Area-Wide EHE/EHMP Document

Factory Street Area
Honolulu,
Oahu

February 2018

Version 2.0

Prepared by:

State of Hawai‘i Department of Health (HDOH)

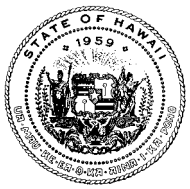
Hazard Evaluation and Emergency Response Office (HEER Office)

Acknowledgements of Major Contributors:

- **Environmental Science International for Sections of EHE and EHMP**

DAVID Y. IGE
GOVERNOR OF HAWAII

VIRGINIA PRESSLER, M.D.
DIRECTOR OF HEALTH



STATE OF HAWAII
DEPARTMENT OF HEALTH
P. O. BOX 3378
HONOLULU, HI 96801-3378

Environmental Hazard Evaluation (EHE)
Environmental Hazard Management Plan (EHMP)
Factory Street Area, Honolulu, Hawaii

February, 2018

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ACRONYMS

bgs	Below ground surface
BMP	Best management practice
C&C	City and County
CDC	Centers For Disease Control and Prevention
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
C/I	Commercial/Industrial
COC	Contaminant of concern
cy	Cubic yard
DCS	Debris-contaminated soil
DU	Decision Unit
EAL	Environmental action level
EC	Engineering Control
EHE	Environmental Hazard Evaluation
EHMP	Environmental Hazard Management Plan
EPA	U.S. Environmental Protection Agency
eV	Electron volt
FSA	Factory Street Area
GPR	Ground Penetrating Radar
GPS	Global Positioning System
HAR	Hawaii Administrative Rules
HAZWOPER	Hazardous Waste Operations and Emergency Response
HDOH	Hawaii Department of Health
HDOT	Hawaii Department of Transportation
HEER	Hazard Evaluation and Emergency Response
HIOSH	Hawaii Occupational Safety and Health
HRS	Hawaii Revised Statutes
HSERC	Hawaii State Emergency Response Commission
HSP	Health and Safety Plan
HVOC	Halogenated volatile organic compound
IC	Institutional control
kg	Kilogram
LEL	Lower explosive limit
LEPC	Local Emergency Planning Committee
mg	Milligram
MI	Multi-Increment
mil	Milliliter
MTBE	Methyl tertiary butyl ether
NFA	No Further Action
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
OPA	Oil Pollution Act
OSHA	Occupational Safety and Health Administration
PA	Preliminary Assessment
PCS	Petroleum-contaminated soil

PEL	Permissible exposure limit
PID	Photoionization detector
PPE	Personal protective equipment
ppm	Parts per million
ppmv	Parts per million by volume
PRP	Potentially responsible party
RP	Responsible party
RQ	Reportable quantity
SHWB	Solid and Hazardous Waste Branch
SOSC	State On-scene Coordinator
SPH	Separate phase hydrocarbons
TCLP	Toxicity Characteristic Leaching Procedure
TGM	Technical Guidance Manual
TPH	Total petroleum hydrocarbons
TPH-o	Total petroleum hydrocarbons as oil
TPH-RRO	Total petroleum hydrocarbons as residual range organics
TWA	Time-weighted average
GP	Underground pipeline
UIC	Underground injection control
UST	Underground storage tank
VOC	Volatile organic compound
XRF	X-ray fluorescence
yd	yard

1.0 INTRODUCTION

The Hawaii Department of Health (HDOH) Hazard Evaluation and Emergency Response Office (HEER) Office has provided this Environmental Hazard Management Plan (EHMP) to inform the City and County of Honolulu, including the Honolulu Board of Water Supply as well as other private utility companies and their contractors about their responsibilities for safe management of lead (and petroleum) contaminated soils present in the subsurface at Factory Street and surrounding area. Contact with this soil is possible during excavation, drilling, or asphalt removal activities. The area of highest lead contamination is described in more detail below, but it is anticipated that the highest concentrations of lead in soil will be encountered in soil directly under the asphalt cover at a depth of 0 to 1 foot below the asphalt also referred to as below ground surface (bgs).

Factory Street is located in Kalihi, Oahu, Hawaii (Figure 1 and 2). Underneath the Factory Street pavement lead was detected in soil from discrete and multi-increment (MI) samples at concentrations exceeding the commercial/industrial (C/I) and construction worker Environmental Action Level (EAL; 800 mg/kg). Discrete sample concentrations represent locally isolated areas in a heterogeneous soil and are therefore not very reliable in terms of average (chronic) exposure risk. MI sample concentrations are more representative of a wider area and present a more realistic average concentrations one can be exposed to. The area of highest concentrations (or contamination) on Factory Street that has been extensively sampled laterally and vertically in 2017 using the MI sampling approach is shown in Figure 3. MI lead samples in this area showed lead concentrations ranging from 7 to over 24,000 mg/kg. The highest concentrations were detected in shallow soil right under the asphalt.

Factory Street connects to N. King Street in the northwest, crosses Waterhouse Street and ends in Stanley Street to the southwest (Figure 2). The next street to the west is Kopke Street, Pulaa Street to the northeast, and Industrial Road and Puuhale Road to the southeast. This wider area is in the following described as Factory Street Area (FSA).

Lead concentrations from discrete samples collected in the FSA have exceeded the unrestricted EAL (200 mg/kg; Figure 4) and in one case the C/I EAL (on Pulaa Lane), but are likely unrelated to the contamination on Factory Street. Nevertheless, cautionary procedures as outlined in this EHMP should also be applied to the wider FSA. The area is zoned as Mixed Industrial Use Area (IMX-1). Small businesses and residential housing are observed in the area.

In the 1990s, it was discovered that high lead concentrations are present in the surface soil/ash of Factory Street and are likely a result of commercial activities (e.g., manufacturing of lead weights for fishing supplies). Lead concentrations at or exceeding the current applicable Environmental Action Level (EAL) for unrestricted land use of 200 mg/kg were measured in soil down to approximately 4 feet below ground surface (bgs). The measured concentration range in the FSA was 50 to 300,000 mg/kg lead (EPA, 1995), with the highest concentrations being observed in the surface soils and near surface soil (Figures 4 and 5 and Appendix C) in the shoulder area of Factory Street. Only sporadic samples were taken in the travel way of Factory Street at that point, but one discrete sample taken from beneath the road showed a concentration of at least 10,000 mg/kg (based on XRF results-underestimated concentrations) in an isolated area, indicating that contamination likely spread to beneath the roadway. The areas of highest contamination in the shoulder areas were partially excavated and the residual contaminated soil covered in the 1990s. The contamination in the roadway is currently covered by asphaltic pavement, maintained by the City and County of Honolulu. These asphalt/concrete barriers serve as engineering controls to direct exposure of residents and commercial/industrial workers.

As long as the pavement is maintained, there is no exposure to any receptors. However, exposure to residents, C/I workers, and construction workers can occur during (1) future subsurface activities—including belowground constructions of utility trenches (e.g., for water, natural gas, electricity, telephone, cable, box culverts and storm drain laterals, sanitary sewers, street lights, traffic lights, grease traps) in the shoulder areas; (2) construction activities within the travel way of the road (including repaving where the old asphalt is removed and the subsurface is exposed), and 3), exposure to soil exposed in potholes in degrading pavement.

During the 2017 Site Assessment it was discovered during toning that multiple utility lines are located within the shoulder areas, at the intersection of shoulder and roadway of Factory Street, underneath Factory Street running parallel to Factory Street or crossing Factory Street (see Photographic Documentation in Appendix A). Ground Penetrating Radar Maps that indicate utility line locations are attached in Appendix B and are included for future reference.

This Area-Wide Environmental Hazard Evaluation (EHE)/EHMP specifies requirements, procedures, and guidelines intended to prevent occurrences of these potential exposures that would pose hazards to human health and the environment during subsurface construction activities, such as utility corridor excavations.

The Hazard Evaluation and Emergency Response (HEER) Office of the Hawaii Department of Health (HDOH) is overseeing remediation of historical impacts associated with (1) impacts by metal and other compounds resulting from past industrial or imported fill activities, including those in the FSA and (2) petroleum handling activities that have resulted in petroleum hydrocarbon releases from storage tanks and pipelines. While this EHMP focuses on lead contamination on Factory Street, potential contact to petroleum products in soil is possible from releases or oiling of streets likely from two previous service stations that lined Factory Street. Petroleum or gas pipelines. As opposed to lead contamination, petroleum contamination is usually easy to detect through soil staining and a distinct petroleum odor. The presence of a petroleum component is also evidenced by elevated TPH-o concentrations above the unrestricted and commercial/industrial (C/I) EAL, although part of the signature might be related to asphaltic material in the shallow soil. The construction (or trench) worker direct exposure EAL was however not exceeded. Petroleum or gas utility lines have also been documented from the utility survey (Appendix A and B).

Pursuant to the Environmental Response Law (Hawaii Revised Statutes [HRS] 128-D) and the State Contingency Plan (Hawaii Administrative Rules [HAR] 11-451), parties are required to comply with this Area- Wide EHE/EHMP.

Parties may utilize this Area-Wide EHE/EHMP as is, and HDOH expects this for small-scale projects within private sites, roadways, and common areas. Off-site construction within roadways and common areas will likely encounter COCs that must be properly managed by construction and environmental contractors.

Alternatively, parties can refine or modify the details of this Area-Wide EHE/EHMP in order to better address site-specific requirements. Therefore, parties have the option to create their own site-specific EHMPs provided the site is properly characterized based on the Area-Wide EHE/EHMP. For larger projects, HDOH will request the submittal of a tailored EHMP that describes the operations-specific tasks and soil handling in more detail.

2.0 PURPOSE

The purpose of this Area-Wide EHE/EHMP is to document the location of existing lead (and any other) contamination, explain residual hazards, and specify consistent and effective practices for

managing lead if encountered during subsurface activities within Factory Street and the wider FSA. HDOH specifically characterized the area of highest lead contamination on Factory Street to enable safe handling, waste characterization for non-hazardous and hazardous waste, and appropriate (quick) disposal of the soil at a landfill. Lead toxicity characteristic leaching procedure (TCLP) concentrations were determined for all decision units (DUs) by MI sampling in the area of highest lead concentrations that exceeded 100 mg/kg lead (Appendix F). Armed with this information, the user should contact the Solid and Hazardous Waste Branch (SHWB) of HDOH for disposal questions and to obtain an EPA number for hazardous waste disposal for soil disposal from DU-6 (A).

Soil with lead exceeding 200 mg/kg may not be stockpiled onsite overnight and must be covered during the day or misted to avoid transport through air as fugitive dust and runoff through contact with water. Soil from DU-6A must be immediately placed into a closed container (drum or roll-off container) for same day disposal.

Soil with lead concentrations exceeding 200 mg/kg cannot be reused offsite and must be analyzed for TCLP prior to disposal (see Appendix J), except for the area of highest contamination (Figures 3, 6a, 6b, and 6c). For this area TCLP concentrations have already been determined (Appendix F).

The HDOH approved EHMP is the primary regulatory document directing safe, long-term management of contaminated soils at the site. The EHMP may be updated or modified in the future as needed, subject to HDOH approval. The approved EHMP shall be referred to in the environmental covenant that describes legal obligations for long-term management of the property.

Activities covered by this document include: (1) future subsurface activities—including belowground constructions of utility trenches (e.g., for water, natural gas, electricity, telephone, cable, box culverts and storm drain laterals, sanitary sewers, street lights, traffic lights, grease traps) in the shoulder areas; and (2) construction activities within the travel way of the road (including repaving where the old asphalt is removed and the subsurface is exposed

If unsure whether this Area-Wide EHE/EHMP is detailed enough to provide appropriate guidance for planned subsurface construction activities, contact HDOH prior to commencing the project.

Under intact conditions of the pavement and appropriate controls, contamination within Factory Street and the FSA does not pose a threat to human health or the environment.

This document does not supersede existing site-specific EHE/EHMPs or the need to develop site-specific documents for land development and large construction projects. HDOH recognizes that developing independent, site-specific EHE/EHMPs for small-scale projects within private sites, roadways, and common areas can lead to delays in construction because of the requirement that HDOH approve new plans prior to construction. In addition, off-site construction within roadways and common areas will likely encounter contamination that must be properly managed by construction and environmental contractors. EHE/EHMPs currently do not exist to deal with these contingencies. This Area- Wide EHE/EHMP can also be used by landowners, tenants, and utility companies to assist in developing individual EHE/EHMPs for large construction activities. The EHE/EHMP is therefore a vehicle to avoid costly delay in construction when contaminated media are encountered.

Important: Complete site characterization must precede full-scale redevelopment (including construction of additional buildings or major building alterations) within areas of known or

suspected contamination. If contamination is encountered, preparation of a site-specific EHE/EHMP must be carried out to address contamination within the site boundary.

3.0 AREA COVERED

The area covered by this document is Factory Street and the wider FSA.The FSA includes Factory Street, Pulaa Street, King Street between Kopke Street Pulaa Street and Puuhale Road, Kopke Street, Waterhouse Street, Stanley Street, Industrial Road, and Puuhale Road as shown in Figure 4, where concentrations of lead can be expected to exceed the unrestricted EAL (200 mg/kg). While the main contamination is likely very restricted to an area on Factory Street between Waterhouse and North King Street (yellow areas in Figure 6a,b,c) where pervasive contamination is documented by MI samples with lead concentrations exceeding the C/I EALs, single lead concentrations exceeding the unrestricted and/or C/I EAL are documented by previous sampling events using discrete or composite samples. These single concentrations are spotty, likely unrelated, and/or might represent urban anthropological background. However, due to the uncertainty of average concentration distribution in the FSA, precautions in accordance with this plan should be exercised.

The highest concentrations on Factory Street between North King Street and Waterhouse Street-includes soil underneath the roadway and the shoulder areas (Figures 5 and 6a, b, c). No data have been collected for North King Street itself, therefore there exists a data gap for this area. Since North King Street is a busy road it is not expected that lead was dumped in this area, but it cannot be excluded. Again, precautions in accordance with this plan should be exercised.

3.1. History and Background

Historical, the area was used residentially and industrially. The street naming in the area (e.g., Factory Street and Industrial Road) indicates previous industrial use and a survey map from 1912 indicates that Factory Street and lots on the northwest (Ewa) side of the street belonged to the Waterhouse Tract, which belonged to the Kalihi Taro and Land Company, and a Sanborn Map from 1914 shows that the Poi Factory was located on the Diamond Head Side of Factory Street (Figure 7). The lots on the northeast (Diamond Head) side of the street belonged to the Kalihi Poi Factory Tract. Kalihi Taro and Land Company sold their commercial and industrial lots between 1912 and 1926 and was then legally dissolved, likely in response to the introduction of the “Poi Bill” in 1911. Sanborn Maps from 1927 to 1950 show mostly residential dwellings on either side of Factory Street with the exception of 2003 N. King Street and 1955 N. King Street at the intersection with N. King Street. Those two parcels show shops (Figure 8, blue) lining the King Street side of those parcels. Aerial photographs from 1952 revealed that the neighborhood has been primarily residential since 1952 (EPA, 1995).

A witness who lived in the area indicated that between 1955 and 1966 ash containing lead was dumped and spread around the area. It was described that the witness would scavenge through the piles of ash as a child to salvage large chunks of lead to smelt into fishing weights. A potential source of the lead may have been lead electrodes extracted from old car batteries. Other commercial operations that potential disposed of spent chemicals include a dental office, a sign printing shop, and a fishing supply store. The fishing supply store was located close to the area of highest lead contamination and was identified by the EPA as the most probable source for the lead contamination at Factory Street (EPA, 1995). The fishing supply store was situated at the Ewa side of Factory Street at the corner of N. King Street and Factory Street (2003 N. King Street) A small scale smelting operation was operated in the fishing supply store until the early 1980s. Another account indicated that a battery rebuilder “occupied the gas station building which is across the street” (Richardson, 1994). HDOH records indicate that a

service station was located at the parcel at 1955 N. King Street and was operated by various petroleum parties (e.g. Shell, Pacific Tire, Aloha Petroleum; Figure 9). Currently, there are residential as well as small business and industrial shops lining Factory Street.

3.2. Previous Environmental Investigations

In 1993 the HDOH HEER office conducted a comprehensive lead sample study inside and outside of buildings on Factory Street in response to high lead blood levels measured in children living on Factory Street. The soil samples identified a lead source in soil where concentrations of 41,000 – 342,000 mg/kg were measured in the shoulder area (Figures 4 and 5) of Factory Street close to Factory Street's intersection with King Street between Waterhouse and King Street (EPA, 1995). At this time the soil was exposed. Subsequently, after an order was issued, the soil should have been removed to a depth of 6-12 inches and the previous identified locations of high lead concentrations were paved over. However, confirmation sample results were never submitted (EPA, 1995). Therefore, it is unclear if, and how much soil was removed. Areas supposedly excavated and paved in the 1990s are shown in Figure 10.

A Preliminary Assessment (PA) with the sample results was submitted to the EPA by the HEER office in February, 1994 (HDOH, 1996a). The PA was completed for the EPA by DOH on May 25, 1995. After reviewing the PA, the EPA decided that further investigation of the FSA would be necessary to more completely evaluate the site using the EPA Hazard Ranking System (HDOH, 1996). To delineate the lead contamination further, EPA conducted further assessment of the area in 1995 wherein 86 soil samples from 20 borings were collected (EPA, 1995; Figure 5) to a maximum depth of approximately 5 feet bgs (Appendix C, Table 1), when refusal was encountered. All samples were analyzed by XRF and eleven samples were submitted for laboratory analysis of lead as confirmation samples. The highest lead concentrations were detected in soil in a narrow strip between the building at 2003 N. King Street and Factory Street, and across the street at the edge of a parking lot at 1955 King Street (Appendix C, Figure 5) in locations where the high lead concentrations supposedly had been removed. Lead concentrations in the laboratory confirmation samples ranged from 27 to 117,000 mg/kg with concentrations exceeding 10,000 mg/kg also being detected in soil underneath the asphalt of Factory Street itself. Based on XRF -laboratory analytical data correlations obtained at that point, this XRF analytical result is likely underestimating actual lead concentrations present. The EPA concluded that the area of lead contamination above background was limited, but that high lead concentrations remained in areas where soil with high lead concentrations were supposedly removed. The results were summarized in the EPA's Technical Assistance Team Report (EPA, 1995) and HDOH's Site Assessment Report (HDOH, 1996). The site received a No Further Action (NFA) Status in 1996, because the site had been evaluated and determined to be in no priority category as long as the cap was maintained (HDOH, 1996b).

In 2016, the site was reopened by HDOH HEER after a site visit determined that the pavement on Factory Street is degrading. An open area with no asphalt was identified in the shoulder area in front of Factory Street 915B during the site visit and sampled using MI sampling protocols (HDOH, 2016). The results showed that the lead concentration was 280 mg/kg, marginally above the HDOH Tier 1 (unrestricted) EAL, not significantly elevated above expected urban area background and below EPA's action level for residential soils (400 mg/kg). The owner of the 915B Factory Street residence was notified of the condition and advised to notify the family to practice good hygiene and to cover the area to prevent exposure.

In 2017, HDOH HEER conducted an additional Site Assessment and sampled the soil

underneath Factory Street using multi-increment (MI) sampling to get more current and representative lead concentrations of the area between North King Street and Waterhouse Street. Previous data relied to a large degree on discrete samples and XRF-data results. Six lateral decision units (DUs) were determined in the area (Figure 6a) and each was separated into six vertical Layers (Figures (6b,c). Due to multiple utilities running through the shoulder areas, especially on the Ewa side, the assessment concentrated on the travel way portion of Factory Street. The vertical DUs included soil layers from 0 to 5 feet bgs as layers A to E. The two shallowest layers (A and B) had a thickness of 0.5 foot, whereas the deeper layers (C to F) had a thickness of 1 foot. Layer A included asphalt from the surface. A geophysical survey (Ground Penetrating Rador [GPR]) was conducted prior to the investigation to identify subsurface utilities. The results of the survey are attached as Appendix B.

Preliminary results of the MI-assessment (Appendix D) show that the highest concentrations of lead were detected in near surface soil (Layer A) on Factory Street in front of the properties at 2003 N. King Street, 922 Factory Street, and 1955 N. King Street (DU-5 and DU-6, Layer A), extending to underneath Factory Street. Concentrations of lead exceeding 800 mg/kg were detected in A-Layers of DUs 4, 5 and 6, the B-Layers of DU-3 and DU-6, and an E-layer in one triplicate of DU-6 (Figures 6a,b,c). Lead concentrations decrease towards DUs 1 and 2 to close to the unrestricted HDOH HEER environmental action levels (EALs; 200 mg/kg) and with depths to below the unrestricted EALs in all DUs with the exception of DU-6E (Appendix D). High concentrations exceeding the unrestricted EAL extent to deeper soil layers (Layers B, C, E) in DU-6 and DU-4 compared to all other DUs investigated. Concentrations below the unrestricted EAL were found in Layer B and deeper layers in DU-1 and DU-2, and Layer C and deeper layers in DU-3 and DU-5.

Average lead XRF concentrations generally obtained via a hand-held XRF instrument correlated with concentrations obtained by laboratory analyses, but underestimate lead concentrations determined by laboratory analytical methods (Appendix E). At the lower concentration end, the laboratory samples have a lead concentration a factor of two higher than the average lead XRF sample concentrations (Appendix E), whereas at the higher concentration end the factors go up to approximately 10 times, with an outlier of even 84 times the XRF concentration. Approximately 15 individual XRF readings (Appendix E) were obtained for lead on each MI sample that was analyzed using laboratory measurements, and averaged for one lead XRF result. The individual readings can vary by two to three orders of magnitude within a high average concentration sample, indicating that the lead is heterogeneously distributed in affected DUs. This is consistent with results from previous discrete samples in the area. All samples exceeding 100 mg/kg lead (20 x TCLP limit) were analyzed for toxicity using the Toxicity Characteristic Leaching Procedure (TCLP). The results (Appendix F) show that only DU-6 Layer A exceeds the TCLP limit (5 mg/l). Therefore, if soil in DU-6A is to be disposed of, it needs to be disposed of as hazardous waste on the U.S. mainland. The assessment report for the latest site assessment is currently in preparation as of the date of this EHMP, but draft sample results are attached in Appendices D to F.

In addition to lead, TPH-RRO (TPH-o) exceeded the commercial/industrial EAL, but not the direct exposure EAL for construction workers in all layers A and B. A concentration of approximately 2,000 mg/kg in TPH-o is likely due to asphaltic material or oil (e.g. through oiling of roads) in the shallow soils. However, an increase in TPH-o concentration close to the former service station (DU-5 and DU-6) and deeper reaching contamination in this area is likely related to activities at the service station at 1955 King Street.

In October, 2017, HDOH HEER conducted an emergency action where potholes in the shoulder area of Factory Street next to DUs 3 to 6 that showed access to or potential access to

soil were patched to prevent exposure of residents to lead in the surface soil. Potholes in the roadway in the affected DUs had been previously patched by the City and County of Honolulu. In November 2017, the NFA for the site was officially rescinded and additional assessment for the parcels at 2003 N. King Street and 1955 N. King Street requested to further delineate the area of highest contamination.

4.0 HOW TO USE THIS DOCUMENT

The intent of this document is to provide guidance when relatively minor subsurface excavations encounter contaminated soil and groundwater at properties for which site-specific EHE/EHMPs have not been established. An EHE assesses hazards to human health and the environment from contaminants in soil and groundwater that exceed HDOH environmental action levels (EAL). An EHMP details how contaminants are to be managed when encountered during subsurface work. Lead contamination might be present in any properties, roadways, and common areas within the FSA and can to some extent be managed in place as outlined below. Use of an EHE to identify contamination is presented in Sections 6 and 7. Basic components of an EHMP to manage contamination are presented in Sections 8 through 15. Appendices G to K provide guidelines and forms for landowners, tenants, utility companies, and construction contractors responsible for implementation of the EHMP and proper management of contaminated media, including reporting.

Note: In this document, the terms “encounter” and “release” are presumed synonymous where applied to contamination exposed within a medium during subsurface construction/repair activity.

Following procedures specified in this document will help minimize the need to stop work when contamination is encountered. A qualified environmental consultant knowledgeable in dealing with lead contaminated soil and groundwater should be on site during construction activities at the FSA to ensure proper handling, storage, and disposal of the lead contaminated media.

The project director or property owner, or at their direction the environmental consultant, are required to report any release to HDOH (e.g., when concentrations of lead exceed the HDOH Tier 1 EAL; see Section 9 and Appendix H.1) and ensure that management of contaminated soil and/or groundwater is then carried out in accordance with the EHE and EHMP. However as opposed to petroleum contamination, lead contamination is not easily identifiable visually or by smell. Included maps (Figures 3 to 6a,b,c) should be used as a guideline as to where the highest contaminations are to be expected and assessment aided by a qualified environmental consultant. Due to the expected high lead concentrations, extreme care during excavation and handling of the soil is imperative.

The EHMP provides a range of options for dealing with contaminated soil and groundwater. The Guidelines for Landowners, Tenants, Utilities Companies and Construction Contractors (Appendix G) provides graphic and photographic examples of how to deal with contaminated soil and groundwater, and includes a Project Implementation Form. This form is a checklist based on HDOH experience with a wide range of events that can occur during construction.

Use of the forms in Appendix H is required to document proper handling of contamination, provide record keeping for the project, and fulfill reporting requirements for HDOH.

The forms should detail deviations from standard practices in the text, and explain how those deviations were protective of human health and the environment.

Appendix I gives general information about hazards posed by lead. Appendices F and J provide data (TCLP) and a flowchart on how to dispose or reuse soil, and Appendix K shows example of what the lead-contaminated soil looks like in the field.

If subsurface construction is planned within the FSA:

1. Review the EHMP and identify known or suspect areas of contamination with the planned project are;
2. Read the EHE section (and Appendix I) of this document to become familiar with the potential hazards associated with contaminated soil and groundwater;
3. Prepare a brief, project/operation-specific EHMP to outline specific management requirements as needed (e.g., contacts for reporting, stockpile area locations, stormwater management, reuse and disposal options, etc.; see sections 9-15 and associated appendices);
4. Develop a site-specific Health and Safety Plan (HSP) (Section 10 and Appendix H.2).

During subsurface construction work, if contaminated media is encountered, take the following necessary steps as applicable to ensure proper handling of contaminated media:

- Follow the Construction Activities Release Response Plan (Section 11 and Appendix H.3).
- If contaminated soil is encountered, follow the Soil Management Plan (Section 12 and Appendix H.5) and Dust and Vapor Management Plan (Section 14 and Appendix H.8)
- If contaminated groundwater is encountered, follow the Groundwater Management Plan (Section 13 and Appendix H.6).
- If petroleum contaminated soil/groundwater or free product is encountered, follow additionally the Dust and Vapor Management Plan, and Free Product Management Plan (Section 14 and Appendices H.7., H.8). Additional information on removal of pipelines, in case those should be encountered is provided in Appendix H.4).
- If contaminated soil and/or groundwater is in or could be in contact with stormwater, follow the Stormwater Management Plan (Section 15 and Appendix H.9).

Fill out the individual plans in Appendix H by following approved practices in the EHMP sections of the document (Sections 9 through 15). Record actions taken on the appropriate form(s), keep a copy for your records, and submit a copy to the HEER Office to fulfill reporting requirements.

If RPs elect not to adhere to guidance in this document then the subsurface activities must be halted upon the discovery of contamination and the contamination reported to HEER Emergency Preparedness and Response Section. Recommencement of work should not be initiated until the site has been inspected by and On- Scene Coordinator or otherwise directed by the HEER office. Failure to report a release could lead to fines of up to $10,000 per day. Failure to properly handle soil and groundwater could lead to fines from other agencies, including the HDOH Solid and Hazardous Waste Branch and Clean Water Branch.

Disclaimer:

The procedures, information, guidelines, and sample hazard management plans referred to herein are not intended to be a comprehensive description of all rules, regulations,

laws, and other requirements applicable to a construction project. They are only intended to provide general information and should not be used in place of appropriately qualified personnel. Each landowner, tenant, and construction contractor is responsible for complying with all applicable rules, regulations, laws, and other requirements, and for preparing his/her/its own hazard management plans for his/her/its own site-specific project.

5.0 AREA GEOLOGY & HYDROGEOLOGY

The FSA is located on the coastal plain of southern Oahu on the southwest flank of Koolau volcano. In this area, Honolulu Volcanics' lava flows intersect with older alluvium and calcareous reef rock (Sherrod et al., 2007) that overly eroded formations of Koolau volcanoes. The alluvium comprises unconsolidated deposits of silt, sand, and gravel along stream and valley bottoms. The calcareous reef rock is comprised mainly of coral heads, but includes finely laminated lagoonal limestone.

Based on the soil survey of Foote et al., (1972), Honouliuli clays are part of the Honouliuli Series which are soils that develop in alluvium derived from basic igneous material. The Honouliuli clays specifically occur in the lowlands along coastal plains, are very sticky, very plastic clays and are identified as neutral to mildly alkaline. The Ewa silty clay loams are part of the Ewa Series which also develop in alluvium derived from basic igneous rock. The Ewa silty loam however, is said to develop from coral limestone, sand, or gravelly alluvium. This soil is described as being neutral. Based on soil maps (USDA, 2017) most of the soils northeast of Waterhouse street are Honouliuli clays. Southwest of Waterhouse Street they are Ewa silty clay loams.

During drilling at Factory Street during the 2017 Site Assessment sticky, grey to brown or reddish clay was encountered at depth of approximately 1.5/2 ft to 5 feet bgs. Some of the reddish clay included saprolite texture, indicating derivation from basaltic material. This is consistent with the description of Honouliuli clays expected in this area. Coralline sand and gravel that topped this material and was increased locally to approximately 0.5-1 foot thickness in the vicinity of utility lines is interpreted as anthropogenic material, likely marking utility installation around 1923 and an older road surface. This is supported by basaltic gravel topping this layer (locally with sticky black asphaltic material. Towards the surface, this layer was topped by light brown, sticky clay material that can have basaltic material, or carbonatic appearing material, topped by brown silty to sandy material with base coarse material.

No active drinking water wells are present within the FSA, but are located upgradient between 0.5 to 1 mile from Factory Street (EPA, 1995). The area is located above (Mauka) of the underground injection control (UIC) line. Shallow groundwater is situated in a sedimentary, unconfined aquifer (Mink and Lau, 1990) and is not a drinking water source. Deeper groundwater is situated in a confined basaltic flank aquifer. A previous environmental investigation at the FSA reported that the groundwater table of the shallow aquifer is at approximately nine feet depth below the ground surface (bgs), whereas the deeper aquifer is located at a depth of approximately 128 feet bgs (EPA, 1995). Kalihi Stream is located approximately 1.5 miles to the west of the site and flows southwest into Keehi Lagoon. Storm water runoff from the FSA enters into collection drains, which empty into Kalihi Stream (EPA, 1995).

6.0 ENVIRONMENTAL HAZARD EVALUATION (EHE)

The EHE consists of Sections 6 and 7.

6.1. Contaminants of Potential Concern

Based on history of the area, lead is the contaminant of potential concern (COPC). Lead may be encountered in soil and groundwater during subsurface construction projects, although groundwater is anticipated to be at approximately 9 feet bgs, which is below the depth where

refusal was encountered, that was interpreted as a hard basaltic layer.

Lead can affect most every organ and system in the human body. Even low levels of lead in children have been shown to result in: behavior and learning problems, lower IQ and hyperactivity, slowed growth, hearing problems, insomnia, and anemia. In rare cases, ingestion of high amounts of lead can cause seizures, coma and even death. Adults exposed to high levels of lead have had health symptoms that include: cardiovascular problems, increased blood pressure and incidence of hypertension; decreased kidney function; and reproductive problems (in both men and women). Once absorbed by the human body, lead is difficult to remove. Consequently, limiting exposure to lead wherever possible is recommended.
If any of these symptoms described are observed during or following construction work in the FSA, seek help from a physician.

Lead is particularly dangerous to pregnant women and young children. According to the U.S. Centers for Disease Control (CDC) lead poisoning is the most common and serious "environmental" disease affecting children. Children's bodies absorb more lead than adults do and their brains and nervous systems are more sensitive to the damaging effects of lead.

The best prevention of lead exposure for construction workers is to adhere to this EHMP, OSHA, and HIOSH regulations and avoid inhalation and accidental ingestion. The EHMP also targets exposure prevention of surrounding residents. Additional preventive measures can be found in the HDOH lead factsheet in Appendix I.

TPH-o is a secondary contaminant of concern (COC), because TPH-o concentrations exceeded the Tier 1 (unrestricted) EAL but is not a risk driver. TPH-o concentrations did not exceed direct exposure EALs for construction workers.

6.2. Direct Exposure

Accidental ingesting the soil is the primary source of exposure to lead in soil. Lead can also be inhaled with very fine soil particles during construction work, or carried into houses as airborne dust, or on shoes, clothing, or pets. Most children put their hands, toys, or other objects in their mouths, and these often have small amounts of soil and dust on them that the child then swallows. Residual dirt on hands after construction activities or gardening/outside work may also contribute to lead exposure through accidental ingestion of soil particles. In addition, lead exposure may result from eating produce grown in gardens with elevated soil lead levels.

In the absence of institutional controls (ICs; such as this EHMP) and engineered controls (e.g., missing pavement), future human populations (e.g., residents and construction workers) at the FSA could be exposed to contaminated soil (including contaminated dust) or groundwater.

If suspicion of lead poisoning as indicated in Section 6.1 exists, contact your physician or local health department for information on blood lead testing. Any lead exposure testing should be recommended and conducted by a doctor or trained medical professional. A simple blood test is available to measure lead levels. Testing can determine if the level of lead in the body is higher or lower than the average person.

Figures 6 a,b,c shows hazard maps where potential direct exposure to lead in soil can pose a risk to construction workers during trench work. Note that the area is likely larger if lead-laden dust particles are stirred up and transported downwind (hazard to construction workers, C/I workers and residents).

6.3. Leaching

Leaching is movement of contaminants from vadose zone soils into underlying groundwater through chemical and physical mechanisms. The principal chemical mechanism is dissolution of contaminants into water (e.g., percolating rainwater, irrigation water) moving downward through the vadose zone. Physical mechanisms include (1) entrainment of contaminants bound in a colloid phase by water moving through the vadose zone, and (2) mass movement of contaminants through the vadose zone by infiltrating water. Most contaminants in areas considered to present a leaching hazard typically are mobile, volatile chemicals that are toxic to humans and may threaten ecological receptors at sites close to surface water bodies.

Lead in the FSA is concentrated in the shallowest layer(s)- 0 to approximately 1.5 feet bgs indicating it is not very soluble. Clay layers below also effectively inhibit leaching downward. The surface is capped with asphalt currently inhibiting leaching as well.

In the absence of engineered controls, groundwater could be contaminated via leaching of contaminants from vadose zone soils by infiltrating groundwater or by contact of groundwater with lead-contaminated soil. Contact of the contaminated soil with water needs to be avoided.

6.4. Ecotoxicity

6.4.1. Terrestrial Ecotoxicity

Ecotoxicity refers to the capability of a contaminant to damage an ecological population, ecological community, or ecosystem. The ecotoxicity of a contaminant typically is based on its toxicity to one or more species, its persistence in the environment, and its ability to bioaccumulate. Under consideration are flora and fauna in terrestrial (i.e., land) habitats and aquatic (e.g., marine) habitats.

Impacts on terrestrial flora and fauna can occur through exposure of populations to contaminated soil. Most contaminants in areas considered to present a terrestrial eco-toxicity hazard typically are relatively immobile, non-volatile chemicals that are toxic to ecological receptors. Because no current or future sensitive ecological receptors are or will be present within the FSA, terrestrial eco-toxicity is not considered a concern and will not be evaluated further. In the absence of concerns regarding terrestrial flora or fauna in the area, terrestrial eco-toxicity is not considered an environmental hazard.

6.4.2. Aquatic Ecotoxicity

Impacts on aquatic (i.e., marine) flora and fauna can occur through discharge of contaminated groundwater into surface waters. Most contaminants in areas considered to present an aquatic eco-toxicity hazard typically are mobile, volatile chemicals that are toxic to ecological receptors. In the absence of engineered controls, sensitive populations could be exposed to groundwater contaminants entering the surface water bodies such as the ocean, streams, or lakes via migration through a potential preferential pathway (i.e., current and future storm drains).

7.0 EXPOSURE PATHWAYS

Identified potential exposure pathways to human receptors within the FSA include ingestion, inhalation, and dermal contact. These are described briefly below.

