

**APPLICATION FOR RISK-BASED CLEAN-UP
OF POLYCHLORINATED BIPHENYLS
894 MIDDLE STREET
BRISTOL, CONNECTICUT
REM ID No. 12906**

FOR:

City of Bristol
Bristol Development Authority
111 North Main Street
Bristol, CT 06010

BY:

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Nobis Project No. 90680.01
June 2017



June 28, 2017
File No. 90680.01

Ms. Kimberly Tisa
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5 Post Office Square, Suite 100
Mail Code: OSRR07-2
Boston, MA 02109-3912

Re: Application for Risk-Based Clean-up of Polychlorinated Biphenyls
894 Middle Street
Bristol, Connecticut
REM ID No. 12906

Dear Ms. Tisa:

On behalf of the City of Bristol, Nobis Engineering (Nobis) has prepared this Application for Risk-Based Cleanup and Disposal Approval of Polychlorinated Biphenyls (PCBs) at the property known as 894 Middle Street in Bristol, Connecticut (Site). This application has been prepared in accordance with 40 CFR 761.61(c) and the United States Environmental Protection Agency's (USEPA's) "Risk-Based Cleanup and Disposal Approval § 761.61(c) Checklist".

Relatively low levels of PCBs (generally less than 10 mg/kg) have been distributed across portions of this approximately 17-acre Site by the former operations of Laviero Metals. The objective of this application is to obtain the USEPA's approval to remediate the Site to meet industrial/commercial remedial thresholds for PCBs (i.e. PCBs less than 10 mg/kg or part per million).

Our remediation plan includes a combination or hybrid of self-implementing and risk-based clean-up and disposal options in 40 CFR 761.61. Therefore, the approval of the EPA Administrator is required. This application requests the USEPA's and the CTDEEP's approval of this Risk-Based Cleanup and Disposal Plan to meet the following primary and secondary objectives:

1. A primary objective is to mitigate seven areas where as-found PCB concentrations in soils exceed the state's Significant Environmental Hazard threshold of 30 mg/kg. These soils will be disposed at a permitted off-site disposal facility.
2. A primary objective is to excavate and dispose of soils containing as-found PCB concentrations more than 10 mg/kg to permitted off-site disposal facilities.
3. If project costs and regulatory approvals proposed under this plan allow, a secondary objective is to excavate and consolidate most impacted soils containing PCBs at concentrations less than 10 mg/kg to a "Soil Consolidation Area" located in a remote portion of the Site. Following remedial excavation, a large portion of the Site would meet residential criteria for PCBs. The remote western portion of the Site will consolidate impacted soils up to the industrial/commercial standard (PCBs less than 10 mg/kg) and will be capped. The Soil Consolidation Area would be the subject of an Environmental Land Use Restriction (ELUR); and,



4. Perform post-excavation soil sampling at alternate confirmatory sample densities than the 1.5 meter by 1.5-meter grid (or 5 foot by 5-foot grid), specified by 40 CFR 761.265. Based on the size of the impacted area and the results of previous PCB analyses, we propose variable confirmatory sampling grid sizes varying between 1.5-meter, 3-meter, and 9-meter.

The initial assessment of the Site was completed in accordance with an EPA Brownfield Assessment Grant administered by the Naugatuck Valley Council of Governments. The City of Bristol has appropriated additional funds and was awarded a \$1.3 million grant from the Connecticut Department of Economic and Community Development (DECD) in support of environmental remediation to return this property to productive use. On November 3, 2016, based on an application submitted by the City of Bristol, the Site was accepted into the Connecticut Department of Energy and Environmental Protection's (CTDEEP's) Voluntary Remediation Program under Connecticut General Statutes 22a-133x.

On behalf of the City of Bristol, we appreciate your review and ultimate approval of this plan. We are available to discuss this application and proposed remedial approach at your convenience.

Sincerely,

NOBIS ENGINEERING, INC.

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Project Engineer

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cc: Justin Malley, Bristol Development Authority
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Arthur Bogen, Naugatuck Valley Council of Governments
Ned Moore, Connecticut Department of Community and Economic Development
Patricia DeRosa, Connecticut Department of Energy and Environmental Protection
Gary Trombly, Connecticut Department of Energy and Environmental Protection
Jing Chen, Connecticut Department of Energy and Environmental Protection

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1.0 INTRODUCTION

On behalf of the City of Bristol, Nobis Engineering (Nobis) has prepared this Application for Risk-Based Cleanup and Disposal Approval of Polychlorinated Biphenyls (PCBs) at the property known as 894 Middle Street in Bristol, Connecticut (Site). This application has been prepared in accordance with 40 CFR 761.61(c) and the United States Environmental Protection Agency's (USEPA's) "Risk-Based Cleanup and Disposal Approval § 761.61(C) Checklist".

Relatively low levels of PCBs (generally less than 10 mg/kg) have been distributed across 5.6 acres of this approximately 17-acre Site from the former operations of Laviero Metals. The objective of this application is to obtain the USEPA's approval to remediate the Site to meet industrial/commercial remedial thresholds for PCBs (i.e. PCBs less than 10 mg/kg or part per million). This application requests the USEPA's and the CTDEEP's approval of this Risk-Based Cleanup and Disposal Plan to meet the following primary and secondary objectives:

1. A primary objective is to mitigate seven areas where as-found PCB concentrations in soils exceed the state's Significant Environmental Hazard threshold of 30 mg/kg. These soils will be disposed at a permitted off-site disposal facility.
2. A primary objective is to excavate and dispose of soils containing as-found PCB concentrations in excess of 10 mg/kg to permitted off-site disposal facilities.
3. If project costs and regulatory approvals proposed under this plan allow, a secondary objective is to excavate and consolidate the majority of impacted soils containing PCBs at concentrations less than 10 mg/kg to a "Soil Consolidation Area" located in a remote portion of the Site. Following remedial excavation, a large portion of the Site would meet residential criteria for PCBs. The remote western portion of the Site would consolidate impacted soils up to the industrial/commercial standards (10 mg/kg) and will be capped. The Soil Consolidation Area would be the subject of an Environmental Land Use Restriction (ELUR); and,
4. Perform post-excavation soil sampling at alternate confirmatory sample densities than the 1.5 meter by 1.5-meter grid (or 5 foot by 5-foot grid), specified by 40 CFR 761.265. Based on the size of the impacted area and the results of previous PCB analyses, we propose variable confirmatory sampling grid sizes varying between 1.5-meter, 3-meter, and 9-meter.

The initial assessment of the Site was completed in accordance with an EPA Brownfield Assessment Grant administered by the Naugatuck Valley Council of Governments. The City of Bristol has appropriated additional funds and was awarded a \$1.3 million grant from the Connecticut Department of Economic and Community Development (DECD) in support of environmental remediation to return this property to productive use. On November 3, 2016, based on an application submitted by the City of Bristol, the Site was accepted into the Connecticut Department of Energy and Environmental Protection's (CTDEEP's) Voluntary Remediation Program under Connecticut General Statutes 22a-133x.



2.0 SITE DESCRIPTION

The Subject Site consists of approximately 17-acres of industrially-zoned property located in Bristol, Connecticut. An Area Plan is provided as Figure 1. A Site Plan is provided as Figure 2.

