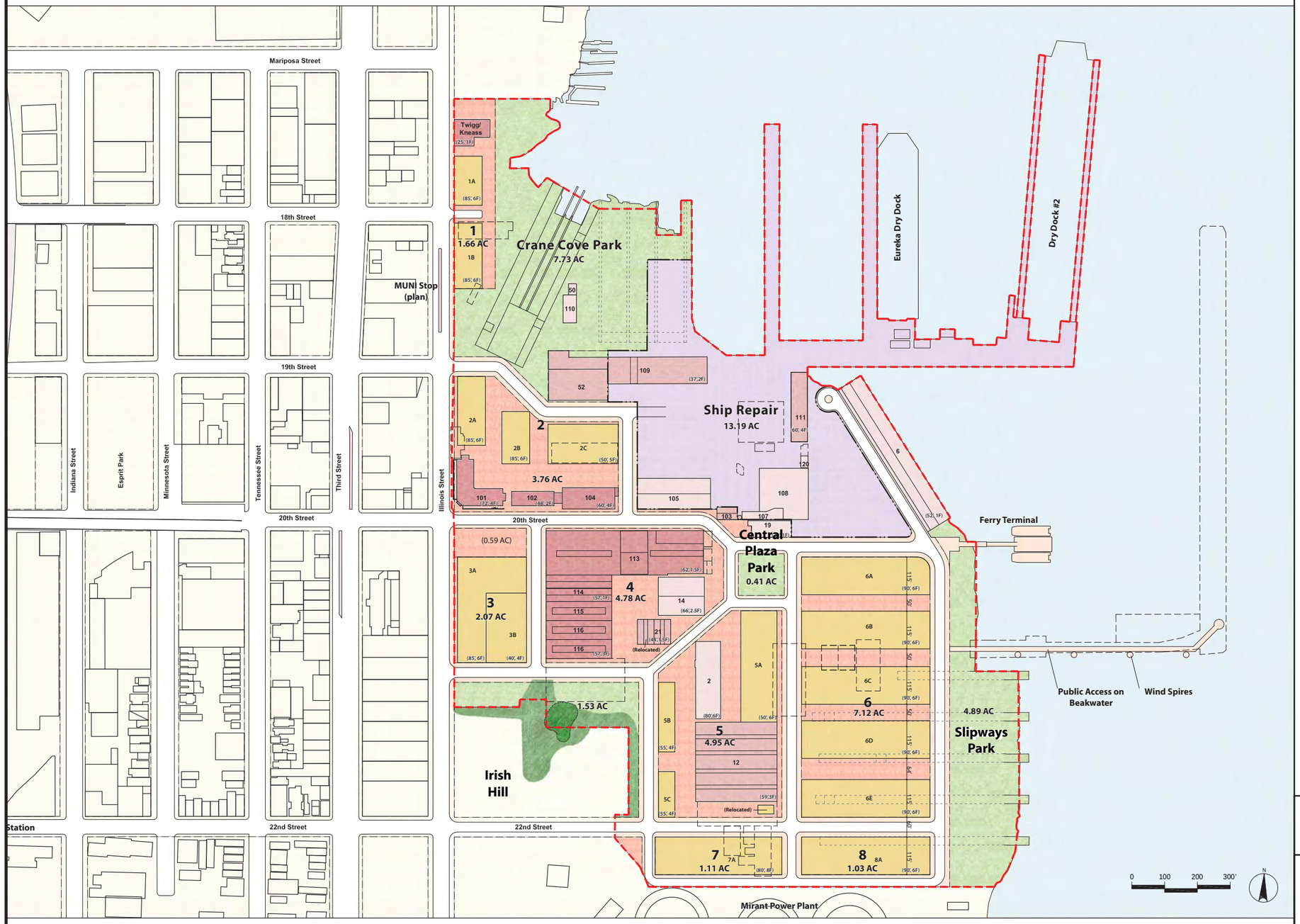
PIER 70 ENVIRONMENTAL SITE INVESTIGATION
San Francisco, California

CURRENT LAND USE

Date 7/20/2009	Project 4963.01	Figure ES-3

Treadwell&Rollo

Treadwell & Rollo, C:\GIS\4963 - Pier 70\arcmap_doc\2009\4963-01-003.mxd



Legend

- Very Significant Resource
- Significant Resource
- Contributing Resource
- Open Space
- Ship Repair
- Contributing Building Removed
- New Building Pads

Pier 70 Total Site Area	65.32 AC
Ship Repair	13.19 AC
Historic Building Footprints*	6.34 AC (276,100 SF)
New Building Pads	12.11 AC (527,200 SF)
Streets	11.08 AC
Parks, Plazas and Pedestrian Ways	22.60 AC

* Not including inside Ship Repair and Crane Cove Park

Source:
ROMA Design Group and Associated Consultants, *Pier 70 Draft Preferred Master Plan*, 17 July 2009.

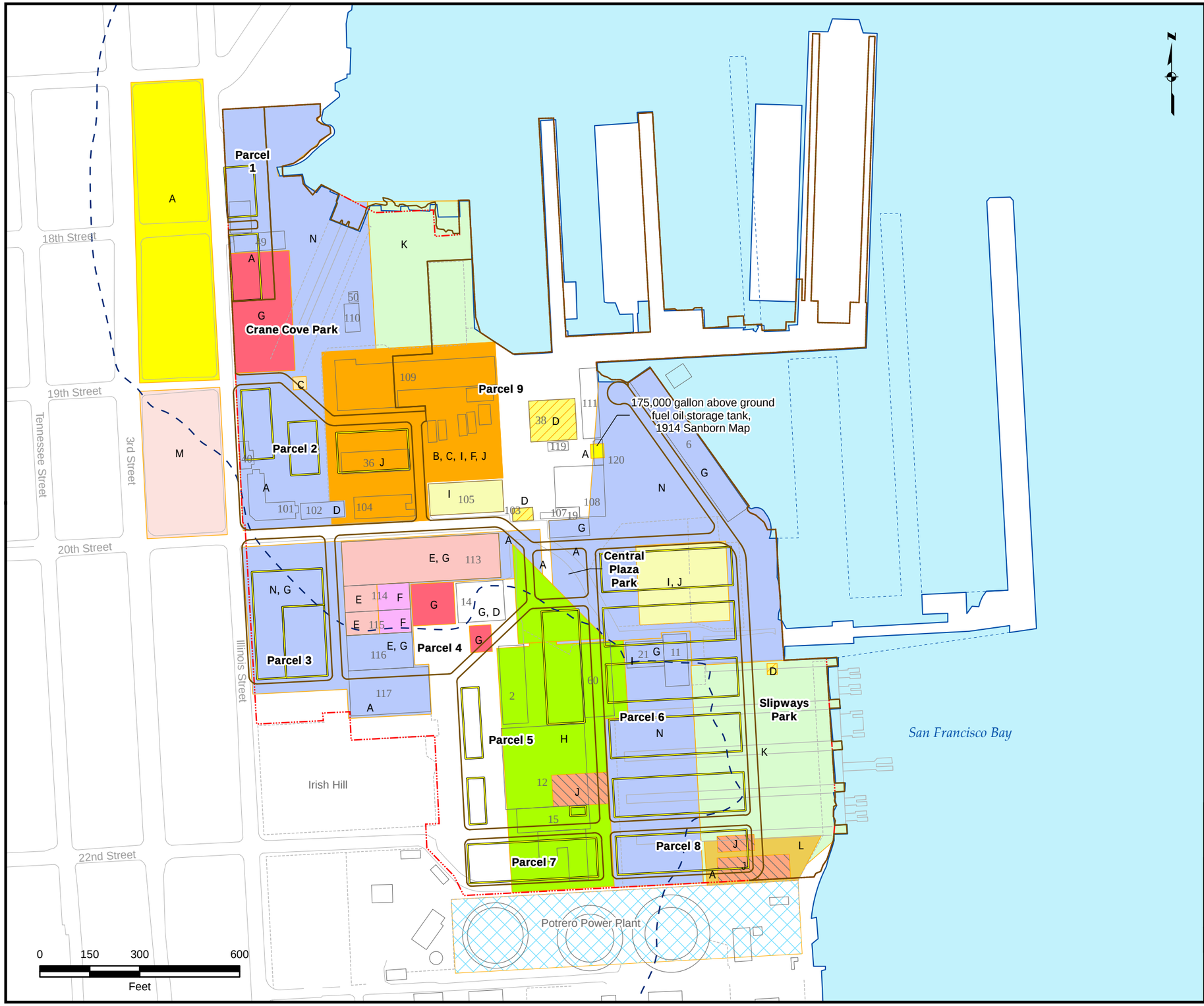
PIER 70 ENVIRONMENTAL SITE INVESTIGATION
San Francisco, Califorina

MASTER PLAN

Date 5/27/2010	Project 4963.01	Figure ES-4

Treadwell&Rollo

Treadwell & Rollo, C:\GIS\4963 - Pier 70\arcmap_doc\2009\4963-01-005.ai



Legend

Surface Feature
- Fence
- Other
- Road Edge
- Approximate 1869 Shoreline
- Building
- Proposed Building
- Pier 70 Site Area
- Master Plan Parcel Areas (eg. Parcel 1 = P1, Crane Cove Park = CC, etc...)

Potential Source Area
- A, UST/AST Fuel Storage
- B, Paint Shop
- C, Galvanizing
- D, Powerhouse (Boiler/Transformer)
- E, Machine Shop
- F, Foundry
- G, Hazardous Waste Storage
- H, Machine Shop/Auto Wrecking
- I, Metal Fabrication/Substation
- J, Plating/Welding
- K, Filled Slipways
- L, Historical Manufactured Gas Plant Investigation Area
- M, Metals Recycling
- N, Bay Fill with PAHs, Metals, and Asbestos
- O, Manufactured Gas Plant
- Multiple Source Areas. See Descriptions Above.