7.1. Ingestion

Ingestion is oral intake of a solid or liquid material. Ingestion of contaminated soil or groundwater is a human health risk and a direct exposure hazard. Accidental ingestion of contaminated soil or groundwater will be of concern during construction when lead- contaminated soil and groundwater are encountered. Lead-laden dust particles that get stirred up during excavation or other types of exposure of soil (e.g. removal of asphalt) are the primary source of hazard by accidental ingestion for construction workers, or nearby residents and/or C/I workers.

7.2. Inhalation

Inhalation is the act of drawing air, other gases, vapors, fumes, smoke, dust, or mists into the lungs. Inhalation of contaminated soil (as dust) is a human health risk and a direct exposure hazard. VOC vapors released from surface soil potentially pose an indirect exposure hazard. During excavation and construction activities, contaminated subsurface soils may be disturbed, thus increasing potential for release of lead- laden dust into the work area. Lead-laden dust particles that get stirred up during excavation or other types of exposure of soil (e.g. removal of asphalt) are the primary source of hazard by the inhalation pathway for construction workers, nearby residents and/or C/I workers.

Based on examination of TPH-Chromatograms of TPH-contaminated soil, it is unlikely that TPH in soil poses a vapor hazard. However, vapor monitoring should be conducted as a precautionary measure.

7.3. Dermal Contact

Dermal contact is direct exposure of skin to solids, liquids, or gases. Dermal contact with contaminated soil, groundwater, or soil vapor is a direct exposure hazard. During excavation and construction activities, contaminated subsurface soils and groundwater are likely to be encountered, thus increasing potential for dermal contact. Dermal contact with lead-contaminated soil, and groundwater will be of concern during construction activities when contaminated soil and groundwater are encountered. However, the main exposure routes are inhalation and accidental ingestion since lead does not easily get absorbed through skin.

8.0 ENVIRONMENTAL HAZARD MANAGEMENT PLAN

The EHMP consists of Sections 8 through 15.

This EHMP has been developed to mitigate potential exposure of residents, construction workers, other on-site workers, and the aquatic ecosystem to lead during activities associated with future construction activities. The EHMP consists of six individual plans presented as Sections 9 through 15 as follows, each addressing a specific potential source of COCs (see Section 6.1) and methods of handling contaminated media:

- Release Reporting Plan
- Health and Safety Plan (HSP)
- Construction Activities Release Response Plan
- Soil Management Plan
- Groundwater Management Plan
- Dust and Vapor Management Plan
- Stormwater Management Plan

The plans include engineering and institutional controls, as well as requirements for personal protective equipment (PPE) and a monitoring program. Prior to initiation of construction work, on-site workers will be informed and educated about potential hazards posed by COCs and methods used to prevent exposure. Prior to construction, a communications plan should be prepared that includes notifying residents and affected businesses of the upcoming work, potential hazards, and mitigation measures. Submit the plan to the HEER Office 30 days prior to construction.

Construction activities in contaminated media are to be reported by filling out appropriate form(s) in Appendix H and submitting the forms to the HEER Office.

9.0 RELEASE REPORTING PLAN

Encounters with contaminated soil or contaminated groundwater during subsurface construction activities is considered a release and must be reported to the HEER Office according to the following procedures. That means that new detections of lead exceeding the Tier 1 EAL (200 mg/kg) that are not reported in this EHMP should be reported to the HEER Office. Releases that occur during construction activities or releases due to contingencies should also be reported by following the directions in this Section.

The contractor must immediately notify the Hawaii State Emergency Response Commission (HSERC)/HEER) (808-586-4249 or 808-247-2191 after work hours) and the Local Emergency Planning Committee (LEPC) (808-723-8960) after discovery of contaminated soil and/or groundwater.

9.1. Immediate Verbal Notification

In the event of a release that causes an imminent threat to human health or the environment, the first call shall be to 9-1-1.

Immediate verbal notification shall be provided to the HSERC/HEER and LEPC either via telephone or in person. HEER/HSERC will not accept initial notification via fax or e-mail. In addition, unless it is specifically stated that a verbal notification is being given to a State On-scene Coordinator (SOSC) on scene during an incident, mere presence of an SOSC does not constitute a notification. When in doubt, the contractor should call and speak to an SOSC. There is no penalty for reporting a release unnecessarily, but there are large penalties for not reporting a release.

Notification should occur within 20 minutes of discovery of the release. Provide the following information to the extent known at the time of notification (do not delay notification if notification information regarding the release is incomplete):

- Name and telephone number of the caller
- Name and telephone number of a contact person (if different from the caller) who can provide timely information as the incident is occurring
- Name (trade and chemical) of the hazardous substance that has been released
- Approximate quantity of the hazardous substance that has been released
- Location of the incident
- Date and time of spill, release, or threatened release
- Description of what happened (source and cause of the release)
- Immediate danger or threat posed by the release
- Name, address, and telephone number of the RP or potentially responsible party (PRP)
- Measures taken or proposed to be taken in response to the release as of the time of notification
- Any known injuries or advice regarding medical attention necessary for exposed individuals
- Names and phone numbers of other federal, state, or local government agencies that have been notified of the release
- Any other information that may help emergency personnel respond to the incident.

Once the information has been conveyed, the caller will be provided with a HEER Incident Case Number, which shall be referenced in any future correspondence including the written notification submittal. State and federal requirements under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and Oil Pollution Act (OPA) require that releases of Reportable Quantities (RQ) of CERCLA hazardous substances and releases of oil that cause a sheen on water must also be reported to the National Response Center at 1-800-424-8802.

9.2. Written Follow-Up Notification Contents

Notification, including all information provided in the verbal notification described above and any other pertinent information not previously provided, shall also be made in writing to the HSERC/HEER. This written notification shall be sent to HSERC/HEER no later than thirty (30) days after initial discovery of a release. The written notification can be sent by certified mail, fax, hand-delivery, or another means that provides proof of delivery. Photos should be included to document the incident. A copy of the Written Follow-up Notification Form is in Appendix H.1.

9.3. Recordkeeping Requirements for Encountered Contamination

Fill out Form H.1 for your records and send a copy to the HEER Office.

10.0 HEALTH AND SAFETY PLAN (HSP)

Provide an HSP for workers performing excavations who will encounter or potentially encounter the COCs and hazards described in Sections 6.0 (EHE). The HSP should generally include the following:

- Requirements that workers be trained in dealing with separate phase hydrocarbons (SPH) and chemical substances and hazards, including, but not limited to, use of appropriate PPE.
- General site control and safety requirements such as site access controls, engineering controls, information on emergency medical facilities, and good worker practices.
- Specific controls, exposure assessment and monitoring requirements for lead during construction activities (HIOSH and OHSA requirements)
- Description of present and potential hazards, including COC action concentration levels, where appropriate
- Emergency contact information.

A HSP is not a substitute for OSHA/ Hawaii Occupational Safety and Health (HIOSH) requirements. Employers of construction workers/utility workers must comply with all applicable OSHA/HIOSH requirements. See form H.2 for additional guidance.

11.0 CONSTRUCTION ACTIVITIES RELEASE RESPONSE PLAN

Parties should operate under a site-specific release response plan. The sample Construction Activities Release Response Plan provided in Appendix H.3 can be used as a starting point.

On-site workers need to minimize probability of releases from excavations during construction. They should familiarize themselves with site conditions and potential presence of lead and SPH in the subsurface. An HSP and soil and groundwater management plans should be prepared.

If uncontrolled releases of lead-impacted soil and lead-impacted groundwater could occur, human health concerns would include possible contact with lead, and disruptions to site activities, including possibly local traffic. Environmental impacts of concern would be discharges of metals-contaminated groundwater or surface waters either directly or via a storm drain or other type of surface water conveyance.

A response plan to deal with uncontrolled releases should be available to the construction workers and other parties. It should include descriptions of the types of releases, a list of names and contact information regarding the release response team and the parties that must be notified, a list of available response equipment, descriptions of response procedures, and an outline of release reporting requirements.

12.0 SOIL MANAGEMENT PLAN

The purpose of the soil management plan is to ensure proper handling and management of lead-(and oil) related contamination in soil that could be encountered during future construction. The principal hazards posed by these contaminants in soil are direct exposure and leaching to groundwater. Contaminated soil cannot be re-used off site prior to laboratory testing and confirmation that testing results meet the most restrictive EALs (for unrestricted use, within 150 meters of a water body over a drinking water resource). See Appendix J for soil disposal and reuse flow chart and Appendix F for lead TCLP data acquired in the area of highest contamination. Coordinate any disposal with the HDOH SHWB.

Previous results of the site characterization within the FSA indicate that soil can be contaminated from the surface and to 4 feet bgs. These results are however based on discrete and composite sampling, which is not realistic average, chronic exposure concentrations. Recently collected MI samples, which are more representative of the heterogeneous contamination indicate that lead concentrations exceeding the C/I and construction worker EAL are generally limited to the upper 0 to 1 foot bgs (DUs 3 to 6, Figures 6 a,b,c; DU 6E is an exception with contamination at 3-4 feet bgs). Concentrations exceeding the unrestricted EAL were identified in MI samples down to 1.5 foot bgs (with the exception of DU-6E).

Subsurface soil lead contamination may not be obvious. Attachment K shows how the contaminated soil may look like. The shallowest soil with the highest concentrations may be of brown color and include base coarse material or include blackish material. Therefore, special care is required for soil handling, especially when water pipelines are to be installed, so that potential contaminated soil or water do not enter pipelines. Based on visual observations and site history, the lead containing material might resemble lead dioxide, which is very powdery material that can easily be generate lead-laden dust . This indicates that dust control and appropriate PPE with airway protection is essential during construction work, including excavation. **Misting soil is preferred to overloading soil with water, which could create a runoff and containment problem.**

If a handheld XRF result for lead is to be obtained for screening purposes, a 10-15 point average of the sample should be obtained to ensure a representative concentration of the heterogenous material (Appendix E). The assessment report for the latest site assessment is currently in preparation, but draft sample results are attached in Appendix E that will help parties working in the area to assess exposure in the area and use obtained lead XRF and lead laboratory data correlation to assess lead concentrations in the area that have not been investigated (e.g., at North King Street). Appendix F shows lead TCLP results for all DU layers sampled during the 2017 Site Assessment where lead concentrations exceeded 100 mg/kg.

Disposal of soil to be excavated in the area of highest contamination should be planned and arranged ahead of excavation and a EPA number obtained through the HDOH SHWB, so that hazardous waste is not stockpiled and/or stored onsite and instead immediately containerized and transported offsite. This is necessary to protect resident and children playing nearby.

Outside the area of highest contamination (Figure 6 a,b,c), contaminated soil should be assessed during subsurface construction activities. Contractors that will work within areas of known contamination should be so notified prior to mobilization so they can properly prepare for dealing with contaminated soil.

Two landfills on Oahu are permitted by the State to accept contaminated soil for disposal: Waimanalo Gulch Sanitary Landfill and PVT Land Company Landfill. A Hazardous Waste

Characterization must be performed on the soil prior to disposal if disposing of soil outside the area of highest contamination (Figures 6 a,b,c). Contact the HDOH Solid and Hazardous Waste Branch at 808-586-4226 for further information. **Should soil from DU-6, Layer A be excavated and disposed of off site, it needs to be disposed of as hazardous waste on the U.S. mainland (see Appendix F for TCLP results).**

Waste Disposal General Guidance (HDOH 2011c). Potential characteristics that could cause Lead-contaminated soil to be classified as Hazardous Waste include: (1) failure of lead in the soil to pass the Toxic Characterization Leaching Procedure (TCLP). Soil classified as hazardous waste must be disposed of at a hazardous waste facility on the mainland. No permitted hazardous waste landfills are present in Hawaii. Special precautions should be taken to avoid generation of excess hazardous waste during subsurface activities.

Refer to the HEER Office document *Guidance for Soil Stockpile Characterization and Evaluation of Imported and Exported Fill Material* for guidance on testing of soils for reuse or disposal (HDOH 2017a).

12.1. Soil Management

If contaminated subsurface soil is encountered during excavation, appropriate response actions will be taken and the actions will conform to HDOH and U.S. Environmental Protection Agency (EPA) regulatory guidelines. The response actions include ensuring that workers have the appropriate level of PPE, residents and C/I workers on Factory Street are not exposed to lead, that the excavated lead-contaminated soil is segregated from clean soil and managed properly following excavation. An environmental consultant will reference field observations and measurements to assess the excavated soil. Based on professional experience and judgment, the consultant will determine whether or not the excavated soil is lead-contaminated soil.

Anticipated tasks associated with managing excavated soil are summarized as follows:

- Notify the HDOH HEER Office at least 30 days prior to construction activities that could disturb lead-related contaminated soil.
- During emergency excavations, notify the HDOH HEER Office immediately at 808-586-4249 (After hours: 808-247-2191) if it is known that lead-related contaminated soil will be disturbed.
- Provide field oversight by a qualified environmental professional to direct soil excavation and appropriate use of excavated soils as on-site backfill versus off-site disposal; and provide health and safety guidance related to potential exposure of workers to COCs.
- Remove asphalt material and place directly into supersacks or otherwise enclosed containers. Avoid stirring up dust during removal using dust suppression **(misting).**
- If soil/ base coarse is excavated below the asphalt, it should be assumed to be contaminated with lead in absence of additional testing. TCLP data from the 2017 Site Assessment can be used to evaluate disposal option in the area of highest contamination (Appendix F) based on XRF-lead to lead analytical laboratory data correlation.
- In the area of highest contamination, excavate to depth required and place excavated material directly into supersacks or otherwise enclosed containers. Contamination normally diminishes with depth; therefore, different containers should be used per 0.5 foot depth intervals (A and B layers) or 1 foot depth intervals (layers C to F)

- **Soil must not be stockpiled/stored if originating from the main area of contamination except in closed containers or if lead concentrations are lower than 200 mg/kg**. Otherwise, soil must be stored/stockpiled in an offsite location inaccessible to the public, pending sampling according to the HEER office's *"Guidance for Soil Stockpile Characterization and the Evaluation of Imported and Exported Fill Material, Including Contaminant Characterization of Stockpiles"* (HDOH, 2017a). Contact of residents (especially children) to soil in the main area of contamination must be avoided at all costs, and stormwater runoff and wind erosion avoided in accordance with HDOH NPDES and fugitive dust requirements. Contact HDOH Office of Solid and Hazardous Waste Branch (SHWB) for options for offsite stockpiling and further discussions.

- Offsite stockpiles should be covered with and stored on 10-mil plastic sheeting and clearly marked to prevent inadvertent exposure. Excavation and soil stockpiling work should be planned to reduce likelihood of rain and wind events.

- If lead concentrations in stockpiled soil are > 200 mg/kg, soil must be profiled and disposed of at an appropriate landfill site in case of offsite disposal (see Appendix J).

- Soil can only be reused onsite, if deposited within the same lateral DU at the deepest depth of excavation and covered with an isolating barrier and metallic warning tape. The location of the soil will be documented with maps and photographs of the barrier on the soil, and will be submitted with the maps to HDOH, so that this EHMP can be updated with the information where contaminated soil can be encountered during future excavation.

- The leaching of lead from the contaminated soil must be avoided, e.g. the soil should not be relocated overlying or next to preferential pathway (e.g., gravel beds or other permeable materials), or contacting ground- or surface water.

- Areas where contaminated soil has been removed should be backfilled with clean fill material.

- Offsite disposal of soil should be coordinated with the HDOH SHWB in Honolulu and the landfill operator. Note that this may require a formal, Hazardous Waste Determination, including TCLP test data in the FSA outside the area of highest contamination. If the soil fails the TCLP test then it cannot be disposed of in a municipal landfill and must be disposed of at a hazardous-waste facility on the U.S. mainland.

- Stockpiling more than 1 cubic yard (cy) of petroleum-contaminated soil (PCS) at an off-site location requires a solid waste management permit from the Solid and Hazardous Waste Branch (see HRS, 2011).
- Decontaminate equipment used in contaminated areas before using it in non-contaminated areas. All liquid and solid waste resulting from on-site decontamination must be collected and appropriately disposed of at a certified landfill site.

12.2. Soil Testing

The two types of chemical testing detailed below may occur before stockpiled soil is disposed of in a suitable landfill.

Landfill Profile Testing. This testing involves determining suitability of the soil for use as daily cover or for disposal as a waste at a landfill. Soils can generally be disposed of in a suitable landfill, but disposal of these soils would is subject to Landfill Profile Testing. Information regarding chemical analysis and disposal options (i.e., as cover or as waste) should be obtained from the relevant landfill. Soils that meet the landfill's standards for interim/daily cover or longer term, intermediate cover should be used as such. The former typically requires that the soil meet HDOH EALs for commercial/industrial land use, while the latter typically requires that the soil meet EALs for unrestricted reuse. Costs for disposal of these soils are typically lower than for disposal of more contaminated soil that cannot be used for cover. Soils not suitable for use as cover or other uses at the landfill must be disposed of as waste. Soil testing to pre-profile the soil for off-site disposal can also occur as part of the pre-excavation field investigations.

Stockpile Testing. Recommendations for sampling soil stockpiles are provided in the HDOH guidance *Guidance for Soil Stockp*ile Characterization *and Evaluation of Imported and Exported Fill Material* (HDOH 2017a). For low mobility, non-volatile contaminants such as lead, the HEER office generally recommends a sample frequency of one soil batch ("Decision Unit") per 100 yd^3 using multi-increment (MI) samples, but smaller stockpiles might be recommended in areas of the highest contamination to lower the costs for potential hazardous waste disposal. If offsite stockpiling is not an option, MI sampling should be conducted by collecting random increments from excavator buckets before the soil is being placed into containers.

Stockpiles or significant portions of stockpiles (i.e., greater than 20 yd^3 in volume) that are suspected to contain pockets of heavy contamination ("spill areas") should be isolated and characterized separately. This will help avoid the need to re-segregate and characterize otherwise large volumes of material due to the inclusion of a relatively small volume of heavily contaminated soil. For pre-characterized DUs, separate DU soil by layers according to pre-characterization. If the soils from the DUs show similar degrees of contamination, they can be combined after confirmation from SHWB.

Material from small but heavily contaminated stockpiles should not be deliberately mixed with "clean" or less contaminated stockpiles to dilute overall contaminant concentrations.

12.3. Soil Contingency Plan

The Soil Contingency Plan provides guidelines for actions to be taken when engineering controls, administrative controls, or PPE fail, and risk of exposure to contaminated soil is imminent.

12.3.1. Open Excavations

During construction activities, subsurface contaminated soil could be exposed in excavations for utility corridors or other subsurface structures. It is essential that access to contaminated soil in the excavations by the surrounding population is severely restricted in the area of highest contamination (Figures 6 a,b,c). Therefore, excavations must be covered outside of working hours.

If contaminated soil is more contaminated than anticipated to be encountered and could pose a direct exposure hazard to on-site workers, the following actions may be taken:

- If site conditions warrant, PPE will be upgraded from Level D to Level C. Level C is almost certainly required in the most contaminated areas on Factory Street (close to King Street). Respiratory protection and monitoring are described in the Dust and Vapor Management Plan (Section 14) and will be described in the Site-Specific HSP.

- If warranted, contaminated soil will be excavated and properly stockpiled or containerized prior to continuance of work. The stockpiling/containerizing procedures are described in the Soil Management Plan (Section 12.1).
- If airborne dust generated from contaminated soil becomes significant, additional dust control measures will be implemented. This may require more frequent use of or an increased volume of applied water. Also, the dust screen cloth on the site boundary fence, if present, will be inspected for damage and repaired as necessary.

12.3.2. Soil Stockpiles

During construction activities or long-term exposure to sunlight, the plastic sheeting used to berm and cover soil stockpiles could be damaged through long-term exposure to sunlight, by strong winds or punctured by debris or other sharp objects. Such damage could allow on-site workers to come into contact with lead. To prevent that from occurring, the following actions may be taken:

- Damaged sections of plastic sheeting will be replaced promptly.
- Damaged sections of the berm will be repaired promptly.

12.4. Engineering and Administrative Controls

Dust control methods may be necessary during construction-related work in which contaminated soil is encountered. These controls include use of enclosed containers onsite and offsite, plastic sheeting on soil stockpiles (offsite), and dust suppression using applied water. Per 29CFR 1926 if lead is present in the work space, the employer is required to make an initial determination if any employee's exposure to lead exceeds the action level (currently 30 $\mu g/m^3$). This initial determination requires the employer to monitor worker's exposure unless he or she has objective data which can demonstrate conclusively that no employee will be exposed to lead in excess of the action level. For details on the use of objective data refer to the standard.

It is anticipated that Level C PPE (or modified Level C) or higher will be appropriate for workers during future construction in the area of highest contamination. Modified level D (with dust mask) is likely appropriate for the wider FSA area, but final PPE election should be based on the exposure assessment and Health and Safety Plan. Should site conditions warrant, the PPE will be upgraded. Ultimately, the contractor is responsible for monitoring site conditions and supplying site workers with appropriate training and PPE, in accordance with 29 *Code of Federal Regulations* (CFR) 1910 and 29 CFR 1926. 29 CFR 1926.62 contains details about exposure assessments, training, engineering controls, proper housekeeping and good work practices, and PPE, including respiratory protection measures pertaining to lead exposure during construction. The following action levels/ PELs for work with lead are currently listed. Check for updated values prior to beginning work.

Action level:	30 $\mu g/m^3$ for 8-Hour Time-Weighted Average (TWA)
Maximum worker exposure:	50 $\mu g/m^3$ (PEL) for 8-Hour Time-Weighted Average (TWA)
Respirator use:	if lead concentration is > Action Level (30 $\mu g/m^3$) TWA
Guide for respirator type:	29 CFR 1926.62(f), CDC NIOSH Pocket Guide
Respirator upgrade :	If lead conc. > 0.5 mg/m^3 half mask air-purifying respirator with high efficiency filters or half-mask supplied -air

	respirators operated on demand (negative pressure) mode are needed (as of current OSHA requirements- check for updated requirements; e.g., https://www.cdc.gov/niosh/npg/nengapdxe.html).
Other protective clothing:	200 μg/m^3 for 8-Hour TWA
Full medical surveillance:	If exposed to > PEL for more than 30 days in any consecutive 12 month and if blood lead is > 40 μg/dl.

In addition to respiratory protection practices, engineering controls and safe work practices will be employed. Engineering controls include barriers that prevent workers from unnecessarily entering work zones and use of recycled air conditioning in mobile equipment cabs. Safe work practices include monitoring wind direction and having workers stand upwind of dust sources sources whenever possible, or instituting a modified work schedule. Warning signs must be posted in the work area if lead concentration exceeds the PEL. The sign(s) should include the following language:

DANGER

LEAD WORK AREA

MAY DAMAGE FERTILITY OR THE UNBORN CHILD

CAUSES DAMAGE TO THE CENTRAL NERVOUS SYSTEM

DO NOT EAT, DRINK OR SMOKE IN THIS AREA

The PEL must be achieved through a combination of engineering, work practices, and administrative controls to the extent feasible. Where these controls are in place, but do not reduce the employee exposure to or below the PEL, they must be used nonetheless and supplemented with respirators to meet the 50 μg/m^3 PEL.

12.5. Periodic Inspections and Preventive Maintenance

A key component of the plan is routine inspections. Accordingly, all locations where exposure of on-site workers or residents/commercial workers to lead is possible (e.g., open excavations, soil stockpiles, containers) will be inspected at a frequency appropriate for access and activities carried out on the site (e.g., daily for sites used or accessed on a daily basis). The site should also be inspected prior to and following adverse weather conditions that could disrupt control measures (e.g., heavy winds or rains). In addition, daily inspections of the security fence (if applicable), locked gates, silt fences, stormwater control measures, and dust screen will occur during construction and excavation activities. Replacement and repair of damaged or inadequate chain link fences, dust screens, stormwater control measures, stockpile covers, berms, etc., will occur immediately after discovery. PPE will be inspected for damage and defects before personnel don the PPE. If respiratory protection is required, a daily positive pressure respirator fit test will be performed at the start of each day, and filter cartridges will be replaced regularly.

12.6. Record Keeping and Reporting

Detailed records will be maintained of workspace monitoring, changes to PPE requirements, soil

excavation, soil stockpiling, soil manifesting, soil testing, soil reuse and disposal, inspections, and maintenance and response activities. Significant issues will be communicated to site workers promptly. Major deviations from this EHE/EHMP should be approved by HDOH prior to implementation. Minor deviations from the EHE/EHMP are acceptable based on field discretion. All deviations should be explained and documented; complete Appendix H.5 and Appendix H.8 for your records and send a copy to HDOH.

13.0 GROUNDWATER MANAGEMENT PLAN

The purpose of the groundwater management plan is to ensure proper handling and management of contaminated groundwater that could be encountered during construction. Principal hazards posed by contaminated groundwater are gross contamination, drinking water toxicity, leaching, and aquatic ecotoxicity.

Shallow groundwater in the area is typically encountered at approximately 9 feet bgs. Groundwater contamination is not apparent through visual evidence.

Contaminated groundwater in the area has not been encountered during previous site characterizations and remedial activities. It is unlikely that residual groundwater contamination is at a level warranting extensive response actions or disposal; however and importantly, additional site characterization may be required depending on conditions encountered in the field.

13.1. Groundwater Management

If contaminated groundwater is encountered during excavation activities (e.g., as indicated by contact of contaminated soil with groundwater), appropriate response actions must be taken that conform to HDOH and EPA regulatory guidelines. These response actions include ensuring that workers have the appropriate level of PPE and that groundwater is managed properly if dewatering is conducted. Anticipated tasks associated with managing groundwater are summarized as follows:

- If groundwater is encountered during construction excavation activities, provide field oversight to identify contaminated groundwater, direct appropriate dewatering if this is conducted, manage disposal of groundwater if this is necessary, and provide health and safety guidance related to potential exposure of workers to COCs.

- Dewatering is not anticipated during future construction. However, if dewatering becomes necessary, water will likely be pumped into on-site infiltration pits, and will not be allowed to discharge off site.
- If off-site discharge is necessary, a Notice of Intent (NOI) for National Pollutant Discharge Elimination System (NPDES) coverage will be submitted to HDOH. The NOI will include a dewatering plan. Prior to discharge into a storm sewer or aquatic habitat, the water will be tested and, if necessary, treated to address both free product and dissolved-phase contamination. Water with contaminant concentrations exceeding EALs for chronic aquatic toxicity will not be discharged off site.
- Generation of groundwater requiring disposal is not anticipated during future construction. However, if such disposal becomes necessary, the groundwater will be stored in closed appropriate containers (e.g., 55-gallon drums), sampled, and analyzed for the appropriate COCs to determine disposal options, and disposed of properly. For additional details, see the Guidelines Appendix A.

13.2. Vector Control

If groundwater is filling open excavation it has the potential to attract vectors that will breed in standing water. Vectors can carry viruses and propagate diseases such as Dengue Fever and the Zika virus. Vector control methods (e.g., continuously agitating standing water by introducing fountains, addition of larvicides) may be necessary when excavations have standing water.

13.3. Groundwater Contingency Plan

The Groundwater Contingency Plan provides guidelines for actions to be taken when engineering controls, administrative controls, or PPE fail, and risk of exposure to contaminated groundwater is imminent.

13.3.1. Open Excavations

During construction activities, although unlikely, contaminated groundwater could be exposed in excavations for utility corridors or other subsurface structures. If contaminated groundwater is encountered that could pose a direct exposure hazard to on-site workers, the following actions may be taken:

- If site conditions warrant, PPE will be upgraded from Level D to Level C (or higher). Respiratory protection are described in the Dust and Vapor Management Plan (Section 14) and Site-Specific HSP.
- If appropriate, the excavation will be backfilled using appropriate materials (e.g., gravel, select borrow) to a level above the groundwater prior to continuance of work.
- If it becomes necessary to remove contaminated groundwater from the excavation, the groundwater will be stored in appropriate containers (e.g., 55-gallon drums), sampled, analyzed for the appropriate COCs to determine disposal options, and disposed of properly.

13.3.2. Dewatering Pits

Dewatering is not anticipated during future construction. However, if dewatering is conducted, and contaminated dewatering water is encountered that could pose a direct exposure hazard to on-site workers, the following actions may be taken:

- If site conditions warrant, PPE will be upgraded from Level D to Level C (or higher). Respiratory protection is described in Dust and the Vapor Management Plan (Section 14).
- If appropriate, dewatering will be discontinued until such time that contaminants at the source of the dewatering (i.e., an open excavation) can be mitigated.
- If it becomes necessary to discharge contaminated groundwater from a dewatering pit, such discharge will fully comply with the conditions of any required NPDES permit.

13.4. Periodic Inspections and Preventive Maintenance

A key component of the plan is routine inspections. Accordingly, all locations where exposure of on-site workers to contaminated groundwater is possible (e.g., open excavations, dewatering pits) will be inspected daily.

If groundwater requiring disposal is generated, the storage containers will be inspected regularly for rust and other signs of deterioration while they remain on site, pending disposal. If on-site dewatering is conducted, the infiltration pit(s) will be inspected daily to ensure that no accidental discharge occurs.

13.5. Record Keeping and Reporting

Detailed records will be maintained of workspace monitoring, dewatering (if performed), groundwater disposal (if conducted), and response activities. Significant issues will be communicated to site workers on a regular basis. Major deviations from the EHE/EHMP should be approved by HDOH prior to implementation. Minor deviations from the EHE/EHMP are acceptable based on field discretion. All deviations should be explained and documented; complete Appendix H.6 for your records and send a copy to HDOH.

14.0 DUST AND VAPOR MANAGEMENT PLAN

The purpose of the Dust and Vapor Management Plan is to identify dust and VOC vapors that could adversely affect air quality during construction activities within the area covered by this document. Based on results previous assessments it is highly unlikely that VOC vapors are going to pose a problem, however, they are included in this document, because two service stations were located on the Diamond Head side of Factory Street (e.g., Figure 9). TPH-o was detected at or exceeding the Tier 1 EAL during the 2017 Site Assessment. However, chromatograms of samples with these concentrations indicated that the majority of the petroleum detected is in the hydraulic oil range with a minor compound of VOC depleted diesel or gasoline.

The dominant hazard in terms of inhalation and accidental ingestion is fugitive lead-laden dust from soil that can be stirred up during construction activities (direct exposure). This dust can be ingested accidently by utility workers if they don't practice good hygiene (no washing of hands and face) before eating. Lead-laden dust particles can also be carried into nearby residences and commercial buildings through windows and open doors or into yards and pose a hazard to residents and commercial workers.

The principal hazards posed by VOC vapors at levels below LELs are direct exposure and gross contamination. The areas within which these hazards potentially pose the greatest concern are where contaminated soil has been previously encountered. However, there are no buildings on Factory Street and its shoulder areas and therefore vapor intrusion into buildings is not a concern.

This EHE/EHMP describes the necessary controls for minimizing exposure of on-site workers, residents, and commercial/industrial workers to hazardous lead-laden dust and vapors as a result of construction activities. Included are procedures for identifying and mitigating potential physical hazards posed by generation of explosive vapors. Importantly, this EHE/EHMP describes general procedures for monitoring hazardous lead-laden dust and vapors during field activities. Rather than as a stand- alone document to address vapor issues, it should be considered a companion document to the site-specific HSP, which should describe in detail procedures and equipment for monitoring hazardous lead laden fugitive dust and vapor concentrations, as well as PPE and engineering controls.

14.1. Dust And Vapor Management

If fugitive dust or VOC vapors are encountered during excavation, appropriate response actions need to be taken that comply with HDOH and EPA regulatory guidelines. The response actions

include ensuring that on-site workers have the appropriate level of PPE, and that the general public is not affected adversely. Anticipated tasks associated with managing lead-laden dust and VOC vapor exposure are summarized as follows:

- If dust is stirred up during excavation activities, field oversight must be provided to control the dust and provide health and safety guidance related to potential exposure of workers to lead. Engineering controls should always be used prior to upgrading PPE. If possible, workers should work upwind of a dust cloud. Dust should be controlled by misting with water, but an excessive application of water that produces runoff needs to be avoided.
- If VOC vapors below LELs are encountered during excavation activities, field oversight must be provided to identify VOC vapors and provide health and safety guidance related to potential exposure of workers to COCs.
- Dust and air monitoring should be conducted during excavation associated with future construction activities. Dust and air monitoring should also occur when workers are required to enter excavations. The monitoring should include both workspace (on site) and perimeter measurements. See Section12.4 for monitoring requirements, PPE, and information on respiratory protection.
- If warranted by dust and air monitoring results, on-site workers should be notified to upgrade PPE to include respiratory protection.
- Air/dust monitoring is required to be conducted by the contractor responsible for construction/excavation. Associated air monitoring requirements will be described in the site-specific HSP for construction.

14.2. Dust And Vapor Contingency Plan – Exposure Monitoring

To assess potential exposure of on-site workers to hazardous lead-laden dust and/or VOC vapors and determine the level of PPE that might be required, a baseline exposure assessment will be required for the area of highest contamination (Figure 6a,b,c). To conduct the assessment, both lead concentrations in air and total VOC concentrations in air must be measured during excavation. See Section 12.4 for further details. Measurements of concentrations of these COCs within the workspace atmosphere and at the perimeter (off site) are required.

Based on results of the exposure assessment, exposure limits must be established for workers performing remedial excavation. The exposure limits are based on Occupational Safety and Health Administration (OSHA) permissible exposure limits (PEL). The exposure monitoring plan is summarized as follows and in Section 12.4.

- Level D PPE or Level D modified (dust mask) will likely be appropriate for on-site workers under normal working conditions in the majority of the FSA- excluding the area of highest contamination. The latter will likely require an upgrade of PPE, focusing on upgrade of respiratory protective equipment. Final determination of PPE needs however be based on the exposure assessment.
- Both workspace (on site) and perimeter (off site) air monitoring will be conducted.
- Air monitoring will proceed using a conventional photoionization detector (PID) to determine total VOC concentration.
- If lead is at levels of exceeds 0.5 mg/m^3 half mask air-purifying respirator with high efficiency filters or half-mask supplied -air respirators operated on demand (negative pressure) mode are needed (as of current OSHA requirements- check for

updated requirements; e.g., https://www.cdc.gov/niosh/npg/nengapdxe.html).

- If total VOC concentration in the workspace atmosphere exceeds an 8-hour, time-weighted average (TWA) of 20 parts per million (ppm) or a 15-minute, short-term exposure limit (STEL) of 100 ppm, PPE requirements will be upgraded to Level C, and it may be necessary to implement a modified work schedule. These levels are based on a maximum benzene concentration in gasoline of 5 percent by volume.

14.3. Engineering and Administrative Controls

Dust and vapor control methods may be necessary during construction-related work in which VOC vapors are encountered. These controls include use of plastic sheeting on soil stockpiles, vapor suppressants, and supplied ventilation.

It is anticipated that Level D PPE (or modified Level D with dust mask) will be appropriate for workers during future construction in most of the FSA (excluding the main area of contamination). For the high concentration area it is likely appropriate to start with Level C PPE, but the PPE should be adjusted based on the results of the exposure assessment. If site conditions warrant, as described above, PPE will be upgraded to Level C or higher.

In addition to respiratory protection practices, engineering controls and safe work practices will be employed. Engineering controls include barriers that prevent workers from unnecessarily entering work zones and use of recycled air conditioning in mobile equipment cabs. Safe work practices include monitoring wind direction and having workers stand upwind of VOC vapor sources whenever possible, or instituting a modified work schedule.

A natural control is that vapors originating within the FSA normally will be diluted by the prevailing northeasterly trade winds.

Because anaerobic degradation of petroleum products will continue in the area for many years, methane gas remains a potential problem for workers if there is significant petroleum degradation. Significant areal petroleum contamination (e.g., free product) has not been observed.

14.4. Periodic Inspections and Preventive Maintenance

A key component of the plan is routine inspections, dust and air monitoring. Accordingly, daily or more frequent (if appropriate) dust and air monitoring will occur at all locations where exposure of on-site workers to hazardous dust or vapors is possible (e.g., open excavations, soil stockpiles). PPE will be inspected for damage and defects before personnel don the PPE. If respiratory protection is required, a daily positive pressure respirator fit test will be performed at the start of each day, and filter cartridges will be replaced regularly.

The PID requires daily calibration. The PID should be calibrated using a 100 ppm isobutylene standard. m easurements of the standard will occur as needed to confirm that the calibration is maintained. Records of the recalibrations will be maintained.

14.5. Record Keeping and Reporting

Detailed records of workspace monitoring and changes to PPE requirements will be maintained. Daily monitoring results and sampling locations will be documented in field logs. Significant

issues will be communicated to site workers on a regular basis. Major deviations from this EHE/EHMP should be approved by HDOH prior to implementation. Minor deviations from the EHE/EHMP are acceptable based on field discretion. All deviations should be explained and documented; complete Appendix H.8 for your records and send a copy to HDOH.