No structures are currently located on-site, which is partially wooded and has unimproved access roads and clearings. As shown on Figure 2, existing Connecticut Light & Power (now Eversource) overhead electrical transmission lines roughly bisects the Site from the northwest to the southeast. Branches of the Eight Mile River are located along the west and southern boundaries of the Site. Eight Mile River flows towards the southwest.

The Site is bounded to the north by Enterprise Drive, and Luiza's Diner and A Place to Grow Too Daycare; to the east by Middle Street and the main campus for ESPN; to the south by residences, wooded and wetland areas; and, to the west by wooded area and the Bristol Resource Recovery Facility across Lake Avenue.

From approximately 1955 until about 1990, Laviero Metals owned the Site and performed metal recycling operations. The business received and recycled scrap metal from all manner of suppliers. The scrap metals included oil filled capacitors and transformers. Based on prior reporting, there were three main handling areas (Receiving, Storage, and a Burn Pit). Surficial debris remaining from the former metal recycling processes has been noted throughout the Site including broken electrical insulators, ceramic pieces, metals, brick, and copper wire. Additional information about the status of investigation and proposed remediation of the former Laviero Metals is summarized below.

3.0 CONCEPTUAL SITE MODEL

This section presents the Conceptual Site Model (CSM) for the Site. The CSM was developed based on data and evaluations presented in the Phase I Environmental Site Assessment (Phase I ESA) (GeoDesign, 2014) and the Phase III ESA report (Nobis, 2016). The CSM depicts the relationships between the factors necessary to assess contaminant extent, fate, and migration including:

- Environmental Setting;
- Site history and sources of soil contamination;
- Nature and extent of contamination; and
- Contaminant migration pathways, fate and transport.

3.1 SITE ENVIRONMENTAL SETTING

As shown on the USGS Topographic Map (see Figure 1) for the Bristol Quadrangle, the elevation of the Site is approximately 210 to 250 feet above mean sea level. Topographically, the Site slopes moderately to the south and west, toward Eight Mile River. Based on regional topography and drainage considerations, groundwater flow beneath the Site is inferred to be in a southwesterly direction. Groundwater flow patterns are subject to change based on natural variations and man-made influences, including former underground utilities and drainage.



According to the CT Environmental Conditions Online database¹, the Site is located within the Eight Mile River drainage basin (5201-00). Groundwater at the Site is classified "GB". The Connecticut Department of Energy and Environmental Protection's (CTDEEP) Water Quality Standards (WQS) defines Class GB groundwater as being located within a historically highly urbanized area or an area of intense industrial activity and where public water supply service is available. Such ground water may not be suitable for human consumption without treatment due to waste discharges, spills or leaks of chemicals or land use impacts². No aquifer protection areas were identified within a 1-mile radius of the Site.

The Eight Mile River, is located on the southeastern and western portions of the Site and is designated a Class "B" surface water. Class B surface waters are known or presumed to meet criteria which support designated uses such as habitat for fish and other aquatic life and wildlife; recreation; navigation; and industrial and agricultural water supply.

Surficial materials (i.e. "unconsolidated materials below the top 0 to 18-inch layer of developed soil") over most of the Site are mapped to consist mainly of very coarse to fine sand, commonly in well-sorted layers. Surficial materials in the wetland area in the southeastern portion of the Site are described as floodplain alluvium overlying undifferentiated coarse sand and gravel deposits (a/sg). Floodplain Alluvium (a) consists of sand, gravel, silt, and some organic material, on the floodplains of modern streams. The texture of alluvium commonly varies over short distances both laterally and vertically, and is often similar to the texture of adjacent glacial deposits. Along smaller streams, alluvium is commonly less than 5 feet thick. The alluvium overlies Sand and Gravel (sg) composed of mixtures of gravel and sand within individual layers and as alternating layers. Bedding may be distorted and faulted due to post-depositional collapse. It is likely that some deposits within this unit consist of gravel or sand and gravel overlying sand. It is less likely that some of these deposits are sand (fluvial deposits or delta-topset beds).

According to the Bedrock Geologic Map of Connecticut (Connecticut Geological and Natural History Survey, 1985) obtained online (<http://tmsc.org/geology/bedrock>) bedrock under the Site consists of New Haven Arkose. The New Haven Arkose is described as red, pink, and gray course-grained, locally conglomeratic, poorly sorted and indurated arkose, interbedded with brick-red micaceous, locally shaly siltstone and fine-grained feldspathic clayey sandstone. The depth to bedrock at Site is not known.

The City of Bristol GIS Database identified wetlands areas along the southern boundary Site and adjoining properties to the west and south. To support Site remediation, a wetlands survey and report were completed by David Lord, certified soil scientist and Civil1 of Woodbury, Connecticut.

¹ <http://ctecoapp1.uconn.edu/advancedviewer/>

² State of Connecticut Department of Environmental Protection, "Water Quality Standards", Effective February 25, 2011 and April 12, 1996.



The Site was not indicated on the CTDEEP's Natural Diversity Database (NDDDB) as having threatened or endangered species. Flood data was obtained from the online Federal Emergency Management Agency (FEMA) Map Service Center³. According to FEMA, the Site is situated outside the 500-year flood zone. The area bordering the Site to the West is situated within Zone A of the Eightmile River indicating no base flood elevations have been determined.

3.2 SUMMARY OF PRIOR ENVIRONMENTAL REPORTS

Prior environmental reports were reviewed as part of this application for Risk-Based Cleanup and Disposal. Pertinent findings and conclusions of the reports are summarized below.

3.2.1 Phase I ESA

Review of regulatory inspection reports for Laviero Metal's operations in the early 1980s identified compliance problems and releases to Site soils which resulted in enforcement actions. The CTDEP PCB Unit identified used transformers, oil filled capacitors, and other storage which was not in compliance with the regulations. Furthermore, Laviero Metals used open burning to remove insulation and other combustibles from metals prior to reclaim from the 1960s through the early 1980s. In January 1984, the CTDEP issued Administrative Order 3676. In July 1987, the USEPA issued Consent Agreement and Order TSCA-I-86-1015. The orders required that the facility be brought into compliance with environmental regulations and that the facility identify the degree and extent of soil and groundwater contamination.

The Phase I ESA identified that available documentation of remedial actions appeared to be incomplete. It was not clear that the orders were fully closed even though Laviero Metals performed potentially significant amounts of soil remediation at the Site. The record indicates that Laviero Metals assumed that the requirements of the two Orders had been met. We note that the environmental remediation and assessments were conducted prior to 1996, when the Connecticut Remediation Standard Regulations (RSRs) were finalized. Therefore, the remedial goals may have differed from current standards.

In March 2014, GeoDesign, Inc., issued a Phase I ESA report which identified six Recognized Environmental Conditions (RECs) at the Site. The locations of the RECs are shown on Figure 2.

REC-1: Former "Burn Area" – an area in the western portion of the Site where open burning was conducted to remove insulation from wires during metal reclamation operations. An unspecified amount of soil removal was completed in this area in the 1980s and 1990s.

REC-2: Former "Petroleum Stained Soil Area" – an area in the north-central portion of the Site where oils were reportedly released to the ground surface, possibly from electrical transformers brought to the Site for metals reclamation. An unspecified amount of soil removal was completed in this area in the 1980s and 1990s.