Notes:

1. Buildings, surface features, and road edges digitized from digital orthophotos 10SEG535775.tif and 10SEG535790, California Spatial Information Library (CASIL) UC Davis, ca 2005, http://archive.casil.ucdavis.edu/casil/.
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4. Historical Manufactured Gas Plant Subsurface Investigation Area taken from AMEC Geomatrix , *Report of Results: Subsurface Investigation Activities Evaluation of Impact ot Fill and Bay Mud, Potrero Power Plant*, Figure 2, September 2010.
5. Site boundary and parcels from ROMA Design Group, *Pier 70 Draft Preferred Master Plan*, 17 July 2009.
6. Map displayed in California State Plane Coordinate System, Zone III, North American Datum of 1983 (NAD83), US Survey Feet.

PIER 70 ENVIRONMENTAL SITE INVESTIGATION
San Francisco, California

POTENTIAL SOURCE AREAS

Date 9/29/2010	Project 4963.01	Figure ES-5

Treadwell&Rollo

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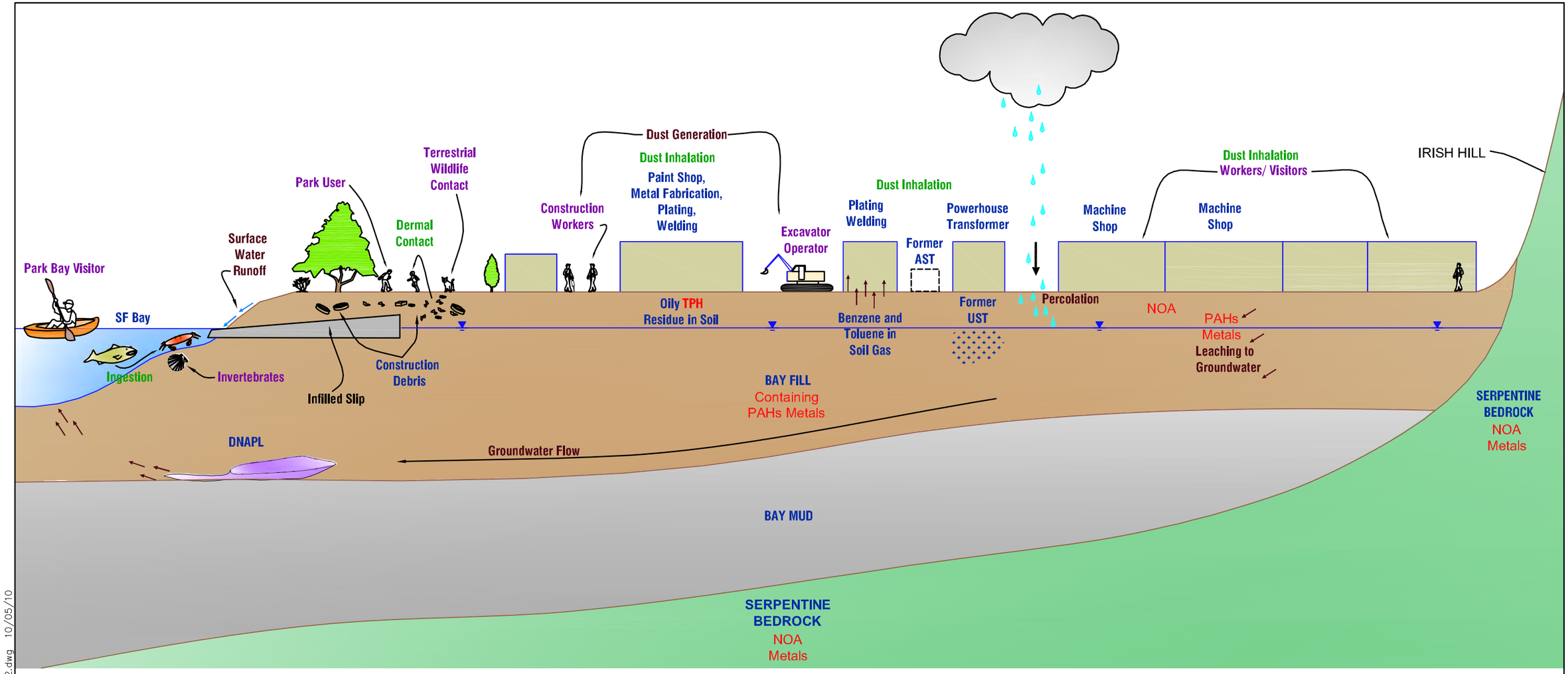

EXPLANATION

PCOCs:	Potential contaminants of concern		Soil vapor
NOA	Naturally occurring asbestos	B36	Building number
PAHs	Polycyclic aromatic hydrocarbons		Water table
VOCs	Volatile organic compounds		Groundwater flow
PCBs	Polychlorinated biphenyls		Building
TPH	Total petroleum hydrocarbons		**Receptors**
	Heavily degraded highly viscous petroleum hydrocarbons		**Source**
	Dense non-aqueous phase liquid (DNAPL)		**Exposure Pathway**
			Exposure Media and Release Mechanism

NOT TO SCALE

PIER 70 ENVIRONMENTAL SITE INVESTIGATION
San Francisco, California

UPDATED SITE CONCEPTUAL MODEL

Date 10/05/10	Project No. 4963.01	Figure ES-6

Treadwell&Rollo

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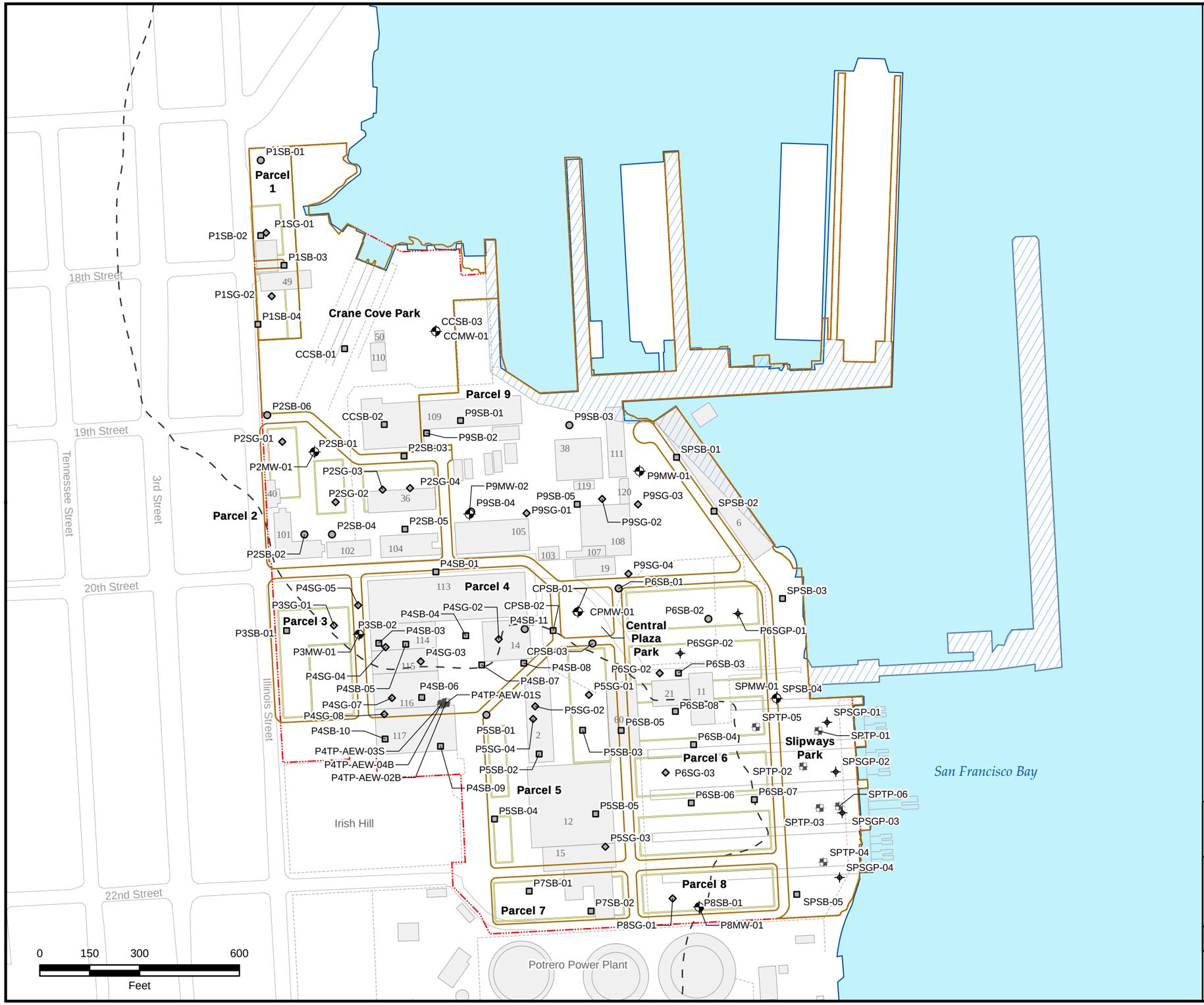

Legend

Sample Location
- Monitoring Well
- Soil
- Soil Gas
- Soil and/or Grab Groundwater
- Soil Gas Probe
- Test Pit

Surface Feature
- Fence
- Other
- Road Edge
- Approximate 1869 Shoreline
- Building
- Proposed Building
- Pier 70 Site Area
- Master Plan Parcel Areas (eg. Parcel 1 = P1, Crane Cove Park = CC, etc...)
- Pile-Supported Structure Over Water

Notes:

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4. Site boundary, parcels, and acreages from ROMA Design Group, *Pier 70 Draft Preferred Master Plan*, 17 July 2009.
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PIER 70 ENVIRONMENTAL SITE INVESTIGATION
San Francisco, California

PHASE 1 SAMPLING LOCATIONS

Date 9/30/2010	Project 4963.01	Figure ES-7

Treadwell&Rollo

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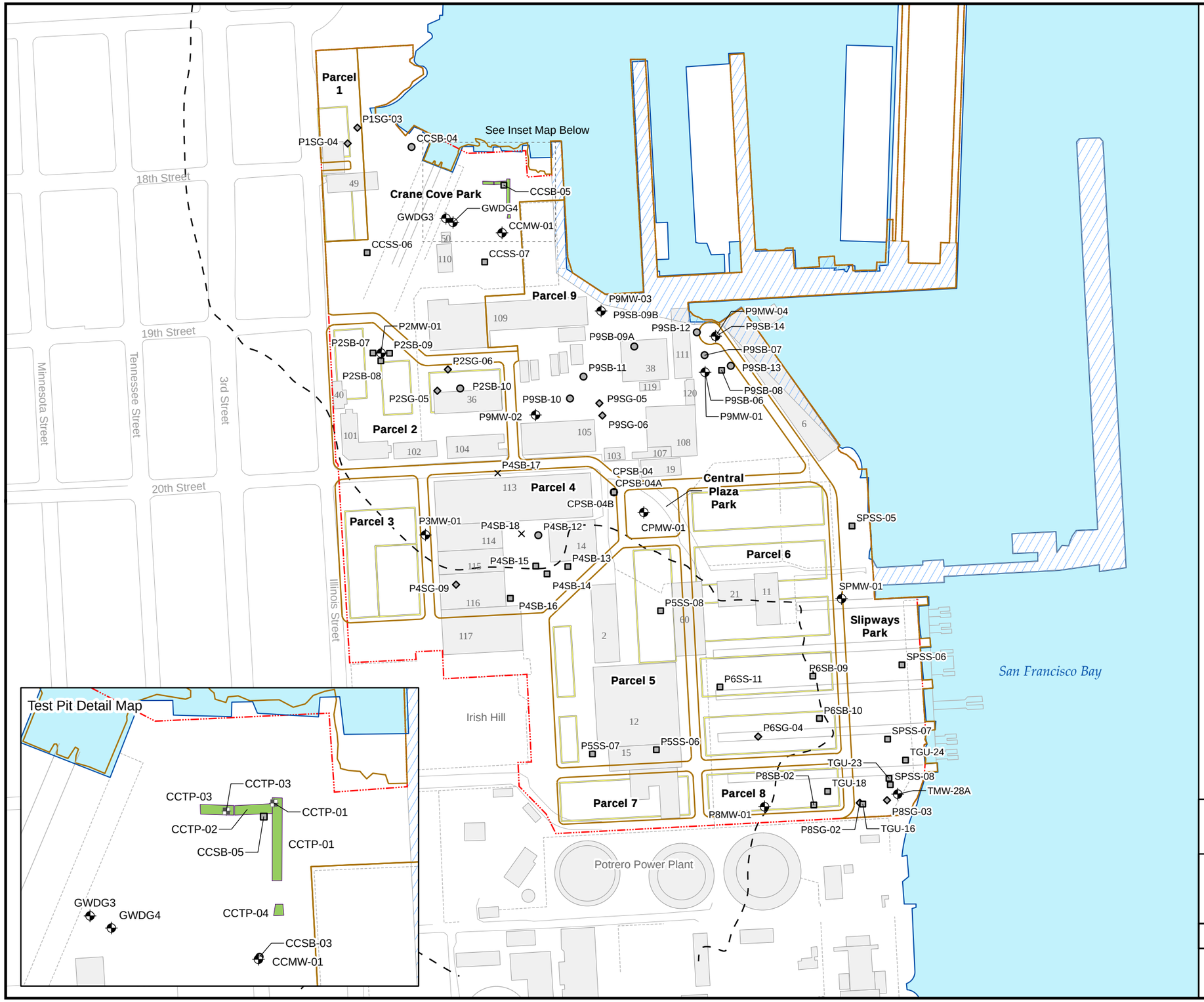

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PIER 70 ENVIRONMENTAL SITE INVESTIGATION
San Francisco, California

PHASE 2 SAMPLING LOCATIONS

Date 10/5/2010	Project 4963.01	Figure ES-8

Treadwell&Rollo

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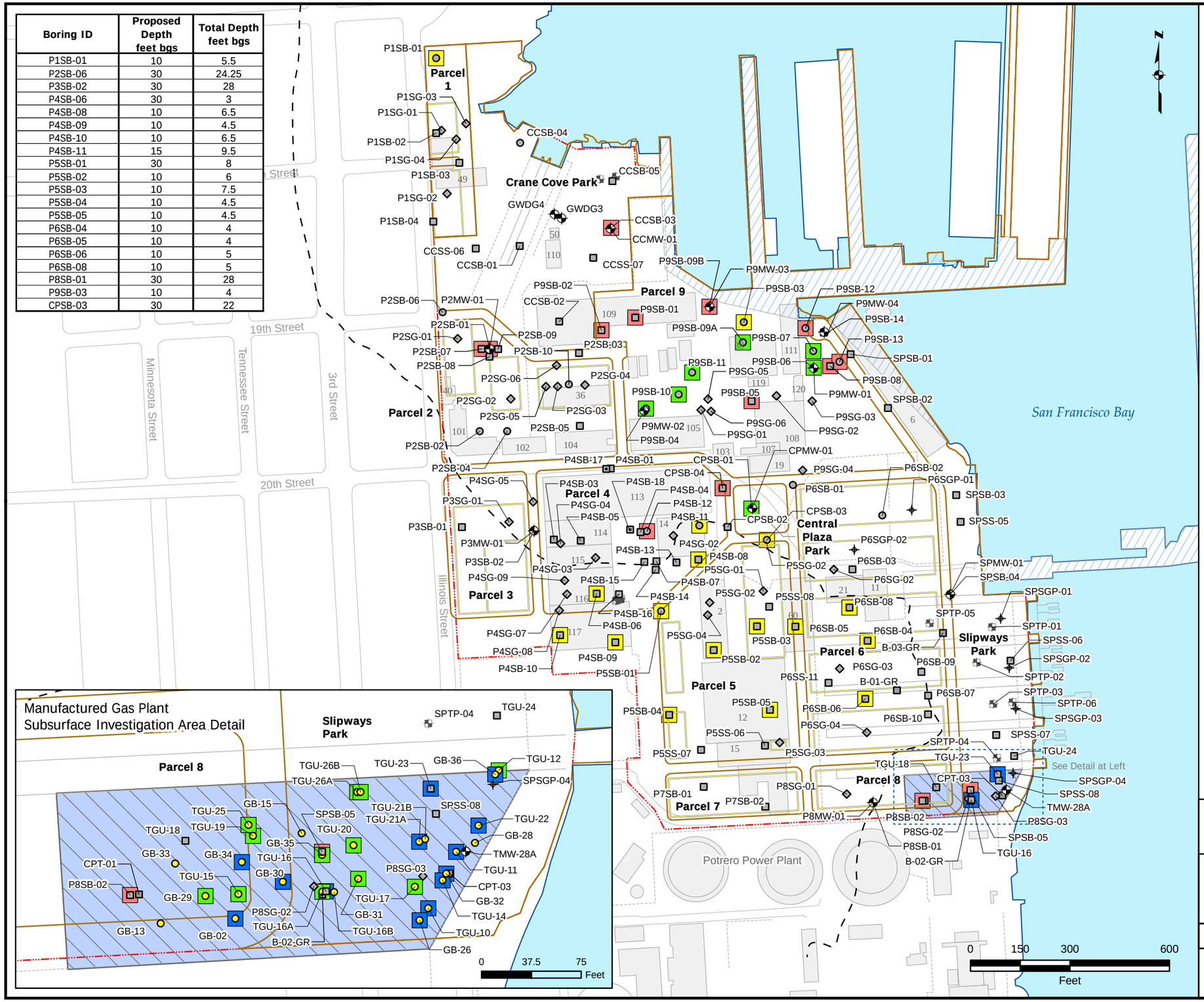
Boring ID	Proposed Depth feet bgs	Total Depth feet bgs
P1SB-01	10	5.5
P2SB-06	30	24.25
P3SB-02	30	28
P4SB-06	30	3
P4SB-08	10	6.5
P4SB-09	10	4.5
P4SB-10	10	6.5
P4SB-11	15	9.5
P5SB-01	30	8
P5SB-02	10	6
P5SB-03	10	7.5
P5SB-04	10	4.5
P5SB-05	10	4.5
P6SB-04	10	4
P6SB-05	10	4
P6SB-06	10	5
P6SB-08	10	5
P8SB-01	30	28
P9SB-03	10	4
CPSB-03	30	22



Legend

Sample Location
- Monitoring Well
- Geotechnical Boring
- Soil
- Soil and or Groundwater
- Soil Gas
- Soil Gas Probe
- Test Pit

Boring Completion Summary
- Early Refusal
- Oily Residue Observed in Soil
- Non-Aqueous Phase Liquid Present
- Dense Non-Aqueous Phase Liquid Present
- Approximate 1869 Shoreline

Surface Feature
- Fence
- Other
- Road Edge
- Historical Manufactured Gas Plant Subsurface Investigation Area
- Building
- Proposed Building
- Pier 70 Site Area
- Master Plan Parcel Areas (eg. Parcel 1 = P1, Crane Cove Park = CC, etc...)
- Pile-Supported Structure Over Water
- Soil Borings from Amec, 2009 and 2010

Notes:

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4. Site boundary and parcels from ROMA Design Group, *Pier 70 Draft Preferred Master Plan*, 17 July 2009.
5. Historical Manufactured Gas Plant Subsurface Investigation Area and additional sample points taken from AMEC Geomatrix , *Report of Results: Subsurface Investigation Activities Evaluation of Impact to Fill and Bay Mud, Potrero Power Plant*, Figures 2 and 19, September 2010.
6. Map displayed in California State Plane Coordinate System, Zone III, North American Datum of 1983 (NAD83), US Survey Feet.