15.0 STORMWATER MANAGEMENT PLAN

The purpose of the stormwater management plan is to provide procedures to prevent stormwater runoff from coming into contact with contaminated soil or groundwater, and to provide contingencies in the event that such contact does occur. The principal hazards posed by stormwater runoff are direct exposure, gross contamination, and aquatic eco-toxicity. If contaminated stormwater is allowed to leave the construction or storage site, downgradient human populations (the general public) and ecological receptors (marine flora and fauna in Honolulu Harbor) could be exposed to COCs. Areas within which these hazards potentially pose the greatest concern are where contaminated soil, and contaminated groundwater have been encountered.

This plan describes the necessary measures for controlling stormwater within the area covered by this document during construction activities. Preventing stormwater from coming into contact with contaminated media is the principal concern during future construction activities. Construction activities could expose stormwater runoff to contaminated media as follows:

- Subsurface excavation could expose stormwater to contaminated subsurface soil and/or groundwater.
- Stormwater could be exposed to excavated contaminated soil stored temporarily in stockpiles. Excavated contaminated soil in the area of highest contamination (Figure 6a,b,c) that exceed 200 mg/kg lead needs to be immediately placed into containers to avoid any contact with potential stormwater.
- Although not anticipated, if dewatering is conducted that utilizes an on-site infiltration pit, stormwater could be exposed to contaminated groundwater.

15.1. Stormwater Management

If contaminated soil or groundwater is encountered during excavation, appropriate response actions will be taken that conform to HDOH and EPA regulatory guidelines. The response actions include ensuring that these media are not exposed to stormwater. Anticipated tasks associated with managing stormwater are summarized as follows:

- Field oversight in the FSA will be provided during excavation activities associated with construction. The purpose of the oversight is to identify contaminated media that could be exposed to stormwater runoff, and to provide guidance related to controlling stormwater at the site.

- Storage of lead contaminated soil and groundwater in enclosed containers is preferred. The material should be stored inaccessible to children (locked) and stormwater. Stockpiling should only be conducted for a minimal amount of time if necessary at all. In addition, weather will be monitored throughout each work day for signs of approaching storms and/or heavy rains.
- Inspections of engineering stormwater controls will occur each day to ensure that contaminated media will not be exposed to stormwater runoff, and that contaminated

stormwater will not leave the construction site.

- All construction activities—including clearing, grading, and excavation—that result in disturbance of 1 or more acres of total land area will accord with the conditions of an HDOH-approved NPDES NOI permit for stormwater discharge associated with construction activity. Conditions of the permit include preparation of a Construction Site Best Management Practices (BMP) Plan. For projects involving disturbance of less than 1 acre of land, an NPDES permit is not required; however, the C&C of Honolulu Department of Planning and Permitting requires erosion controls or implementations of BMPs at all disturbed areas.

15.2. Engineering and Administrative Controls For Open Excavations

In the absence of engineering and administrative controls, lead contaminated soil and/or groundwater exposed in open excavations could come into contact with stormwater, thus potentially contaminating the stormwater with COCs. To prevent this, the following activities will occur:

1. Where possible, excavations will be backfilled as soon as practicable to limit the time they are open and potentially exposed to stormwater runoff and direct precipitation. If immediate backfilling is not possible, excavations will be covered with a heavy steel plate at the end of each day.
2. Where possible, the edges of excavations will be bermed, thus preventing stormwater runoff from entering.
3. Open excavations will be inspected each day to minimize potential for direct precipitation to cause the excavation to overflow.

Soil Stockpiles. In the absence of engineering and administrative controls, excavated lead contaminated soil stored in stockpiles could come into contact with stormwater, thus potentially contaminating the stormwater with COCs. To prevent this, the following activities will occur:

- Soil stockpiles will be avoided as much as possible and soil immediately drummed or otherwise contained with no access by children. Away from the area of highest contamination soil stockpiles may be temporarily placed on plastic sheeting, and the sheeting will be bermed at the edges, thus preventing contact with stormwater runoff. Soil with more than 200 mg/kg lead should not be stored stockpiled overnight.
- At the end of each day, or in the event of a storm, the containers or soil stockpiles will be covered with plastic sheeting or soil containerized, thus preventing contact with direct precipitation.
- The soil stockpiles will be inspected each day to ensure that the plastic sheeting is intact.
- Time of stockpile storage should be minimized to reduce the potential of stormwater interaction with stored soil with high lead concentrations.

Dewatering Infiltration Pits. In the absence of engineering and administrative controls, the water in infiltration pits used for on-site dewatering could come into contact with stormwater. To prevent this, the following activities will occur:

- Where possible, infiltration pits will be backfilled as soon as practicable to limit the time they are open and potentially exposed to stormwater runoff and direct precipitation.

- Where possible, the edges of infiltration pits will be bermed, thus preventing entry of stormwater.

- Infiltration pits will be inspected each day or more frequently as appropriate to minimize potential for direct precipitation to cause the pit to overflow.

Erosion and sediment control measures will be in place and functional before construction activities commence. These measures will be maintained throughout the construction period. If stormwater discharge from the site is anticipated, the following preventive measures may be taken:

- Stormwater flowing towards active construction areas will be diverted using appropriate control measures, as practicable.
- Erosion control measures will be designed to handle the size of the disturbed or drainage area in order to detain runoff and trap sediment.
- Height of the property boundary can be increased using sandbags.
- Additional silt fencing will be added to affected property boundaries, if warranted.
- Berms surrounding soil stockpiles will be increased as necessary.

15.3. Stormwater Contingency

Open Excavations. During construction activities, stormwater could come into contact with contaminated soil or groundwater exposed in excavations for utility corridors or other subsurface structures. If a storm event is more severe than anticipated and could result in entry of stormwater to an excavation or overflow of water from an excavation, the following actions may be taken:

1. Height of the berm along the edges of the excavation may be increased to prevent stormwater runoff from entering the excavation.
2. If feasible, stormwater runoff may be diverted away from the excavation.
3. The excavation may be covered with plastic sheeting to prevent entry of direct precipitation or stormwater runoff.

Soil Stockpiles. During construction activities, stormwater could come into contact with lead contaminated soil stored in stockpiles. If a storm event is more severe than anticipated and could result in stormwater runoff coming into contact with stockpiled soil or in damage to the plastic covering the stockpile, the following actions may be taken:

- Berms surrounding soil stockpiles that are damaged by a storm will be repaired. Additional plastic sheeting may be necessary.
- Height of the berm surrounding the stockpile may be increased.
- If feasible, stormwater runoff may be diverted away from soil stockpiles.
- Plastic sheeting covering soil stockpiles that is damaged by a storm will be repaired or replaced. Additional plastic sheeting may be necessary.

Dewatering Pits. During construction activities, stormwater could come into contact with contaminated groundwater exposed in dewatering pits, if dewatering become necessary (not anticipated). If a storm event is more severe than anticipated (i.e., capable of overcoming engineering controls) and could result in stormwater runoff entering a dewatering pit or water overflowing a dewatering pit, the following actions may be taken.

- Height of the berm along the edges of the dewatering pit may be increased to prevent stormwater runoff from entering the excavation.
- If feasible, stormwater runoff may be diverted away from the dewatering pit.

Stormwater Run-on. During construction activities, stormwater run-on could enter the property and come into contact with contaminated soil or groundwater. If a storm event is more severe than anticipated and could result in stormwater run-on entering the property, the following action may be taken:

- Height of the property boundary can be increased using sandbags.

Off-Site Discharge of Contaminated Stormwater. If, during construction activities, stormwater comes into contact with contaminated soil or groundwater and that stormwater is not contained, contaminated stormwater could discharge off site. If a storm event is more severe than anticipated and could result in discharge of contaminated stormwater off site, the following actions may be taken:

- Pump contaminated stormwater into drums that can be closed or totes.
- Height of the property boundary can be increased using sandbags.
- If feasible, stormwater runoff may be diverted away from the property boundary.
- Additional silt fencing may be added at affected property boundaries.

15.4. Inspection and Preventive Maintenance

A key component of the plan is routine inspections. Accordingly, all locations of possible contact of stormwater with contaminated media (e.g., open excavations, soil stockpiles, dewatering pits) should be inspected daily. During storm events, inspections should occur to minimize possibilities of stormwater runoff, contact of direct precipitation with soil stockpiles, and entry of stormwater runoff into open excavations or (if present) infiltration pits.
Storage containers, vehicles, and heavy equipment that could come into contact with stormwater will be stored within one area and will be inspected regularly to ensure proper functioning. Signs of deterioration or leaks that could lead to an unanticipated release of petroleum-based products or hazardous substances will be reported immediately, and corrective measures will be taken.

General site inspections should occur periodically and should be documented. Engineering controls should be inspected and repaired as necessary. During prolonged rainfall, daily inspections may be necessary. Accumulated sediment at the silt fence should be removed once accumulation reaches one-third the height of the fence. If damaged, the silt fence should be repaired or replaced within 24 hours. During storm events, stormwater runoff will be inspected to assess whether it has been impacted by COCs or by contaminants associated with construction activities.

15.5. Record Keeping and Reporting

Detailed records of storm events, inspections of engineering controls, and response activities will be maintained. Significant issues will be communicated to site workers and the project on-site representative on a regular basis. Reporting requirements of the NPDES stormwater discharge permit will be followed strictly. Major deviations from this EHE/EHMP should be approved by HDOH prior to implementation. Minor deviations from the EHE/EHMP are acceptable based on field discretion. All deviations should be explained and documented; complete Appendix H.9 for your records and send a copy to HDOH.

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Figures

Environmental Hazard Management Plan

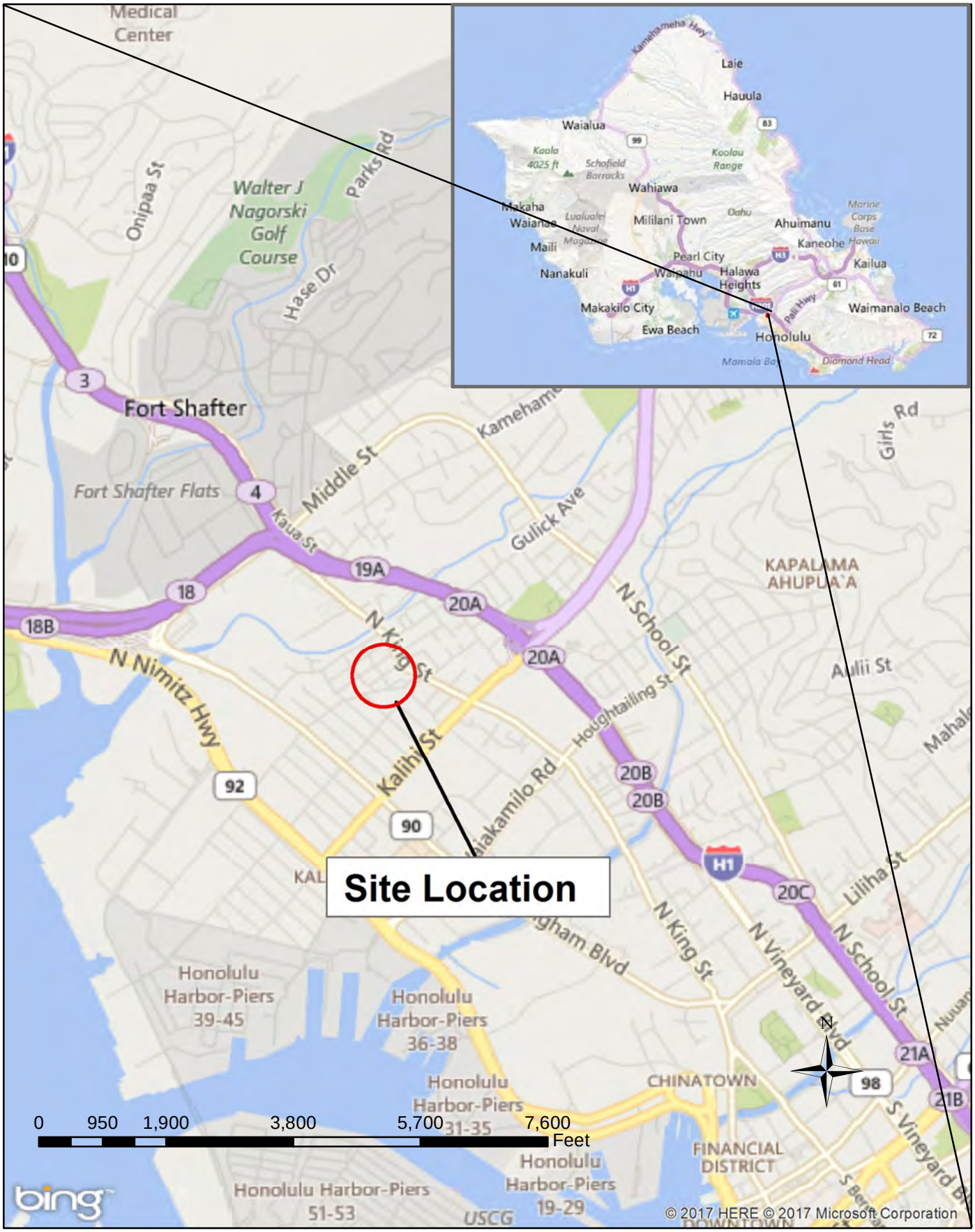

Figure 1: Site Location

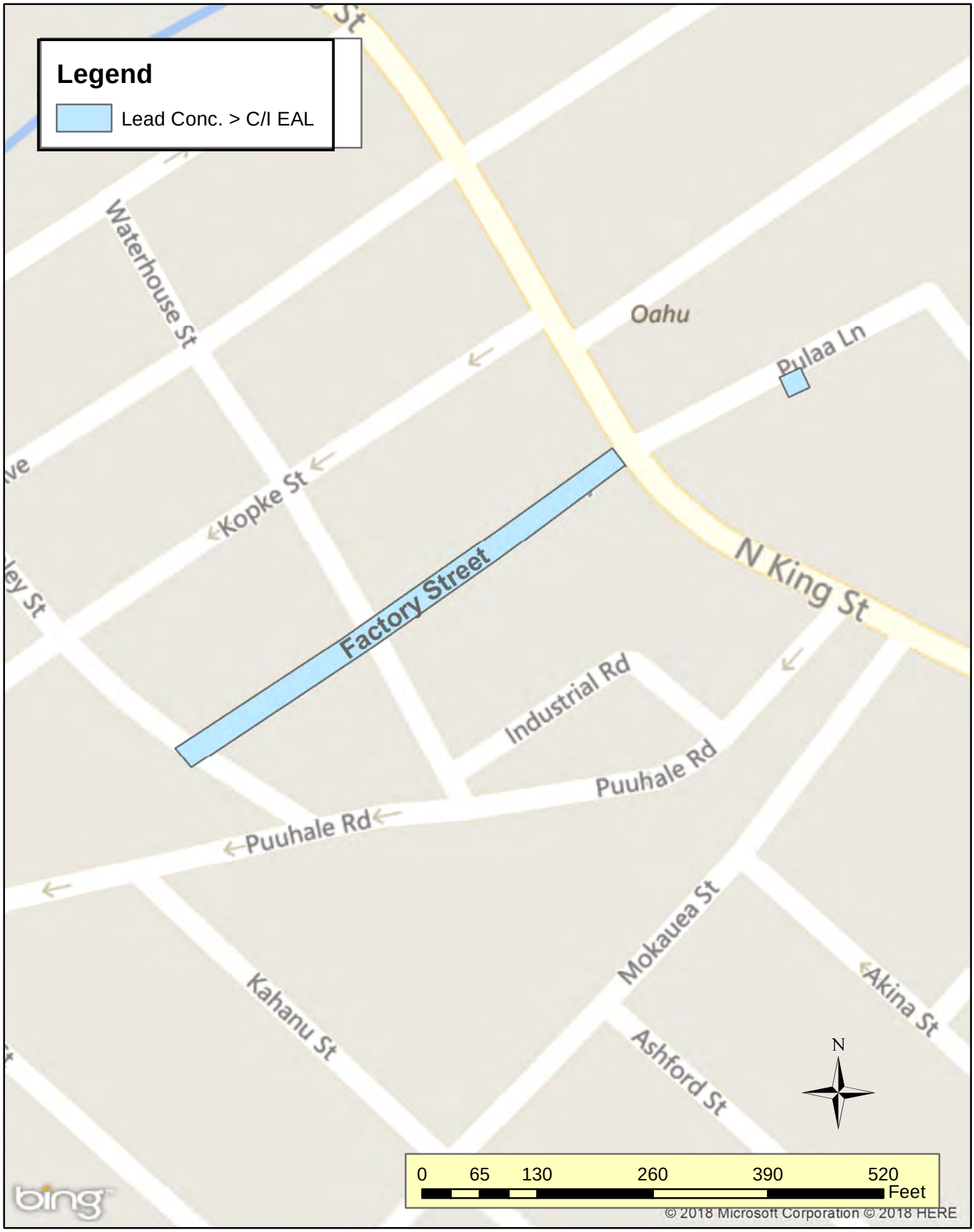

Figure 2: Areas with Lead > 800 mg/kg

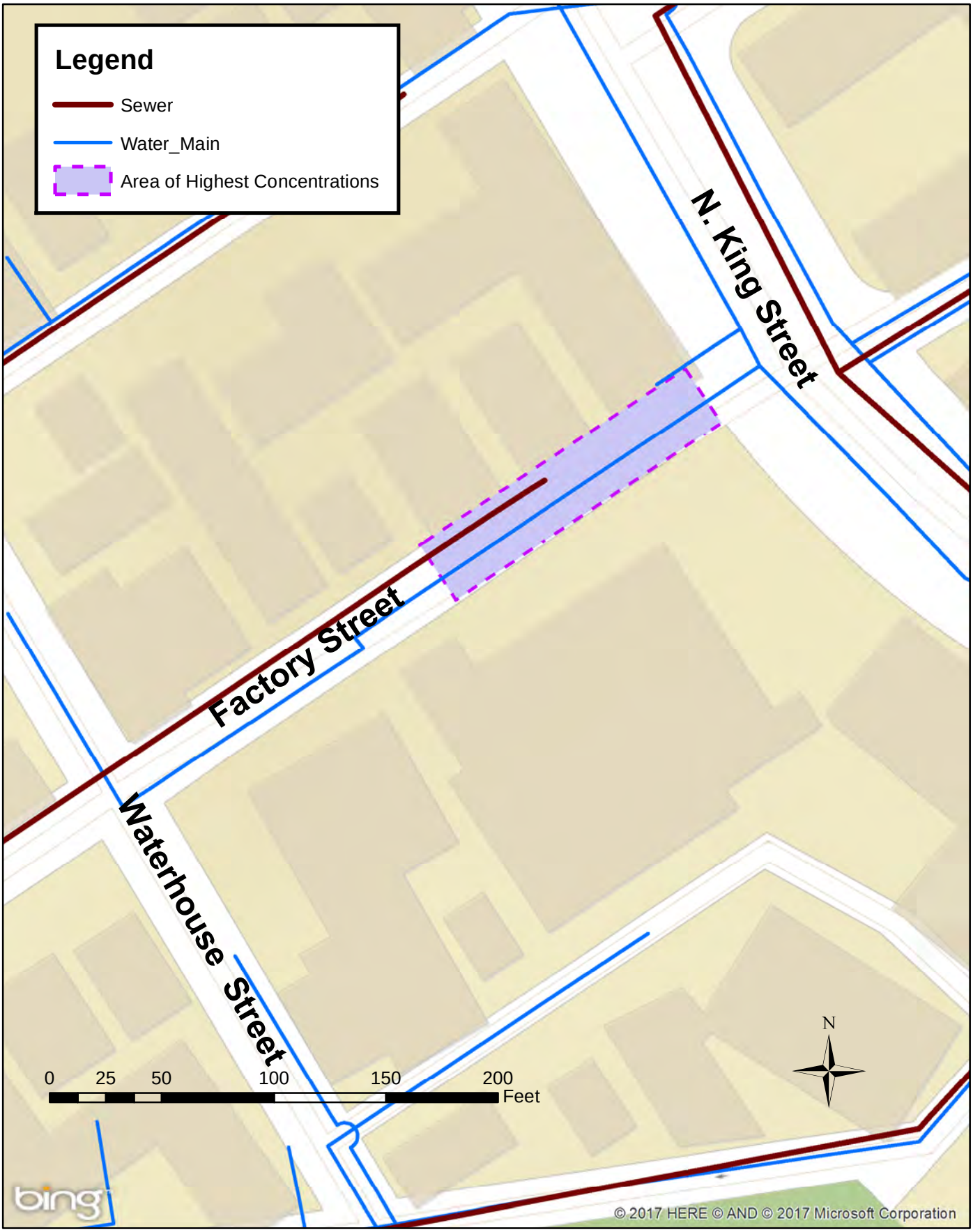

Figure 3: Area of Highest Lead Concentrations

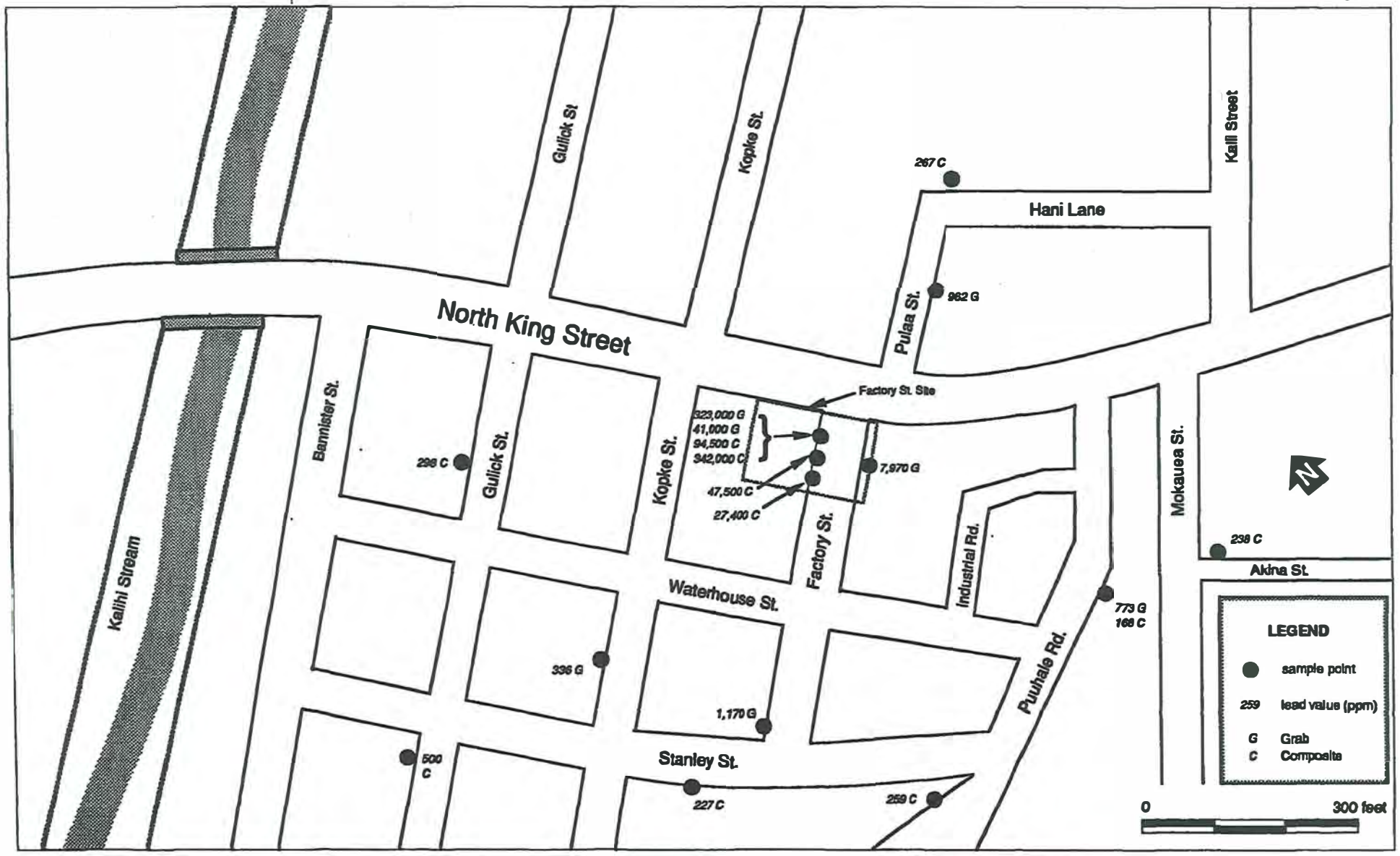

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Figure 4

HEER SAMPLE LOCATION

MAP-Investigation 1

Factory Street Area (FSA)

Honolulu, Hawaii

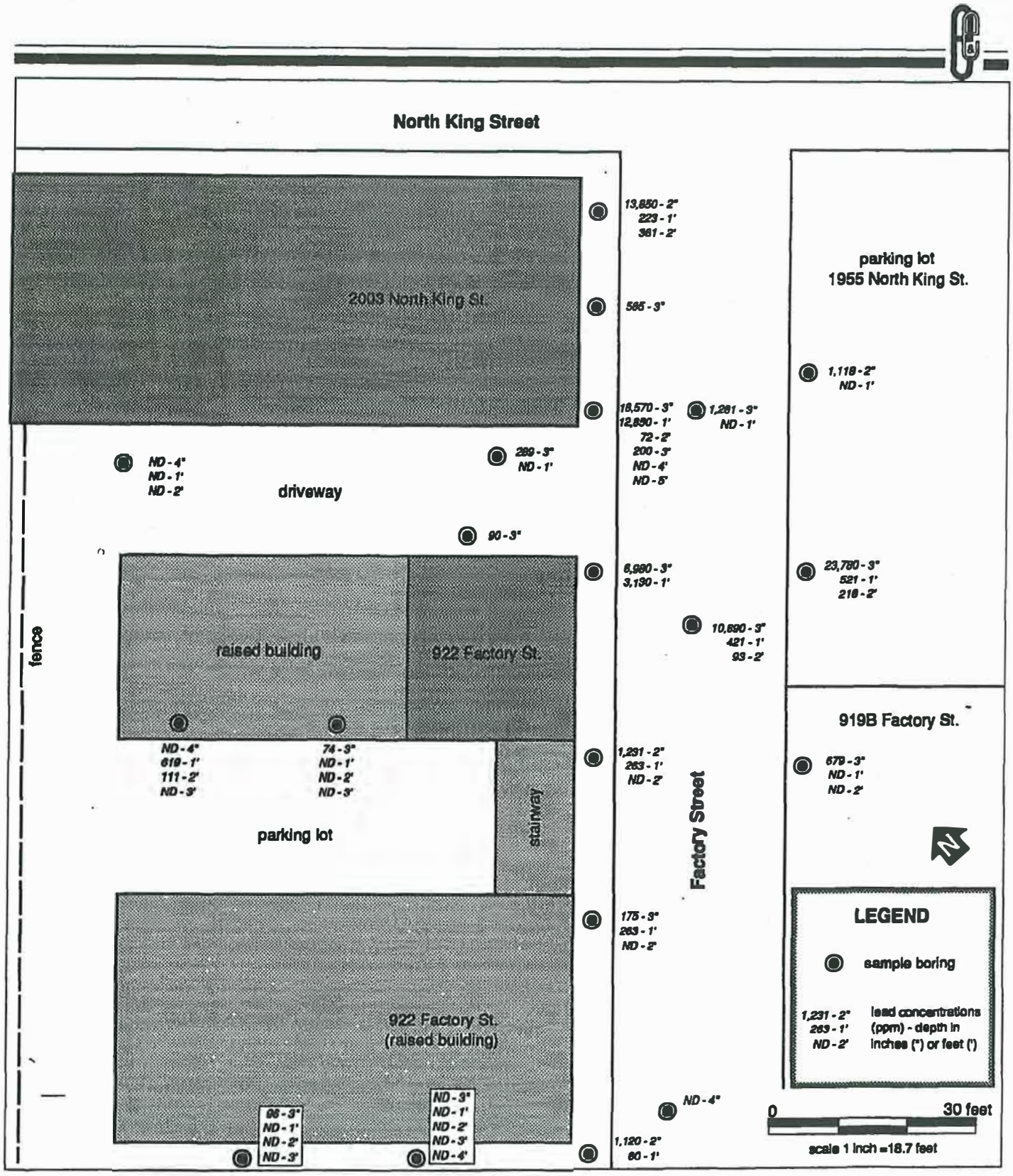

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Figure 5

SOIL SAMPLE LEAD CONCENTRATIONS (XRF) - Investigation 2

Factory Street Lead Site

Honolulu, Hawaii

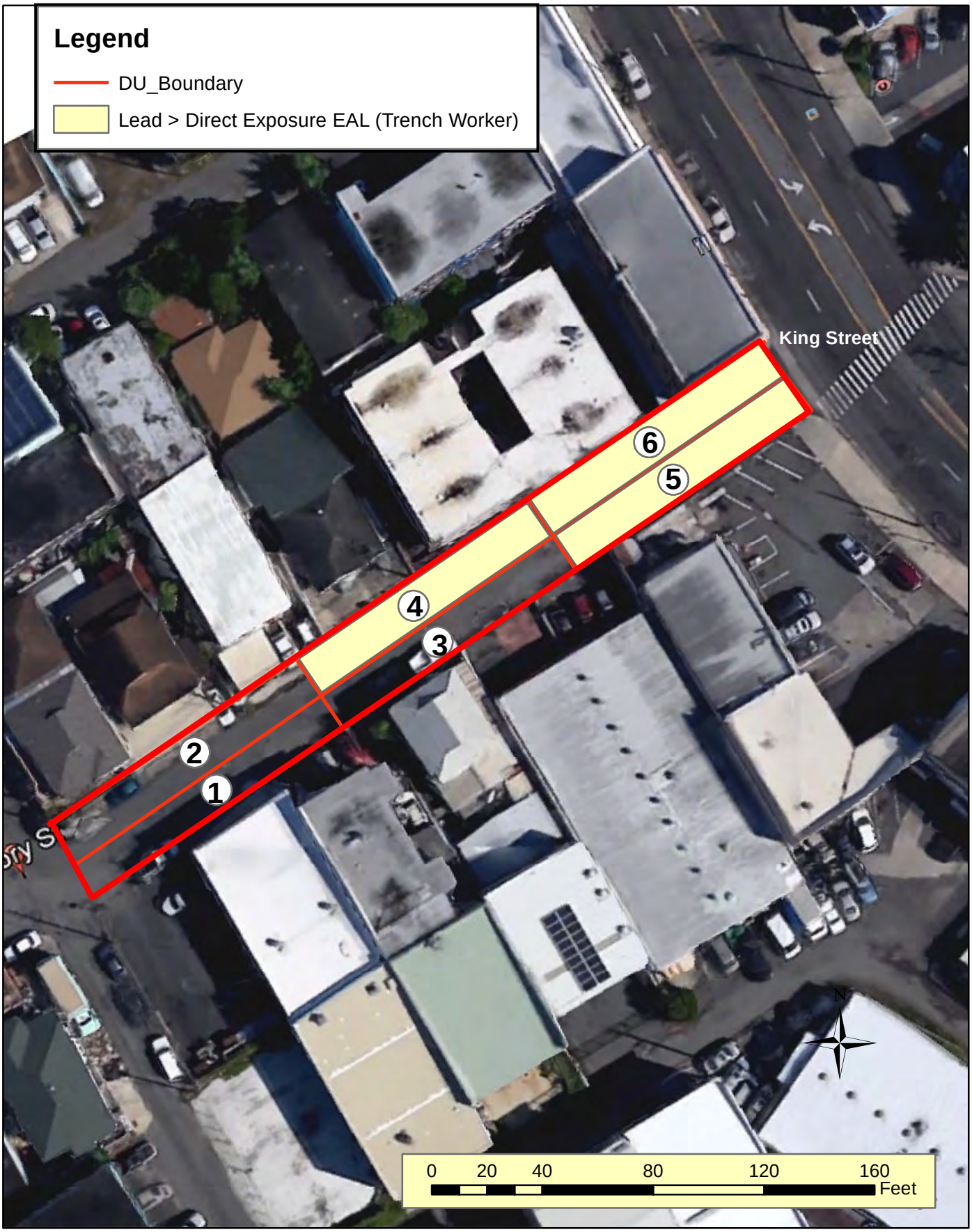

Figure 6a: DUs of 2017 Site Assessment with lead > 800 mg/kg (0 to 0.5 feet bgs)