³ From Federal Emergency Management Agency website: <http://msc.fema.gov/portal>



REC-3: Former Subsurface Storage and/or Disposal of Wastewaters – Wastewaters generated from a former incinerator scrubber, wire rinsing operation and floor cleaning in the northeast portion of the Site went to a 20,000-gallon settling UST and then to a septic tank. The structures are no longer present but there is no documentation about the removals.

REC-4: Former Chemical Storage and Use - A former building was located in the northeastern portion of the Site. Chemical storage included chlorinated solvents and oils in and around the former Site building, as documented by Fire Marshall records. Such storage and use suggest the possibility of vapor intrusion issues. No significant volatile organic contamination has been identified at this location based on prior sampling. The structures are no longer present but there is no documentation about the removal.

REC-5: Former Bulk Oil Storage Tanks - Underground and aboveground bulk storage tanks in or adjacent to the former Site building in the northeastern portion of the Site. No significant volatile organic contamination has been identified at this location based on prior sampling. The structures are no longer present but there is no documentation about the removal.

REC-6: Existing Solid Waste Debris Piles - Miscellaneous areas of surface disposal of debris containing concrete, metal, tires, and wood were observed. The source(s) of the debris is/are not known.

Based on the information obtained, the Site is an “Establishment”, as defined by the Property Transfer Act (CGS 22a-134).

3.2.2 Contaminants of Concern

Based on the findings of the Phase I, the primary Contaminants of Concern (COCs) were identified as:

- PCBs located at all RECs but particularly at REC-1, REC-2 and REC-3;
- Volatile Organic Compounds (VOCs) at REC-4, REC-5, and REC-6;
- Extractable Total Petroleum Hydrocarbons (ETPH) at all RECs; and,
- Copper, Lead and Zinc at all RECs.

3.2.3 Phase II Assessment

A Phase II Assessment was conducted in accordance with an EPA-approved Quality Assurance Protection Plan (QAPP) (revised in August 2014) and attached in Appendix 1. All samples for PCB analysis were submitted to Phoenix Environmental Laboratories of Manchester, Connecticut for PCB analysis by EPA Method 8082 using Soxhlet extraction.

During the Phase II Assessment, fifteen composite soil samples were selected for the analysis of PCBs, as summarized on Table 1. PCBs were identified in ten of the fifteen composite soil samples submitted. The as-found PCB concentrations ranged from 770 µg/kg to 390,000 µg/kg or 0.77 mg/kg to 390 mg/kg. Of the ten identified composited soil samples, five soil samples exceeded remedial criterion (R-DEC of 1 mg/kg).



3.2.4 Phase III Investigation - Delineation of PCBs

Phase III delineation sampling was performed primarily for PCBs during various sampling rounds in 2015 through February 2016. For the Phase III Investigation, a significant focus was placed on delineating the horizontal and vertical extent of PCB contamination on a Site-wide basis. Soil samples were designated based on their location within a 100-foot square grid and then by depth interval. Using vibratory drilling methods and hand augers, soil samples were generally collected at the following depth intervals: 0 to 0.5 fbg (Figure 3A), 0.5 to 1.5 fbg (Figure 3B), 1.5 to 3.5 fbg (Figure 3C), and 3.5 to 5.5 fbg (Figure 3D). Deeper interval samples (e.g. 3.5 to 5.5 fbg) were not typically analyzed if PCBs were not detected in the soil sample above it. The sampling and analyses were performed in accordance with the approved QAPP.

Sampling locations and results are shown on Figures 3A through 3E. The laboratory data are summarized on Tables 1 and 2. Laboratory reports are included in Appendix 2. A total of 542 soil samples were analyzed and the data compared to remedial requirements.

As shown on Figures 3A through 3D, PCBs were detected over much of the Site, particularly in Laviero Metal's operational areas including the former Burn Pit (REC-1), the former Petroleum Stained Area (REC-2), and along an unimproved road where Laviero transported materials from one area to another. The highest as-found concentration of PCBs in soil was 7,900 mg/kg in the north-central portion of the Site (near grid C-5 on Figure 3A).

Near surface soils obtained in the central, northwestern, and southeastern portions of the site have PCB concentrations exceeding both I/C-DEC (10 mg/kg) and SEH thresholds (30 mg/kg). As-found PCB in soil concentrations of greater than 30 mg/kg and within 18-inches of the ground surface were identified in seven areas of the Site. Shallow soil contamination with PCBs above 30 mg/kg exceeds the CTDEEP's Significant Environmental Hazard (SEH) notification threshold under CGS 22a-6u. The locations of the seven "SEH" Areas are indicated on Figures 2 and 5. A Significant Environmental Hazard Notification was submitted to the CTDEEP. As a result of discussions with the CTDEEP, barriers were installed around the delineated SEH areas to prevent trespassers from inadvertently contacting the soils.

As shown on Figure 3C and 3D, soil samples obtained at depths greater than 1.5 fbg had sporadic PCB detections, the majority of which were significantly lower in concentration. There were no SEH or I/C-DEC exceedances and minimal exceedances of the R-DEC. The exception was in the southeastern corner of the Site, where elevated PCB concentrations (greater than 1 mg/kg but less than 10 mg/kg) have been identified in a low-lying outwash deposit that was formed from soils eroding from the area of the former Burn Pit (REC-1). PCB impacts in this area extend to a depth of approximately 5.5 fbg. Lower levels of PCBs are associated with some of the debris areas (REC-6).

General statistics of the Phase III PCB sample results can be summarized as follows:



Statistic	Total Number of Samples	Percent of Total
Total Samples Analyzed	542	---
Exceedance of SEH Threshold (30 mg/kg)	17	3%
Exceedances of I/C-DEC (10,000 ug/kg or 10 mg/kg)	34	6.3%
Exceedance of R-DEC (only) (1,000 ug/kg or 1 mg/kg)	137	25.3%
Detection without Exceedance of 1,000 ug/kg	48	8.9%
Samples with No PCBs Detected	357	65.9%

Aroclor	Number of Detects	Percentage of Total
PCB-1248	31	23.8%
PCB-1254	76	58.5%
PCB-1260	23	17.7%
Total Count	130	100.0%

The horizontal extent of PCB contamination was delineated on Figures 3A through 3D by manually extrapolating areas of PCB impacts to the nearest data point. The horizontal boundaries of the PCB Remediation Areas shown on the figures are bound by samples which were non-detected for PCBs.

3.2.5 SPLP Extractable PCBs

On April 11, 2017, Nobis obtained 14 soil samples for analysis of both total and extractable PCBs using the Synthetic Precipitation Leaching Procedure (SPLP). The objective of the sampling was to evaluate whether in-place soils containing total PCBs up to 10 mg/kg would leach PCBs at concentrations above the GB-PMC of 0.005 mg/l by SPLP. The samples were obtained in known areas of contamination at depths ranging from 0 to 0.5 fbg, except for samples obtained in the outwash area, located in the western portion of the Site. Because the outwash material is up to 5.5 feet thick, sample "Outwash 3" was obtained from three depth intervals: 0-0.5 ft, 0.5-1 ft, and 1-1.5 ft. The laboratory data is summarized on Table 3 and the data report is included in Appendix 2.