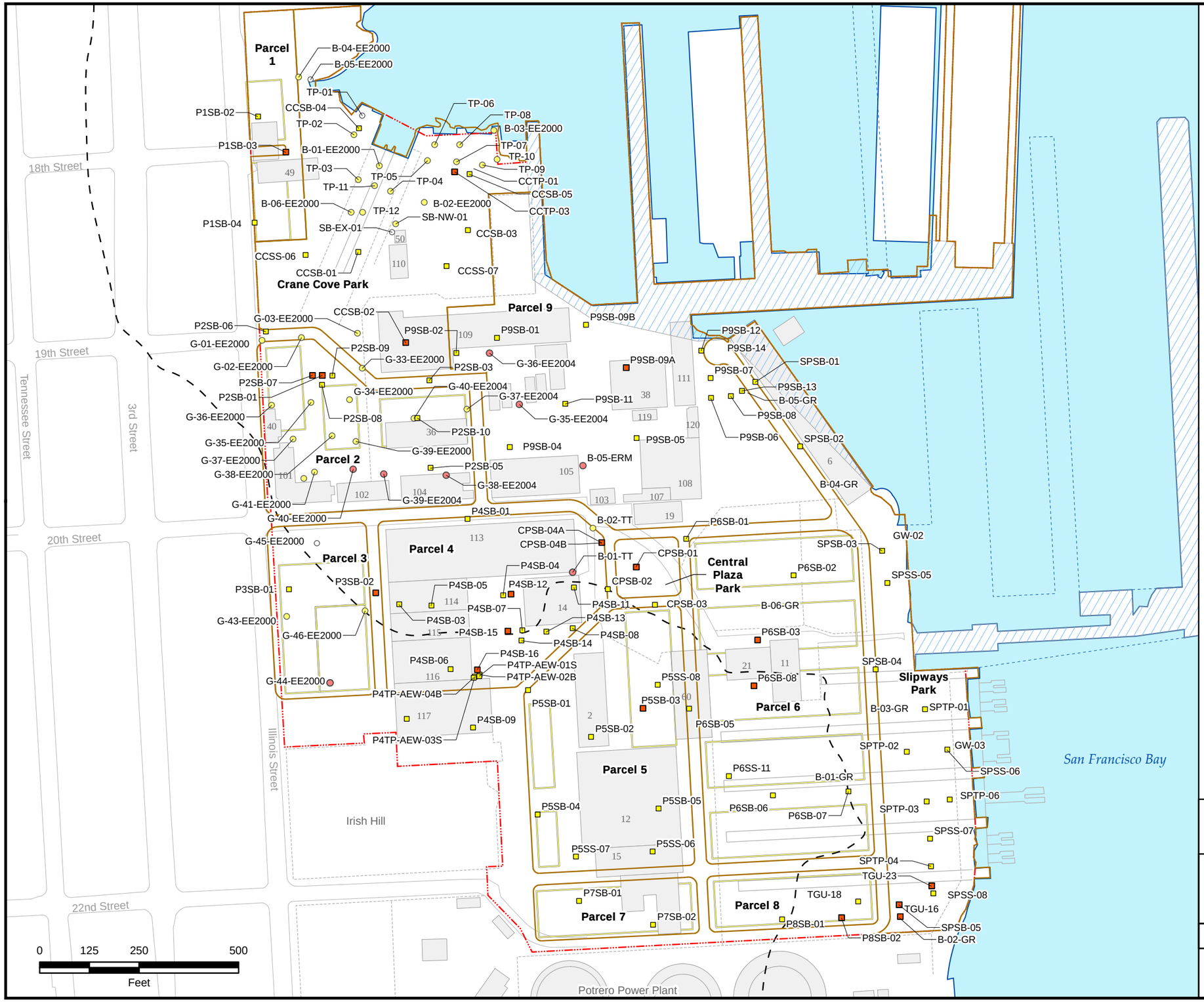
PIER 70 ENVIRONMENTAL SITE INVESTIGATION
San Francisco, California

BORING COMPLETION SUMMARY

Date 10/12/2010	Project 4963.01	Figure ES-9

Treadwell&Rollo

Treadwell & Rollo, C:\GIS\4963 - Pier 70\arcmap_doc\2010\4963-01-062.mxd



Legend

Historical Sample Location
- Not Detected
- Detected Below ESL
- Exceedance of ESL

Recent Sample Location
- Detected Below ESL
- Exceedance of ESL

Surface Feature
- Fence
- Other
- Approximate 1869 Shoreline
- Road Edge
- Building
- Proposed Building
- Pier 70 Site Area
- Master Plan Parcel Areas (eg. Parcel 1 = P1, Crane Cove Park = CC, etc...)
- Pile-Supported Structure Over Water

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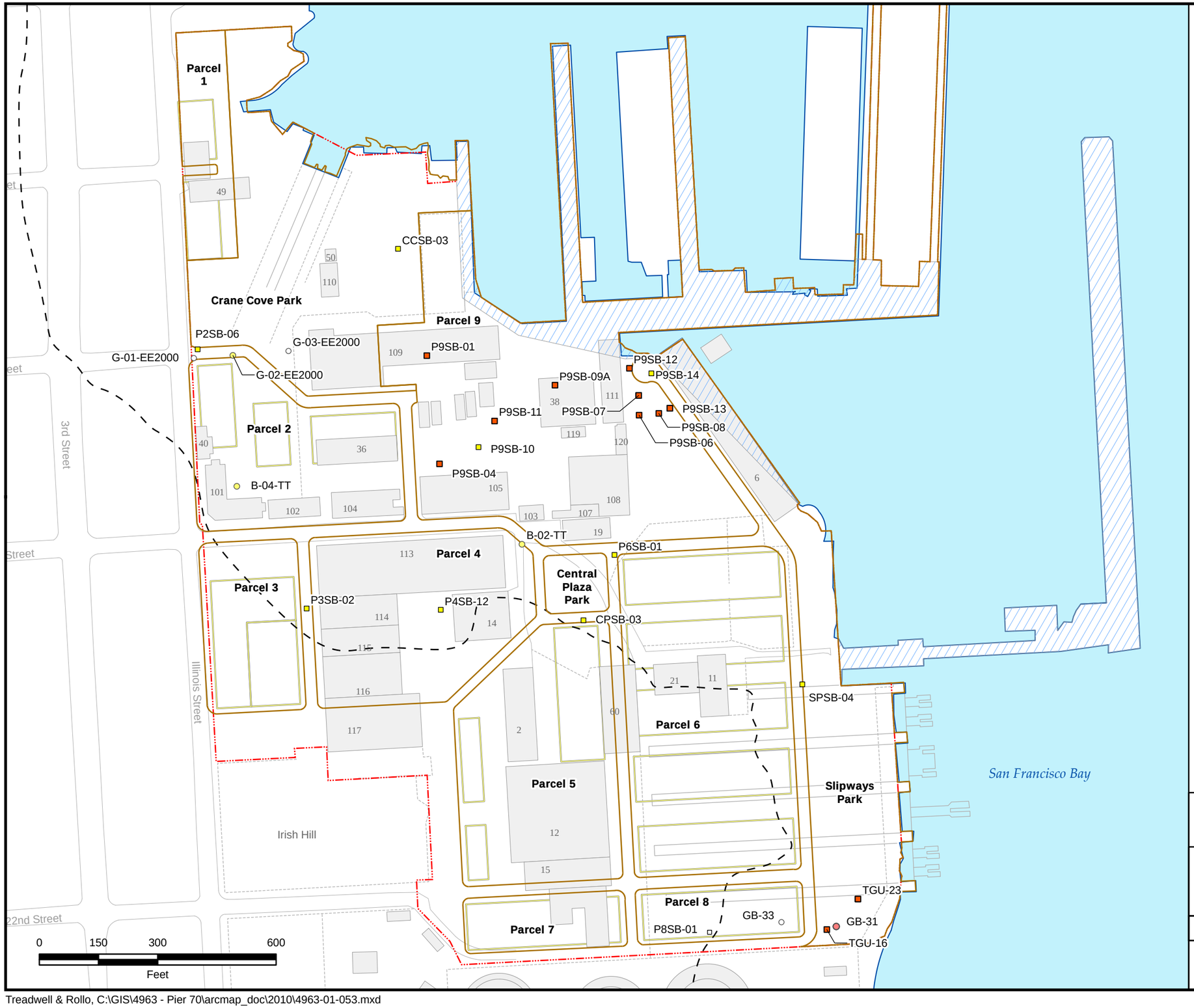
PIER 70 ENVIRONMENTAL SITE INVESTIGATION
San Francisco, California

TPH RESULTS AND ESL EXCEEDANCES IN SHALLOW SOIL (0-10 FEET)

Date 9/15/2010	Project 4963.01	Figure ES-10

Treadwell&Rollo

Treadwell & Rollo, C:\GIS\4963 - Pier 70\arcmap_doc\2010\4963-01-050.mxd



Legend

Historical Sample Location
- Not Detected
- Detected Below ESL
- Exceedance of ESL

Recent Sample Location
- Not Detected
- Detected Below ESL
- Exceedance of ESL

Surface Feature
- Fence
- Other
- Approximate 1869 Shoreline
- Road Edge
- Building
- Proposed Building
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PIER 70 ENVIRONMENTAL SITE INVESTIGATION
San Francisco, California

TPH RESULTS AND ESL EXCEEDANCES IN DEEP SOIL (>10 FEET)

Date 9/30/2010	Project 4963.01	Figure ES-11

Treadwell&Rollo

Treadwell & Rollo, C:\GIS\4963 - Pier 70\arcmap_doc\2010\4963-01-053.mxd

Legend

- Historical Sample Location
  - Not Detected
  - Detected Below ESL
  - Exceedance of ESL
- Recent Sample Location
  - Not Detected
  - Detected Below ESL
  - Exceedance of ESL
- Surface Feature
  - Fence
  - Other
  - Approximate 1869 Shoreline
  - Road Edge
  - Building
  - Proposed Building
  - Pier 70 Site Area
  - Master Plan Parcel Areas (eg. Parcel 1 = P1, Crane Cove Park = CC, etc...)
  - Pile-Supported Structure Over Water

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5. Map displayed in California State Plane Coordinate System, Zone III, North American Datum of 1983 (NAD83), US Survey Feet.