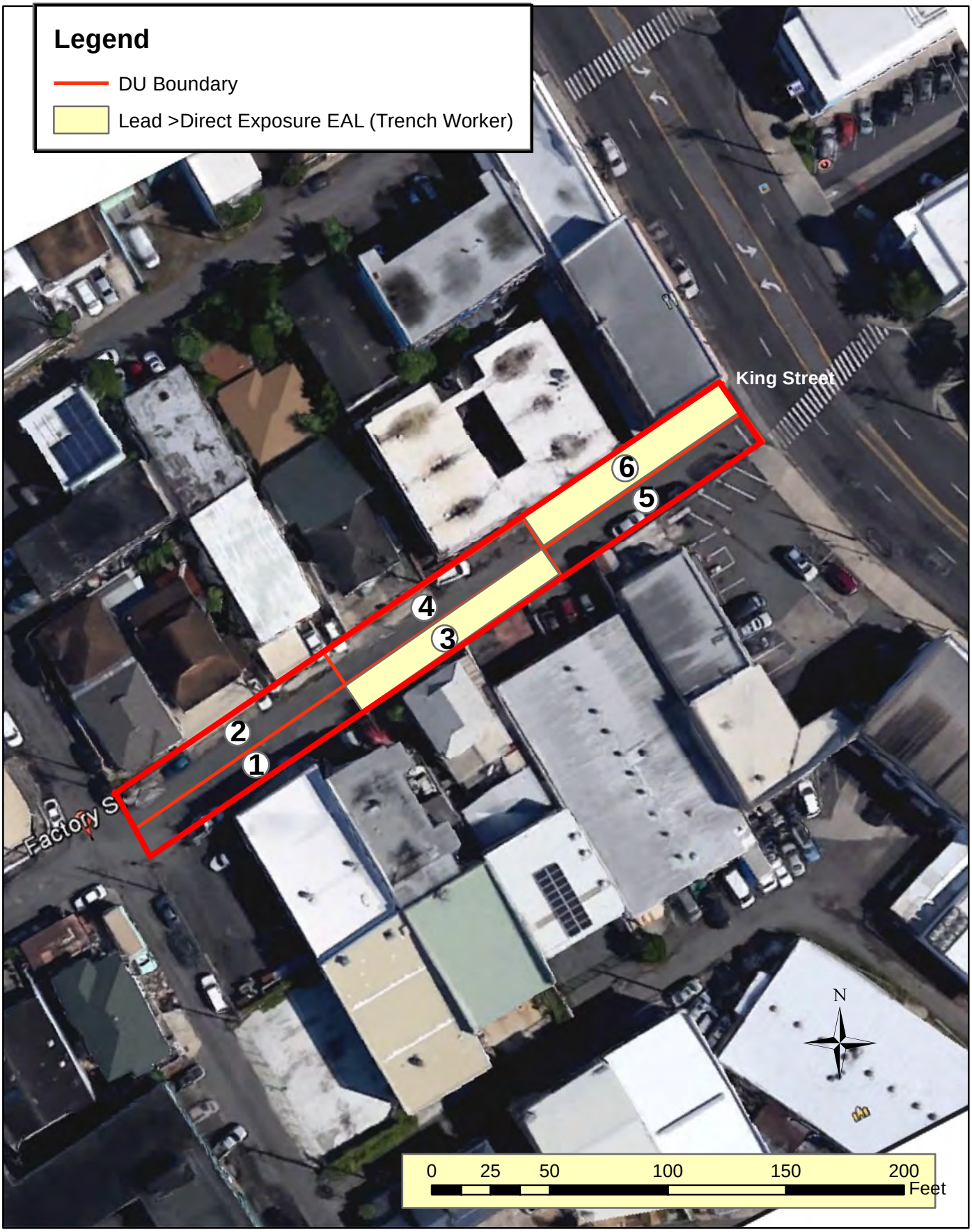

Figure 6b: DUs of 2017 Site Assessment with lead > 800 mg/kg at 0.5 to 1 ft bgs

Figure 6c: DUs of 2017 Site Assessment with lead > 800 mg/kg at 4 to 5 ft bgs

Figure 7: Location of Kalihi Poi Factory on 1914 Sanborn Fire Insurance Map

Figure 8: Properties on 1927-1950 Sanborn Map

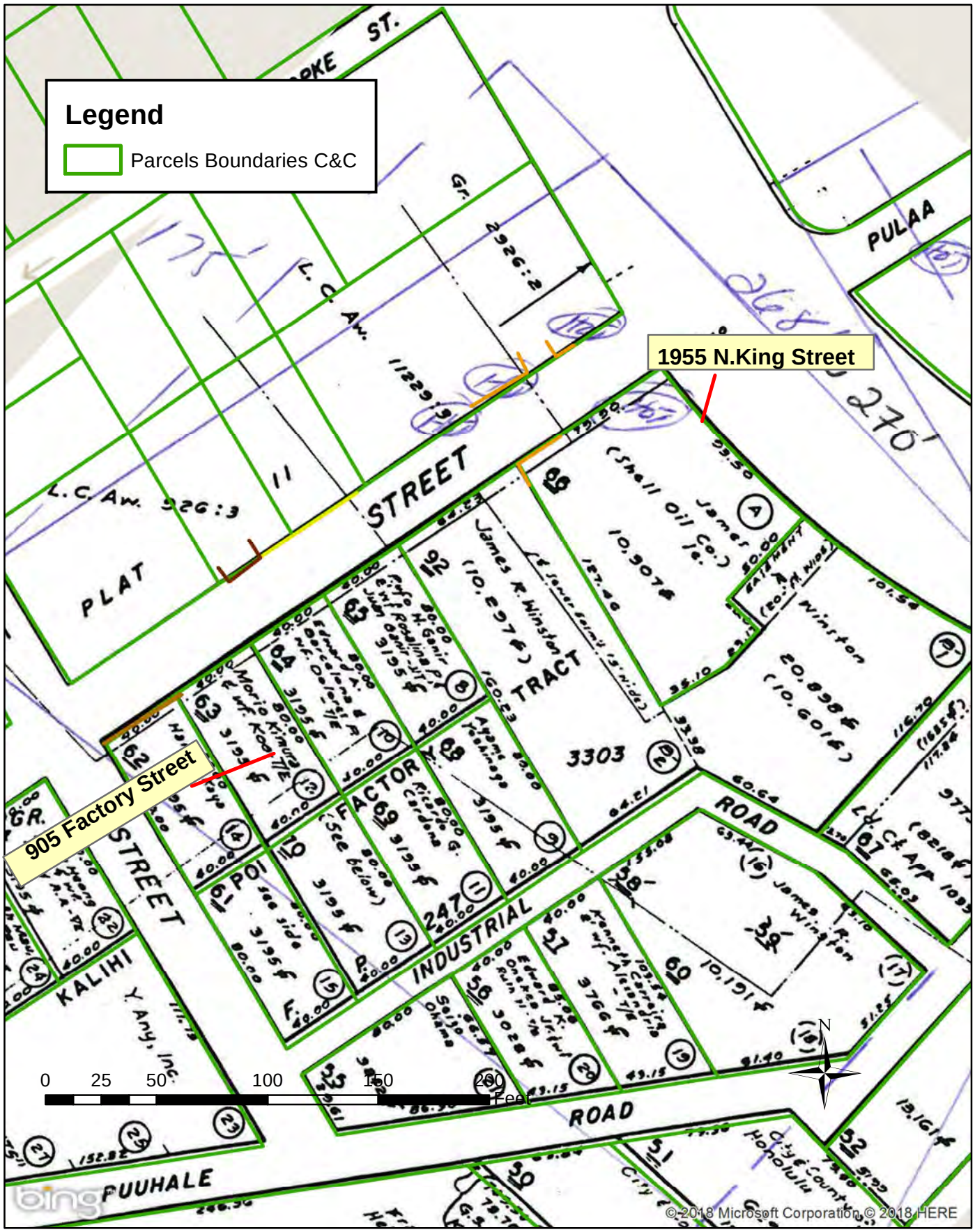

Figure 9: Shell Service Station on 1960s TMK Map

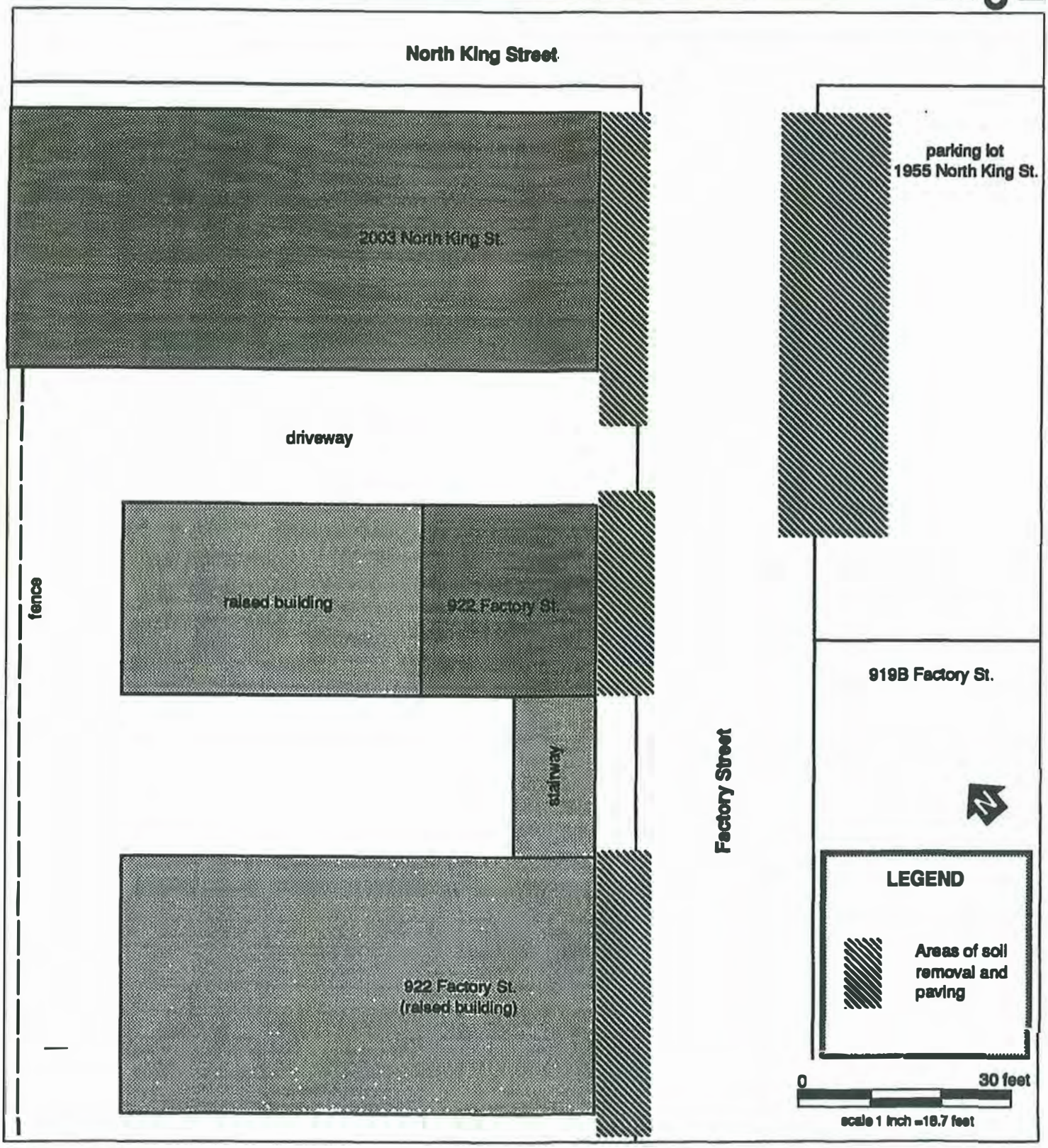

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Figure 10

APPROXIMATE EXTENT OF SOIL REMOVAL AND PAVING COMPLETED BY LANDOWNER

Factory Street Lead Site

Honolulu, Hawaii

Appendix A

Environmental Hazard Management Plan

Photographic Documentation

(2017 Site Assessment)

Photographic Documentation

Photo 1 : Corner of Factory Street and N. King Street looking (view towards Diamond Head). Red marks show locations of electrical lines, blue marks locations of water lines.

Photo 2 : Factory Street viewed towards southwest. Water lines (blue) are marked on the Ewa side (right) and crossing Factory Street. The yellow line crossing the street indicates the presence of a gas, petroleum, or steam line.

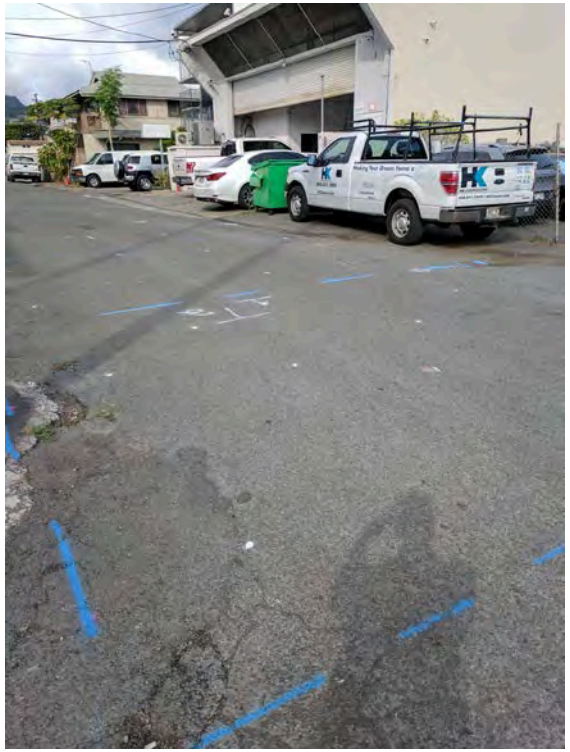


Photo 3 : Factory Street viewed towards east/northeast. Water lines (blue) are marked on the Ewa side (left) and crossing Factory Street right before the intersection with Waterhouse Street.

Photographic Documentation

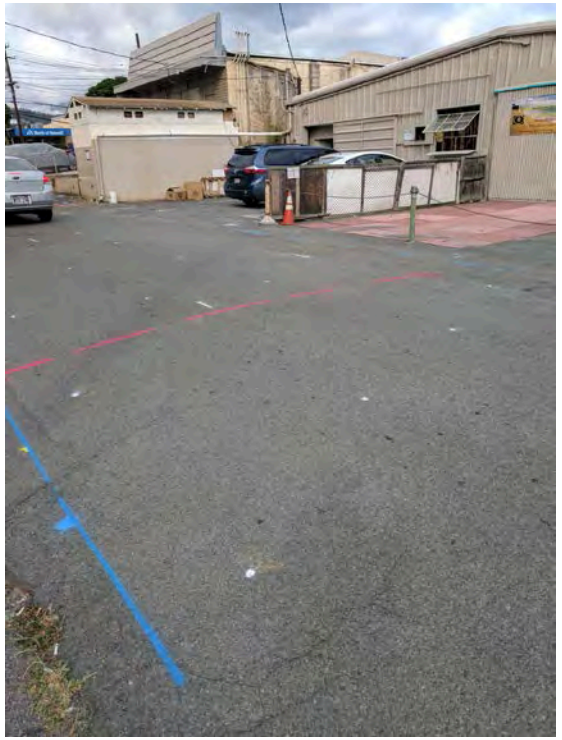


Photo 4 : Factory Street viewed towards east/northeast. Water lines (blue) are marked on the Ewa side (left) and an electrical line (red) is marked crossing Factory Street.

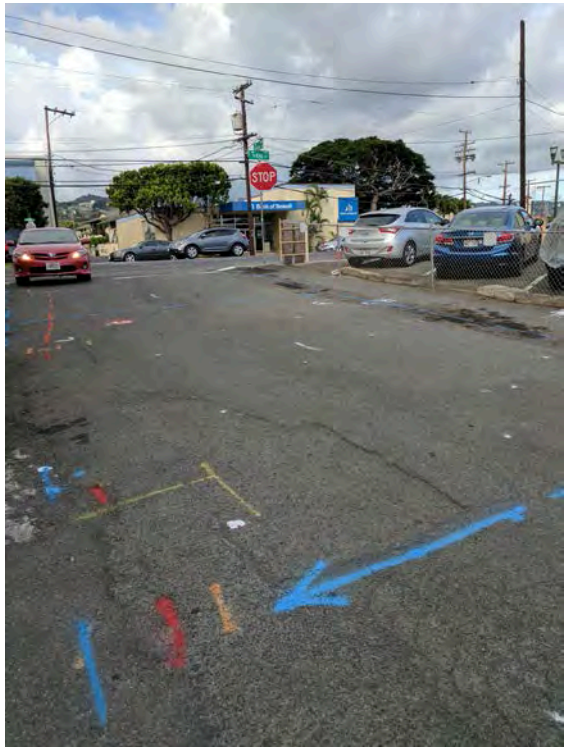


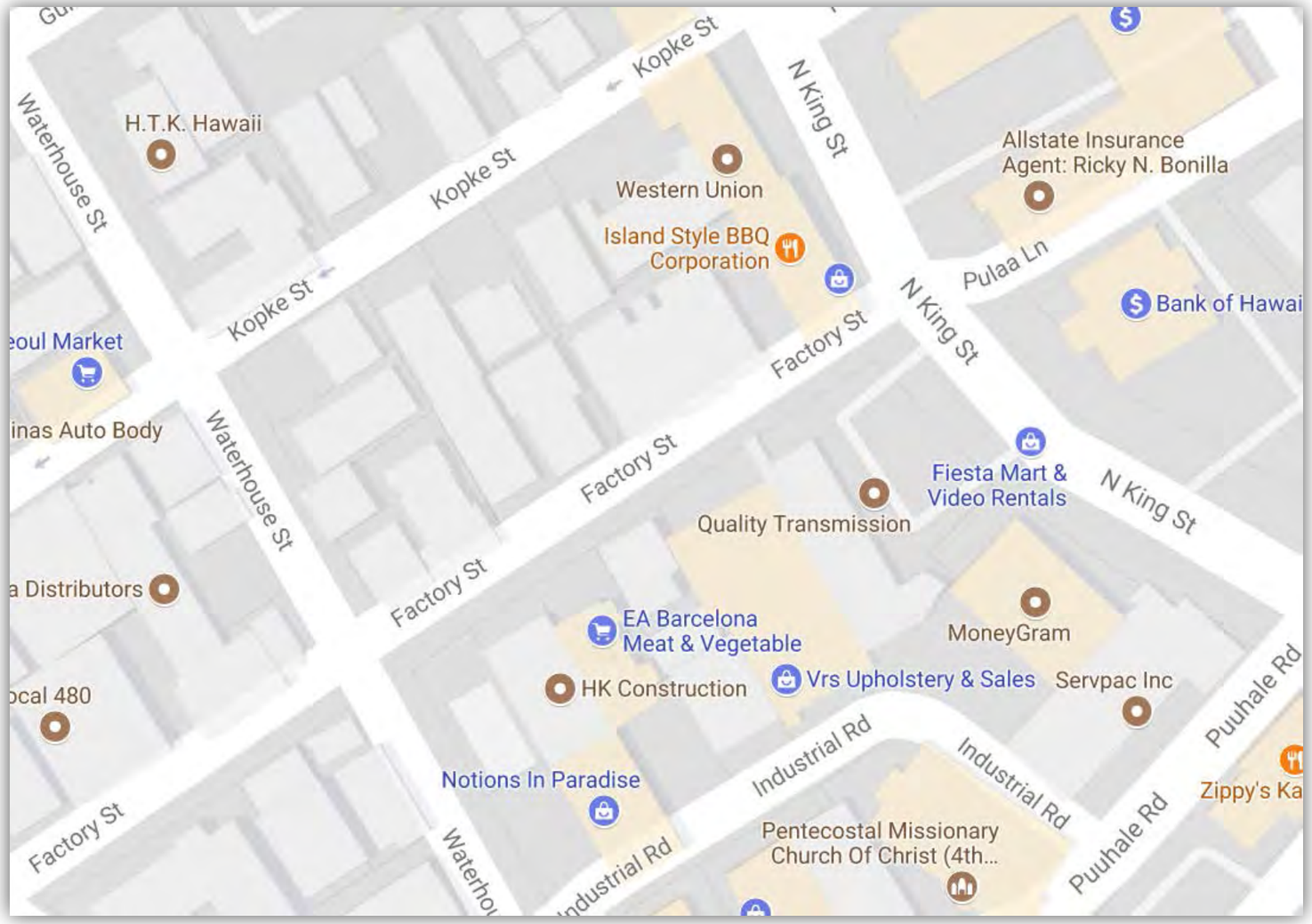
Photo 5 : Factory Street viewed towards northeast. Multiple utility lines are marked under the Ewa Side of Factory Street (left), including water (blue), electrical (red), communication (orange), and petroleum/gas/steam (yellow).

Photo 6 : Factory Street viewed towards east. A water line (blue) is marked under the diamond Head shoulder area of Factory Street (right)

Appendix B

Ground-Penetrating Radar (GPR) Maps

(2017 Site Assessment)



Project was on Factory St. Between Waterhouse St and N. King St.

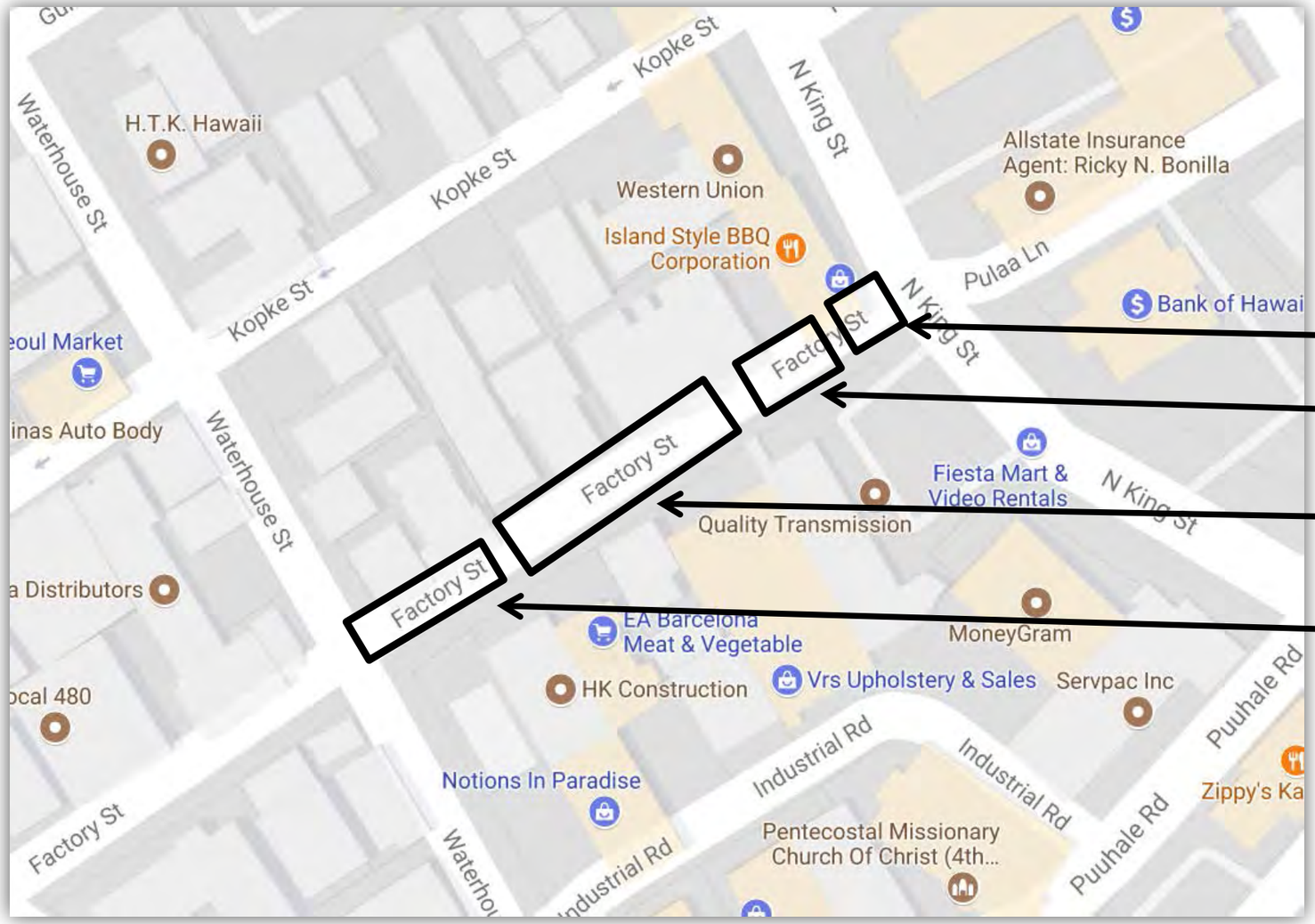
GeoTek Hawaii Inc.
Geophysical and Environmental Site Assessment

Factory St. – Street Map

No Scale Implied - locations approximate

Map 1

Created By:	Date:	Figure:
TPM	8/22/2017	1
GeoTek Project No:	File Path:	



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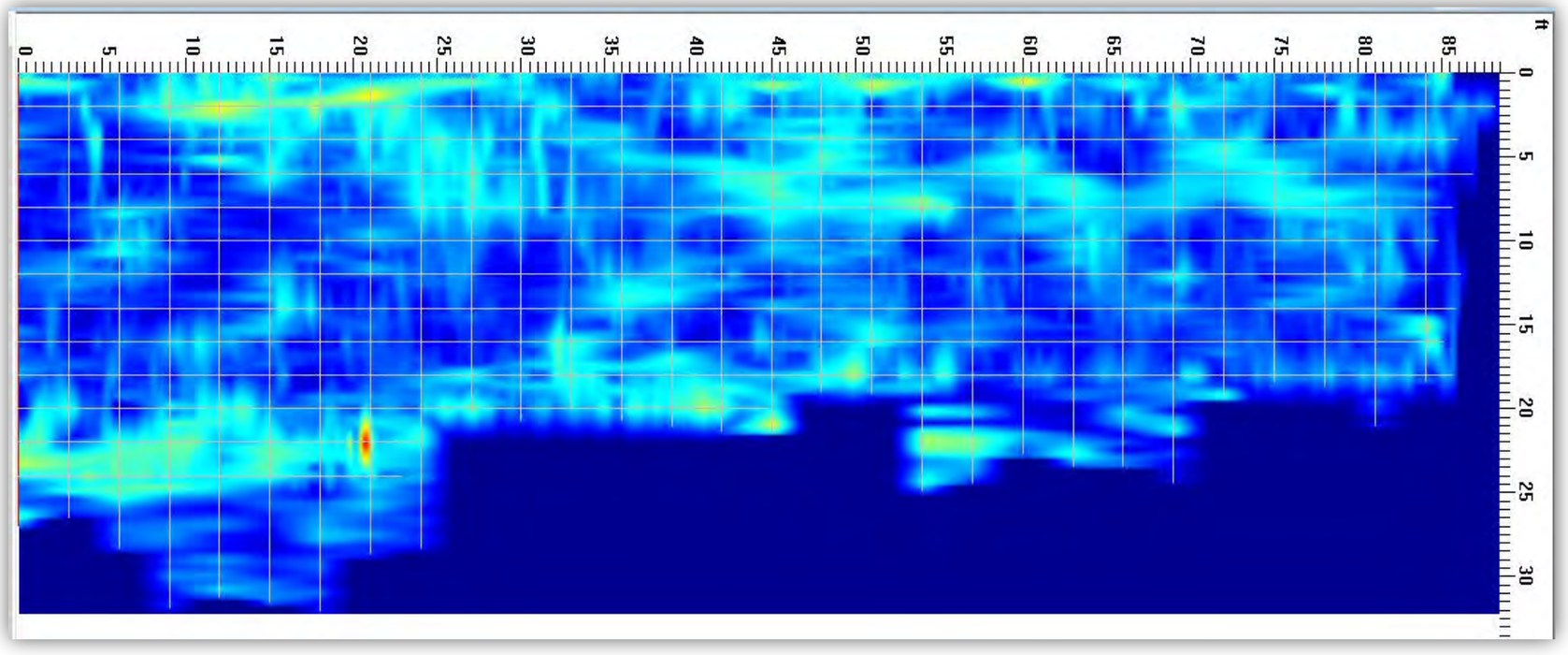
Factory St. – Grid Locations

No Scale Implied - locations approximate

Map 1

Created By:	Date:	Figure:
TPM	8/22/2017	2
GeoTek Project No:	File Path:	

N. King St.



Waterhouse St.

~1’ Depth

- Grid 1
- Grid closest to Waterhouse St.
- GPR Survey was preformed mainly on the road
- Linear features were indentified in the field as utilities
- Axis units are in Feet

GeoTek Hawaii Inc.
Geophysical and Environmental Site Assessment

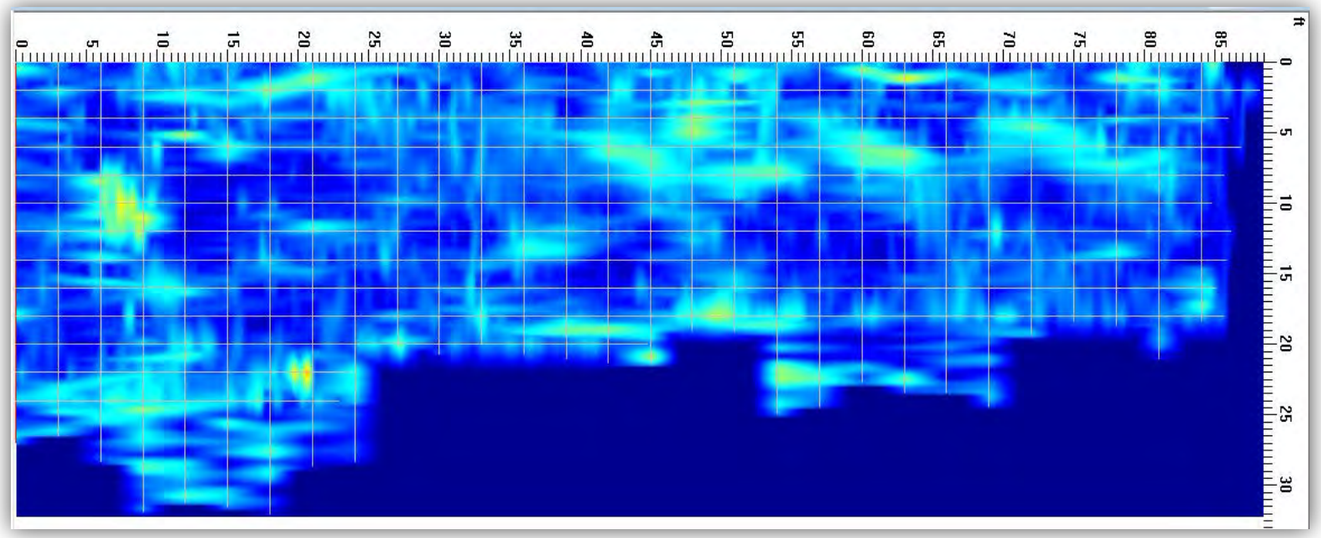
Factory St. – GPR Depth Slice

No Scale Implied - locations approximate

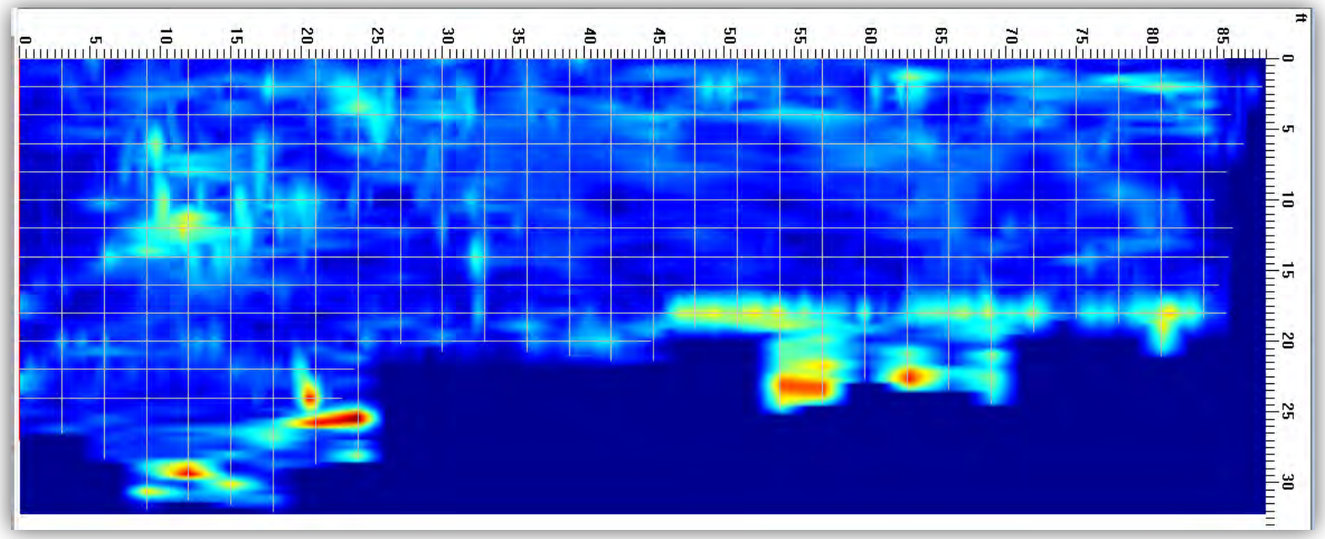
Map 1

Created By:	Date:	Figure:
TPM	8/22/2017	3
GeoTek Project No:	File Path:	

Waterhouse St.



~1.5’ Depth



~2’ Depth

N. King St.

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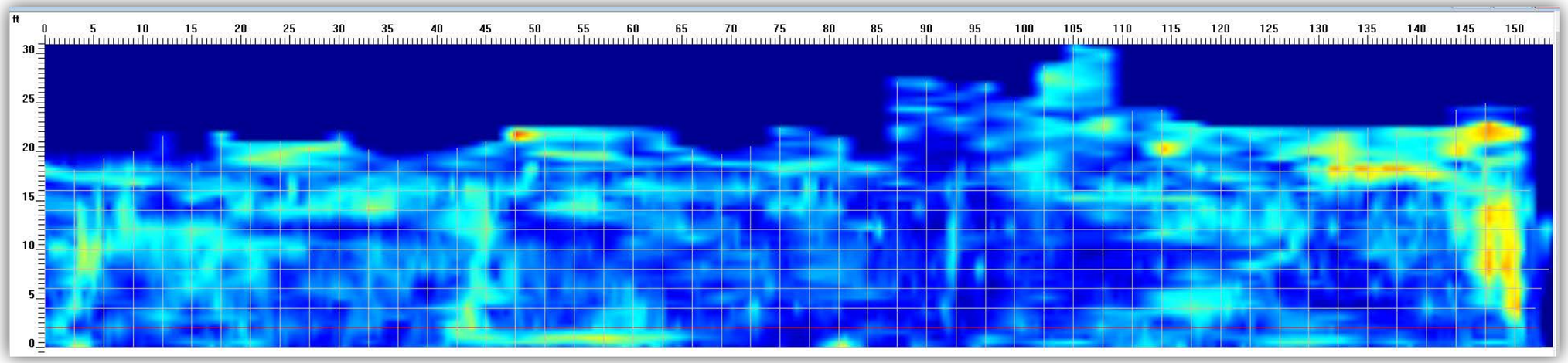
Factory St. – GPR Depth Slice

No Scale Implied - locations approximate

Map 1

Created By:	Date:	Figure:
TPM	8/22/2017	4
GeoTek Project No:	File Path:	

Waterhouse St.



N. King St.

~1’ Depth

- Grid 2
- GPR Survey was preformed mainly on the road
- Linear features were indentified in the field as utilities
- Axis units are in Feet

GeoTek Hawaii Inc.
Geophysical and Environmental Site Assessment

Factory St. – GPR Depth Slice

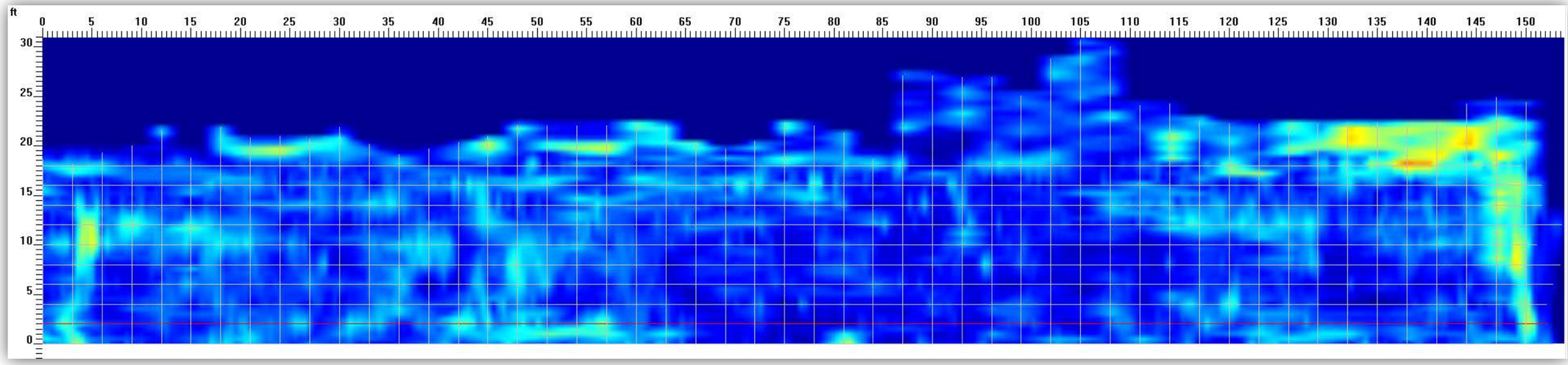
No Scale Implied - locations approximate

Map 1

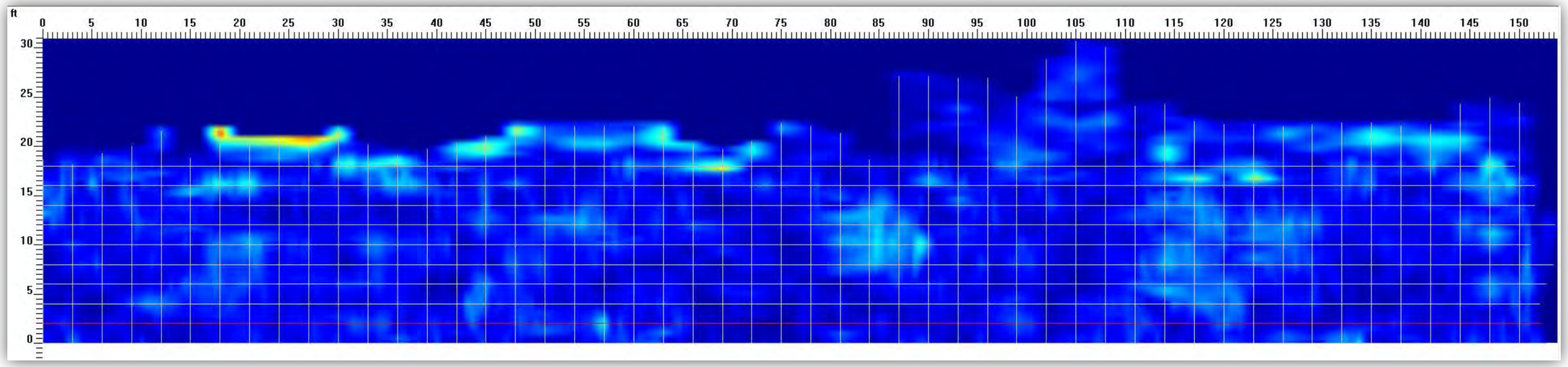
Created By:	Date:	Figure:
TPM	8/22/2017	5
GeoTek Project No:	File Path:	

Waterhouse St.