Total PCB concentrations ranged from 1,700 to 34,000 ug/kg in the fourteen samples analyzed. Twelve of these samples, with concentrations of PCBs ranging from 1,700 ug/kg to 15,000 ug/kg, were selected for additional analysis of SPLP extractable PCBs. The SPLP results were compared to the GB-PMC of 5 ug/l. The SPLP data can be summarized as follows:

- Of the twelve samples analyzed, "Sample Outwash 3" from a depth of 0.5-1 ft had SPLP extractable PCBs of 5.5 ug/l. This concentration exceeded the GB-PMC of 5 ug/l. No other exceedances of the GB-PMC were identified.
- Trace levels of SPLP extractable PCBs were detected in four of twelve samples with concentrations ranging between 0.5 to 2.1 ug/l.
- SPLP extractable PCBs were not detected in seven of the twelve samples, including sample "SEH-6 1" which had the highest total PCB concentration of 15,000 ug/l.



3.3 SAMPLING AND ANALYSIS FOR DIOXINS & FURANS

The US EPA requested an evaluation of the presence of dioxin as the result of Laveiro Metals' historic practice of burning electrical components in an open Burn Pit (REC-1). Dioxin is a Contaminant of Concern, particularly near REC-1 Burn Area, because combustion of PCBs at lower temperatures than complete incineration, can result in the formation of dioxins and furans.

The sampling was conducted to evaluate the co-existence of PCBs, polychlorinated dibenzo-p-dioxins (PCDDs), and polychlorinated dibenzofurans (PCDFs). The results of dioxin testing (which are reported as concentrations of numerous congeners and homologs) were converted by Pace Analytical Services, Inc. of Minneapolis, Minnesota (Pace Analytical) to the Toxicity Equivalent (TEQ) of 2,3,7,8-TCDD, per World Health Organization Protocol. This is standard practice for normalizing PCDD and PCDF results in a sample to the toxicity of 2,3,7,8-TCDD, which is the most toxic of the PCDDs and PCDFs.

On February 17, 2016, Nobis personnel obtained five shallow soil samples, at locations inside, adjacent to, and outside the former Burn Area (REC-1). The samples were collected at the following grid coordinates: C.625-3.375, D.6-2.2, E.5-2.1, H.1-1.1, and D.25-9.15. Previous soil sampling identified PCB impacted areas located near the former Burn Pit (REC-1) and the Petroleum Stained Area (REC-2). Sample H1-1.1 was collected from a depth of 0 to 2 feet below grade because this area had been filled by soils eroding from the area of the former Burn Pit. The other four samples were collected at 0 to 0.5 fbg.

Dioxin analyses were conducted by Pace Analytical in accordance with EPA Method 8290. Pace Analytical's laboratory report is included on the compact disk in Appendix 3.

Because the RSRs do not have established remedial criteria for dioxins/furans, Nobis performed a review of literature for previously approved clean-up criteria. We also derived draft direct exposure criteria, based on the risk assessment formula provided in the RSRs. The following clean-up standards are provided for comparison purposes only and have not yet been submitted for regulatory approval:

Dioxin TEQ - Direct Contact Soil Screening Levels (assumes 2,3,7,8-TCDD TEQ)	Residential (ng/kg)		Commercial/Industrial (ng/kg)	
	Cancer	Non-Cancer	Cancer	Non-Cancer
USEPA RSLs (Nov. 2015) ⁴ (80 kg adult)	4.8	51	22	720
CT DEC ⁵ (70 kg adult BW)	4.7	48.6	44	4000

⁴ U.S. EPA's Regional Screening Levels, Nov. 2015. <https://www.epa.gov/risk/regional-screening-levels-RSLs-generic-tables-november-2015> (accessed April 15, 2016)

⁵ Calculated in accordance with RCSA 22a-133k-2(b)(5) for both carcinogenic and non-carcinogenic substances. The calculated remedial criteria have not been approved by the CTDEEP.



3.3.1 Dioxin/Furan Sample Results

Total PCB Aroclor results from the dioxin samples ranged from 7 to 4,200 mg/kg or ppm. The Dioxin TEQ results ranged from 13 to 520 nanograms per kilogram (ng/kg or ppt). The highest concentrations of both total PCBs (4,200 mg/kg) and Dioxin TEQ (520 ng/kg) was identified in sample C.625-3.375 which was obtained north of the former "Burn Pit" (REC-1). Three samples (D.6-2.2, E.5-2.1, and H1-1.1) collected from the vicinity of the REC-1 Burn Remediation Area had Dioxin TEQ ranging from 72 to 370 ng/Kg.

The total PCBs and Dioxin TEQ results of the five samples can be compared as follows:

Contaminant	Units	Sample Designation, Depth, Location Description & Result				
		C.625-3.375 0-0.5 fbg	D.6-2.2 0-0.5 fbg	E.5-2.1 0-0.5 fbg	H.1-1.1 0-2.0 fbg	D.25-9.15 0-0.5 fbg
		North of REC-1: Burn Pit	North of REC-1: Burn Pit	Within REC-1: Burn Pit	South of REC-1: Burn Pit	REC-2: Oil Stained Area
Total PCBs	mg/kg	4200	180	82	18	7
Dioxin TEQ ⁶	ng/kg	520	370	72	200	13

All five analyzed soil samples were below the non-cancer based EPA Regional Screening Level (RSL) for Industrial/Commercial (I/C) use of 720 ng/kg and calculated CTDEEP I/C-DEC of 4,000 ng/kg. Four of five samples exceeded the cancer-based I/C-RSL of 22 ng/kg and calculated CTDEEP I/C-DEC of 44 ng/kg. The C.625-3.375 sample had the highest detected dioxin TEQ (520 ng/Kg), and is situated approximately 170 feet north of the REC-1 Burn Remediation Area.

3.4 OTHER CONTAMINANTS IN SOIL

As part of this remediation effort, a separate Remedial Action Plan will be prepared which identifies the means and methods for removing other Contaminants of Concern from the Site coincident with the PCB remediation.

The locations of other remedial criteria exceedances at the Site are shown on Figure 3E. In addition to PCBs in soil, ETPH and metals (specifically copper and lead) were detected above their respective I/C-DEC (lead and ETPH only) and R-DEC concentrations. As expected based on historical information, these exceedances are in the Former Burn Area (REC-1) in the southeast portion of the Site and the petroleum stained soil area (REC-2) in the central portion of the Site. There was a single ETPH exceedance in the northeast corner of the Site near the former 20,000-gal wastewater UST (REC-3). Generally, the EPTH and metals exceedances are horizontally co-located with PCB exceedances. Many of the ETPH and metals soil samples were collected from larger composited depth intervals (e.g. 0 to 39 inches below ground) so the vertical extent of these exceedances may need to be better determined.

⁶ Dioxin TEQ (2,3,7,8-TCDD Toxicity Equivalent)



In general, the exceedances of remedial criteria for other Contaminants of Concern co-exist with soils containing PCBs.