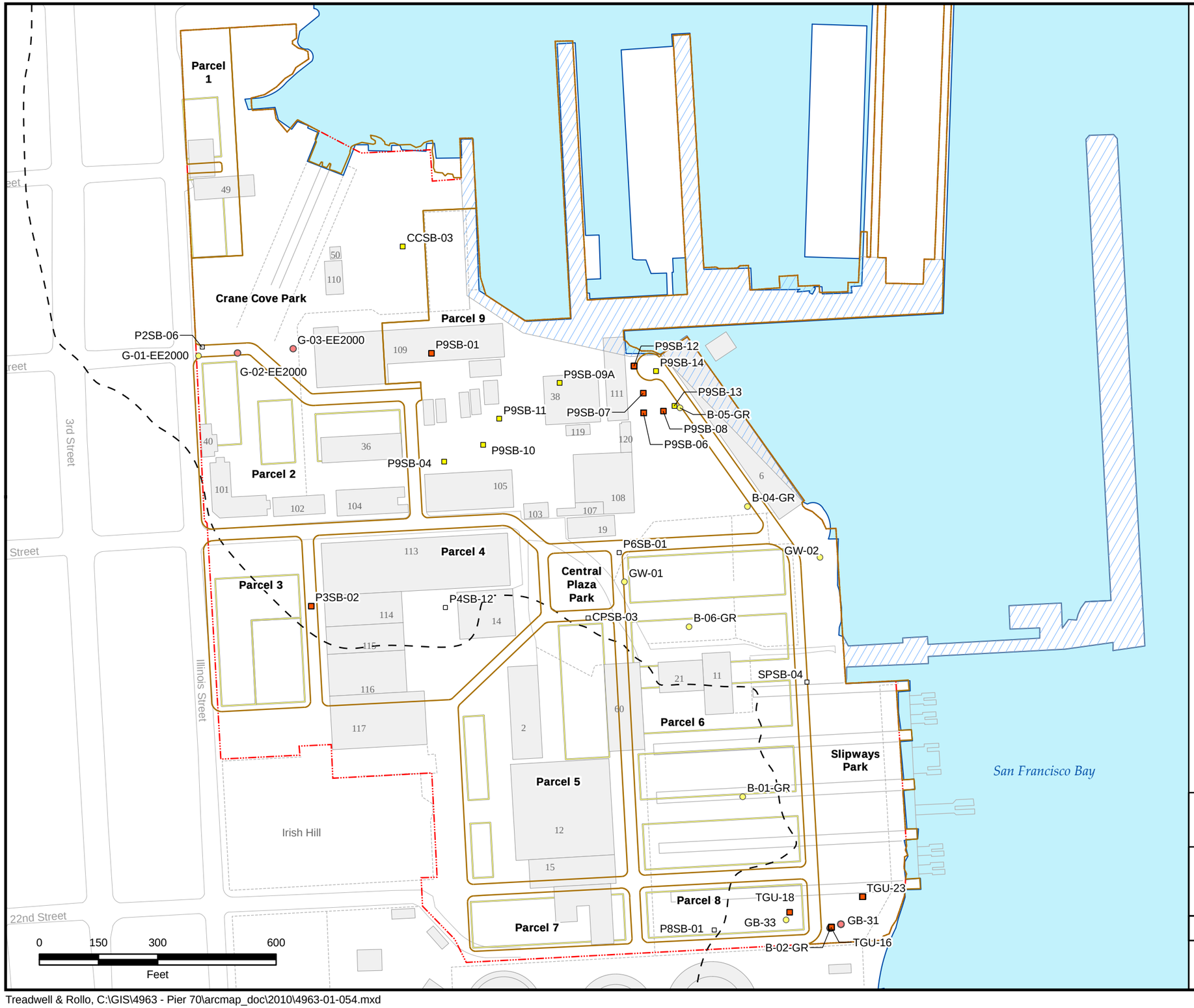
PIER 70 ENVIRONMENTAL SITE INVESTIGATION
San Francisco, California

PAH RESULTS AND ESL EXCEEDANCES IN SHALLOW SOIL (0-10 FEET)

Date 9/15/2010	Project 4963.01	Figure ES-12

Treadwell&Rollo

Treadwell & Rollo, C:\GIS\4963 - Pier 70\arcmap_doc\2010\4963-01-051.mxd



Legend

Historical Sample Location
- Not Detected
- Detected Below ESL
- Exceedance of ESL

Recent Sample Location
- Not Detected
- Detected Below ESL
- Exceedance of ESL

Surface Feature
- Fence
- Other
- Approximate 1869 Shoreline
- Road Edge
- Building
- Proposed Building
- Pier 70 Site Area
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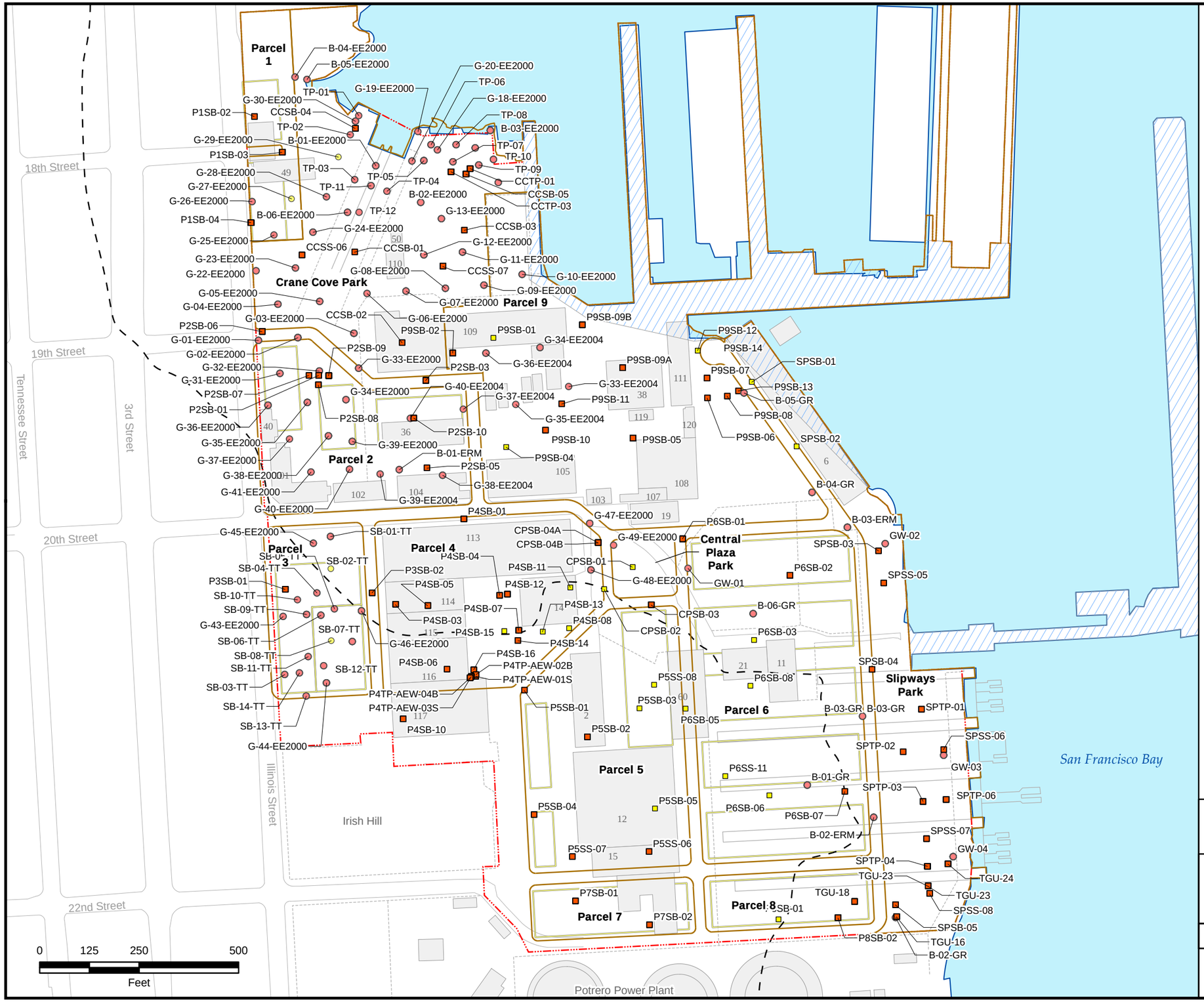
PIER 70 ENVIRONMENTAL SITE INVESTIGATION
San Francisco, California

PAH RESULTS AND ESL EXCEEDANCES IN DEEP SOIL (>10 FEET)