N. King St.



~1.5’ Depth



~2’ Depth

GeoTek Hawaii Inc.
Geophysical and Environmental Site Assessment

Factory St. – GPR Depth Slice

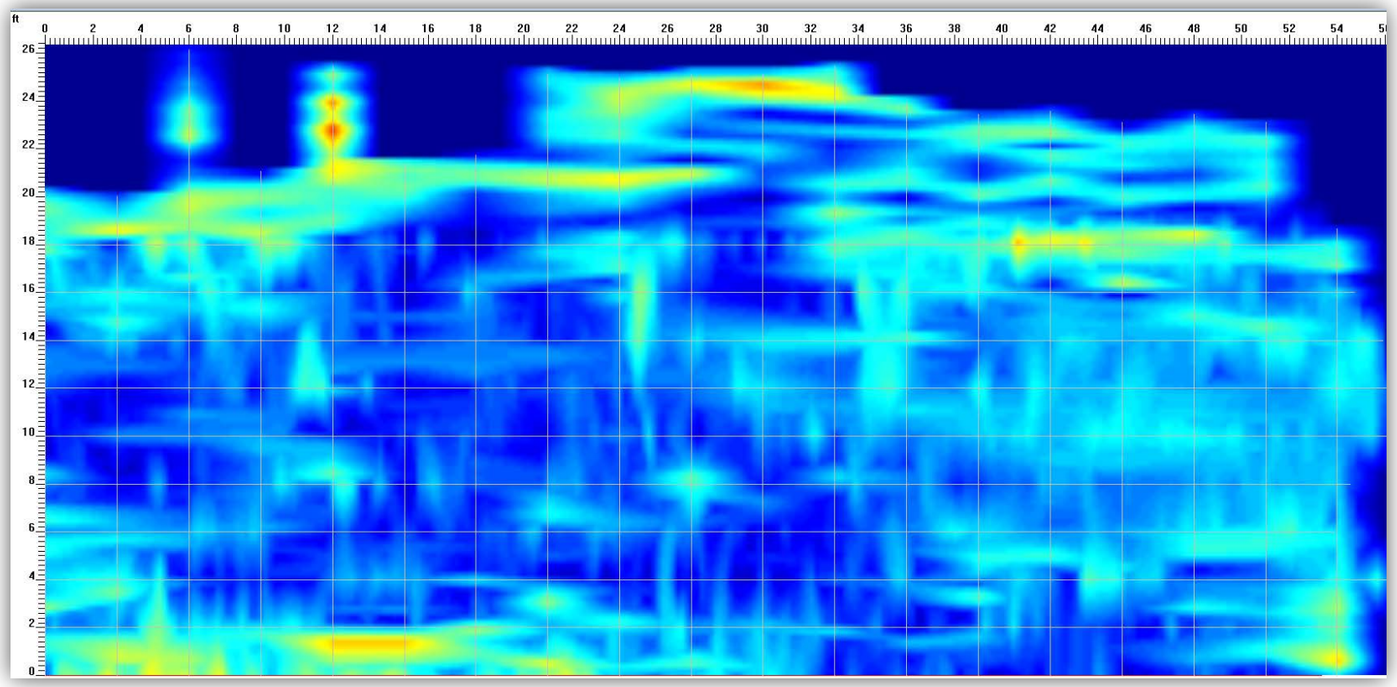
No Scale Implied - locations approximate

Map 1

Created By:	Date:	Figure:
TPM	8/22/2017	6
GeoTek Project No:	File Path:	

Waterhouse St.

N. King St.



~1’ Depth

- Grid 3
- GPR Survey was preformed mainly on the road
- Linear features were indentified in the field as utilities
- Axis units are in Feet

GeoTek Hawaii Inc.
Geophysical and Environmental Site Assessment

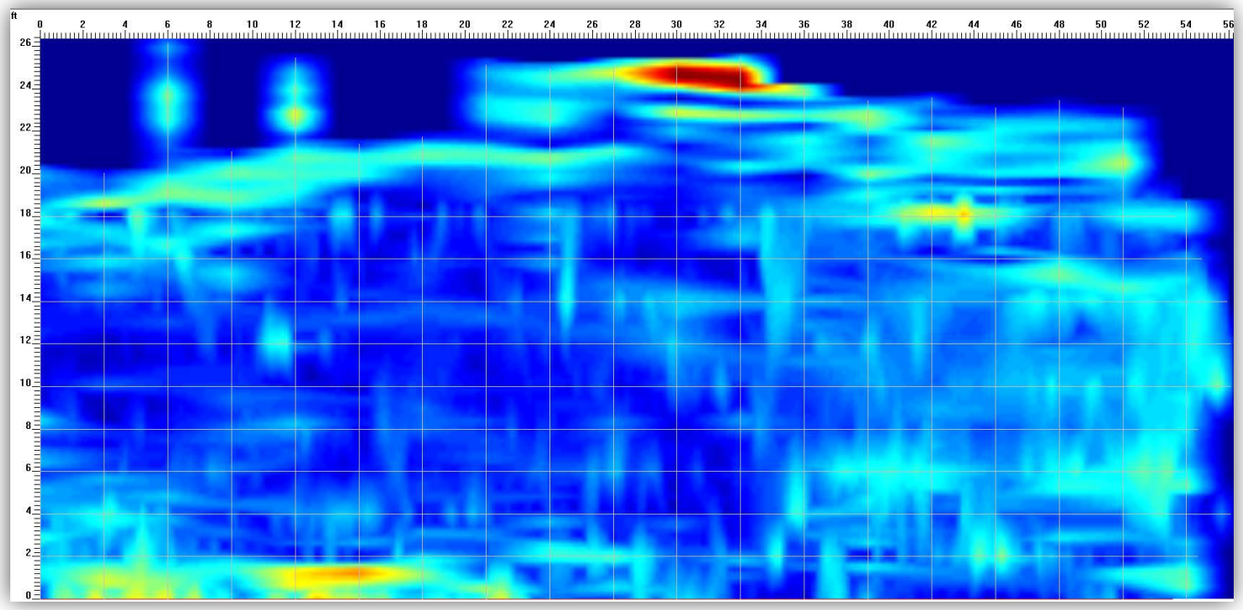
Factory St. – GPR Depth Slice

No Scale Implied - locations approximate

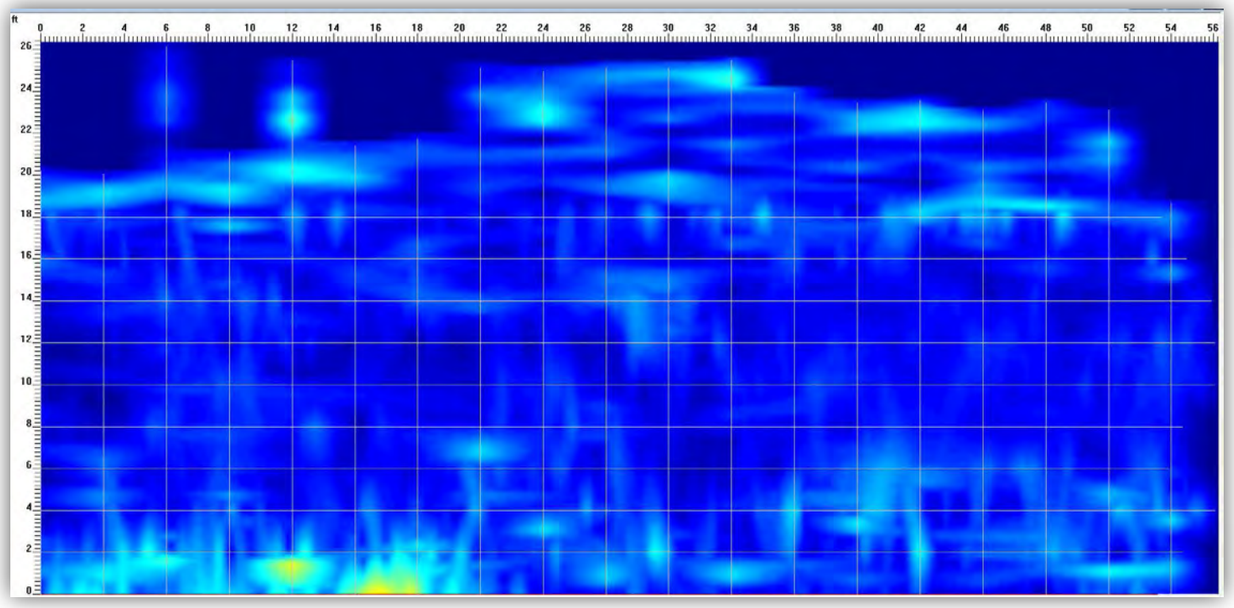
Map 1

Created By:	Date:	Figure:
TPM	8/22/2017	7
GeoTek Project No:	File Path:	

Waterhouse St.



~1.5’ Depth



~2’ Depth

N. King St.

GeoTek Hawaii Inc.
Geophysical and Environmental Site Assessment

Factory St. – GPR Depth Slice

No Scale Implied - locations approximate

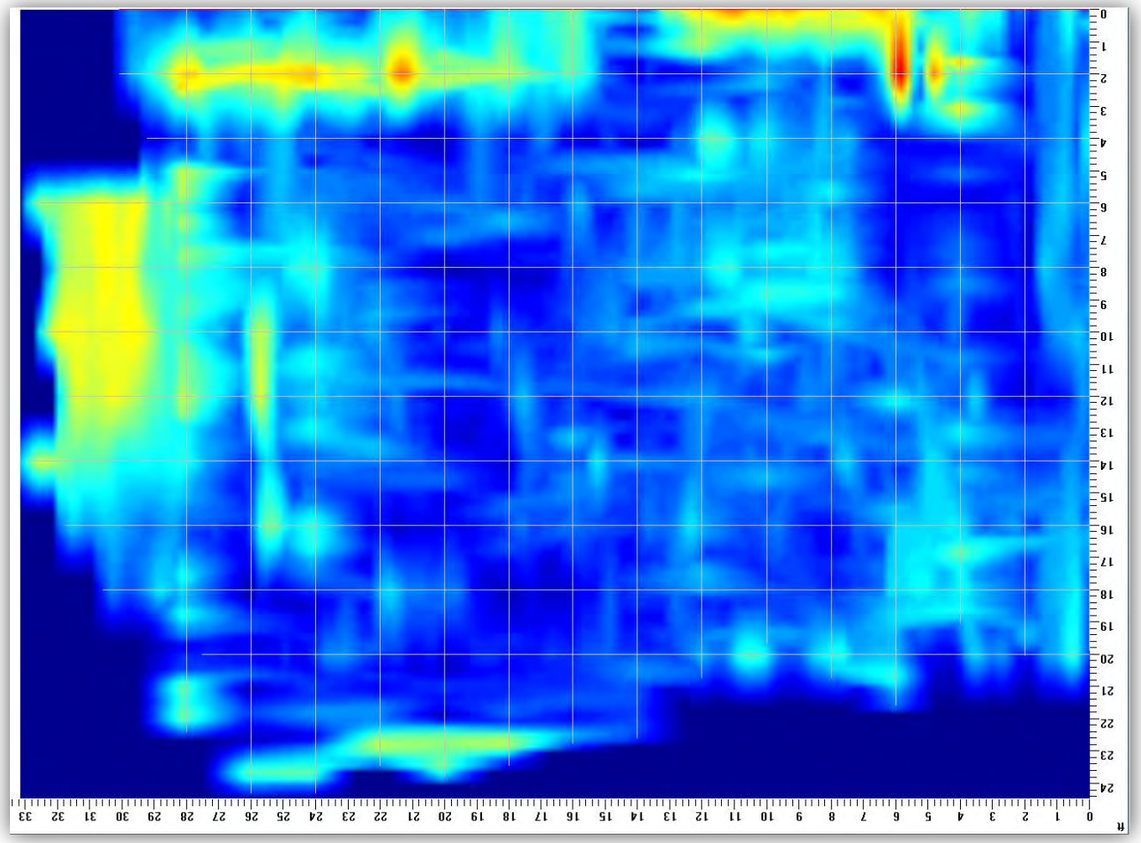
Map 1

Created By:	Date:
TPM	8/22/2017
GeoTek Project No:	File Path:

Figure: 8

Waterhouse St.

N. King St.



~1’ Depth

- Grid 4
- Grid closest to N. King St.
- GPR Survey was preformed mainly on the road
- Linear features were indentified in the field as utilities
- Axis units are in Feet

GeoTek Hawaii Inc.
Geophysical and Environmental Site Assessment

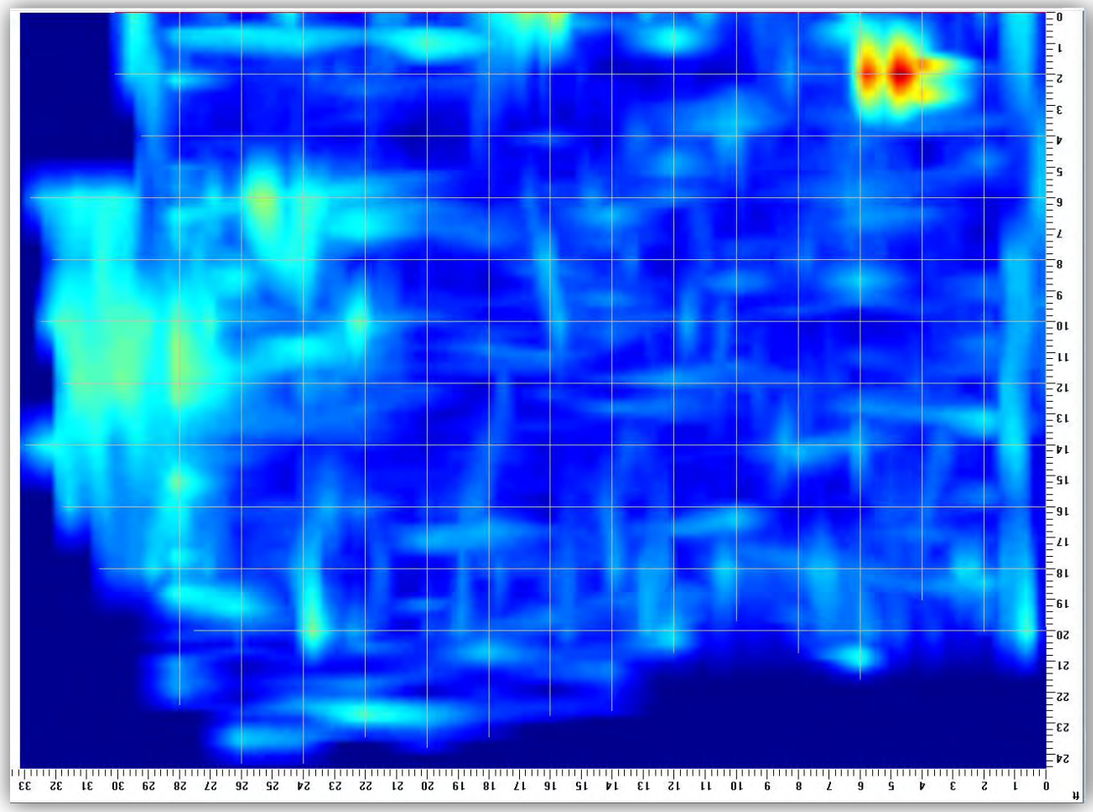
Factory St. – GPR Depth Slice

No Scale Implied - locations approximate

Map 1

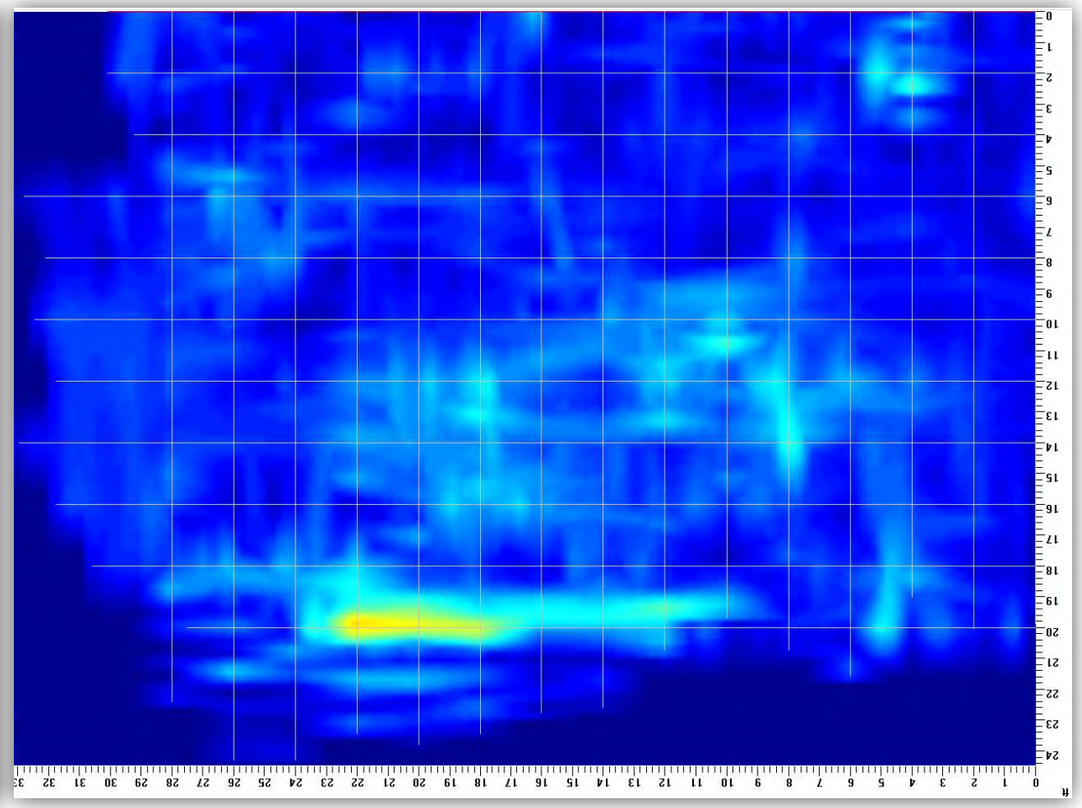
Created By:	Date:	Figure:
TPM	8/22/2017	9
GeoTek Project No:	File Path:	

Waterhouse St.



~1.5’ Depth

N. King St.



~2’ Depth

GeoTek Hawaii Inc.
Geophysical and Environmental Site Assessment

Factory St. – GPR Depth Slice

No Scale Implied - locations approximate

Map 1

Created By:	Date:	Figure:
TPM	8/22/2017	10
GeoTek Project No:	File Path:	

Appendix C

Soil Assessment Results 1990s

(XRF and Laboratory Analytical Results)

Table 1
Factory Street Lead Site
Analytical Results

SAMPLE ID	SAMPLE NUMBER	STREET ADDRESS	SAMPLE TYPE	SAMPLE DEPTH	SAMPLE COLLECTION DATE	XRF RESULT Pb - mg/kg ND = < 60 (1)	LAB RESULT Pb - mg/kg ND = < 7.1 (2)
PU-1032-1-0'	1	1032 Pulaa Street	Grab	0' - 6"	2/22/95	150	
PU-1032-2-1'	2	1032 Pulaa Street	Grab	1' - 1' 6"	2/22/95	ND	
PU-1032-3-2'	3	1032 Pulaa Street	Grab	2' - 2' 6"	2/22/95	ND	
KSAK-4	4	Kalihi Stream	Stream sediment	surface	2/22/95	ND	
KSBK-5	5	Kalihi Stream	Stream sediment	surface	2/22/95	75	
KSBK-6	6	Kalihi Stream	Stream sediment	surface	2/22/95	115	207
KSBK-7	7	Kalihi Stream	Stream sediment	surface	2/22/95	126	
FS-915-8-0'	8	915 Factory Street	Grab	0' - 6"	2/22/95	188	
FS-915-9-1'	9	915 Factory Street	Grab	1' - 1' 6"	2/22/95	124	
FS-915-10-2'	10	915 Factory Street	Grab	2' - 2' 6"	2/22/95	106	
WA-2003-11-0'	11	2003 Waterhouse St	Grab	0' - 6"	2/22/95	ND	
WA-2003-12-1'	12	2003 Waterhouse St	Grab	1' - 1' 6"	2/22/95	ND	
WA-2003-13-2'	13	2003 Waterhouse St	Grab	2' - 2' 6"	2/22/95	ND	ND
FS-806-14-0'	14	806 Factory St	Grab	0' - 4"	2/22/95	320	
FS-806-15-4"	15	806 Factory St	Grab	4" - 10"	2/22/95	389	
FS-919B-16-3"	16	919B Factory St	Grab	0' - 6"	2/23/95	679	
FS-919B-17-1'	17	919B Factory St	Grab	1' - 1' 6"	2/23/95	ND	
FS-919B-18-2'	18	919B Factory St	Grab	2' - 2' 6"	2/23/95	ND	
NK-2003-19-3"	19	2003 North King St	Grab	3" - 6"	2/23/95	289	
NK-2003-20-1'	20	2003 North King St	Grab	1' - 1' 6"	2/23/95	ND	
NK-2003-21-4"	21	2003 North King St	Grab	0' - 6"	2/23/95	ND	
NK-2003-22-1'	22	2003 North King St	Grab	1' - 1' 6"	2/23/95	ND	
NK-2003-23-2'	23	2003 North King St	Grab	2' - 2' 6"	2/23/95	ND	
FS-910-24-0'	24	910 Factory St	Grab	0' - 1' 6"	2/23/95	289	
FS-910-25-2'	25	910 Factory St	Grab	2' - 2' 6"	2/23/95	ND	
FS-904-26-0'	26	904 Factory St	Grab	0' - 6"	2/23/95	449	
FS-904-27-1'	27	904 Factory St	Grab	1' - 1' 6"	2/23/95	ND	
FS-904-28-2'	28	904 Factory St	Grab	2' - 2' 6"	2/23/95	ND	
FS-922-29-3"	29	922Factory St	Grab	3" - 6"	2/23/95	74	
FS-922-30-1'	30	922 Factory St	Grab	1' - 1' 6"	2/23/95	ND	172
FS-922-31-2'	31	922 Factory St	Grab	2' - 2' 6"	2/23/95	ND	
FS-922-32-3'	32	922 Factory St	Grab	3' - 3' 6"	2/23/95	ND	
NK-2003-33-3"	33	2003 North King St	Grab	3" - 6"	2/24/95	18,570	
NK-2003-34-1'	34	2003 North King St	Grab	1' - 1' 6"	2/24/95	12,850	37,400
NK-2003-35-2'	35	2003 North King St	Grab	2' - 2' 6"	2/24/95	72	
NK-2003-36-3'	36	2003 North King St	Grab	3' - 3' 6"	2/24/95	200	
NK-2003-37-4'	37	2003 North King St	Grab	4' - 4' 6"	2/24/95	ND	308
NK-2003-38-5'	38	2003 North King St	Grab	5' - 5' 6"	2/24/95	ND	
NK-2003-39-3"	39	2003 North King St	Grab	3" - 6"	2/24/95	90	
FS-922-40-4"	40	922 Factory St	Grab	4" - 6"	2/24/95	ND	27
FS-922-41-1'	41	922 Factory St	Grab	1' - 1' 6"	2/24/95	619	
FS-922-42-2'	42	922 Factory St	Grab	2' - 2' 6"	2/24/95	111	
FS-922-43-3'	43	922 Factory St	Grab	3' - 3' 5"	2/24/95	ND	

Table 1
Factory Street Lead Site
Analytical Results

SAMPLE ID	SAMPLE NUMBER	STREET ADDRESS	SAMPLE TYPE	SAMPLE DEPTH	SAMPLE COLLECTION DATE	XRF RESULT Pb - mg/kg ND = < 60 (1)	LAB RESULT Pb - mg/kg ND = < 7.1 (2)
FS-922-44-3"	44	922 Factory St	Grab	3" - 6"	2/25/95	ND	
FS-922-45-1'	45	922 Factory St	Grab	1' - 1' 6"	2/25/95	ND	
FS-922-46-2'	46	922 Factory St	Grab	2' - 2' 6"	2/25/95	ND	
FS-922-47-3'	47	922 Factory St	Grab	3' - 3' 6"	2/25/95	ND	
FS-922-48-4'	48	922 Factory St	Grab	4' - 4' 6"	2/25/95	ND	
FS-922-49-3"	49	922 Factory St	Grab	3" - 6"	2/25/95	98	
FS-922-50-1'	50	922 Factory St	Grab	1' - 1' 6"	2/27/95	ND	
FS-922-51-2'	51	922 Factory St	Grab	2' - 2' 6"	2/27/95	ND	
FS-922-52-3'	52	922 Factory St	Grab	3' - 3' 6"	2/27/95	ND	
HA-1927-53-SC	53	1927 Hani Lane	surface composite	surface	2/27/95	351	
HA-1020-54-SC	54	1020 Hani Lane	surface composite	surface	2/27/95	ND	
NK-1955-55-SC	55	1955 North King St	surface composite	surface	2/27/95	883	
FS-915-56-SC	56	915 Factory St	surface composite	surface	2/27/95	554	
FS-902-57-SC	57	902Factory St	surface composite	surface	2/27/95	902	
IN-902-58-SC	58	902 Industrial Road	surface composite	surface	2/27/95	325	
WA-2016-59-SC	59	2016 Waterhouse St	surface composite	surface	2/27/95	336	
KO-757-60-SC	60	757 Kopke St	surface composite	surface	2/27/95	511	
PA-774-61-SC	61	774 Puuhale Road	surface composite	surface	2/27/95	951	
NK-1955-62-3"	62	1955 North King St	Grab	3" - 6"	2/27/95	23,780	117,000
NK-1955-63-1'	63	1955 North King St	Grab	1' - 1' 6"	2/27/95	521	
NK-1955-64-2'	64	1955 North King St	Grab	2' - 2' 6"	2/27/95	216	
NK-2003-65-3"	65	2003 North King St	Grab	3" - 6"	2/27/95	585	
NK-2003-66-2"	66	2003 North King St	Grab	2" - 6"	2/27/95	13,850	
NK-2003-67-1'	67	2003 North King St	Grab	1' - 1' 6"	2/27/95	223	
NK-2003-68-2'	68	2003 North King St	Grab	2' - 2' 6"	2/27/95	361	
FS-922-69-3"	69	922 Factory St	Grab	3" - 6"	2/27/95	6,980	
FS-922-70-1'	70	922 Factory St	Grab	1' - 1' 6"	2/27/95	3,130	4,710
FS-922-71-2"	71	922 Factory St	Grab	2" - 6"	2/28/95	1,231	14,900
FS-922-72-1'	72	922 Factory St	Grab	1' - 1' 6"	2/28/95	263	
FS-922-73-2'	73	922 Factory St	Grab	2' - 2' 6"	2/28/95	ND	
FS-922-74-3"	74	922 Factory St	Grab	3" - 6"	2/28/95	175	
FS-922-75-1'	75	922 Factory St	Grab	1' - 1' 6"	2/28/95	263	
FS-922-76-2'	76	922 Factory St	Grab	2' - 2' 6"	2/28/95	ND	
FS-CTR-77-3"	77	Center of Factory St	Grab	3" - 6"	2/28/95	10,690	
FS-CTR-78-1'	78	Center of Factory St	Grab	1' - 1' 6"	2/28/95	421	1,920
FS-CTR-79-2'	79	Center of Factory St	Grab	2' - 2' 6"	2/28/95	93	
FS-CTR-80-3"	80	Center of Factory St	Grab	3" - 6"	2/28/95	1,281	
FS-CTR-81-1'	81	Center of Factory St	Grab	1' - 1' 3"	2/28/95	ND	
FS-922-82-2"	82	922 Factory St	Grab	2" - 6"	2/28/95	1,120	
FS-922-83-1'	83	922 Factory St	Grab	1' - 1' 6"	2/28/95	60	
FS-CTR-84-4"	84	Center of Factory St	Grab	4" - 6"	2/28/95		
NK-1955-85-2'	85	1955 North King St	Grab	2" - 6"	2/28/95	1,118	
NK-1955-86-1'	86	1955 North King St	Grab	1' - 1' 6"	2/28/95	ND	

Notes: Shading indicates samples grouped by borehole or street address

(1) Detection limit for XRF samples = 60 mg/kg

(2) Detection limit for laboratory samples = 7.1 mg/kg

Pb = Lead

ND = Non-detect (value below detection limit)

mg/kg = milligrams per kilogram

Appendix D

Soil MI Laboratory Analytical Results

(2017 Site Assessment)

Table 1. Soil Sample Results
Factory Street, Honolulu, Oahu, Hawaii

			Sample Results (mg/kg)						
		Antimony	Arsenic	Barium	Cadmium	Chromium	Lead	Zinc	TPH-Residual Range Organics
Tier 1 EAL (Residential)		**6.3**	**24**	**1,000**	**14**	**1,100**	**200**	**1,000**	**500**
Tier 1 EAL (Commercial/Industrial)		**93**	**95**	**2,500**	**74**	**1,100**	**800**	**2,500**	**1,000**
Sample ID	**Sample date**								
DU1-A	7/26/2017	<0.12	4.36	333	<0.084	107	228	123	2,420
DU1-B	7/26/2017	<0.12	4.52	661	<0.084	137	50.6	128	1,840
DU1-C	7/26/2017	<0.12	5.83	359	<0.084	202	28.8	153	140
DU1-D	7/26/2017	<0.12	7.41	361	<0.084	265	10.7	174	NA
DU1-E	7/26/2017	<0.12	7.77	608	<0.084	312	9.06	196	NA
DU1-F	7/26/2017	<0.12	7.65	615	<0.084	293	7.21	207	NA
DU2-A	7/27/2017	<0.12	3.88	432	<0.084	98.7	291	175	1,890
DU2-B	7/27/2017	<0.12	4.87	497	<0.084	191	66.7	210	1,980
DU2-C	7/27/2017	<0.12	4.74	354	<0.084	173	54.7	203	320
DU2-D	7/27/2017	<0.12	7.3	429	<0.084	259	12.8	205	NA
DU2-E	7/27/2017	<0.12	3.87	325	<0.084	171	50	187	NA
DU2-F	7/27/2017	<0.12	5.93	513	<0.084	306	7.35	207	NA
DU3-A	7/27/2017	<0.12	3.85	409	<0.084	108	704	122	2,080
DU3-B	7/27/2017	<0.12	4.44	484	<0.084	158	1,010	176	1,290
DU3-C	7/27/2017	<0.12	5.41	412	<0.084	161	125	254	286
DU3-D	7/27/2017	<0.12	7.34	683	<0.084	184	25.7	181	NA
DU3-E	7/27/2017	<0.12	6.85	715	<0.084	200	11	188	NA
DU3-F	7/27/2017	<0.12	6.69	1,150	<0.084	217	11.7	210	NA
DU4-A	7/27/2017	1.03	4.24	316	<0.084	112	4,660	128	2,630
DU4-B	7/27/2017	<0.12	4.31	447	<0.084	109	472	136	2,100
DU4-C	7/27/2017	<0.12	5.32	457	<0.084	132	223	184	699
DU4-D	7/27/2017	<0.12	5.62	484	<0.084	158	24.8	213	NA
DU4-E	7/27/2017	<0.12	5.86	782	1.39	186	12.7	336	NA
DU4-F	7/27/2017	<0.12	6.92	883	<0.084	216	15.7	227	NA
DU5-A	7/28/2017	1.37	3.89	412	1.6	71.8	8,450	303	3,410
DU5-B	7/28/2017	1.1	3.98	447	<0.084	74.5	429	130	4,260
DU5-C	7/28/2017	<0.12	5.56	552	1.47	101	124	288	1,960
DU5-D	7/28/2017	<0.12	6.56	1,070	<0.084	351	72.8	474	NA
DU5-E	7/28/2017	<0.12	11.3	732	1.59	157	45.8	251	NA
DU5-F	7/28/2017	<0.12	7.82	878	1.06	144	21.8	197	NA
DU6-A-T1	7/28/2017	3.68	3.51	139	<0.084	65.7	14,300	104	4,070
DU6-B-T1	7/28/2017	<0.12	3.52	252	<0.084	99.7	264	108	4,340
DU6-C-T1	7/28/2017	<0.12	4.14	491	1.26	137	239	185	1,300
DU6-D-T1	7/28/2017	<0.12	7.57	764	<0.084	171	92.8	178	NA
DU6-E-T1	7/28/2017	<0.12	7.83	946	<0.084	134	2,440	160	NA
DU6-F-T1	7/28/2017	<0.12	5.9	1,110	<0.084	124	20	160	NA
DU6-A-T2	7/28/2017	3.65	6.41	230	1	112	24,800	122	3,600
DU6-B-T2	7/28/2017	<0.12	5.92	390	1	130	634	163	3,140
DU6-C-T2	7/28/2017	<0.12	6.47	484	1.73	167	239	329	909
DU6-D-T2	7/28/2017	<0.12	8.61	653	<0.084	188	125	225	NA
DU6-E-T2	7/28/2017	<0.12	37.1	717	2.11	142	30.3	190	NA
DU6-F-T2	7/28/2017	<0.12	5.47	1,330	<0.084	140	20.8	198	NA
DU6-A-T3	7/28/2017	3.26	4.6	181	<0.084	78.8	13,400	133	2,680
DU6-B-T3	7/28/2017	1.04	4.65	322	<0.084	116	840	163	3,350
DU6-C-T3	7/28/2017	<0.12	5.41	461	1.26	142	497	341	1,540
DU6-D-T3	7/28/2017	<0.12	5.7	592	<0.084	172	141	234	NA
DU6-E-T3	7/28/2017	<0.12	5.66	1,460	<0.084	145	32.5	211	NA
DU6-F-T3	7/28/2017	<0.12	6.42	846	<0.084	135	129	191	NA

Acronyms and Abbreviations:
EAL = Environmental Action Level (non-drinking water resource; <150 meters to nearest surface water body)
Results exceed the residential EAL
Results exceed the commercial/industrial EAL
mg/kg = milligrams per kilogram
NA = Not analyzed
TPH = Total petroleum hydrocarbons

Notes:
Only chemicals detected above the respective method detection limits are presented in this table.
Letters A to F in sample names referebce depths of layers as follows:

A = 0 to 0.5 foot bgs (includes asphalt)

B = 0.5 to 1 foot bgs

C = 1 to 2 feet bgs

D = 2 to 3 feet bgs

E = 3 to 4 feet bgs

F = 4 to 5 feet bgs

Appendix E

Soil MI- Sample XRF Results

(2017 Site Assessment)

Table 2. Soil Sample Results Site Assessment 2017
Factory Street, Honolulu, Oahu, Hawaii

		Lead (mg/kg)	Lead XRF Averages (mg/kg)
Tier 1 EAL (Residential)		**200**	
Tier 1 EAL (Commercial/Industrial)		**800**	
Sample ID	**Sample date**		
DU1-A	7/26/2017	228	129
DU1-B	7/26/2017	50.6	35
DU1-C	7/26/2017	28.8	14
DU1-D	7/26/2017	10.7	6
DU1-E	7/26/2017	9.06	5
DU1-F	7/26/2017	7.21	4
DU2-A	7/27/2017	291	102
DU2-B	7/27/2017	66.7	48
DU2-C	7/27/2017	54.7	18
DU2-D	7/27/2017	12.8	6
DU2-E	7/27/2017	50	4
DU2-F	7/27/2017	7.35	4
DU3-A	7/27/2017	704	296
DU3-B	7/27/2017	1,010	67
DU3-C	7/27/2017	125	52
DU3-D	7/27/2017	25.7	54
DU3-E	7/27/2017	11	5
DU3-F	7/27/2017	11.7	5
DU4-A	7/27/2017	4,660	622
DU4-B	7/27/2017	472	175
DU4-C	7/27/2017	223	60
DU4-D	7/27/2017	24.8	74
DU4-E	7/27/2017	12.7	6
DU4-F	7/27/2017	15.7	5
DU5-A	7/28/2017	8,450	838
DU5-B	7/28/2017	429	133
DU5-C	7/28/2017	124	43
DU5-D	7/28/2017	72.8	18
DU5-E	7/28/2017	45.8	10
DU5-F	7/28/2017	21.8	7
DU6-A-T1	7/28/2017	14,300	4,451
DU6-B-T1	7/28/2017	264	390
DU6-C-T1	7/28/2017	239	111
DU6-D-T1	7/28/2017	92.8	104
DU6-E-T1	7/28/2017	2,440	29
DU6-F-T1	7/28/2017	20	10
DU6-A-T2	7/28/2017	24,800	3,737
DU6-B-T2	7/28/2017	634	257
DU6-C-T2	7/28/2017	239	293
DU6-D-T2	7/28/2017	125	74
DU6-E-T2	7/28/2017	30.3	20
DU6-F-T2	7/28/2017	20.8	9
DU6-A-T3	7/28/2017	13,400	1,730
DU6-B-T3	7/28/2017	840	673
DU6-C-T3	7/28/2017	497	89
DU6-D-T3	7/28/2017	141	23
DU6-E-T3	7/28/2017	32.5	26
DU6-F-T3	7/28/2017	129	13

Acronyms and Abbreviations:

EAL = Environmental Action Level (non-drinking water resource; <150 meters to nearest surface water body)
mg/kg = milligrams per kilogram

Notes:

Only chemicals detected above the respective method detection limits are presented in this table.
Letters A to F in sample names referebce depths of layers as follows:

A = 0 to 0.5 foot bgs (includes asphalt)