3.5 GROUNDWATER SAMPLING & RESULTS

As part of the Phase II ESA, five groundwater monitoring wells were installed in the shallow/overburden aquifer and designated MW-2R, MW-5, MW-6, MW-7 and MW-8. One existing groundwater well (UNK-MW3) was incorporated into the monitoring well network due to measurable groundwater. Groundwater samples were collected for constituents of concern using low-flow purging and sampling techniques⁷. Samples were selectively analyzed for VOCs, polynuclear aromatic hydrocarbons, PCBs, and dissolved metals, in accordance with the approved QAPP.

Laboratory results from the two groundwater samples selected for PCB analysis (MW-5 and MW-7) indicated that no PCBs were detected. The only exceedance of an applicable groundwater remedial criterion was dissolved copper in monitoring well MW-8. The groundwater concentration of 0.138 mg/l exceeded the Surface Water Protection Criterion of 0.0048 mg/l.

3.6 CONTAMINANT FATE AND TRANSPORT

Based on the findings of the environmental assessments, direct disposal of contaminated scrap metals, inadvertent spills, and burning of materials have resulted in contamination of surficial soils at the Site. Former ASTs and USTs on the Site may have also contributed to spillage, leakage, and other releases of contaminants to soil. Historic deposition of contaminants through discharges, dumping, and erosion are the primary transport pathways. In addition, the Site is accessible, via the Eversource right-of-way, to all-terrain vehicles which are redistributing impacted soils. Dynamic hydrologic conditions, including storm events, may continue to cause redistribution of contaminants. Figure 4 provides an illustrative view of our Conceptual Site Model.

At least five factors have influenced the degree and extent of the surficial contamination observed at the Site:

1. In the 1980s and 1990s, former soil remediation efforts were conducted by the responsible party, as required by orders issued by the CTDEEP and the USEPA. The degree and extent of the remediation is poorly documented such that areas of soil removal and post-excavation soil results are unclear. The remedial efforts were completed prior to the establishment of the current numeric remediation standards for contaminants of concern.

Based on the data, our CSM acknowledges that these remedial efforts likely removed many point sources and generally contaminated source areas from the Site. The contamination which remains is residual from these clean-ups, with a few exceptions where PCB concentrations greater than 500 mg/kg have been identified and which were presumably outside of the limits of previous soil removal efforts.

⁷ United States EPA Region I, "Low Street (low flow) Purging and Sampling Procedure for the Collection of Ground Water Samples from Monitoring Wells", July 30, 1996.



2. Soil erosion has occurred in a sloped area in the southwestern portion of the Site such that an outwash deposit of PCB contaminated sand appears to have encroached into an adjacent wetland area. The depth of the contamination in this area extends to approximately 5.5-ft, where the original grade and wetlands soils were encountered. Because of the well-drained sandy soils, significant deposition from water erosion has not been identified over other areas of the Site.
3. Trespassers on motorized all-terrain vehicles (ATVs) have actively used the Site over the last 20 years and created berms and other non-natural surface features. ATV access is primarily achieved via the electrical transmission line right of way, which passes through some significantly contaminated areas. Soils exhibiting PCBs more than 30 mg/kg have been fenced off to restrict further contact with these contaminated areas. In addition, warning signage has been posted around the perimeter and the interior of the property.
4. Although elevated concentrations of PCBs, metals, and ETPH were detected in the soil, these contaminants do not appear to have significantly impacted underlying groundwater quality. PCBs and ETPH exhibit low volatility, and have relatively low solubility in water. The PCBs and ETPH (organic contaminants) are readily sorbed to soil particles and humic matter. These organic contaminants can be mobilized by wind erosion or surface water runoff of surface soils. At depth, these contaminants exhibit very low solubility; therefore, are generally immobile and are unlikely to be mobilized by precipitation, infiltration and leaching.
5. Metals can be mobilized in the environment depending on the type of metal compounds present in the soil matrix. If the metal is a component of a soluble compound (i.e., salt), it can dissolve and migrate with precipitation runoff or infiltration into groundwater, or could be mobilized by wind erosion or runoff if adsorbed to particulate matter. If the metal is a component of a low solubility or insoluble compound (i.e., oxide, sulfide, etc.), then the metal ion adsorbed to particulate matter could be mobilized by wind erosion or surface runoff. At depth, low solubility metal compounds will generally be immobile under natural conditions. Based on the groundwater sampling to date, metals contamination is not a significant concern to groundwater.

3.7 REMEDIAL CRITERIA FOR PCBS

The state and federal limits for total PCBs in soil are as follows:

- Residential Direct Exposure Criterion (R-DEC) = 1 mg/kg
- Industrial/Commercial Direct Exposure Criterion (I/C-DEC) = 10 mg/kg
- Pollutant Mobility Criteria for GB groundwater (GB-PMC) = 0.005 mg/L, as tested using either the Synthetic Precipitation Leaching Procedure (SPLP) or Toxicity Characteristic Leaching Procedure (TCLP)
- In accordance with Connecticut General Statutes Section 22a-6u, PCBs in soils at concentrations exceeding 30 mg/kg and within 18-inches of the ground surface represent a Significant Environmental Hazard condition.



- In wetland areas, the remedial target will be the Limit of Detection (LOD), which will be in the range of 15 ug/kg to 30 ug/kg, dependent on the percent solids of a particular sample and potential matrix interference. This limit is based on a discussion with Ms. Traci Iott of the CTDEEP's ecological risk assessment group and Mr. Greg Lawrence of Phoenix Environmental Laboratories.

The RSRs allow that inaccessible soils impacted by PCBs can be remediated to 25 mg/kg if the area meets the definition of an "other restricted area" as defined by 40 CFR 761.123. This definition requires the area to be at least 0.1 km from a residential/commercial area.

In accordance with RCSA 22a-133k-3, the remedial criterion for PCBs in groundwater in a GB groundwater area is the Surface Water Protection Criteria (SWPC) of 0.0005 mg/L.

3.8 VOLUME AND MASS ESTIMATES OF PCB IMPACTS

As-found PCB concentrations are summarized on Figures 3A through 3D. Based on the results of the analysis of over 500 soil samples, it is estimated that the total area affected by PCB impacts greater than 1 mg/kg is approximately 2.5-acres. Based on the horizontal and vertical delineation of PCBs, the estimated volume and weight of PCB impacted soil are summarized as follows:

Range of PCB Concentration In Soil	Estimated Affected Area (acres)	Average Estimated Affected Depth (ft)	Estimated Volume (cu yd)	Estimated Volume with 25% Contingency (cu yd)	Estimated Mass (tons) (Mass = 1.5 tons/cu yd)
>1 ppm but <10 ppm	1.95	1	3,227	4,034	6,051
>10 ppm but <30 ppm	0.35	1.25	706	882	1,323
Hotspot Soils > 30 ppm	0.31	0.75	375	469	703

We have estimated that the depth of excavation required to achieve the residential criterion for PCBs, outside of the areas of high concentration, ranges between 0.5 and 1.5 feet (or an average of 1 foot). These estimates are based on interpolation of sampling points and as-found concentrations of PCBs in soils. The presence of heterogeneous soil conditions, the potential for spot releases in various portions of the Site with varying concentrations, and other factors may impact the estimates. To account for unknowns, we have included a 25% contingency on the volume estimates for soils exhibiting various PCB concentrations above standard.