Date 9/16/2010	Project 4963.01	Figure ES-13

Treadwell&Rollo

Treadwell & Rollo, C:\GIS\4963 - Pier 70\arcmap_doc\2010\4963-01-054.mxd



Legend

Historical Sample Location
- Not Detected
- Detected Below ESL
- Exceedance of ESL

Recent Sample Location
- Not Detected
- Detected Below ESL
- Exceedance of ESL

Surface Feature
- Fence
- Other
- Approximate 1869 Shoreline
- Road Edge
- Building
- Proposed Building
- Pier 70 Site Area
- Master Plan Parcel Areas (eg. Parcel 1 = P1, Crane Cove Park = CC, etc...)
- Pile-Supported Structure Over Water

Notes:

1. Buildings, surface features, and road edges digitized from digital orthophotos 10SEG535775.tif and 10SEG535790, California Spatial Information Library (CASIL) UC Davis, ca 2005, http://archive.casil.ucdavis.edu/casil/.
2. Current and recent historical shoreline based upon San Francisco Enterprise GIS, *Extended San Francisco Shoreline Shapefile*, http://gispub02.sfgov.org/ website/sfshare/catalog/sfshoreext.zip.
3. Approximate 1869 Shoreline based upon Board of Tidelands Commissioners, *Map of the Salt Marsh and Tide Lands and Lands Lying Under Water South of Second Street and Situate in the City and County of San Francisco*, 1869.
4. Site boundary, parcels, and acreages from ROMA Design Group, *Pier 70 Draft Preferred Master Plan*, 17 July 2009.
5. Map displayed in California State Plane Coordinate System, Zone III, North American Datum of 1983 (NAD83), US Survey Feet.

PIER 70 ENVIRONMENTAL SITE INVESTIGATION
San Francisco, California

METAL RESULTS AND ESL EXCEEDANCES IN SHALLOW SOIL (0-10 FEET)

Date 9/30/2010	Project 4963.01	Figure ES-14

Treadwell&Rollo

Treadwell & Rollo, C:\GIS\4963 - Pier 70\arcmap_doc\2010\4963-01-052.mxd

Legend

Historical Sample Location
- Not Detected
- Detected Below ESL
- Exceedance of ESL

Recent Sample Location
- Not Detected
- Detected Below ESL
- Exceedance of ESL

Surface Feature
- Fence
- Other
- Approximate 1869 Shoreline
- Road Edge
- Building
- Proposed Building
- Pier 70 Site Area
- Master Plan Parcel Areas (eg. Parcel 1 = P1, Crane Cove Park = CC, etc...)
- Pile-Supported Structure Over Water

Notes:

1. Buildings, surface features, and road edges digitized from digital orthophotos 10SEG535775.tif and 10SEG535790, California Spatial Information Library (CASIL) UC Davis, ca 2005, http://archive.casil.ucdavis.edu/casil/.
2. Current and recent historical shoreline based upon San Francisco Enterprise GIS, *Extended San Francisco Shoreline Shapefile*, http://gispub02.sfgov.org/ website/sfshare/catalog/sfshoreext.zip.
3. Approximate 1869 Shoreline based upon Board of Tidelands Commissioners, *Map of the Salt Marsh and Tide Lands and Lands Lying Under Water South of Second Street and Situate in the City and County of San Francisco*, 1869.
4. Site boundary, parcels, and acreages from ROMA Design Group, *Pier 70 Draft Preferred Master Plan*, 17 July 2009.
5. Map displayed in California State Plane Coordinate System, Zone III, North American Datum of 1983 (NAD83), US Survey Feet.

PIER 70 ENVIRONMENTAL SITE INVESTIGATION
San Francisco, California

METALS RESULTS AND ESL EXCEEDANCES IN DEEP SOIL (>10 FEET)

Date 9/16/2010	Project 4963.01	Figure ES-15

Treadwell&Rollo

Treadwell & Rollo, C:\GIS\4963 - Pier 70\arcmap_doc\2010\4963-01-055.mxd

Legend

California Hazardous Material Criteria Result

- Non Hazardous
- Exceeded California Soluble Threshold Limit Concentration (STLC) - State of California Non-RCRA
- Exceeded California Total Threshold Limit Concentration (TTLC) - State of California Non-RCRA

Surface Feature

- Fence
- Other
- Approximate 1869 Shoreline
- Road Edge
- Building
- Proposed Building
- Pier 70 Site Area
- Master Plan Parcel Areas (eg. Parcel 1 = P1, Crane Cove Park = CC, etc...)
- Pile-Supported Structure Over Water

Notes:

1. Some locations show results that both exceed and do not exceed the hazardous waste standards. In such cases, samples were collected at differing depths and provided more than one result per location.
2. No samples exceeded the Federal Toxicity Characteristic Leaching Potential (TCLP).
3. Buildings, surface features, and road edges digitized from digital orthophotos 10SEG535775.tif and 10SEG535790, California Spatial Information Library (CASIL) UC Davis, ca 2005, http://archive.casil.ucdavis.edu/casil/.
4. Shoreline based upon San Francisco Enterprise GIS, *Extended San Francisco Shoreline Shapefile*, http://gispub02.sfgov.org/website/sfshare/catalog/sfshoreext.zip.
5. Approximate 1869 Shoreline based upon Board of Tidelands Commissioners, *Map of the Salt Marsh and Tide Lands and Lands Lying Under Water South of Second Street and Situate in the City and County of San Francisco*, 1869.
6. Site boundary, parcels, and acreages from ROMA Design Group, *Pier 70 Draft Preferred Master Plan*, 17 July 2009.
7. Map displayed in California State Plane Coordinate System, Zone III, North American Datum of 1983 (NAD83), US Survey Feet.

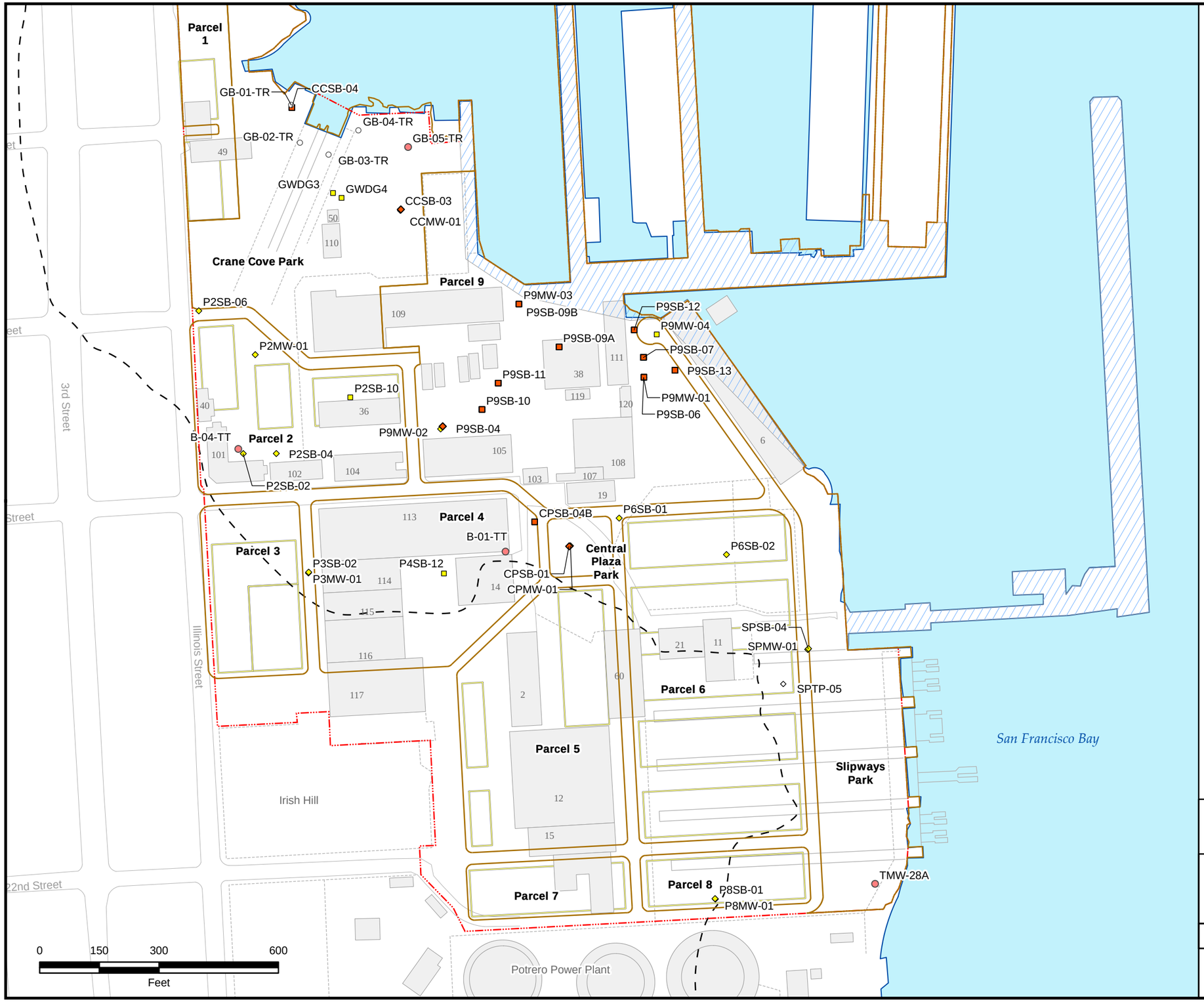
PIER 70 ENVIRONMENTAL SITE INVESTIGATION
San Francisco, California

CALIFORNIA HAZARDOUS MATERIAL CRITERIA EXCEEDANCES IN SHALLOW SOIL 0 TO 10 FEET

Date 10/5/2010	Project 4963.01	Figure ES-16

Treadwell&Rollo

Treadwell & Rollo, C:\GIS\4963 - Pier 70\arcmap_doc\2010\4963-01-065.mxd



Legend

Historical Sample Location
- Not Detected
- Detected Below ESL
- Exceedance of ESL