B = 0.5 to 1 foot bgs

C = 1 to 2 feet bgs

D = 2 to 3 feet bgs

E = 3 to 4 feet bgs

F = 4 to 5 feet bgs

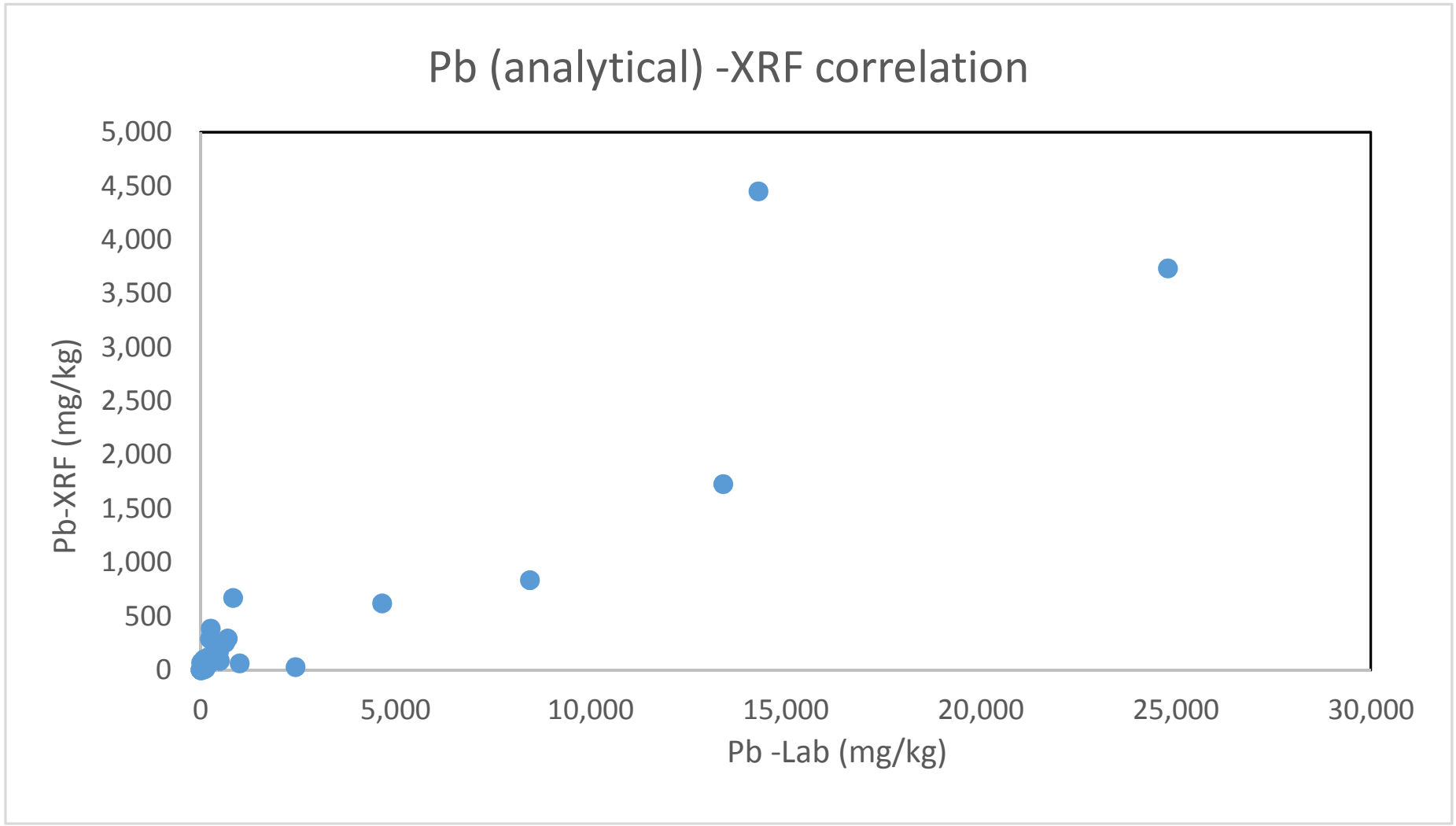

Pb (analytical) -XRF correlation
Pb-XRF (mg/kg)
5,000
4,500
4,000
3,500
3,000
2,500
2,000
1,500
1,000
500
0
0
5,000
10,000
15,000
20,000
25,000
30,000
Pb -Lab (mg/kg)

Table 3: XRF Results (Lead)- All Points Factory Street Investigation ppm

Analyte	Lead
Tier 1 EAL	**200**
Sample ID	
DU1-A	39
DU1-A	27
DU1-A	44
DU1-A	67
DU1-A	14
DU1-A	54
DU1-A	222
DU1-A	52
DU1-A	27
DU1-A	336
DU1-A	150
DU1-A	283
DU1-A	16
DU1-A	174
DU1-A	461
DU1-A	84
DU1-A	104
DU1-A	167
DU1-B	173
DU1-B	33
DU1-B	29
DU1-B	23
DU1-B	32
DU1-B	18
DU1-B	11
DU1-B	20
DU1-B	67
DU1-B	32
DU1-B	9
DU1-B	4
DU1-B	10
DU1-B	51
DU1-B	13
DU1-C	4
DU1-C	20
DU1-C	13
DU1-C	16
DU1-C	16
DU1-C	26
DU1-C	4
DU1-C	19
DU1-C	5
DU1-C	12
DU1-C	14
DU1-C	12
DU1-C	19
DU1-C	4
DU1-C	4
DU1-C	23
DU1-D	15
DU1-D	7
DU1-D	4
DU1-D	4
DU1-D	4
DU1-D	7
DU1-D	4
DU1-D	16
DU1-D	4
DU1-D	4
DU1-D	4
DU1-D	4
DU1-D	11
DU1-D	4
DU1-D	4
DU1-D	4
DU1-D	4
DU1-D	4
DU1-E	4
DU1-E	4
DU1-E	4
DU1-E	4

DU1-E	4
DU1-E	10
DU1-E	4
DU1-E	8
DU1-E	4
DU1-E	4
DU1-E	4
DU1-E	4
DU1-E	4
DU1-E	4
DU1-E	4
DU1-E	4
DU1-E	7
DU1-F	4
DU1-F	4
DU1-F	4
DU1-F	4
DU1-F	4
DU1-F	4
DU1-F	4
DU1-F	4
DU1-F	4
DU1-F	4
DU1-F	4
DU1-F	4
DU1-F	4
DU1-F	4
DU1-F	4
DU2-A	211
DU2-A	43
DU2-A	74
DU2-A	55
DU2-A	17
DU2-A	40
DU2-A	210
DU2-A	203
DU2-A	23
DU2-A	69
DU2-A	60
DU2-A	107
DU2-A	206
DU2-A	105
DU2-A	73
DU2-A	140
DU2-B	104
DU2-B	35
DU2-B	56
DU2-B	78
DU2-B	62
DU2-B	91
DU2-B	99
DU2-B	43
DU2-B	86
DU2-B	35
DU2-B	24
DU2-B	29
DU2-B	29
DU2-B	32
DU2-B	11
DU2-B	22
DU2-B	19
DU2-B	16
DU2-C	4
DU2-C	19
DU2-C	64
DU2-C	19
DU2-C	30
DU2-C	15
DU2-C	21
DU2-C	21
DU2-C	9
DU2-C	20
DU2-C	8
DU2-C	4
DU2-C	6

DU2-C	22
DU2-C	7
DU2-C	15
DU2-D	4
DU2-D	11
DU2-D	4
DU2-D	20
DU2-D	4
DU2-D	4
DU2-D	4
DU2-D	4
DU2-D	4
DU2-D	4
DU2-D	6
DU2-D	4
DU2-D	4
DU2-D	9
DU2-D	5
DU2-E	4
DU2-E	3
DU2-E	4
DU2-E	4
DU2-E	4
DU2-E	4
DU2-E	4
DU2-E	4
DU2-E	4
DU2-E	4
DU2-E	4
DU2-E	4
DU2-F	4
DU2-F	4
DU2-F	4
DU2-F	4
DU2-F	4
DU2-F	4
DU2-F	3
DU2-F	4
DU2-F	4
DU2-F	4
DU2-F	4
DU2-F	4
DU2-F	4
DU2-F	4
DU2-F	4
DU3-A	147
DU3-A	65
DU3-A	209
DU3-A	217
DU3-A	225
DU3-A	93
DU3-A	179
DU3-A	1,045
DU3-A	1,310
DU3-A	100
DU3-A	351
DU3-A	97
DU3-A	218
DU3-A	140
DU3-A	50
DU3-B	236
DU3-B	64
DU3-B	31
DU3-B	97
DU3-B	17
DU3-B	86
DU3-B	37
DU3-B	56
DU3-B	35
DU3-B	92
DU3-B	64
DU3-B	44

DU3-B	76
DU3-B	36
DU3-B	32
DU3-C	15
DU3-C	131
DU3-C	67
DU3-C	76
DU3-C	93
DU3-C	37
DU3-C	32
DU3-C	27
DU3-C	4
DU3-C	41
DU3-C	42
DU3-C	96
DU3-C	58
DU3-C	30
DU3-C	28
DU3-C	38
DU3-D	69
DU3-D	4
DU3-D	4
DU3-D	42
DU3-D	4
DU3-D	11
DU3-D	4
DU3-D	4
DU3-D	28
DU3-D	442
DU3-D	9
DU3-D	15
DU3-D	13
DU3-D	125
DU3-D	11
DU3-E	4
DU3-E	7
DU3-E	4
DU3-E	4
DU3-E	8
DU3-E	9
DU3-E	5
DU3-E	6
DU3-E	4
DU3-E	5
DU3-E	8
DU3-E	6
DU3-E	4
DU3-E	4
DU3-E	4
DU3-F	4
DU3-F	4
DU3-F	7
DU3-F	6
DU3-F	8
DU3-F	10
DU3-F	4
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DU3-F	4
DU3-F	4
DU3-F	4
DU3-F	4
DU3-F	4
DU3-F	3
DU3-F	5
DU3-F	4
DU4-A	166
DU4-A	171
DU4-A	599
DU4-A	57
DU4-A	288
DU4-A	2,960
DU4-A	521
DU4-A	703
DU4-A	225

DU4-A	1,955
DU4-A	1,430
DU4-A	163
DU4-A	50
DU4-A	255
DU4-A	201
DU4-A	216
DU4-B	25
DU4-B	103
DU4-B	129
DU4-B	23
DU4-B	222
DU4-B	61
DU4-B	18
DU4-B	72
DU4-B	48
DU4-B	777
DU4-B	68
DU4-B	344
DU4-B	119
DU4-B	60
DU4-B	560
DU4-C	47
DU4-C	85
DU4-C	36
DU4-C	91
DU4-C	69
DU4-C	47
DU4-C	223
DU4-C	53
DU4-C	32
DU4-C	26
DU4-C	47
DU4-C	43
DU4-C	29
DU4-C	35
DU4-C	33
DU4-D	32
DU4-D	14
DU4-D	9
DU4-D	4
DU4-D	4
DU4-D	6
DU4-D	8
DU4-D	9
DU4-D	4
DU4-D	4
DU4-D	11
DU4-D	1,007
DU4-D	17
DU4-D	21
DU4-D	4
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DU4-F	5
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DU4-F	4

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DU4-F	4
DU4-F	4
DU4-F	10
DU4-F	4
DU4-F	4
DU4-F	4
DU4-F	4
DU5-A	274
DU5-A	1,384
DU5-A	770
DU5-A	1,701
DU5-A	226
DU5-A	400
DU5-A	110
DU5-A	1,708
DU5-A	985
DU5-A	692
DU5-A	543
DU5-A	1,397
DU5-A	41
DU5-A	2,070
DU5-A	264
DU5-B	44
DU5-B	189
DU5-B	58
DU5-B	13
DU5-B	305
DU5-B	96
DU5-B	311
DU5-B	88
DU5-B	300
DU5-B	125
DU5-B	144
DU5-B	81
DU5-B	149
DU5-B	44
DU5-B	140
DU5-B	43
DU5-C	56
DU5-C	89
DU5-C	18
DU5-C	24
DU5-C	48
DU5-C	43
DU5-C	38
DU5-C	36
DU5-C	21
DU5-C	33
DU5-C	52
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DU5-C	44
DU5-C	57
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DU5-E	4
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DU5-F	4
DU5-F	7
DU5-F	4
DU5-F	7
DU5-F	4
DU5-F	17
DU5-F	16
DU5-F	10
DU5-F	9
DU6-A-T1	3,141
DU6-A-T1	816
DU6-A-T1	2,926
DU6-A-T1	2,464
DU6-A-T1	2,853
DU6-A-T1	62
DU6-A-T1	1,196
DU6-A-T1	4,891
DU6-A-T1	5,381
DU6-A-T1	15,474
DU6-A-T1	1,278
DU6-A-T1	9,802
DU6-A-T1	1,177
DU6-A-T1	633
DU6-A-T1	6,095
DU6-A-T1	13,028
DU6-B-T1	74
DU6-B-T1	178
DU6-B-T1	17
DU6-B-T1	58
DU6-B-T1	33
DU6-B-T1	194
DU6-B-T1	3,586
DU6-B-T1	230
DU6-B-T1	214
DU6-B-T1	64
DU6-B-T1	228
DU6-B-T1	404
DU6-B-T1	461
DU6-B-T1	134
DU6-B-T1	536
DU6-B-T1	104
DU6-B-T1	111
DU6-C-T1	145
DU6-C-T1	199
DU6-C-T1	4
DU6-C-T1	13
DU6-C-T1	225
DU6-C-T1	168
DU6-C-T1	144
DU6-C-T1	136
DU6-C-T1	105
DU6-C-T1	109
DU6-C-T1	100
DU6-C-T1	71
DU6-C-T1	62
DU6-C-T1	184
DU6-C-T1	163
DU6-C-T1	47
DU6-C-T1	53

DU6-C-T1	129
DU6-C-T1	58
DU6-C-T1	222
DU6-C-T1	66
DU6-C-T1	43
DU6-D-T1	29
DU6-D-T1	27
DU6-D-T1	25
DU6-D-T1	524
DU6-D-T1	245
DU6-D-T1	10
DU6-D-T1	40
DU6-D-T1	18
DU6-D-T1	37
DU6-D-T1	293
DU6-D-T1	52
DU6-D-T1	33
DU6-D-T1	112
DU6-D-T1	20
DU6-D-T1	91
DU6-E-T1	8
DU6-E-T1	4
DU6-E-T1	21
DU6-E-T1	52
DU6-E-T1	4
DU6-E-T1	4
DU6-E-T1	19
DU6-E-T1	8
DU6-E-T1	8
DU6-E-T1	184
DU6-E-T1	8
DU6-E-T1	47
DU6-E-T1	15
DU6-E-T1	48
DU6-E-T1	6
DU6-F-T1	7
DU6-F-T1	13
DU6-F-T1	4
DU6-F-T1	6
DU6-F-T1	24
DU6-F-T1	4
DU6-F-T1	14
DU6-F-T1	4
DU6-F-T1	4
DU6-F-T1	17
DU6-F-T1	4
DU6-F-T1	11
DU6-F-T1	8
DU6-F-T1	10
DU6-F-T1	4
DU6-F-T1	20
DU6-A-T2	1,075
DU6-A-T2	1,040
DU6-A-T2	464
DU6-A-T2	232
DU6-A-T2	1,786
DU6-A-T2	986
DU6-A-T2	552
DU6-A-T2	592
DU6-A-T2	909
DU6-A-T2	11,587
DU6-A-T2	14,790
DU6-A-T2	15,464
DU6-A-T2	658
DU6-A-T2	321
DU6-A-T2	5,600
DU6-B-T2	875
DU6-B-T2	533
DU6-B-T2	216
DU6-B-T2	15
DU6-B-T2	26
DU6-B-T2	31
DU6-B-T2	26
DU6-B-T2	34
DU6-B-T2	35
DU6-B-T2	711

DU6-B-T2	167
DU6-B-T2	190
DU6-B-T2	244
DU6-B-T2	293
DU6-B-T2	94
DU6-B-T2	383
DU6-B-T2	836
DU6-B-T2	62
DU6-B-T2	276
DU6-B-T2	90
DU6-C-T2	60
DU6-C-T2	70
DU6-C-T2	801
DU6-C-T2	860
DU6-C-T2	167
DU6-C-T2	13
DU6-C-T2	11
DU6-C-T2	25
DU6-C-T2	21
DU6-C-T2	4
DU6-C-T2	1,065
DU6-C-T2	115
DU6-C-T2	52
DU6-C-T2	1,328
DU6-C-T2	60
DU6-C-T2	20
DU6-C-T2	305
DU6-D-T2	79
DU6-D-T2	93
DU6-D-T2	22
DU6-D-T2	59
DU6-D-T2	44
DU6-D-T2	36
DU6-D-T2	16
DU6-D-T2	95
DU6-D-T2	15
DU6-D-T2	26
DU6-D-T2	536
DU6-D-T2	39
DU6-D-T2	23
DU6-D-T2	6
DU6-D-T2	14
DU6-E-T2	4
DU6-E-T2	11
DU6-E-T2	8
DU6-E-T2	22
DU6-E-T2	77
DU6-E-T2	14
DU6-E-T2	8
DU6-E-T2	8
DU6-E-T2	12
DU6-E-T2	8
DU6-E-T2	6
DU6-E-T2	6
DU6-E-T2	21
DU6-E-T2	11
DU6-E-T2	18
DU6-E-T2	71
DU6-F-T2	4
DU6-F-T2	11
DU6-F-T2	11
DU6-F-T2	7
DU6-F-T2	23
DU6-F-T2	4
DU6-F-T2	10
DU6-F-T2	4
DU6-F-T2	10
DU6-F-T2	5
DU6-F-T2	27
DU6-F-T2	4
DU6-F-T2	4
DU6-F-T2	13
DU6-F-T2	9
DU6-F-T2	7
DU6-F-T2	4
DU6-A-T3	3,265
DU6-A-T3	523

DU6-A-T3	1,161
DU6-A-T3	2,807
DU6-A-T3	1,306
DU6-A-T3	1,665
DU6-A-T3	1,515
DU6-A-T3	442
DU6-A-T3	1,268
DU6-A-T3	949
DU6-A-T3	2,913
DU6-A-T3	4,937
DU6-A-T3	3,091
DU6-A-T3	1,448
DU6-A-T3	167
DU6-A-T3	3,793
DU6-A-T3	726
DU6-A-T3	508
DU6-A-T3	386
DU6-B-T3	71
DU6-B-T3	70
DU6-B-T3	69
DU6-B-T3	317
DU6-B-T3	30
DU6-B-T3	1,739
DU6-B-T3	813
DU6-B-T3	386
DU6-B-T3	354
DU6-B-T3	170
DU6-B-T3	1,636
DU6-B-T3	978
DU6-B-T3	963
DU6-B-T3	199
DU6-B-T3	747
DU6-B-T3	396
DU6-B-T3	2,564
DU6-B-T3	612
DU6-C-T3	83
DU6-C-T3	111
DU6-C-T3	82
DU6-C-T3	40
DU6-C-T3	39
DU6-C-T3	4
DU6-C-T3	4
DU6-C-T3	4
DU6-C-T3	35
DU6-C-T3	319
DU6-C-T3	109
DU6-C-T3	185
DU6-C-T3	91
DU6-C-T3	62
DU6-C-T3	115
DU6-C-T3	211
DU6-C-T3	13
DU6-D-T3	24
DU6-D-T3	16
DU6-D-T3	35
DU6-D-T3	46
DU6-D-T3	11
DU6-D-T3	4
DU6-D-T3	17
DU6-D-T3	9
DU6-D-T3	25
DU6-D-T3	60
DU6-D-T3	44
DU6-D-T3	24
DU6-D-T3	8
DU6-D-T3	14
DU6-D-T3	14
DU6-E-T3	4
DU6-E-T3	23
DU6-E-T3	7
DU6-E-T3	12
DU6-E-T3	12
DU6-E-T3	15
DU6-E-T3	11
DU6-E-T3	30
DU6-E-T3	12

DU6-E-T3	12
DU6-E-T3	14
DU6-E-T3	74
DU6-E-T3	4
DU6-E-T3	149
DU6-E-T3	36
DU6-E-T3	8
DU6-F-T3	4
DU6-F-T3	13
DU6-F-T3	4
DU6-F-T3	4
DU6-F-T3	14
DU6-F-T3	13
DU6-F-T3	20
DU6-F-T3	10
DU6-F-T3	11
DU6-F-T3	8
DU6-F-T3	8
DU6-F-T3	42
DU6-F-T3	4
DU6-F-T3	17
DU6-F-T3	31
DU6-F-T3	19
DU6-F-T3	6

Results are reported in ppm
Samples were analyzed between July 31 and August 3, 2017
Result was ND at Limit of Detection, LOD is reported in lieu of ND
Exceeds HDOH Tier 1 EAL for unrestricted use

Appendix F

Soil MI-Sample TCLP Results

(2017 Site Assessment)

Table 4. Lead Soil Sample Results with Concentrations exceeding 100 mg/kg and TCLP Results
Factory Street, Honolulu, Oahu, Hawaii

		Lead [mg/kg]	TCLP Lead [mg/L]
Tier 1 EAL (unrestricted)		**200**	**N/A**
Tier 1 EAL (Commercial/Industrial)		**800**	**N/A**
TCLP Threshold		**N/A**	**5.0**
Sample ID	**Sample date**		
DU1-A	7/26/2017	228	< 0.05
DU2-A	7/27/2017	291	< 0.05
DU3-A	7/27/2017	704	< 0.05
DU3-B	7/27/2017	1,010	< 0.05
DU3-C	7/27/2017	125	< 0.05
DU4-A	7/27/2017	4,660	3.17
DU4-B	7/27/2017	472	< 0.05
DU4-C	7/27/2017	223	< 0.05
DU5-A	7/28/2017	8,450	3.35
DU5-B	7/28/2017	429	< 0.05
DU5-C	7/28/2017	124	< 0.05
DU6-A-T1	7/28/2017	14,300	88
DU6-B-T1	7/28/2017	264	< 0.05
DU6-C-T1	7/28/2017	239	< 0.05
DU6-E-T1	7/28/2017	2,440	< 0.05
DU6-A-T2	7/28/2017	24,800	58.1
DU6-B-T2	7/28/2017	634	< 0.05
DU6-C-T2	7/28/2017	239	< 0.05
DU6-D-T2	7/28/2017	125	< 0.05
DU6-A-T3	7/28/2017	13,400	122
DU6-B-T3	7/28/2017	840	< 0.05
DU6-C-T3	7/28/2017	497	< 0.05
DU6-D-T3	7/28/2017	141	< 0.05
DU6-F-T3	7/28/2017	129	< 0.05

Acronyms and Abbreviations:

EAL = Environmental Action Level (non-drinking water resource; <150 meters to nearest surface water body) mg/kg - milligrams per kilogram

ND- Non-detect at the method detection limit (MDL); all MDLs were below applicable EALs TCLP = Toxicity Characteristic Leaching Procedure

Notes:

Only chemicals detected above the respective method detection limits are presented in this table Results exceed the residential EAL

Results exceed the commercial/industrial EAL

Results exceed the TCLP Threshold

Appendix G

Environmental Hazard Management Plan

GUIDELINES FOR LANDOWNERS, TENANTS, UTILITIES COMPANIES, AND CONSTRUCTION CONTRACTORS

Environmental Hazard Evaluation

Environmental Hazard Management Plan

Factory Street Area

GUIDELINES FOR LANDOWNERS, TENANTS, UTILITIES COMPANIES, AND CONSTRUCTION CONTRACTORS

Prepared by

HDOH

Version 2

February, 2018

These guidelines are for landowners, tenants, utility companies, and construction contractors involved in construction projects within the Factory Street Area (FSA) of Kalihi, Oahu, Hawaii, which is described in more detail below. They describe controls that provide protection from lead and oil, oily soil and water. They will guide you through three steps on how to:

1. Determine if your project is within the area covered by the guidelines (see page G-3).
2. Determine if you should consider these guidelines
3. If you follow these guidelines, use them as an aid in determining the controls you need to conduct your specific project safely and protect the environment.

Soil and groundwater within the FSA (Figure 2) have been impacted by lead from commercial activities (e.g., battery recycling, fishing weight smelting etc.) and oil released from historical tanks and buried pipelines.The area of highest contamination within the FSA is shown in Figure 3.

Remediation has been historically undertaken in some parts of the shoulder area within the FSA, between North King Street and Factory Street, but the exact location and depth of excavation is unknown. Because remedial activities did not remove all soil and groundwater contamination, appropriate precautions must be taken so that workers involved in excavating within the area are not exposed to risks related to remaining contamination on site. Maintenance and restoration of the asphaltic cap covering the lead contaminated soil is key in preventing exposure to the surrounding residences. Dust suppression without generating excessive amounts of water that could transport contaminated soil particles downgradient is key during construction activities.

These guidelines explain how parties performing construction work within the FSA shown on the map on page A-3 can protect those who may be exposed to contamination in soil and groundwater.

Disclaimer:

The procedures, information, guidelines, and sample hazard management plans referred to herein are not intended to be a comprehensive description of all of the rules, regulations, laws, and other requirements applicable to a construction project. They are only intended to provide general information, and should not be used in place of appropriately qualified personnel. Each landowner, tenant, and construction contractor is responsible for complying with all applicable rules, regulations, laws, and other requirements, and for preparing his/her/its own hazard management plans for his/her/its own site-specific project.

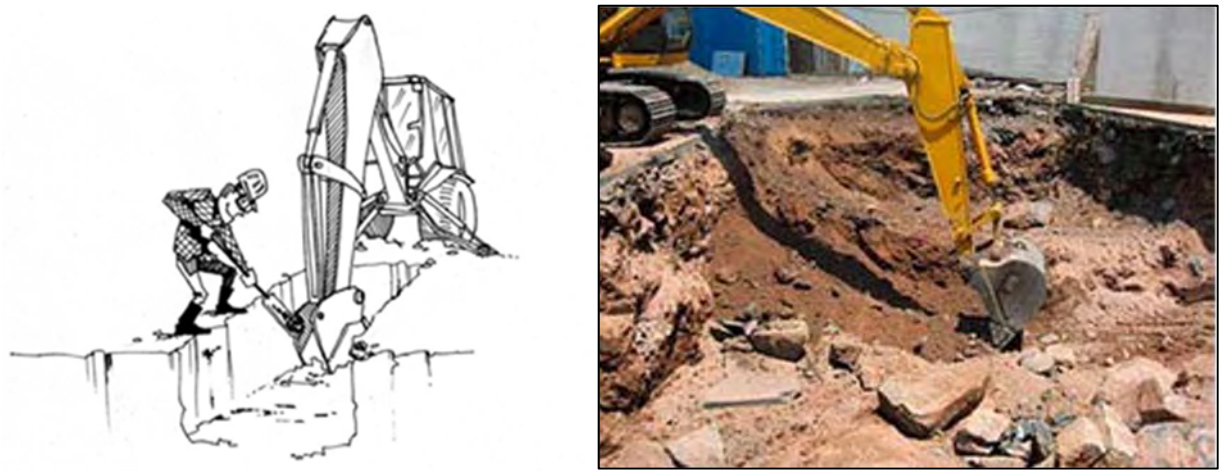
Determine if you should consider these guidelines for work within the FSA:

- If you are landscaping, paving, or excavating in Factory Street or its shoulder area, you need to consider these guidelines.
- If you are replacing or repairing belowground utilities, consider these guidelines when implementing proper procedures to protect construction workers, residents, or workers from hazards related to historical releases. Check with the HEER Office for information and support.
- If you are on private property and excavating or replacing floor slabs, replacing or substantially modifying foundations, or constructing new buildings, contact the HEER Office to determine whether a site-specific assessment is required.

Some potential hazards that can occur during excavation and how they can be prevented are described below.

During excavations, workers may be exposed to lead or oil remaining in the soil or on groundwater. **Site-Specific Health and Safety Plans (HSP)** (which require appropriate protective clothing, equipment, and training) may be needed.

Backhoe excavation



Backhoe Excavation

Oil might seep from the side of an excavation and cause an oil sheen. It may be necessary to manage the oily water.

Contaminated soil may be inadvertently spread around the work area. Also, clean and contaminated soil could be mixed, increasing the volume of soil that must be disposed of.

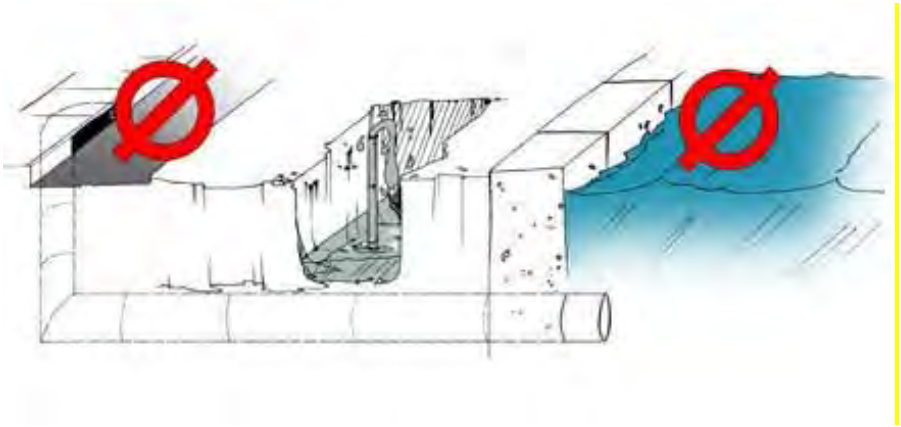
Site-Specific (or Project-Specific) Environmental Hazard Management Plans (EHMP) with a Soil Management Plan approved by the HEER Office may be needed to prevent spreading oily soil or otherwise contaminated soil (Appendix H.5). Separate clean soil from contaminated soil. Do not stockpile contaminated soil onsite, but contain it in drums or other type of closed (locked) container and get the containers off site as soon as possible. Soil has been pre-characterized in the area of highest contamination (Figure 6a,b,c) using lead TCLP so that disposal (hazardous/non-hazardous) can be pre-arranged prior to start of construction (see Appendix F for TCLP results).

Although unlikely, oil might seep from the side of an excavation near previous services stations and cause oil sheen. It may be necessary to manage the oily water.

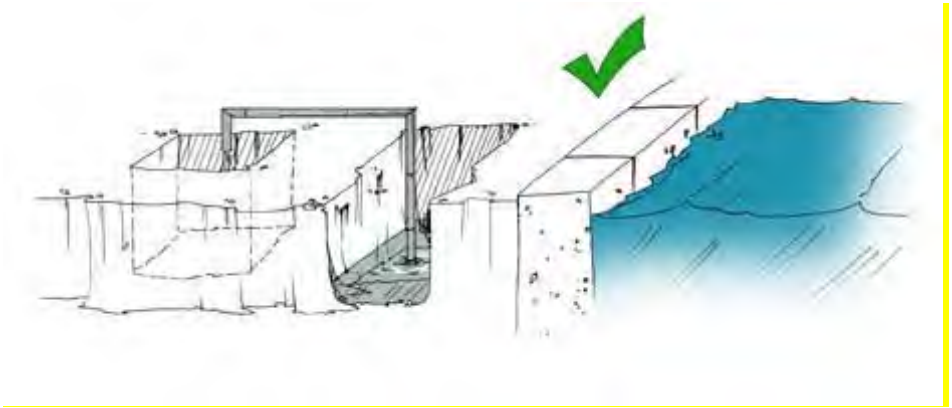
Oil or contaminated water or soil extracted from excavations could be released and reach surface waters, including the ocean. Releasing any oil to surface waters, storm drains, or the harbor or the ocean is illegal.

Avoid creating preferential pathways that would allow contaminated soil and groundwater to reach the ocean.

Do not discharge extracted groundwater unless it meets the requirements of, or is approved by the HEER Office and other applicable government agencies. Prepare and follow a **Groundwater Management Plan (Appendix H.6)** and obtain necessary permits or approvals from the HEER Office and other applicable government agencies to appropriately manage any contaminated water that is encountered.



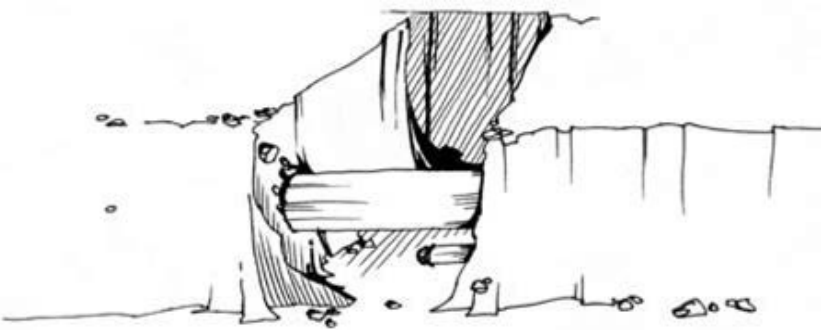
In some instances, oily or lead-contaminated water must be removed from excavations. **Do not discharge to the ocean or storm drains.**



Upon acquisition of applicable government approval, contaminated water can be discharged into a newly excavated pit/trench within the impacted area.

Upon acquisition of applicable government approval, contaminated water can be hauled for off-site disposal.

Abandoned petroleum product pipelines or underground storage tanks (UST) may be discovered in excavations. If these are discovered, contact the HEER Office. If you need to remove a segment of an abandoned pipeline, develop an Inactive Pipeline Removal Plan (Appendix H.3), and tap, drain, cut, and cap the pipeline in accordance with the plan. Obtain HEER Office approval if you undertake removal.



Exposed abandoned pipelines in the harbor area

Workers tapping and draining abandoned pipelines

Emergency responses to releases of contaminated soil or water.

Accidental releases of oil, contaminated soil or contaminated water can occur during construction. Sudden releases can also occur if a water line or other utility fails. Develop a Construction Activities Release Response Plan (Appendix H-2) that describes how to deal with an accidental release of oil, contaminated soil, or contaminated water during construction.

Emergency responses to releases of oily soil or water.

HOW TO PROCEED

Planned Projects:

Determine whether your project falls under these guidelines. If you have any questions, contact the HEER Office. (See Contacts on page 11.) If your project does fall under these guidelines, complete the following steps:

1. Notify the HEER Office as soon as possible about your project. HEER can provide information and support.
2. Get the support of an environmental consultant.
3. You are encouraged to read the attached "Project Implementation Form" because it provides a useful checklist of the items you should consider. Filling out the form will help HEER determine how to support you. If necessary, have HEER assist you in completing the form.
4. Consult with the HEER Office as needed.
5. Determine what steps you should take to protect your workers and the environment during construction, and have a qualified environmental professional complete the needed hazard management plan forms (Appendix H). Sample plans that can be considered by your environmental professional are at the back of these guidelines.
6. Proceed with your project.
7. As appropriate, keep the HEER Office informed.

Unplanned Release Responses:

If any releases associated with your project occur, you should act in accordance with your Construction Activities Release Response Plan. If you discover a release of oil, contaminated soil, or contaminated water within the property where you are working, do the following:

1. Review release reporting requirements (described in the HEER Technical Guidance Manual [TGM]), and Section 9.0 of this EHMP and if the release is determined to be reportable, notify the HEER Office immediately.
2. Notify the landowner, tenant or client for whom you are working.

HEER Office Contact:

HEER Office:

Steven Mow

e-mail: steven.mow@doh.hawaii.gov
phone: (808) 586-4249

The HEER web-site for Spill Reporting and Emergency Response is:
http://eha-web.doh.hawaii.gov/eha-cma/Leaders/HEER/spill-reporting-and-emergency-response

DISCLAIMER:

The procedures described herein are not intended to be a comprehensive description of all requirements (e.g., federal, state, and local) with which landowners/tenants and others must comply while undertaking a construction project.

Filling out this form will help HEER determine what support to provide.

PROJECT IMPLEMENTATION FORM:

Project: _____

Project Owner: _____

Location: _____

Project Description: _____

_____

Completed By (Name): _____

Title/Company: _____

Phone Number: _____ e-mail: _____

Expected Date of Construction: _____ Date Form Completed: _____

Are you considering land use other than Commercial or Industrial?

YES: _____ NO: _____.