4.0 SUMMARY OF REMEDIAL OPTIONS & COSTS

The following sections identify the remedial objectives for the Site, the preferred clean-up plan for a Risk Based Cleanup Option, and the basis for this application. This application has been prepared in accordance with 40 CFR 761.61(c) and the United States Environmental Protection Agency's (USEPA's) "Risk-Based Cleanup and Disposal Approval § 761.61(c) Checklist".

The estimated PCB remediation area or area impacted by PCB releases above 1 mg/kg covers an approximate 2.61-acre area and is shown on Figure 5. The objective of this application is to obtain the USEPA's approval to remediate PCB contaminated soils to support the beneficial reuse of the Site for industrial/commercial purposes. The western/southwestern portion of the Site, would be remediated to meet industrial/commercial standards. A 3.4-acre area in the western portion of the Site area is proposed to contain a Soil Consolidation Area (SCA) consisting of soils



excavated from other areas of the Site which have been sampled to demonstrate that they contain as-found PCB concentrations below the industrial/commercial threshold of 10 mg/kg. An ELUR restricting residential use and notifying for the presence of PCBs will be applied to the property deed, as needed. Following remedial earthwork, the western 3.4-acres of the Site will potentially be developed into a fuel cell energy park or other industrial use.

Our remediation plan includes a combination or hybrid of self-implementing and risk-based clean-up and disposal options in 40 CFR 761.61. Therefore, the approval of the EPA Administrator is required. Consideration of alternative remedial options and associated costs is also provided below.

4.1 CLEAN-UP OBJECTIVES

We propose two clean-up objectives for the Site to support two proposed future uses and to also complete the remediation as cost-effectively as possible. The remedial objectives, means, and methods are summarized below.

1. A primary objective is to excavate, segregate, and dispose of approximately 703 tons of PCB Remediation Waste soils exhibiting as-found PCB concentrations more than 30 mg/kg and up to 7,900 mg/kg from seven locations on-site. The soils will be transported to permitted off-site disposal facilities. Soils which have as-found PCB concentrations greater than 30 mg/kg and within 18-inches of the ground surface represent a Significant Environmental Hazard, as defined by the CTDEEP. This removal action will mitigate the Significant Environmental Hazard issue.
2. Another primary objective is to excavate, segregate, and dispose of approximately 1,323 tons of PCB Remediation Waste soils exhibiting as-found PCB concentrations in excess of 10 mg/kg but less than 30 mg/kg at permitted off-site disposal facilities. This will remove areas of PCB contamination greater than the industrial/commercial direct exposure criterion (10 mg/kg). The Site is currently zoned commercial and industrial.
3. A secondary objective is to excavate and consolidate soils containing as-found PCB concentrations greater than 1 mg/kg but less than 10 mg/kg from the Site to a Soil Consolidation Area (SCA) in the remote western portion of the Site (refer to Figure 5). This would potentially allow the 13.6-acres of land that makes up the northern and eastern portion of the Site (see Figure 2) to meet residential remedial standards for PCBs (less than 1 mg/kg). The SCA is also important to facilitate the removal of PCB contaminated sand which has impacted two wetland areas.

The SCA will be constructed to allow approximately 4,000 to 5,500 tons of low level PCB contaminated soil to be capped in the western portion of the Site. The size and volume of the SCA can be modified, as needed. The SCA is intended to render the soils inaccessible, as defined by RCSA 22a-133k-2(a)(32). Furthermore, the reuse of the polluted soil on-site will be designed to comply with the provisions of the RSRs related to the reuse of polluted soil (RCSA Section 22a-133k-2(h)(2)).



It is anticipated that the eastern portion of the Site, from Middle Street up to and including the Eversource right-of-way, may be shown to meet residential standards for PCBs (PCBs < 1 mg/kg). In the event the PCB remediation does not achieve residential standards on the eastern portion of the Site, due to cost, persistent detections above the 1 mg/kg standard, or other factors, these soils may be rendered inaccessible or isolated, in accordance with the RSRs and an ELUR restricting residential use will be placed on the entire 17-acre Site. The Site is currently zoned for commercial/industrial use.

4. The southwestern 3.4-acres of the Site will be remediated to meet the industrial/commercial standard for PCBs. Up to 5,500 cubic yards of contaminated soils from other areas of the Site, which exceed residential criteria but are below industrial/commercial criteria, will be consolidated and capped in the SCA area. This remote portion of the property is planned for industrial/commercial use including potential natural gas fired fuel cells. The fuel cells are remotely operated and require limited maintenance. Therefore, the proposed use meets the definition of a low occupancy area per the regulations⁸.
5. Following completion of remedial excavation, the SCA will be capped and the western 3.4-acres of the Site redeveloped for a fuel cell energy park or for other industrial/commercial use. The 3.4-acres will be the subject of an Environmental Land Use Restriction (ELUR) to prevent residential use in perpetuity and notify for the presence of PCBs.
6. This Application for Risk-Based Cleanup of PCBs proposes to perform post-excavation soil sampling at alternate confirmatory sampling densities than the 1.5-meter by 1.5-meter grid (or 5 foot by 5-foot grid), specified by 40 CFR 761.265. Based on the sizes of the impacted areas and the previous PCB analyses, we propose variable confirmatory sampling densities varying between 1.5-meter, 3-meter, and 9-meter grid centers. The remediated areas where the highest as-found concentrations of PCBs were excavated will have the highest sample density to demonstrate the effectiveness of remediation. The proposed sampling designs are summarized below.

4.2 EVALUATION OF REMEDIAL OPTIONS

Our evaluation of remedial options focused on the amount of soils containing various as-found concentrations of PCBs and the federal and state regulatory requirements that apply. State remedial standards have differing requirements which apply to soils containing greater than: 1 mg/kg, 10 mg/kg, and 30 mg/kg (or parts per million). EPA regulations apply more directly to PCB Remediation Wastes and have varying thresholds and requirements that apply to concentrations greater than 1 mg/kg, 10 mg/kg, and 50 mg/kg.

⁸ Low occupancy area means any area where PCB remediation waste has been disposed of on-site and where occupancy for any individual not wearing dermal and respiratory protection for a calendar year is: less than 840 hours (an average of 16.8 hours per week) for non-porous surfaces and less than 335 hours (an average of 6.7 hours per week) for bulk PCB remediation waste



In preparing this application for risk-based cleanup of PCBs, the cost for the removal and disposal of varying concentrations of PCB contamination soils, estimated soil volumes and weights, and additional costs (verification sampling, groundwater monitoring, engineered controls etc.) were estimated based on the as-found PCB concentrations. For the purposes of this plan, and to be conservative with respect to PCB remediation waste handling and disposal, the CTDEEP's SEH threshold of 30 mg/kg was applied as the equivalent of the EPA's requirements for PCB remediation wastes containing greater than 50 mg/kg. The estimated remedial costs for various scenarios are itemized in Appendix 4 and are summarized below.