Recent Sample Location

Phase 1
- Not Detected
- Detected Below ESL
- Exceedance of ESL

Phase 2
- Detected Below ESL
- Exceedance of ESL

Surface Feature
- Fence
- Other
- Approximate 1869 Shoreline
- Road Edge
- Building
- Proposed Building
- Pier 70 Site Area
- Master Plan Parcel Areas (eg. Parcel 1 = P1, Crane Cove Park = CC, etc...)
- Pile-Supported Structure Over Water

Notes:

1. Buildings, surface features, and road edges digitized from digital orthophotos 10SEG535775.tif and 10SEG535790, California Spatial Information Library (CASIL) UC Davis, ca 2005, http://archive.casil.ucdavis.edu/casil/.
2. Current and recent historical shoreline based upon San Francisco Enterprise GIS, *Extended San Francisco Shoreline Shapefile*, http://gispub02.sfgov.org/ website/sfshare/catalog/sfshoreext.zip.
3. Approximate 1869 Shoreline based upon Board of Tidelands Commissioners, *Map of the Salt Marsh and Tide Lands and Lands Lying Under Water South of Second Street and Situate in the City and County of San Francisco*, 1869.
4. Site boundary, parcels, and acreages from ROMA Design Group, *Pier 70 Draft Preferred Master Plan*, 17 July 2009.
5. Map displayed in California State Plane Coordinate System, Zone III, North American Datum of 1983 (NAD83), US Survey Feet.

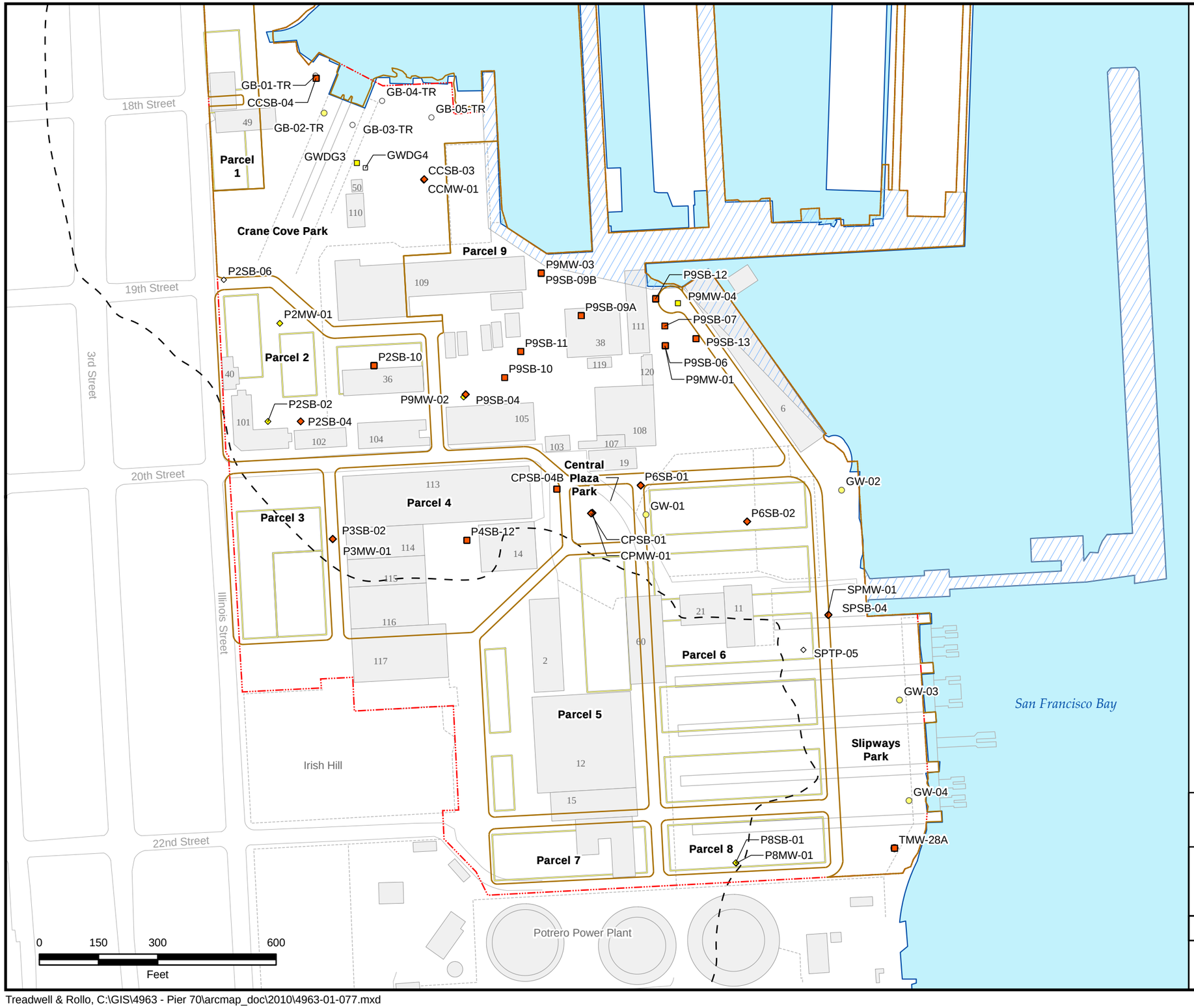
PIER 70 ENVIRONMENTAL SITE INVESTIGATION
San Francisco, California

TPH RESULTS AND ESL EXCEEDANCES IN GROUNDWATER

Date 9/17/2010	Project 4963.01	Figure ES-17

Treadwell&Rollo

Treadwell & Rollo, C:\GIS\4963 - Pier 70\arcmap_doc\2010\4963-01-075.mxd



Legend

Historical Sample Location
- Not Detected
- Detected Below ESL
- Exceedance of ESL

Recent Sample Location

Phase 1
- Not Detected
- Detected Below ESL
- Exceedance of ESL

Phase 2
- Not Detected
- Detected Below ESL
- Exceedance of ESL

Surface Feature
- Fence
- Other
- Approximate 1869 Shoreline
- Road Edge
- Building
- Proposed Building
- Pier 70 Site Area
- Master Plan Parcel Areas (eg. Parcel 1 = P1, Crane Cove Park = CC, etc...)
- Pile-Supported Structure Over Water

Notes:

1. Buildings, surface features, and road edges digitized from digital orthophotos 10SEG535775.tif and 10SEG535790, California Spatial Information Library (CASIL) UC Davis, ca 2005, http://archive.casil.ucdavis.edu/casil/.
2. Current and recent historical shoreline based upon San Francisco Enterprise GIS, *Extended San Francisco Shoreline Shapefile*, http://gispub02.sfgov.org/ website/sfshare/catalog/sfshoreext.zip.
3. Approximate 1869 Shoreline based upon Board of Tidelands Commissioners, *Map of the Salt Marsh and Tide Lands and Lands Lying Under Water South of Second Street and Situate in the City and County of San Francisco*, 1869.
4. Site boundary, parcels, and acreages from ROMA Design Group, *Pier 70 Draft Preferred Master Plan*, 17 July 2009.
5. Map displayed in California State Plane Coordinate System, Zone III, North American Datum of 1983 (NAD83), US Survey Feet.

PIER 70 ENVIRONMENTAL SITE INVESTIGATION
San Francisco, California

PAH RESULTS AND ESL EXCEEDANCES IN GROUNDWATER

Date 9/17/2010	Project 4963.01	Figure ES-18

Treadwell&Rollo

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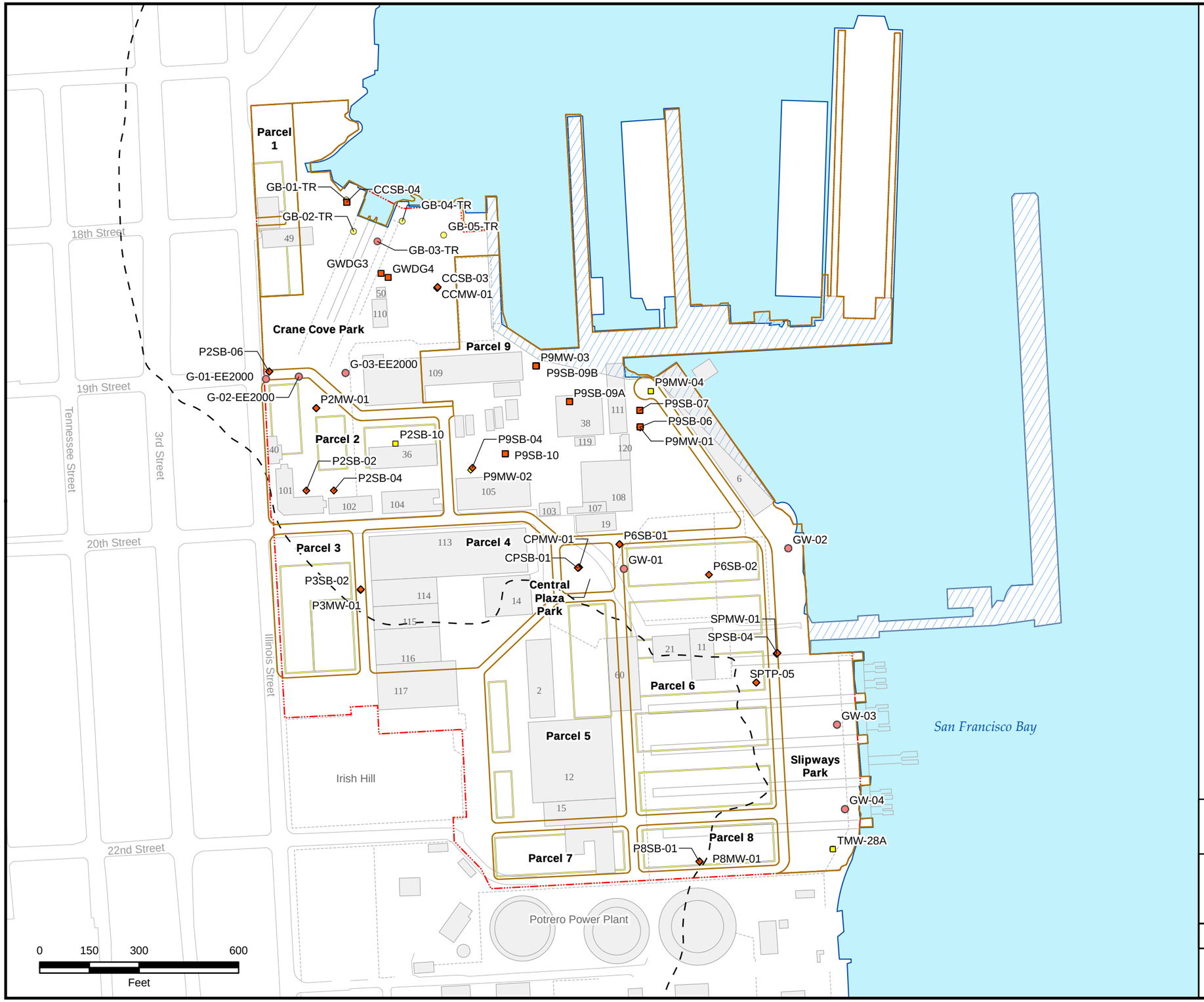