If Yes, explain: _____

_____

Are you considering Excavation or Repaving with Removal of current asphalt? YES: ___ NO: __

Do you need the support of an environmental company? YES: _____ NO: _____

If yes, who do you intend to use? _____

_____

Other Comments: _____

_____

_____

Questions continued on next page

QUESTIONS	ANSWERS		Useful remarks by HEER and/or Tenant/Contractor
Have you reviewed the site background information available in the public record maintained by the HEER Office:	**YES**	**NO**	**Describe reports and information sources that may be useful:**
• **Site Characterization Reports?**	☐	☐	
• **Environmental Hazard Management Plan?**	☐	☐	
• **Monitoring Reports?**	☐	☐	
• **Appropriate As-built Reports describing past cleanup and construction reports?**	☐	☐	
Have you determined if your project may result in exposure to contaminated soil or groundwater :	**YES**	**NO**	**Further describe the hazards that may be encountered during construction:**
• **During construction?**	☐	☐	
• **At the completion of construction (of a new building for example)?**	☐	☐	
Do you understand potential hazards to:	**YES**	**NO**	**Refer to Environmental Hazard Management Plan, as necessary, for more details.**
• **Construction workers?**	☐	☐	
• **Residents/Building occupants?**	☐	☐	
• **Visitors or customers?**	☐	☐	
• **Ocean water, storm drains, etc.?**	☐	☐	
• **Do you understand the requirements and your responsibilities to prevent hazards from occurring?**	☐	☐	
• **Site-specific Health and Safety Plan?**	☐	☐	

QUESTIONS	ANSWERS	Useful remarks by HEER and/or Tenant/Contractor
• **Free Product Management Plan**	**YES** ☐ **NO** ☐	
• **Construction Activities Release Response Plan?**	☐ ☐	
• **Inactive Pipeline Removal Plan?**	☐ ☐	
• **Dust Monitoring Plan?**	☐ ☐	
• **Soil Management Plan?**	☐ ☐	
• **Groundwater Management Plan?**	☐ ☐	
Are you undertaking additional environmental investigations for the project planning or implementation purposes:	**YES** **NO**	**What HEER support do you need in undertaking investigations?**
• **Soil?**	☐ ☐	
• **Groundwater?**	☐ ☐	
Are you complying with:	**YES** **NO**	**Remarks:**
• **Landowner's environmental requirements?** (These may be included in lease agreements or other legal documents)	☐ ☐ ☐ ☐	
Are the construction workers that may encounter contaminated soil or groundwater 40 hour HAZWOPER trained?	**YES** ☐ **NO** ☐	

[1] Either NO or NOT NEEDED.
[2] Routine air monitoring is included in the Health and Safety Plan. This plan is intended for large-scale excavations (i.e., down to five feet or deeper and over an area exceeding one half acre, or as required by the HEER Office).
[3]See sample plans at the back of these guidelines.

What is HEER's role?

For Planned Projects, HEER may be able to:

- Provide oversight and technical support for dealing with contaminated contaminated soil, water, and soil vapors, and for implementing the Environmental Hazard Management Plan (EHMP).
- Suggest possible reimbursement of reasonable incremental environmental costs from known responsible parties (RP).
- Develop guidelines for consideration when implementing the EHMP.
- Monitor effectiveness of the EHMP in properly dealing with environmental issues during subsurface construction. This may require HEER to access monitoring points on your parcel.

If an accidental release of contaminated soil and water must be addressed, HEER may be able to:

- Participate as a member of the emergency response team.
- Assist in providing the appropriate method(s) for proper management of the contaminated medium.

What type of HEER technical and logistical support can I expect?

- HEER's Project Manager is available to provide general guidance on how to comply with the EHMP, and to assist with the logistics of addressing oil, contaminated soil, groundwater.
- HEER will provide sample plans that can be considered by your environmental consultant in preparing plans that may be required for your project.
- HEER can help identify environmental companies that can perform support services. The landowner or tenant and utilities companies are responsible for directing the work of the professional.

What are the responsibilities of Landowners?

The landowner is responsible for the following:

- Complying with applicable federal, state, and local laws and regulations
- Determining whether historical activities at the site may have resulted in release of possible non-petroleum and/or petroleum contaminants of concern (COC)
- Verifying that the site has been adequately characterized by identification of the nature and extent of contamination
- Identifying any site conditions requiring appropriate protection of human health and the environment that must be added to the plan template of this EHMP
- Complying with requirements of the EHMP
- Developing/complying with a Management Plan consistent with these guidelines
- Communicating requirements of the EHMP and these guidelines to whoever is undertaking construction work (e.g., excavation, building construction, etc.)
- Notifying HEER about construction project plans within the FSA, contacting HEER for support to help address requirements of the EHMP, and cooperating with HEER by providing timely information and site access
- Ensuring appropriate hazard management plans are prepared and implemented, and providing appropriate documentation to the HEER Office
- Keeping the HEER Office informed regarding construction work
- Notifying the HEER Office of any accidental release of oil, contaminated soil, or contaminated water.

What is the Tenant's responsibility?

Any tenant undertaking excavation, building re-construction, or new construction should coordinate with the landowner; comply with applicable federal, state, and local laws and regulations; and ensure adherence to the EHMP and consideration of these guidelines.

What are the responsibilities of the Utilities Companies and Construction Contractor?

The Utilities Companies and Construction Contractors undertaking excavation, paving, building reconstruction, or new construction work should (as appropriate to the size and nature of each project) operate under the appropriate Health and Safety Plans (HSP), implement dust monitoring, manage soil and groundwater in accordance with the EHMP, and consider these guidelines. Utilities Companies and Contractors must identify tasks/actions not already covered in the plan templates included in the EHMP. The Contractor should request that the landowner make appropriate changes to the plan(s) prior to commencement of site work.

Contacts:

HEER Office:

Steven Mow

e-mail: steven.mow@doh.hawaii.gov
phone: (808) 586-4249

The HEER web-site for Spill Reporting and Emergency Response is:

http://eha-web.doh.hawaii.gov/eha-cma/Leaders/HEER/spill-reporting-and-emergency-response

Environmental Statutes and Guidelines:

The following environmental statutes, regulations, and guidance documents, or any recent updates to these, may apply:

- The Hawaii Environmental Response Law (*Hawaii Revised Statutes* [HRS] Chapter 128D) and the State Contingency Plan (*Hawaii Administrative Rules* [HAR] 11 451 1 through 11 451 24). These outline legal requirements for protecting human health and the environment from releases or threatened releases of hazardous substances, including oil.
- The Hazard Evaluation and Emergency Response Office Technical Guidance Manual (TGM) for implementation of the State Contingency Plan (Interim Final, 2017). This provides many helpful guidelines and procedures to comply with the Hawaii Environmental Response Law and the State Contingency Plan.
- Hawaii Water Quality Standards (HAR Title 11, Chapter 54). This specifies standards for water quality discharge.
- Hawaii Ambient Air Quality Standards (HAR Title 11, Chapter 59). This specifies air quality standards. Specific standards may apply during soil excavation, remediation, and construction, or during other activities.
- Hawaii Occupational Safety and Health Standards (HAR Title 12, Chapter 99). This specifies health and safety requirements during remedial work and construction.
- Hawaii Solid And Hazardous Waste Standards (HAR Title 11, Chapters 58.1,260.1 and 281)

In addition to the TGM, current technical guidance issued by the HEER Office indicating how it can enforce requirements of the EHMP includes the following:

- Screening Environmental Hazards at Sites with Contaminated Soil and Groundwater (Fall 2017).
- Guidance for Soil Stockpile Characterization and Evaluation of Imported and Exported Fill Material (October, 2017).
- Lead in Soils Fact Sheet (January, 2017; see Appendix I)
- A Landowner's Guide to Environmental Hazard Management Plans (EHMPs; January 2017)
- Long-term Management of Petroleum Contaminated Soil and Groundwater (June 2007).
- EAL Surfer (Fall 2017).

Contact the HEER Office if you are interested in the latest version of these documents.

Appendix H

Reporting Forms

H.1 Written Follow-Up Notification Form

H.2 Health and Safety Plan – Lead & Oil Hazards

H.3 Construction Activities Release Response Plan

H.4 Inactive Pipeline Removal Plan

H.5 Soil Management Plan

H.6 Groundwater Management Plan

H.7 Free Product Management Plan

H.8 Dust and Vapor Management Plan

B.9 Stormwater Management Plan

The purpose of the reporting forms are to ensure consistency between actions taken and the associated management plans. Add notation to indicate all deviations from the management plans.

H.1

Hawaii Hazardous Substance Written Follow-Up Notification Form

PLEASE PROVIDE THE FOLLOWING INFORMATION

Incident Case No.: _____

Contact Information

Caller's Information:

Name: _____

Address: _____

City: _____ State: _____ Zip code: _____

Telephone Number: _____

Owner's Information:

Name: _____

Address: _____

City: _____ State: _____ Zip code: _____

Telephone Number: _____

Operator's Information:

Name: _____

Address: _____

City: _____ State: _____ Zip code: _____

Telephone Number: _____

Name of contact person at the facility or vessel where the release has occurred: _____

_____

Telephone Number: _____

Hazardous Substance Released

Name (trade and chemical) of the hazardous substance which has been released: _____

_____

Chemical Abstracts Service (CAS) Number (if applicable):

_____

Approximate quantity of the hazardous substance released: _____

Incident Information

Location of the release: _____

_____

Brief description of the release: _____

_____

Media into which the release occurred or is likely to occur (indicate all those that apply):

☐ Air ☐ Soil ☐ Groundwater ☐ Concrete ☐ Asphalt ☐ Stream ☐ Ocean ☐ Other

Cause of the release: _____

_____

Date of the release: _____

Time of the release: _____

Duration of the release: _____

Time when person in charge of construction learned of release:

_____

_____

Source of the release: _____

_____

Response Information

Response measures taken thus far: _____

_____

Any appropriate information regarding ability of the owner or operator of the facility or vessel where the release has occurred to pay for or perform any proposed or required response actions:

Names of other federal, state, or local government agencies that have been notified of the release:

Health Information

Known or anticipated acute health risks:

Known or anticipated chronic health risks:

Advice regarding medical attention necessary for exposed individuals:

Potential impacts on public health or welfare:

Potential impacts on the environment:

"I certify under penalty of law that I have personally examined and am familiar with the information submitted and believe the submitted information is true accurate and complete."

Signature: **Date:**

Printed Name:

Title:

Company:

H.2

Health and Safety Plan – Lead & Oil Hazards

Prepared By: **Organization:** _____ **Name:** _____ **Signature:** _____	**Health and Safety Plan – Lead & Oil Hazards** **Environmental Hazard Management Plan Factory Street Area** **Version:** **Reference:** **Date:**

Project Name: _____

Project Location: _____

Parties may use this sample as a basis for preparing their own site-specific plans.

Revise this Sample Plan by:

1. Completing Table 2 with names and telephone numbers.
2. Attaching a Figure 1 map below at conclusion of Appendix H.2 to show locations of the work site and nearest medical facilities and hospitals. Alternatively, ensuring that on-site workers know locations of closest medical facilities.
3. Reviewing the Occupational Safety and Health Administration (OSHA) and Hawaii Occupational Safety & Health Division (HIOSH) regulations to ensure that hazard levels described in Table 1 are still current.
4. Including any additional specific instructions.

Implement this Plan by:

5. Warning on-site workers that they may encounter lead-contaminated soil, water, and dust and oil, oily water, and oil-impacted soil in belowground excavations.
6. Making the on-site workers aware of need for proper safety procedures, and familiarizing them with the contents of this plan.
7. Making sure a copy of this completed plan is present at the construction site.

Note: If you are dealing with hazardous chemicals other than oil, oily water, and oil-impacted soil, you may need additional hazardous Chemical Response Plans and Procedures not covered in this plan.

Delete this box after completing this plan.

2. INTRODUCTION

Lead-impacted soil, -water, and- dust, and oil, oily water, and oil-impacted soil may be encountered during excavation projects. This Health and Safety Plan (HSP) provides information regarding potential hazards that may be encountered (Table 1 below), specifies protective measures and necessary monitoring (Table 1 below), and lists emergency contact information (Table 2 below).

3. WORKER AWARENESS & HAZARD COMMUNICATION

On-site workers who may be exposed to oil, oily water, oil-impacted soil and lead-contaminated soil/dust and -water should have the appropriate and current level of Hazardous Waste Operations and Emergency Response (HAZWOPER) Standard (29 *Code of Federal Regulations* [CFR] 191 0.120) training.

A daily on-site tailgate safety meeting should occur. These meetings should include a discussion of the day's work and an analysis of hazards that may be encountered. The employer should communicate onsite hazards and comply with 1910.1200 and 1926.62 hazard communication standards.
The employer should ensure that at least the following hazards are addressed:

(A) Reproductive/developmental toxicity;

(B) Central nervous system effects;

(C) Kidney effects;

(D) Blood effects; and

(E) Acute toxicity effects.

If site or work conditions change, this HSP may have to be amended accordingly. Apprise on-site workers of any change

4. SITE CONTROL AND GENERAL HEALTH AND SAFETY REQUIREMENTS

Minimize exposure of workers and others to potential hazards by restricting workplace access.

Do not smoke, eat, or drink during and after entering the work zone. Conduct these activities upwind and outside of the work zone after first washing hands.

Avoid skin contact with oil, oily water, oil-impacted soil and debris, and contaminated soil, and avoid inhalation of dust particles.

5. WORKSPACE AIR MONITORING AND ACTION THRESHOLDS

Monitor workspace dust and air conditions during work activities to verify that safe conditions are maintained by comparing measurements to the action levels in Table 1.

If action levels are exceeded, take the actions listed in Table 1 or others, if necessary.

Use the field monitoring devices listed in Table 1, or equivalent, to monitor workspace air conditions.

Acute exposure to elevated concentrations of these constituents listed in Table 1 may cause the following symptoms, among others:

Lead:

Lead is a potent, systemic poison. Taken in large enough doses, lead can kill you in a matter of days. A condition affecting the brain called acute encephalopathy. Signs of encephalopathy are:

- Seizures
- coma
- cardiorespiratory arrest.

Short term occupational exposures of this magnitude are highly unusual, but not impossible.

Similar forms of encephalopathy may, however, arise from extended, chronic exposure to lower doses of lead. There is no sharp dividing line between rapidly developing acute effects of lead, and chronic effects which take longer to acquire. Lead adversely affects numerous body systems, and causes forms of health impairment and disease which arise after periods of exposure as short as days or as long as several years.

Petroleum Hydrocarbons:

- Abnormal eye and nose irritation
- Dizziness
- Loss of judgment
- Headache
- Giddiness
- Nausea
- Abnormal fatigue.

If any of these symptoms are observed during or following construction work, seek help from a physician.

Table 1: Action Levels

Contaminant	Medium/Hazard	Monitoring Instrument (See HEER 2017 for more information)	Monitoring Instructions	Action Levels and Applicable Actions (See OSHA for more information)
Lead	Soil(dust)/Inhalation	Mixed cellulose Ester (MCE) Filter cartridge 25 micron	Personal MCEs and/ or area sampling in the breathing zone, sampling upwind and downwind inspect workspace air for fugitive dust caused by work activities or high winds.	Respirator use: if lead > 30 $\mu g/m^3$ for 8-hour TWA Respirator upgrade : If > 0.5 mg/m^3 half mask air-purifying respirator with high efficiency filters or half-mask supplied -air respirators operated on demand (negative pressure) mode PEL = 50 $\mu g/m^3$ Other protective clothing: >200 $\mu g/m^3$ for 8-hour TWA medical surveillance: If exposed to > 30 $\mu g/m^3$ for more than 30 days in any consecutive 12 month and if blood lead is > 40 $\mu g/dl$.
TPH	Air/Inhalation	Photoionization detector(PID) with l0.6 electron volt (eV) Lamp	Monitor breathing zone while work is ongoing. Compare action thresholds to time-averaged breathing zone measurements.	PEL= 500 ppm

If workers experience any of the above symptoms while conducting work involving exposure to lead-impacted soil, -dust, or water; or oil, oily water, and oil-impacted soil, they should stop work, leave the work area, and consult the Health and Safety Manager (Table 2).

6. PROTECTIVE CLOTHING

A minimum of Occupational Safety and Health Administration (OSHA) modiefied Level D Personal Protective Equipment (PPE) should be used for activities involving disturbance, movement, sampling, or management of lead-impacted soil,-dust,-water; or oil, oily water, and oil-impacted soil. M o d i f i e d Level D PPE consists of the following:

- Safety glasses
- Hard hat
- Surgical (rubber or nitrile) gloves
- Coveralls or full-length pants
- Boots with chemical-resistant steel toe and shank.
- Dust Mask

Additional PPE may be required in response to project-specific hazards or unusual conditions, such as possible close contact of workers with oil seeping from soils or floating on groundwater. An upgrade to higher level PPE might be needed in the zone of highest contamination (Figure 6 a,b,c).

7. EMERGENCY CONTACTS

Table 2: Emergency Contacts

Organization	Purpose	Phone
Contractor-designated Health and Safety Manager *Name*:	Hazardous work conditions	(_____) _____ - _____
For emergencies: Fire, Ambulance, or Police		**911**

8. REFERENCES

State of Hawaii Department of Health (HEER). 2017. Technical Guidance Manual for the Implementation of the Hawai'i State Contingency Plan, Interim Final.

Occupational Safety and Health Administration (OSHA), 29 *Code of Federal Regulations* (CFR) Sections 1910 and 1915.12 (b)(3).

Figure 1

Site and Hospital Map

(Insert appropriate map)

H.3

Construction Activities Release Response Plan

Prepared By: **Organization:**_____ **Name:** _____ **Signature:** _____	**Construction Activities Release Response Plan** **Environmental Hazard Management Plan Factory Street Area, Honolulu** **Version:** **Reference:** **Date:**

Project Name: _____

Project Location: _____

Parties may use this sample as a basis for preparing their own site-specific plan.

Revise this Sample Plan by:

1. Completing Tables 1 through 3.
2. Checking to make sure the Section 9.1 notification requirements are current.
3. Including any additional specific instructions.

Implement this Plan by:

1. Warning on-site workers that they may encounter lead-impacted dust, -soil, or -water; oil, oily water, oil-impacted soil in belowground excavations.
2. Making the on-site workers aware of proper response procedures and familiarizing them with the contents of this plan.
3. Making sure a copy of the completed plan is present at the construction site.
4. Ensuring that on-site workers are familiar with surface drainage patterns, presence and flow directions of storm drains that could direct releases to harbor waters, locations of storm drain outlets to the harbor that may need to be protected with oil booms or other measures, potential locations for emergency storage tanks, etc. Obtain further information on these conditions from HEER, if necessary.

Additional details for completing this form are in Sections 9 and 11 of the EHMP.

Submit a copy of this form to HEER Office if contamination is encountered during subsurface activities.

Note: If you are dealing with hazardous chemicals other than lead-impacted soil,- dust, or -water; or oil, oily water, and oil- impacted soil, you may need additional hazardous Chemical Response Plans and Procedures not covered in this plan.

Delete this box after completing this plan.

1. INTRODUCTION

This Construction Activities Release Response Plan (Plan) describes how to proceed in the event of an unplanned or accidental release of oil, oily water, or oil-impacted soil.

On-site workers must minimize the possibility of spills and releases of oil, oily water, and oil-impacted soil during excavation by:

- Familiarizing themselves with the site conditions
- Implementing appropriate Health and Safety, Soil and Groundwater Management Plans
- Being prepared at all times to encounter and manage oil, oily water, and oil-impacted soils.

Uncontrolled releases or spills of lead-impacted media or oil, oily water, and oil-impacted soil can occur. Such releases can pose a hazard to human health and/or the environment, and require an emergency response and/or regulatory agency notification. Human health concerns include human contact with the impacted medium; explosive or fire hazards; and disruptions to the normal operations in the area around the construction site, particularly disruptions to traffic flow. A major environmental impact of concern is discharge of oil or oily water to the harbor water either directly or via storm drains.

The responses described here apply to incidents that may occur during construction activities and that can be controlled by on-site workers undertaking the construction work. In that case, notify the State HEER Office Emergency Response Team (see first entry in Table 3).

2. TYPICAL RELEASES

The releases described below can occur during repair or replacement of deep utilities (water, sewer, electric, and fuel and communications lines) and buried utilities that require excavation and removal of oil, oily water, and oil-impacted soil and lead-contaminated soil/dust or -water.

Small incidental releases that do not spread and do not interfere with construction activities should be cleaned up as part of normal activities of the construction team.

For the following types of more significant release, respond immediately as outlined in this plan:

- Significant dust generation
- Surface spillage of oil, oily water, and oil-impacted soil from excavations that actually spills, or threatens to spill, beyond the boundaries of the construction site.
- Breakages or other malfunctions of pipelines, storage facilities, groundwater treatment systems, or re- infiltration galleries/trenches used for belowground construction dewatering that continue to release oil or oily water.
- Oil-impacted soils or lead-contaminated soils temporarily stockpiled on the ground surface that are eroded or washed away by rain, and which continue to spread under the action of rain or other causes such as water from a water supply pipeline break.

- Spillage outside of the construction site during handling and disposal of oil, oily water, oil-impacted soils, or lead-contaminated soil removed from excavations.
- Release of oil from abandoned or active oil pipelines encountered and damaged during construction activities—that oil threatening to spill out of the excavation or actually doing so.

3. RELEASE RESPONSE TEAM

In the event of a release, the following team will determine the necessary response, make proper notifications, and conduct the response.

Table 1: Contractor Release Response Team

Name	Phone
Internal Contacts:	
Contractor-designated Release Response Coordinator Name:	(____) ____ - _____
Contractor-designated Health and Safety Manager Name:	(____) ____ - _____
On-site Construction Superintendent Name:	(____) ____ - _____
Landowner Contact Name:	(____) ____ - _____

4. RESPONSE PROCEDURES

4.1 General

The first priority of response action is protection of human health. **Immediate action is required**. Do not delay prudent response action.

In the event of a release:

- Notify the response coordinator (Table 1).
- Take immediate action to contain the release (do not wait if Release Response Coordinator is unavailable).

- In dangerous circumstances, give notice to evacuate the work area and notify persons in Table 1. If no persons listed in Table 1 are available, obtain assistance as necessary by contacting appropriate persons listed in Table 3.

Other general responses include:

- Use appropriate personal protective equipment (PPE).
- Mist dust generated from excavation
- Eliminate or contain the source of the release.
- Put up signs or caution tape to let other workers know of a release and need to stay away.
- Place barriers or absorbents around the release to prevent spread of contamination.
- Secure impacted soil stockpiles by covering, repairing, or constructing containment berms around the stockpile, etc.
- Remove released material and clean all surfaces.
- Dispose of the released material as appropriate (see **Soil and Groundwater Management Plan**).
- Monitor air quality at the location of the release to assess the vapor and dust hazards as defined in the Health and Safety Plan (HSP). Take appropriate action if hazardous conditions exist as required by the HSP. Use appropriate personal protective equipment (PPE).
- Eliminate or contain the source of the release.
- Put up signs or caution tape to let other workers know of a release and need to stay away.
- Place barriers or absorbents around the release to prevent spread of contamination.
- Secure impacted soil stockpiles by covering, repairing, or constructing containment berms around the stockpile, etc.
- Remove released material and clean all surfaces.
- Dispose of the released material as appropriate (see **Soil and Groundwater Management Plan**).

If the release occurs indoors, do the following:

- Close off vents and air ducts leading from the release area to other parts of the building.
- Use appropriate personal protective equipment (PPE).
- Eliminate or contain the source of the release.
- Put up signs or caution tape to let other workers know of a release and need to stay away.
- Place barriers or absorbents around the release to prevent spread of contamination.
- Secure impacted soil stockpiles by covering, repairing, or constructing containment berms around the stockpile, etc.

- Remove released material and clean all surfaces.
- Dispose of the released material as appropriate (see **Soil and Groundwater Management Plan**).

If electrical equipment is operating in the vicinity of the release and hydrocarbon vapors are detected near the explosivity limits (see **Health and Safety Plan**), turn off the equipment, preferably at the main breaker, to avoid sparking.

If necessary, protect nearby storm drains by use of adsorbent, booms, or drain covers; and protect potentially affected harbor water and storm drain outlets to the harbor by placing floating oil booms on the water.

To deal with either the incidental or more significant releases, equipment and materials listed in Table 2 are available either at the construction site or in storage nearby.

Table 2: Response Equipment and Materials

Equipment and Materials	Purpose	Source of Equipment and Materials
Spill kits	Cleanup of small releases to land	
Trucks and loading equipment	Excavation and transport of oil-impacted soil	
Locked steel roll-off bins/55-gallon drums	Temporary storage of lead/oil-impacted soil or on- site relocation	
Pumps, piping, storage tanks	Transfer of impacted water and oil to on-site tanks or approved disposal trenches	
Plastic sheeting	Cover and security of soil stockpiles (< 200 mg/kg lead)	
Hay bales, silt fences, wattles	Erosion control and containment materials	
Oil absorbent pads	Absorption and containment of oil or fluids released to land or within excavations	
Sand bags or equivalent	Construction of a small dike along areas of the release to prevent releases from spreading or entering storm drains	
Sediment and oil filters	Connection to the end of an excavation dewatering hose to filter out sediment and oil	

5. NOTIFICATION INFORMATION

If the release meets the Section 9.1 notification requirements:

- Notify the person in the first entry in Table 3.
- If utilities are involved, notify the affected utility in Table 3.
- Notify the landowner in Table 3.

Table 3: Other Potential Contacts

Organization	Purpose	Phone
State Agency Contacts:		
Hawaii State Emergency Response Commission/the HEER Office	Any required release reporting	(808) 586-4249 (808) 247-2191 (after hours)
HDOH Solid and Hazardous Waste Branch (SHWB)	Any disposal questions (hazardous/non-hazardous waste)	(808) 586-4226
Fire, Ambulance, or Police	Required in the event of fire danger or injury	**911**
Underground Utility Contacts:		
Gas Utility Name:	Notification of any gas utility damage or break	(_____) _____ - _____
Electric Utility Name:	Notification of any electric utility damage or break	(_____) _____ - _____
Water Utility Name:	Notification of any water utility damage or break	(_____) _____ - _____
Sewer Utility Name:	Notification of any sewer utility damage or break	(_____) _____ - _____
Landowner Contact:		
Landowner Name:	Notification of any significant release	(_____) _____ - _____

6. RELEASE COMMUNICATIONS AND AGENCY REPORTING REQUIREMENTS

6.1 Circumstances under which agency notification is required

Pursuant to Title II, Chapter 451, *Hawaii Administrative Rules* [HAR] § 11-451-7, releases meeting ***any of the following criteria must be reported*** to the first agency contact appearing in Table 3 within 24 hours of first occurrence or observance:

- A listed hazardous substance designated under HAR 11-451-5(b), in quantities equal to or exceeding the reportable quantity criteria in HAR 11-451-6(b) in any 24-hour period
- An unlisted hazardous substance designated under HAR 11-451-5(c), in quantities equal to or exceeding the reportable quantity criteria in section 11-451-6(c) in any 24-hour period.
- Any release causing surface water to exhibit sheen.
- Any release of petroleum or hazardous substances to navigable waters (e.g. the ocean and local canals and streams).
- Any release of oil to the environment greater than 25 gallons.
- Any release of oil less than 25 gallons that is not cleaned up within 72 hours.
- In addition, any sheens or oil or oily water releases to storm drains that have open connections to the harbor, even if contained within project boundaries and not yet impacting the harbor water.
- Sheen and oil observed in the harbor or in a storm drain should be reported to the U.S. Coast Guard and HEER Office in Table 3.
- Releases to other waters of the United States require reporting to the U.S. Coast Guard.

Sheen and oil observed in the harbor or in a storm drain should be reported to the U.S. Coast Guard and HEER Office in Table 3.

Report the following information to agencies when notifying of a reportable release:

- Name of the person making the notification
- Location of the release
- Time and date of discovery
- Characteristics of the oil observed (color, viscosity, etc.)
- How the release occurred
- Removal actions taken and volume removed
- Whether the release poses an immediate threat to human health or the environment
- Other agencies that have been notified of the spill
- Known injuries resulting from the spill.

Provide details of actions taken consistent with Section 11 to deal with Construction Activities Release Response:

H.4

Inactive Petroleum Pipeline and UST Management Plan

Prepared By **Organization:** _____ **Name:** _____ **Signature:** _____	**Inactive Petroleum Pipeline and UST Management Plan** **Environmental Hazard Management Plan Factory Street Area** **Version:** **Reference:** **Date:**

Project Name: _____

Project Location: _____

Parties may use this sample as a basis for preparing their own site-specific plan.

Revise this Sample Plan by:

1. Reviewing the requirements of this sample plan to ensure that construction workers can comply with its requirements, and modifying the plan, if necessary.

Implement this Plan by:

1. Making sure on-site workers are aware of a plan for dealing with inactive pipelines.
2. Making sure a copy of the completed plan is present at the construction site.
3. Accessing additional guidance for completing this form in Section 12 of the EHMP.
4. Keeping a copy for your records and sending a copy to the HEER Office.

Delete this box after completing this plan.

1. INTRODUCTION

Inactive pipelines may be encountered during excavation (activities) within the Factory Street Area (FSA). This Plan provides procedures and guidelines for dealing with these inactive pipelines if they are encountered.

2. PREPARATORY WORK

Prior to starting any belowground construction work, undertake the following:

- Contact Hawaii One Call at (866) 423-7287 to notify them of proposed excavation activities. Underground facilities owners must be notified to mark any of their underground utilities near the proposed excavation.
- Conduct an underground utility survey using geophysical surveying equipment (e.g., toning/metal detection, ground penetrating radar) before excavation begins.

In addition to the above, identify the location of any inactive pipelines that may not be included in the above-referenced information. To do this, review the most recent available reports including the Environmental Hazard Management Plan (EHMP) to determine if pipelines could be present within the work area. Contact the Hazard Evaluation and Emergency Response (HEER) Office at (808) 586-4249 for assistance in obtaining the most current pipeline information.

3. NOTIFICATION REQUIREMENTS

If unanticipated inactive pipelines are discovered during construction activities, notify as follows:

- Contact the HEER Office via telephone within immediately after encountering the unanticipated petroleum pipelines.

4. PIPELINE TAPPING AND DRAINING

Inactive piping may contain residual petroleum product and may be under pressure. This could present a possible safety and spill hazard if the line is cut prior to implementation of appropriate measures. If, through the notification process described in Section 12.3, the nature and use of the piping cannot be determined, tapping may be required to determine if fluids are present or if the piping is pressurized, and to provide a means to drain residual product.

If you are performing the work, follow the procedures in Sections 5.0 through 8.0 below.

5. PIPELINE CUTTING AND CAPPING

Follow these general procedures for cutting and capping the pipelines:

1. Prior to cutting, tap the pipeline using non-sparking tools, and drain the contents of the pipeline to the extent practical and possible.
2. Cover the area below and adjacent to the cutting location with plastic sheeting and absorbent material, and place a catch basin beneath the location of the cut. Use these devices to collect residual fluid that may drain from the pipeline during and after cutting.
3. Use precautionary measures to prevent explosive hazards. For example, cut the pipeline using non-sparking tools and remove the pipeline segment.

4. Cap the cut-off ends of remaining pipeline segments to prevent any potential future leakage. Suitable capping methods include concrete plugs, blind flanges, cement plugs with rebar, or other methods that do not involve hot welding. Hot work, including welding, is not considered appropriate due to potential explosiveness of separate phase hydrocarbons (SPH) and associated vapors.

Consider the need for the presence of a vacuum truck on standby during pipeline cutting and capping.

6. PRODUCT SAMPLING

Sample the residual product that has been drained and collected during this process, and have it analyzed by a laboratory to enable proper profiling and off-site disposal.

7. INVESTIGATION-DERIVED WASTE DISPOSAL

Dispose of petroleum and other wastes in accordance with applicable laws and regulations.

8. HEALTH AND SAFETY

Comply with the following health and safety measures whether or not these are included in the **Health and Safety Plan (HSP)**.

- Personnel conducting post-discovery work on abandoned petroleum pipelines should have current 40/24-hour Hazardous Waste Operations and Emergency Response (HAZWOPER) training and air-purifying respirator fit test certifications. At least one on-site worker potentially exposed to chemical or physical hazards should have basic first aid and cardiopulmonary resuscitation (CPR) training.
- Select air-purifying respirators based on the type of contaminant encountered (i.e., petroleum).
- Conduct air monitoring to monitor potential hazardous vapors and worker exposure. If petroleum is encountered, air monitoring typically includes use of a photoionization detector (PID) to monitor organic vapors for potential inhalation hazards, and a methane and oxygen/combustible gas indicator to monitor for potential explosive hazards.

9. DOCUMENTATION ACTIVITIES

Provide HEER with the following information:

- A description of where the pipeline was encountered (Global Positioning System [GPS] coordinates or location relative to prominent landmarks), number and lineal footage of pipelines encountered, size of pipelines, depth of pipelines, condition of pipelines, and actions taken following pipeline discovery such as cutting or petroleum removal
- A location map that shows where the pipeline was encountered. The map must include a north arrow and a scale
- Photographs of the exposed portion of the pipeline in the excavation
- Analytical laboratory reports for product recovered from the pipeline.

Provide details of pipeline removal activities consistent with Section 12 of the EHMP:

H.5

Soil Management Plan

Prepared By **Organization:** _____ **Name:** _____ **Signature:** _____	**Soil Management Plan** **Environmental Hazard Management Plan** **Factory Street Area** **Version:** **Reference:** **Date:**

Project Name: _____

Project Location: _____

Parties may use this sample as a basis for preparing their own site-specific plan.

Revise this Sample Plan by:

1. Reviewing the requirements of this sample plan to ensure that the construction worker can comply with its requirements, and modifying the plan, if necessary.

Implement this Plan by:

1. Making sure on-site workers are aware of this plan and that they follow this plan.
2. Making sure a copy of the completed plan is present at the construction site.
3. Accessing additional guidance for completing this form in Section11 of the EHMP
4. Keeping a copy for your records and sending a copy to the HEER Office.

Delete this box after completing this plan.

1. INTRODUCTION

These procedures are intended to protect construction workers, the environment, and tenants in buildings from contact with contaminated soil/dust where such soils are known to exist, or where people may be exposed. These procedures also comply with requirements for excavating, stockpiling, re-using, and disposing of oil-impacted soils.

2. SOIL EXCAVATION AND STOCKPILING

If the amount of excavated soil is less than 1 cubic yard (cy) (equivalent to about three 55-gallon drums), it can be re-placed in the excavation upon completion of the work without further evaluation. For soil excavation in the high concentration area (Figure 6a,b,c of main document), see specific instructions in the soil management plan (Section 12). The lead XRF-laboratory analytical data correlation in Appendix E can be used to distinguish and separate lead-impacted (>200 mg/kg) from non-impacted (<200 mg/kg) soil (e.g. a handheld XRF- instrument can be used to determine lead analytical concentrations. Note that the XRF lead-concentrations underestimate laboratory concentrations, but the correlation can be used to determine approximate laboratory analytical concentrations.

If you encounter lead- or oil-contaminated soils, do the following:

- If the amount of excavated soil is less than one cubic yard (equivalent to about three 55-gallon drums), it can be replaced in the excavation upon completion of the work without further evaluation.
- Segregate unimpacted soil from the impacted soil, and stockpile and drum these separately.
- Have a qualified environmental professional direct any necessary collection of soil samples, direct testing of the samples in the field or at an off-site laboratory, and direct segregation of impacted soils from non-impacted soils.
- Place contaminated stockpiled soils in containers (such as 20-yard steel roll-off bins, super sacks, tri-wall boxes, or drums) or within lined containment areas (i.e., underlain by plastic sheeting). Drain any liquid phase oil or fuel product associated with the soil prior to stockpiling. Remove and properly dispose of any oil observed in the excavation.
- Cover stockpiles of contaminated soils with plastic sheeting and containerized soil to minimize dust, stormwater, and odor concerns. Inspect cover frequently for damage. Contaminated stockpiles should not be accessible to the public or stockpiled overnight. See Sections 12, 14, and 15 for further details.
- Stockpile soil near the project area prior to reuse.

3. RE-USE OF EXCAVATED SOILS

This plan provides general guidelines. For more details, consult Section 12 of this Document. Unimpacted soils can be used as backfill.

Excavated lead-impacted soil can be used as backfill only under the following conditions:

- Lead-contaminated soil in the area of highest contamination (Figures 6a,b,c) can only be re-used within the same excavation deeper than 4 feet bgs and if covered with a barrier described in the soil management plan (Section 12). The location of this soil and barrier needs to be documented by maps and photographs and submitted to HDOH HEER for updates to this EHMP, so that future workers will know where the soil

can be encountered.

Excavated oil-impacted soil can be used as backfill only under the following conditions:

- The oil-impacted soil does not contain any free oil, oil sheens, oil stains, or total petroleum hydrocarbon (TPH) concentrations exceeding 5000 parts per million (ppm).
- TPH concentration is determined either by an off-site laboratory or through use of a field test such as the paper towel or glove test described in Section 13.
- In the backfilling procedure, the more highly impacted soil should be placed at the bottom of the excavation.

Oil sampling and analysis may be necessary to determine whether soils are suitable and when they can be used as backfill. The HEER Office will determine if sampling is required.

If necessary, the following number of samples should be collected:

Less than 20 cy of soil:	1 MI sample
More than 20 cy of soil:	1 MI sample for each 20 cy up to the first 100 cubic yards
More than 100 cy of soil:	1 MI sample for every additional 100 cy

For further description of soil stockpile characterization, review the current HEER Office Clean Fill Guidance at http://eha-web.doh.hawaii.gov/eha-cma/Leaders/HEER/technical-guidance-and-fact-sheets.