4.2.1 Off-Site Disposal of PCBs Greater Than 30 mg/kg

Table 2 in Appendix 4 provides estimated costs to excavate and dispose off-site an estimated 703 tons of contaminated soils with PCB concentrations above and including 30 mg/kg (the SEH limit) and then capping, environmentally isolating, and the on-site management of contaminated soils with PCBs greater than 1 mg/kg and up to 29 mg/kg, in accordance with a presumed Engineered Control Variance approval from the CTDEEP. The anticipated regulatory requirements and cost considerations for this option include:

1. Preparation of applications and approvals of risk-based closure, remedial action plans, wetlands permitting, and public notice;
2. Preparation of an application for an Engineered Control Variance for anticipated approval by the CTDEEP, including estimated costs for financial assurance, maintenance and monitoring for 30 years;
3. Remedial earthwork and off-site disposal of soils containing PCBs greater than 30 mg/kg. Due to regulatory permitting requirements, multiple disposal facilities may be required;
4. Construction of a 1-acre landfill cap (assumed flexible membrane liner) to render soils containing PCBs less than 30 mg/kg environmentally isolated;
5. Preparation of Environmental Land Use Restrictions for the western portion of the Site to restrict residential use and permit the isolation of PCB containing soils;
6. Closure verification soil sampling and reporting; and,
7. Closure confirmation groundwater monitoring.

This cost is estimated to be \$1,531,466⁹, as summarized on Table 2 in Appendix 4.

4.2.2 Off-Site Disposal of PCBs Greater Than 10 mg/kg

Table 3 in Appendix 4 provides estimated costs to: excavate and dispose off-site an estimated 703 tons of contaminated soils with PCB concentrations above and including 30 mg/kg (the SEH limit); excavation and off-site disposal of an estimated 1,323 tons of soil with PCB concentrations above and including 10 mg/kg; and, then consolidating, capping, rendering environmentally inaccessible contaminated soils with PCBs greater than 1 mg/kg and up to 10 mg/kg in an on-site Soil Consolidation Area. The anticipated regulatory requirements and cost considerations for this option include:

⁹ Costs include remediation for other contaminants



1. Preparation of applications and approvals of risk-based closure, remedial action plans, wetlands permitting, and public notice;
2. Remedial earthwork and off-site disposal of approximately 703 tons of soils containing PCBs greater than 30 mg/kg. Excavation and off-site disposal of an estimated 1,323 tons of soil containing PCB concentrations greater than 10 mg/kg and less than 30 mg/kg. Due to regulatory permitting requirements, multiple disposal facilities may be required;
3. Construction of a Soil Consolidation Area to accept soils with PCB concentrations up to 10 mg/kg. These soils would be rendered environmentally inaccessible (but not isolated) per the CTDEEP. Such a remedy would not require an approved Engineered Control Variance or related financial assurance obligations;
4. Preparation of Environmental Land Use Restrictions for the western portion of the Site to restrict residential use and permit the isolation of PCB containing soils;
5. Closure verification soil sampling and reporting; and,
6. Closure confirmation groundwater monitoring.

This option is anticipated to cost approximately \$1,429,709, as summarized on Table 3 in Appendix 4.

4.2.3 Off-Site Disposal of PCBs Greater Than 1 mg/kg But Less Than 10 mg/kg

Tables 4A and 4B in Appendix 4 provide estimated costs to: excavate and dispose off-site an estimated 703 tons of contaminated soils with PCB concentrations above and including 30 mg/kg (the SEH limit); the excavation and on-site capping of up to 17,150 tons of soils containing PCB up to 10 mg/kg (Table 4A) or the excavation and off-site disposal of 17,150 tons of the same PCB-contaminated soils (Table 4B).

To ensure removal of impacted soils to the remedial objective of less than 1 mg/kg, soils would be excavated from the entire 5.6-acre area of PCB impact to an average depth of 2-feet below grade. This level of off-site disposal is intended to remove residual PCBs remaining in soils above the lowest remedial threshold of 1 mg/kg. The anticipated regulatory requirements and cost considerations include:

1. Preparation of applications and approvals of risk-based closure, remedial action plans, wetlands permitting, and public notice;
2. Remedial earthwork and off-site disposal of 703 tons of soils containing PCBs greater than 30 mg/kg and excavation, off-site disposal of an estimated 18,150 tons of soil containing PCB concentrations greater than 1 mg/kg and up to 30 mg/kg off-site or off-site disposal of soils containing PCBs from 10 mg/kg to 30 mg/kg and the on-site consolidation of remaining soils containing PCBs above 1 mg/kg. Due to regulatory permitting requirements and tipping fees, multiple disposal facilities would be required;
3. Closure verification soil sampling and reporting; and,
4. Closure confirmation groundwater monitoring.

The estimated cost to consolidate contaminated soil in an on-site Soil Consolidation Area is estimated to be \$2,026,459 (Appendix 4 Table 4A). Due to the large volume of soil to be rendered inaccessible and Site physical constraints (easements, wetlands, etc.), multiple SCAs may be needed.



The cost for disposal of 17,150 tons of soil containing as-found PCBs above 1 mg/kg is estimated to be approximately \$3,125,086 (Appendix 4 Table 4B). No land use restrictions or other administrative controls would be required upon successful removal of PCB contaminated soils above 1 mg/kg.

4.3 SELECTED REMEDIAL OPTION

Based on the considerations summarized above and the estimated cost implications of various remedial options, the selected remedial option includes removal and off-site disposal of all soils containing PCBs equal to or greater than 10 mg/kg (estimated 2,026 tons), as summarized above in Section 4.2.2. Under the selected scenario, approximately 4,034 cubic yards of soils with as-found PCB concentrations below 10 mg/kg would remain on-site and be rendered inaccessible and/or isolated under a Fuel Cell Energy Park or other industrial use. An ELUR would be placed on the property deed to prevent residential uses of the property in perpetuity. The Site is currently zoned for commercial purposes.

The selected option described in Section 4.2.2 is the most cost-effective (\$1,429,709) and efficient remedial solution and supports industrial/commercial reuse. If additional volumes of contaminated soils were encountered, the volume of the Soil Consolidation Area could be expanded. The SCA would be constructed to conform with regulatory requirements. In this case, an Environmental Land Use Restriction would be applied to the property deed record to render the soils inaccessible in perpetuity and to restrict residential use. The reuse of the polluted soil will be completed consistent with Section 22a-133k-2(h)(2) of the RSRs (Use of Polluted Soil and Reuse of Treated Soil).

5.0 RISK-BASED PCB REMEDIATION PLAN

The remedial plan has been divided into four phases (Phase I through Phase IV), as summarized below. Soils will be excavated, starting with those containing the highest concentrations, as indicated on Figures 3A through 3D. The work is intended to be completed in phase order to establish and maintain Site control and to minimize the potential for cross-contamination or recontamination of remediated areas. The flowchart provided as Figure 6 diagrams the soil removal and confirmatory sampling decision-making criteria.

5.1 PUBLIC NOTICE OF REMEDIATION

At least forty-five days prior to the start of work, public notice of remediation will be completed in accordance with the Remediation Standard Regulations. Public notice will be completed by two of the following three methods:

- Providing public notice of the remediation in the public notices section of a newspaper which has a substantial circulation in the area; and/or
- Notification of adjacent landowners of the planned remedial action by certified letter; and/or,
- Erecting and maintaining for at least thirty (30) days a legible sign not less than six feet wide by four feet high that is clearly visible from a public roadway and states that "ENVIRONMENTAL CLEAN-UP IN PROGRESS AT THIS SITE. FOR FURTHER INFORMATION CONTACT: ***** AT ###-###-####".