Legend

Historical Sample Location
- Not Detected
- Detected Below ESL
- Exceedance of ESL

Recent Sample Location

Phase 1
- Not Detected
- Detected Below ESL
- Exceedance of ESL

Phase 2
- Not Detected
- Detected Below ESL
- Exceedance of ESL

Surface Feature
- Fence
- Other
- Approximate 1869 Shoreline
- Road Edge
- Building
- Proposed Building
- Pier 70 Site Area
- Master Plan Parcel Areas (eg. Parcel 1 = P1, Crane Cove Park = CC, etc...)
- Pile-Supported Structure Over Water

Notes:

1. Buildings, surface features, and road edges digitized from digital orthophotos 10SEG535775.tif and 10SEG535790, California Spatial Information Library (CASIL) UC Davis, ca 2005, http://archive.casil.ucdavis.edu/casil/.
2. Current and recent historical shoreline based upon San Francisco Enterprise GIS, *Extended San Francisco Shoreline Shapefile*, http://gispub02.sfgov.org/ website/sfshare/catalog/sfshoreext.zip.
3. Approximate 1869 Shoreline based upon Board of Tidelands Commissioners, *Map of the Salt Marsh and Tide Lands and Lands Lying Under Water South of Second Street and Situate in the City and County of San Francisco*, 1869.
4. Site boundary, parcels, and acreages from ROMA Design Group, *Pier 70 Draft Preferred Master Plan*, 17 July 2009.
5. Map displayed in California State Plane Coordinate System, Zone III, North American Datum of 1983 (NAD83), US Survey Feet.

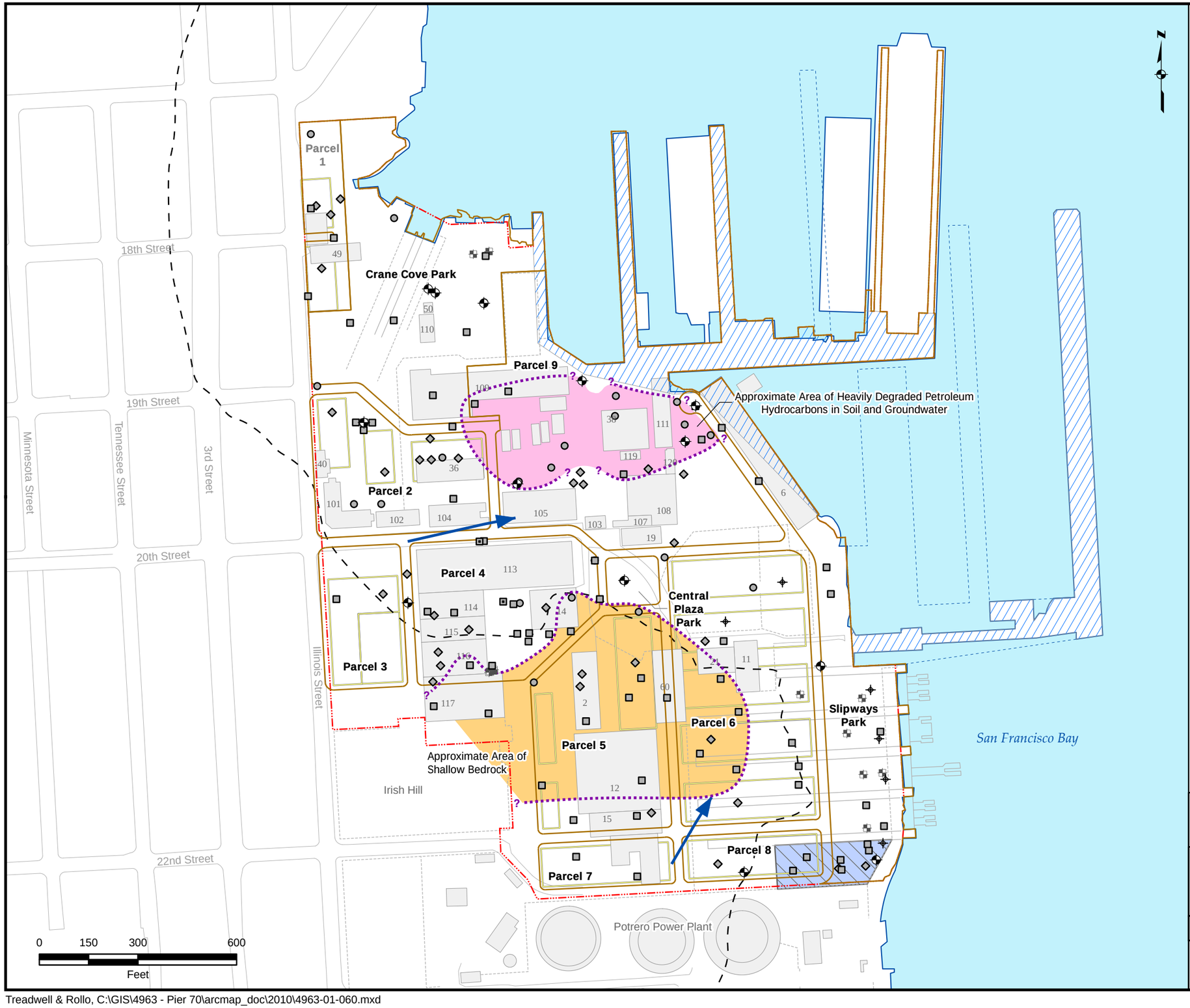
PIER 70 ENVIRONMENTAL SITE INVESTIGATION
San Francisco, California

METALS RESULTS AND ESL EXCEEDANCES IN GROUNDWATER

Date 9/17/2010	Project 4963.01	Figure ES-19

Treadwell&Rollo

Treadwell & Rollo, C:\GIS\4963 - Pier 70\arcmap_doc\2010\4963-01-076.mxd



Legend

Sample Location
- Monitoring Well
- Geotechnical Boring
- Soil
- Soil and or Groundwater
- Soil Gas
- Soil Gas Probe
- Test Pit
- Approximate 1869 Shoreline
- Approximate Groundwater Flow Direction

Surface Feature
- Fence
- Other
- Road Edge
- Area of Non-aqueous Phase Liquid (NAPL)
- Approximate Area of Shallow Bedrock
- *Historical Manufactured Gas Plant Subsurface Investigation Area*
- Building
- Proposed Building
- Pier 70 Site Area
- Master Plan Parcel Areas (eg. Parcel 1 = P1, Crane Cove Park = CC, etc...)
- Pile-Supported Structure Over Water

Notes:

1. Buildings, surface features, and road edges digitized from digital orthophotos 10SEG535775.tif and 10SEG535790, California Spatial Information Library (CASIL) UC Davis, ca 2005, http://archive.casil.ucdavis.edu/casil/.
2. Shoreline based upon San Francisco Enterprise GIS, *Extended San Francisco Shoreline Shapefile*, http://gispub02.sfgov.org/website/sfshare/catalog/sfshoreext.zip.
3. Approximate 1869 Shoreline based upon Board of Tidelands Commissioners, *Map of the Salt Marsh and Tide Lands and Lands Lying Under Water South of Second Street and Situate in the City and County of San Francisco*, 1869.
4. Site boundary and parcels from ROMA Design Group, *Pier 70 Draft Preferred Master Plan*, 17 July 2009.
5. Historical Manufactured Gas Plant Subsurface Investigation Area taken from AMEC Geomatrix , *Report of Results: Subsurface Investigation Activities Evaluation of Impact to Fill and Bay Mud, Potrero Power Plant*, Figure 2, September 2010.
6. Map displayed in California State Plane Coordinate System, Zone III, North American Datum of 1983 (NAD83), US Survey Feet.

PIER 70 ENVIRONMENTAL SITE INVESTIGATION
San Francisco, California

NATURE AND EXTENT OF NAPL IN GROUNDWATER

Date 9/30/2010	Project 4963.01	Figure ES-20

Treadwell&Rollo

Treadwell & Rollo, C:\GIS\4963 - Pier 70\arcmap_doc\2010\4963-01-060.mxd