4. OFF-SITE DISPOSAL

If you intend to transport the excavated soil to an off-site disposal facility, confirm with the disposal facility the number of soil samples needed for laboratory testing, as well as the standards for disposal.

If the excavated soil originates from the area of highest contamination and/or exceeds the TCLP limit for lead (5.0 mg/l; Appendix F), obtain an EPA number from the HDOH SHWB prior to excavation and containerize the soil immediately for same day offsite transport and disposal to a hazardous waste facility on the U.S. mainland.

5. EQUIPMENT DECONTAMINATION

Equipment used in contaminated areas must be decontaminated before use in non-contaminated areas. All liquid and solid waste resulting from on-site decontamination must be collected and appropriately disposed of.

The HEER Office should be notified if contaminated soils are excavated, segregated, and either backfilled or disposed of off-site. In some instances, the HEER Office may require that you obtain its approval for how you intend to excavate, manage, and backfill or dispose of soil.

Provide details of how -contaminated soil was handled consistent with Section 13 of the EHMP:

H.6

Groundwater Management Plan

Prepared By	Groundwater Management Plan
Organization: _____	**Environmental Hazard Management Plan Factory Street Area**
Name: _____	
Signature: _____	**Version:**
	Reference:
	Date:

Project Name: _____

Project Location: _____

Revise this Sample Plan by:

1 If you intend to place excavated groundwater back into an excavation or trench, contacting *the Hazard Evaluation and Emergency Response (HEER) Office at (808) 586-4249 to obtain* an appropriate disposal location.

2 If you intend to discharge extracted water to local surfaces (including storm drains), contacting the HEER Office to obtain all applicable permits and approvals ahead of time because authorizations could take weeks or months.

3 If you intend to discharge extracted water to a local sanitary sewer, contacting the City and County (C&C) for approval to dispose of that water into a sanitary sewer. Water discharged to a sanitary sewer or storm drain may be required to meet Water Quality Standards. These standards are specified in the Environmental Hazard Management Plan (EHMP), and are available from the HEER Office.

4 Reviewing the requirements of this sample plan to ensure that construction workers can handle groundwater possibly impacted by petroleum hydrocarbons which may be encountered during soil excavation.

5 Consulting the HEER office for answers to any questions.

6 Preparing your own site-specific plan.

7 Accessing additional guidance for completing this form in Section 14 of the EHMP.

8 Keeping a copy of the completed form for your records and sending a copy to the HEER Office.

Implement this Plan by:

1. Ensuring that on-site workers are aware of this plan and that they follow it.

Note: If you are dealing with hazardous chemicals other than oil, oily water, and oil-impacted soil, you may need additional hazardous Chemical Response Plans and Procedures not covered in this plan.

Delete this box after completing this plan.

1. INTRODUCTION

These procedures are for handling groundwater encountered during excavation activities. Soil and groundwater may be impacted by petroleum hydrocarbons and/or dissolved metals, and may be encountered during soil excavation. Purposes of these procedures are to: (1) protect construction workers and current residents and workers from contact with contaminated groundwater and inhalation of potential petroleum vapors, and (2) protect the quality of the surface waters.

2. GROUND WATER MANAGEMENT PROCEDURES

The following requirements apply to contaminated water encountered in an excavation:

- If petroleum free product is present in the extracted groundwater, separate it from groundwater and dispose of it at an appropriate off-site facility prior to transfer of the groundwater into a nearby trench or excavation.
- At least once daily, remove oil observed floating on the groundwater during excavation activities using a vacuum truck, absorbent pads, or other methods approved by the HEER Office. Excavations should not be backfilled until the floating oil is removed to the extent practicable, which is when further use of vacuum trucks, absorbent pads, or other approved methods does not result in further floating oil removal.
- If you intend to dispose of the groundwater off site, collect and analyze water samples as required by the disposal facility.
- **CAUTION**: Avoid releases of affected groundwater to surface water bodies or areas beyond the work area.
- If you are disposing of treated or untreated groundwater in accordance with a method approved by the HEER Office or by the City or County, provide the necessary notifications and record the information.

Provide information consistent with Section 14 on handling contaminated groundwater:

H.7

Free Product Management Plan

Prepared By **Organization:** _____ **Name:** _____ **Signature:** _____	**Free Product Management Plan** **Environmental Hazard Management Plan Factory Street Area, Honolulu** **Version:** **Reference:** **Date:**

Project Name: _____

Project Location: _____

Parties may use this sample as a basis for preparing their own site-specific Free Product Management Plan.

Revise this Sample Plan by:

1. Reviewing the requirements of this sample plan to ensure the construction worker can comply with its requirements, and modifying the plan, if necessary.

Implement this Plan by:

1. Making sure on-site workers are aware of this plan and the site-specific Health and Safety Plan (HSP), and that they follow both documents.
2. Making sure a copy of the completed plan is present at the construction site.
3. Accessing additional guidance for completing this form in Section15 of the EHMP.
4. Keeping a copy of the completed form for your records and sending a copy to the HEER Office.

Delete this box after completing this plan.

1. INTRODUCTION

These procedures are for handling free product encountered during excavation activities. Soil and groundwater may be impacted by petroleum hydrocarbons and may be encountered during soil excavation. Normally, free product is found floating on groundwater; however, it can also occur in oil- saturated soils. Purposes of these procedures are to: (1) protect construction workers from contact with petroleum hydrocarbons and inhalation of associated vapors, (2) protect the quality of surface water, and (3) provide guidance in the handling and disposal of free product.

2. FREE PRODUCT MANAGEMENT PROCEDURES

The following requirements apply to free product in soil or floating on groundwater encountered in an excavation:

- If free product is present in the extracted groundwater, it must be separated from groundwater and disposed of at an appropriate off-site facility prior to transfer of the groundwater into a nearby trench or excavation.
- At least once daily, remove oil observed floating on the groundwater during excavation activities using a vacuum truck, absorbent pads, or other methods approved by the HEER Office. Excavations should not be backfilled until the floating oil is removed to the extent practicable, which is when further use of vacuum trucks or absorbent pads, or other approved methods do not result in further floating oil removal.
- If free product is encountered in excavated soil, it must be separated from clean or moderately contaminated fill, profiled, and disposed of at an approved recycling/disposal site.
- Soil contaminated with free product cannot be used for backfill.
- **CAUTION**: Avoid releases of free product to the harbor or areas beyond the work area.

Provide details of how free product was managed (consistent with Section 15 of the EHMP) when encountered floating on groundwater or in soils:

H.8

Dust & Vapor Management Plan

Prepared By **Organization:** _____ **Name:** _____ **Signature:** _____	**Vapor/Fugitive Dust Management Plan** **Environmental Hazard Management Plan Factory Street Area** **Version:** **Reference:** **Date:**

Project Name: _____

Project Location: _____

Parties may use this sample as a basis for preparing their own site-specific Vapor/Fugitive Dust Management
Plan.

Revise this Sample Plan by:

1. Reviewing the requirements of this sample plan to ensure that the construction worker can comply with its requirements, and modifying the plan, if necessary.

Implement this Plan by:

1 Making sure on-site workers are aware of this plan and the site-specific Health and Safety Plan (HSP), and that they follow both documents.

2 Making sure a copy of the completed plan is present at the construction site.

3 Accessing additional guidance for completing this form in Section 14 of the EHMP.

4 Keeping a copy of the completed form for your records and sending a copy to the HEER Office.

Delete this box after completing this plan.

1. INTRODUCTION

These procedures are for handling fugitive dust and/or petroleum vapors encountered during excavation activities. Soil and groundwater may be impacted by lead or petroleum hydrocarbons and may be encountered during soil excavation. This type of contamination may produce dust or soil vapor that must be properly handled during and after construction activities. Purposes of these procedures are to: (1) protect construction workers from contact with contaminated dust and inhalation of associated vapors/lead-laden dust, (2) protect the quality of the surface water, and (3) provide guidance in the handling dust/soil vapors.

2. VAPOR MANAGEMENT PROCEDURES

If fugitive dust or volatile organic compound (VOC) vapors are encountered during excavation, appropriate response actions will be taken, and the actions will conform to Hawaii Department of Health (HDOH) and U.S. Environmental Protection Agency (EPA) regulatory guidelines. The response actions include ensuring that on-site workers have the appropriate level of personal protective equipment (PPE) and the general public is not affected adversely. Anticipated tasks associated with managing fugitive dust and VOC vapor exposure are summarized as follows:

If fugitive dust and/or VOC vapors are encountered during excavation activities, field oversight must be provided to identify VOC vapor and lead dust concentrations and provide health and safety guidance related to the potential exposure of workers to COCs.

- Air monitoring and dust monitoring will be conducted during excavation associated with future construction activities. Air monitoring will also be conducted when workers are required to enter excavations where PCS or free product is present or where high concentrations of lead > 800 mg/kg in soil were measured. The monitoring will include both workspace (on-site) and perimeter measurements.
- If warranted by the dust and/or air monitoring results, on-site workers will be notified of the need to upgrade PPE to include respiratory protection.
- Air monitoring required for confined space entry (if required) will be conducted by the contractor responsible for construction. Confined space entry and associated air monitoring requirements will be described in the site specific health and safety plan for construction.

Air monitoring required for confined space entry (if required) will be conducted by the contractor responsible for construction. Confined space entry and associated air monitoring requirements will be described in the site-specific health and safety plan (HSP) for construction.

3. Exposure Management Procedures

- Level D PPE will be appropriate for on-site workers under normal working conditions.
- Both workspace (on site) and perimeter (off site) dust and air monitoring will occur.
- Air monitoring will be conducted using a conventional photoionization detector (PID) to measure total VOC vapor concentrations.
- If VOC vapor concentrations in the workspace atmosphere exceed an 8-hour time-weighted average (TWA) of 500 parts per million (ppm) PPE requirements will be upgraded to Level C, and it may be necessary to implement a modified work schedule.

- If lead dust concentrations in the workspace atmosphere exceed an 8-hour time-weighted average (TWA) of 0.5 mg/m^3. Respirator requirements will be upgraded to half-face masked or higher as necessary as outlined in Section 14.2, and it may be necessary to implement a modified work schedule.

Provide details of how dust and soil vapor was managed (consistent with Section 14 of the EHMP) when encountered in groundwater or in soils:

H.9

Stormwater Management Plan

Prepared By **Organization:** _____ **Name:** _____ **Signature:** _____	**Stormwater Management Plan** **Environmental Hazard Management Plan** **Factory Street Area** **Version:** **Reference:** **Date:**

Project Name: _____

Project Location: _____

Parties may use this sample as a basis for preparing their own site-specific Stormwater Management Plan.

Revise this Sample Plan by:

1. Reviewing the requirements of this sample plan to ensure that the construction worker can comply with its requirements, and modifying the plan, if necessary.

Implement this Plan by:

1. Making sure on-site workers are aware of this plan and that they follow it.
2. Making sure a copy of the completed plan is present at the construction site.
3. Accessing additional guidance for completing this form in Section17 of the EHMP
4. Keeping a copy of the completed form for your records and sending a copy to the HEER Office.

Delete this box after completing this plan.

1. INTRODUCTION

If contaminated soil or groundwater is encountered during excavation, appropriate response actions will be taken, and the actions will conform to Hawaii Department of Health (HDOH) and U.S. Environmental Protection Agency (EPA) regulatory guidelines. The response actions include ensuring that these media are not exposed to stormwater. Anticipated tasks associated with managing stormwater are summarized below.

2. STORMWATER MANAGEMENT PROCEDURES

Field oversight will be provided during excavation activities conducted as part of construction. Purposes of the oversight are to identify contaminated media that could be exposed to stormwater runoff and to provide guidance related to controlling stormwater on the property. In addition, the weather will be monitored throughout each work day for signs of approaching storms and/or heavy rains.

Inspections of engineering stormwater controls will occur each day to minimize potential for exposure of contaminated media to stormwater runoff and minimize potential for contaminated stormwater to leave the construction site.

All construction will accord with the conditions of an HDOH-approved National Pollutant Discharge Elimination System (NPDES) permit for stormwater discharge associated with construction activity. Conditions of the permit include preparation of a Construction Site Best Management Practices Plan.

3. OPEN EXCAVATIONS

In the absence of engineering and administrative controls, lead-contaminated soil and/or groundwater exposed in open excavations could come into contact with stormwater, thus potentially contaminating the stormwater with contaminants of concern (COC). To prevent this, the following activities will occur:

- Where possible, excavations will be backfilled as soon as practicable to limit the time they are open and potentially exposed to stormwater runoff and direct precipitation.
- If not backfilled immediately, cover the excavation with a heavy steel plate.
- Where possible, the edges of excavations will be bermed, thus minimizing potential for entry of stormwater runoff.
- Open excavations will be inspected each day to minimize potential for direct precipitation to cause the excavation to overflow.

4. SOIL STOCKPILES

In the absence of engineering and administrative controls, excavated lead or petroleum-contaminated soil (PCS) stored in stockpiles could come into contact with stormwater, thus potentially contaminating the stormwater with COCs. To prevent this, the following activities will occur:

- Contaminated soil from the area of highest contamination will be immediately containerized (Figures 6a,b,c, yellow highlight).
- Soil stockpiles will be placed on plastic sheeting, and the sheeting will be bermed at the edges, thus minimizing potential for contact with stormwater runoff.
- At the end of each day, or in the event of a storm, the soil stockpiles will be covered with plastic sheeting, thus minimizing potential for contact with direct precipitation.
- The soil stockpiles will be inspected each day to ensure that the plastic sheeting is intact.

5. DEWATERING INFILTRATION PITS

In the absence of engineering and administrative controls, water in infiltration pits used for on-site dewatering could come into contact with stormwater. To prevent this, the following activities will occur:

- Where possible, infiltration pits will be backfilled as soon as practicable to limit the time they are open and potentially exposed to stormwater runoff and direct precipitation.
- Where possible, the edges of infiltration pits will be bermed, thus minimizing potential for entry of stormwater runoff.
- Infiltration pits will be inspected each day to minimize potential for direct precipitation to cause the pit to overflow.

Erosion and sediment control measures will be in place and functional before construction activities commence. These measures will be maintained throughout the construction period. If stormwater discharge from the site is anticipated, the following preventive measures may be implemented:

- Stormwater flowing toward active construction areas will be diverted using appropriate control measures, as practicable.
- Erosion control measures will be designed to handle the size of the disturbed or drainage area in order to detain runoff and trap sediment.
- Height of the property boundary can be increased using sandbags.
- Additional silt fencing will be added at affected property boundaries, if warranted.
- Berms surrounding soil stockpiles will be increased as necessary.
- Moveable booms will be available to contain spills.
- Absorbent pads will be employed if free product is observed in stormwater runoff.

Provide details of how stormwater was managed (consistent with Section 15 of the EHMP) when a significant storm event occurred during construction:

Appendix I

Environmental Hazard Management

Lead Fact Sheet

Appendix I

HAWAII STATE DEPARTMENT OF HEALTH

The **Hazard Evaluation and Emergency Response Office** (HEER Office) is part of the Hawai'i Department of Health Environmental Health Administration whose mission is to protect human health and the environment. The HEER Office provides leadership, support, and partnership in preventing, planning for, responding to, and enforcing environmental laws relating to releases or threats of releases of hazardous substances.

Lead in Hawaiian Soils: Questions and Answers

This fact sheet provides landowners, private citizens, farmers, developers, realtors, and others with an overview of the potential human health concerns associated with lead in soils in Hawai‘i. Additionally, this fact sheet discusses methods for reducing exposure to lead and provides resources for further information.

What is lead and how does it get in the soil?

Lead is a naturally occurring element that occurs in all soils, including Hawaiian soils, at low levels. Natural background levels of lead in soils are typically 10 to 75 mg/kg (milligrams of lead per kilogram of soil) but elevations in the range of 100-200 mg/kg, levels still considered below a significant long-term health hazard risk, can be found in isolated cases due to additional inputs from historic human activity. Higher lead levels in soils (e.g. >200 mg/kg) may be present from a variety of pollution sources related to historic or current human activities. Exposure to very high levels of lead can be toxic to humans and animals, causing serious health effects. Most childhood exposures to lead can be traced to lead-based paint or lead in batteries, jewelry, and other household items. Exposure to lead in soil can also be important, however.

Lead shot at a firing range. There are several sources of human-caused lead contamination that affect Hawai‘i’s soil and groundwater.

There are two main human-caused sources of lead in soils: the past use of lead-based paint in homes and the past use of leaded gasoline. Although lead in gasoline was phased out starting in the 1970s, years of leaded gasoline use means the soils adjacent to highways and roads have elevated lead levels. Studies in urban areas have shown that soil lead levels are highest around building foundations and within a few feet of busy streets. Lead from leaded gasoline is also found in soils affected by past releases from storage tanks and pipelines at gas station sites. Other human-caused sources of lead in soil include pipes and plumbing materials, roofing nails, and batteries. Some industrial sources of lead contaminate the soil as well. Lead shot at former and active firing ranges, scrap metal yards, and ash from burning lead-bearing wastes like painted wood and batteries can all contribute to lead contamination in soils. When lead is released to the air from industrial sources or vehicles, it may travel long distances attached to fine particles before settling to the ground, where it mixes with soil particles. Lead does not biodegrade in soils, but can be dispersed through natural or human soil disturbances over time or could be transported by erosion to adjacent areas.

The State of Hawai'i Department of Health's (HDOH) Hazard Evaluation and Emergency Response Office (HEER Office) is responsible for responding to releases of lead and other hazardous substances into the soil or groundwater, and overseeing cleanup efforts. Other state and federal agencies have complementary roles in helping to prevent and address lead contamination and exposure. Additional information for these other resources are included at the end of this fact sheet.

How are people exposed to lead in the soil?

Ingesting the soil is the primary source of exposure to lead in soil. Lead can also be inhaled with very fine soil particles during outdoor tasks (e.g. dust from yard work or construction work) or carried into houses as airborne dust, or on shoes, clothing, and pets where it gets on floors or other objects that residents then come in contact with.

Children are at risk of lead exposure from unintentional ingestion of soil through normal play activities.

Lead was added to paint as early as the Medieval ages to speed up drying and increase durability. The use of lead in house paint was banned by 1978 but it still exists in the interior and/or exterior paint of many older homes in Hawai'i. As a result, real estate sales must disclose the potential presence of lead based paint on buildings built before 1978. As the paint chips off, it falls to the ground where the lead-contaminated chips persist in the soil near the foundation. In addition, some older type roofing nails contain lead. Roofing nails have wide, flat heads and short shanks. Similar to the paint chips, as the roofing nails fall off and land adjacent to the foundation, lead can be leached from the nails and mix with soil.

Lead-based paint is still present in many homes in Hawai'i. Children are at risk from eating paint chips and flakes. The paint chips can also fall off the house exterior and get in the soil adjacent to the foundation where children may play.

People, and especially young children, may unintentionally swallow very small amounts of lead-contaminated soil through gardening or other normal outdoor work or play activities. Children frequently put their hands, toys, or other objects in their mouths, and these can often have small amounts of soil and dust on them that the child then swallows.

Exposure to lead can also result from eating produce grown in gardens with elevated soil lead levels, such as gardens near building foundations where deteriorated lead-paint may be present or gardens adjacent to busy roadways. In general, plants do not absorb or accumulate lead. A greater concern is the accidental ingestion of lead in soil or dust particles found on unwashed produce. Thorough washing of produce is especially important for root crops such as taro, carrots or sweet potatoes and leafy vegetables like fern heads, kale and lettuce due to the tendency of soil particles or dust to adhere to the surface of this produce.

What are the human health concerns of lead exposure?

Lead can be particularly harmful to pregnant women and young children. According to the U.S. Centers for Disease Control (CDC) lead poisoning is the most common and serious "environmental" disease affecting children. Children's bodies absorb more lead than adults do and their brains and nervous systems are more sensitive to the damaging effects of lead.

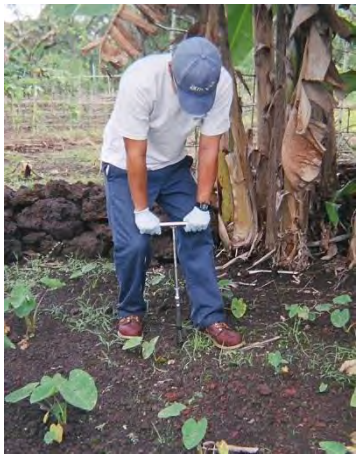
Lead can affect most every organ and system in the human body. Ingestion of large amounts of lead can cause seizures, coma and even death. Adults exposed to high levels of lead have had health symptoms that include: cardiovascular problems, increased blood pressure and incidence of hypertension; decreased kidney function; and reproductive problems (in both men and women).

Significant lead exposure to young children is typically traced to lead-based paint, batteries, jewelry, or other household articles rather than lead in soil. Exposure of children to even low levels of lead has been shown to result in behavior and learning problems, lower IQ and hyperactivity, slowed growth, hearing problems, insomnia, and anemia. Once absorbed by the human body, lead is difficult to remove. Consequently, limiting exposure to lead wherever possible is recommended.

How can I test to see if I have been exposed to lead?

If you have evidence or documentation of lead contaminated soils on your property (i.e. soils that exceed the state lead action levels) or if you think you or a family member may be experiencing symptoms of lead poisoning, you can contact your physician or local health department for information on blood lead testing. Any lead exposure testing should be recommended and conducted by a doctor or trained medical professional. A simple blood test is available to measure lead levels. Testing can determine if the level of lead in the body is higher or lower than the average person. The U.S. Center for Disease Control has updated its recommendations on children's blood lead level of concern for young children to 5 micrograms per deciliter of lead in the blood. The testing cannot determine the origin of the lead (for example soil or food) or whether the lead levels in the body will affect the person's health.

When should testing for soil lead be conducted?



This picture shows soil sample collection from a small garden. Gardens grown near house foundations or near busy roadways have the potential for elevated soil lead concentrations.

Residential or commercial buildings that were built before 1978 or are located near busy roadways may potentially have elevated lead in soil surrounding the foundation area or in soil near the busy roadway due to former use of lead-based paint on the structures or the former use of lead-containing gasoline by vehicles. If you suspect elevated levels of lead in your soil, you may want to have the soil tested. You can hire an environmental professional to conduct testing, or call the HEER Office for advice on sampling and laboratory analysis of any samples collected.

Lead in soil may be very unevenly distributed and therefore, a "Multi Increment" sampling approach for soil lead testing is advised. Multi Increment samples are typically large (weighing between 500-2,000 grams, or filling at least one-half of a gallon-size plastic bag) as each sample is made by combining many small soil increments that are collected from the area of interest. Lead tends to accumulate in the upper few inches of soil and does not move to any great extent in soils unless the soil has been disturbed by activities such as excavation for building or

tillage for landscaping and gardening (a low soil pH may also enhance the mobility of lead). Surface soil samples are typically collected using a small diameter (approximately 1 inch) hand-coring tool from the ground surface down to about 2 to 6 inches in depth, targeting the surface soil depth where exposure may be most likely for you or your family.

Soil testing is the only option to know for certain if levels are elevated, to what extent, and to what depth. Laboratories in Hawai'i that have facilities to analyze soils for lead content can be found in internet directories or in the phone book under "Environmental Analysis Laboratories" or "Analytical Laboratories". Laboratories should be contacted to confirm the services provided and to coordinate on sample collection and delivery details. Laboratories should dry and sieve the Multi Increment sample(s) they receive to analyze the ≤ 2 millimeter (mm) particle size soil fraction for total lead content.

How are soil lead testing data evaluated?

A professional environmental consultant can be hired or the HEER Office can be consulted for questions regarding the evaluation of your data and to provide recommendations. The HEER Office has established environmental action levels or standards for lead in soil. Total lead in soil concentrations should not exceed 200 mg/kg for residential properties and 800 mg/kg for commercial and industrial properties. The HEER Office environmental action levels were developed taking into consideration potential health risk determinations based on predicted bioaccessible lead levels. Bioaccessible lead levels take into account only the estimated proportion of total lead that will be absorbed in the digestive system and potentially contribute to human health risks (a portion of the lead stays tightly bound to soil particles and will not be absorbed).

If soil results show estimated total lead levels are above 200 mg/kg, young children and pregnant women should avoid contact with the bare soil. Cleanup actions may be warranted for residential properties where soil lead levels exceed 200 mg/kg. Total lead levels above 800 mg/kg are considered a potential concern even for commercial or industrial uses of a property, and warrants action to further evaluate lead levels in soil or evaluate and pursue cleanup options. Contact the HDOH HEER Office if testing indicates soil lead levels are above the applicable environmental action levels, and for specific advice on lead control or removal measures that should be taken.

How can I remove lead from the soil?

Currently, the best ways of dealing with high lead soils are to (1) if feasible, eliminate the lead exposure risk by physically removing the contaminated soil to an approved landfill, or (2) covering the lead-containing soils with clean soils. An additional potential method of reducing the hazard of lead in soils is geochemical fixation. Geochemical fixation uses a non-toxic chemical mixed into the contaminated soil to convert the potentially toxic form of lead into a compound less likely to be absorbed by the body if accidentally ingested or inhaled. Soil removal or remediation actions at sites where lead in soil exceeds HEER Office environmental action levels should be conducted by qualified individuals such as professional environmental consultants.

What can I do to prevent exposure to lead-contaminated soil?

If testing reveals elevated soil lead levels on your property, or you live or work in an area that may have elevated soil lead levels, the potential for exposure can be minimized through the following actions:

- Wash hands and face thoroughly after working or playing in the soil, especially before meals and snacks.

- Keep dense groundcover or permanent cover close to the house, roads, and driveways to prevent children from playing in soil where higher lead levels may be found.
- Keep children from playing in bare dirt. Keep toys, pacifiers, and other items that go into children's mouths clean.
- Plant gardens away from house foundations, roads, and driveways where lead levels in the soil may be higher. Have your garden soil tested for lead before you plant. Lime soils as recommended by a soils test; a soil pH of 6.5 to 7.0 will minimize lead mobility.
- Bring in clean sand for sandboxes and add soil known to be free of contamination to food garden areas. Raised garden beds with clean soils should be used if you know your soil has elevated lead concentrations.
- Wash fruits and vegetables from the garden with water before bringing them in the house. Wash again carefully with a 1% vinegar solution or soapy water to remove any remaining soil particles. Discard outer leaves before eating leafy vegetables. Pare root and tuber vegetables before eating. Do not compost the produce peelings and unused plant parts for use back in the vegetable garden.
- Avoid tracking soil into the home and clean up right away if soil is tracked in. Leave shoes at the door or use door mats. Keep pets from tracking soil into your home.

Further Information

For questions related to lead in soils and groundwater, lead sampling, lab analysis and lead testing reports, contact:

Hawai'i Department of Health,
Hazard Evaluation and Emergency Response Office
919 Ala Moana Boulevard, Room 206
Honolulu, Hawai'i 96814

Telephone: (808) 586-4249
Website: http://hawaii.gov/doh/heer

On Hawai'i Island: call the Hilo HEER Office at 808-933-9921

State of Hawai'i Indoor and Radiological Health Branch's lead program helps: (1) prevent exposure to lead and lead-based paint, and (2) maintains the State of Hawaii lead abatement accreditation, certification, and registration systems for lead abatement entities and individuals: http://health.hawaii.gov/irhb/lead/

State of Hawai'i Solid and Hazardous Waste Branch provides guidance on disposal of lead based paint waste and how to manage used lead acid batteries: http://health.hawaii.gov/shwb/files/2013/06/lbpwaste.pdf and http://health.hawaii.gov/shwb/files/2013/06/oldcbats1.pdf

State of Hawai'i Children with Special Health Needs Branch has a Childhood Lead Poisoning Prevention Program: http://health.hawaii.gov/cshcn/home/leadpp/

State of Hawai'i, Safe Drinking Water Branch provides subsidized lead and copper testing for individual homes served by catchment systems: http://health.hawaii.gov/sdwb/raincatchment/

Workplace exposures to Lead
Preventing lead exposures for workers such as those in construction, manufacturing, or other businesses is the

responsibility of the employer through compliance with applicable workplace safety and health regulations.

U.S. Environmental Protection Agency's (EPA) Lead Renovation, Repair and Painting Certification requires that companies performing projects that disturb lead-based paint in homes, child care facilities and pre-schools built before 1978 have their company certified by EPA or the State of Hawai'i, use certified renovators who are trained by EPA-approved training providers, and follow lead-safe work practice: http://www2.epa.gov/lead/renovation-repair-and-painting-program

State of Hawai'i Occupational Safety and Health Division (HIOSH) oversees safe and healthful working conditions for workers in Hawai'i. This includes inspecting workplaces to ensure workers are protected: http://labor.hawaii.gov/hiosh/ . For construction workers, see the guidance on OSHA's Lead in Construction Standard: https://www.osha.gov/Publications/osha3142.pdf

Other Resources for Lead Exposure:

Agency for Toxic Substances and Disease Registry's ToxFAQs website is a federal government website providing information and recommendations regarding lead: http://www.atsdr.cdc.gov/toxfaqs/index.asp

Centers for Disease Control (CDC) Lead Poisoning Prevention Program has information to help eliminate childhood lead poisoning in the United States: https://www.atsdr.cdc.gov/toxfaqs/tf.asp?id=93&tid=22

This fact sheet was created with assistance and funding from USEPA's Region 9 Superfund Division.

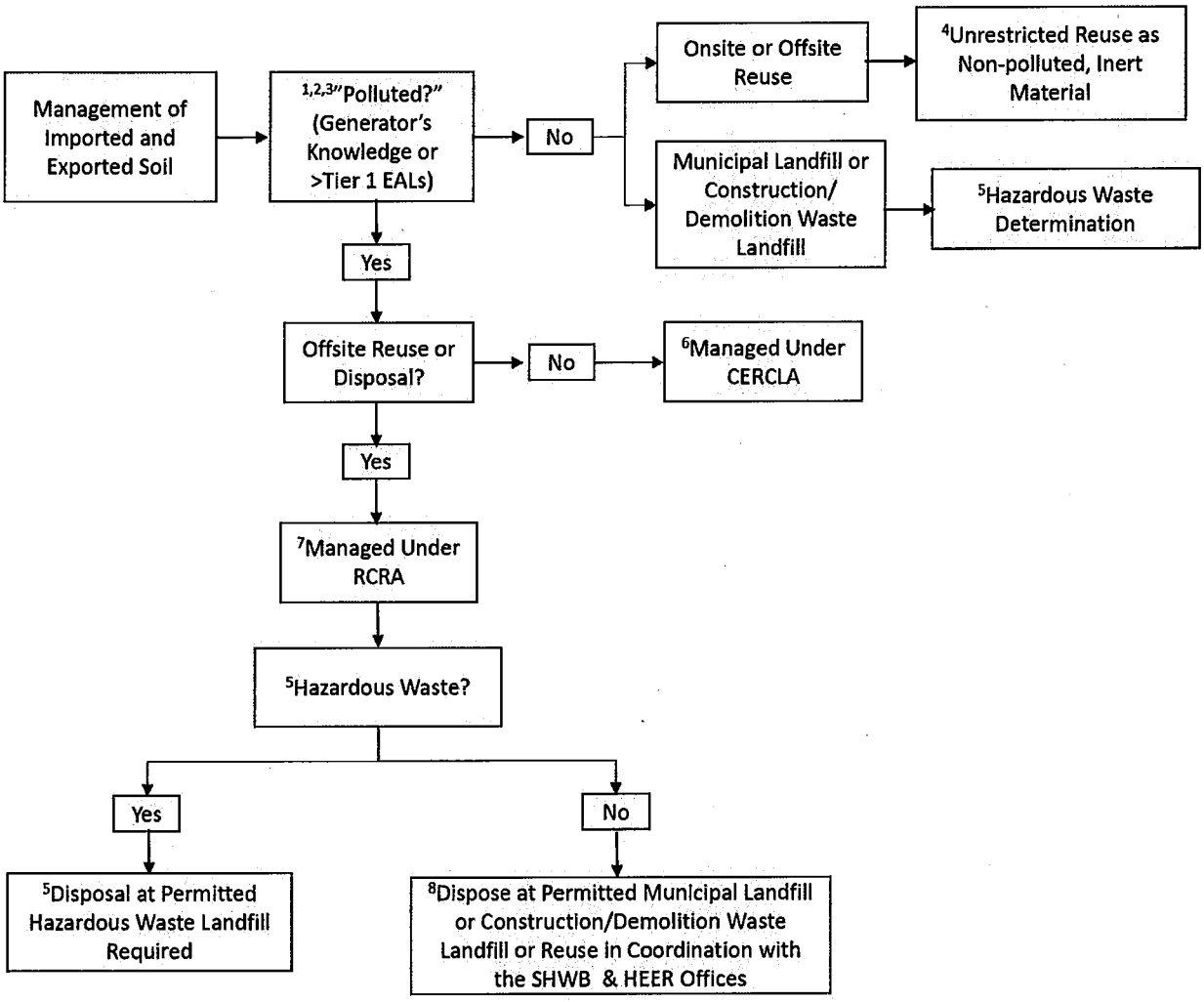
Appendix J

Environmental Hazard Management

Soil Disposal and Reuse Flowchart

Appendix J

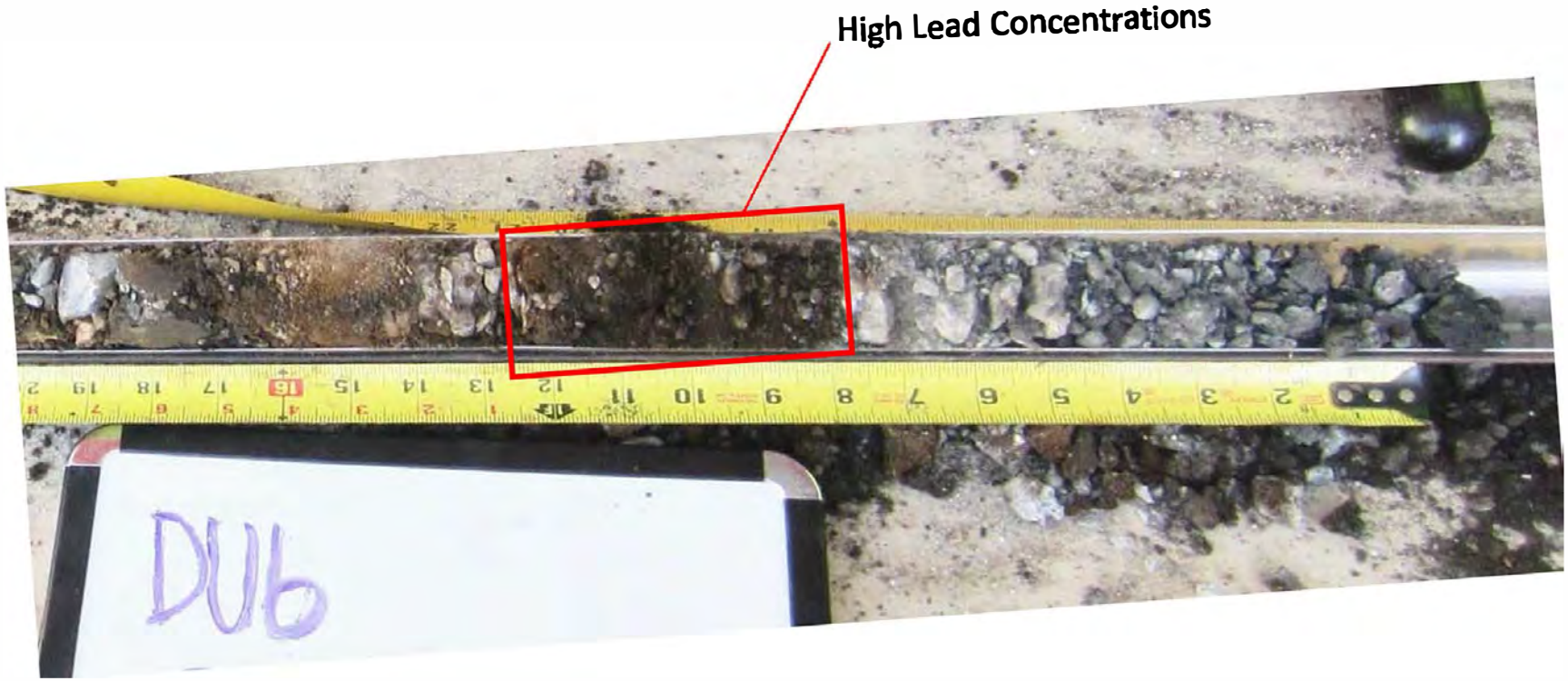
Figure 1. Flow chart depiction of the hazardous waste determination process for soil that is exported or imported to properties overseen by the HEER Office.



Appendix K

Environmental Hazard Management

Photographs of Lead Contaminated Soil



Brown to Black DU-6 Soil

Brown DU-6 Soil