5.2 PERMITTING

On June 8, 2017, an application to conduct remedial activities in regulated wetlands areas was submitted to the City of Bristol Wetlands Commission. The application is included in Appendix 5. The application requests permission to perform remedial excavations within wetland regulated areas (i.e., wetlands and associated 100-foot buffer areas). Wetlands permit applications to the CTDEEP Inland Water Resources United States Army Corps of Engineers and the Town of Southington are currently being prepared. This application has taken into consideration the requirements to remediate and restore impacted wetland areas and minimize damage to ecological resources in the future.

CTDEEP permit applications will be prepared as may be required to complete remedial earthwork at the Site. At this time, we anticipate applying to the CTDEEP for a:

- a. General Permit for the Discharge of Stormwater and Dewatering Wastewaters from Construction Activities. The stormwater general permit must be filed 75 days prior to the start of work;
- b. General Permit Registration for the Discharge of Groundwater Remediation Wastewater to a Sanitary Sewer (to allow discharge of dewatering wastewaters from wetland areas during removal of impacted soils), and,
- c. General Permit for Contaminated Soil and/or Sediment Management (Staging and Transfer).

5.3 PHASE I: SITE PREPARATIONS

The following sections summarize the activities which will be initiated prior to the start of remedial earthwork. Work areas for Phase I activities are identified on Figure 7.

Site work will be performed by personnel who have the requisite knowledge and experience to completely meet the remedial objectives and regulatory requirements of this plan. All site work will be completed by personnel who have received training in accordance with OSHA regulations 29 CFR 1910.120 (Hazardous Waste Operations and Emergency Response).

The selected remedial contractor will complete site preparations, which are considered Phase I of the project. The Contractor will be responsible for: securing the Site using perimeter fencing and signage; restricting access and delineating work areas; establishing work zones; installing sedimentation and erosion controls; and constructing waste storage areas for unloading and loading.

5.3.1 Establishment of Work Zones

A Support Zone (SZ), Contamination Reduction Zone (CRZ), and Exclusion Zone (EZ) will be established for the project as summarized below:

- The EZ will be established to delineate PCB contaminated soils that are subject to this remedial action. The remediation area comprises approximately 5.6-acres of the Site. Equipment used in the EZ will be dedicated and confined to the EZ until decontamination and verification wipe sample analyses are completed for PCBs or pre-approved



decontamination procedures are completed using performance-based organic decontamination fluids (PODFs). Decontamination and verification sampling are further discussed below.

- The CRZ will establish the area where decontamination of personnel and equipment is performed and will be a restricted area between the EZ and the SZ where decontamination and wash facilities will be made available.
- The SZ will include temporary facilities (access routes, utilities, trailers, decontamination pads) intended to support construction activities. The SZ is proposed to be in the eastern portion of the Site. Support zone personnel are responsible for alerting emergency services (if necessary) and copies of all site plans, including telephone numbers, evacuation/hospital maps, and vehicle keys will be kept in the SZ.

Construction laydown areas will be prepared in the SZ, with the decontamination pad located on the edge of the CRZ leading into the SZ; such that personnel and equipment can only access the SZ once decontamination has been performed.

5.3.2 Installation of Sedimentation and Erosion Controls

Erosion and sedimentation controls will be installed around the perimeter of the PCB remediation area in accordance with local approvals, regulations, and guidance. Erosion and sedimentation controls will be installed along the perimeters of work areas and maintained until remedial earthwork is complete. Sedimentation and erosion control requirements are included in the City of Bristol Wetlands Application in Appendix 4 and on Figure 12.

To minimize the generation of dust in the remediation areas, water sprays and mists will be used.

5.3.3 Construction of Waste Storage and Staging Areas

A waste storage and loading area is proposed in the eastern end of the Site, in the general vicinity indicated on Figure 7. Soil stockpiles will be used to temporarily store excavated soil and debris for profiling and waste characterization purposes prior to off-site disposal (soils containing PCBs > 10 ppm) or consolidation on-site (soils containing PCBs less than 10 ppm). The stockpiles will be segregated based on expected PCB concentrations, per the results of prior sampling results. The soil stockpiles will be covered with plastic liners 6-mil (minimum). Soil stockpiles will be maintained in covered and good condition when not actively being managed and in accordance with a Contaminated Soil Stockpile General Permit.

5.3.4 Clearing & Grubbing

Once the work areas are set-up and erosion controls are installed, the remediation areas will be cleared and grubbed of trees, brush, and vegetation. Vegetative materials will be stockpiled within the EZ in the same areas they were generated, chipped, sampled for waste characterization purposes and disposed in accordance with the analytical results.



5.4 PHASE II SOIL EXCAVATIONS

Phase II excavations will address soils delineated to contain PCBs greater than 30 mg/kg. The flowchart provided on Figure 6 diagrams the soil removal and confirmatory sample decision-making criteria for Phase II soil excavations. Figures 8 and 9 shows the seven areas which will be excavated to a depth of about 0.5-foot to 1-foot below existing grade. We estimate approximately 703 tons of soil containing PCBs greater than 30 mg/kg and up to 7,900 mg/kg (SEH soils) will be generated.

The seven SEH areas will be systematically and carefully excavated to prevent redistribution of the high concentrations of PCB contamination. Excavating outside of the limits of the SEH areas will not be allowed. The excavated soils will be temporarily stockpiled in the eastern portion of the Site, and placed in the Waste Storage Area prepared during Phase I activities. Once waste characterization samples are analyzed and disposal approvals are obtained, the soils will be loaded onto permitted dump trailers for transportation for off-site disposal at a permitted secure TSCA landfill.

SEH Areas 6 and 7, located in the southwestern and south-central portions of the Site, are located within designated wetland areas. These SEH areas will be remediated in accordance with wetland approvals. The wetland application for the City of Bristol is included in Appendix 4. The targeted clean-up standard for PCBs in wetlands areas is the analytical Limit of Detection, as summarized above in Section 3.7. If dewatering is necessary to allow for the removal of the impacted soils, the dewatering wastewaters will be handled in accordance with the dewatering general permit to the sanitary sewer. Under the general permit, the discharge limit for total PCBs in dewatering wastewater is 1 ug/l.

5.4.1 Phase II Confirmatory Soil Sampling

Confirmatory soil sampling will be completed to demonstrate the SEH areas have been abated. Following each phase of excavation, confirmation samples will be collected as discrete samples in accordance with 40 CFR 761.289(b)(1)(i). Figures 9A and 9B show the proposed confirmation sampling grid at each of the seven areas.

Confirmation soil samples will be designated "PII" for Phase II, then by the SEH area, then by the grid designation (e.g. row and column), and then by the depth (e.g. PII-1-A1/0-0.5'). All samples will originally be obtained from a depth of 0 to 0.5-feet immediately following excavation. Samples will be obtained on a 5-foot grid (or 1.5-meter). Because of the high concentrations of PCBs delineated in the SEH areas, only discrete soil sampling is proposed. Based on the estimated areas, the following number of confirmatory soil samples will be generated:



SEH Area Designations	Estimated Area (sq ft)	No. of Samples on 5' (1.5m) Centers
1	875	35
2	1,769	71
3	3,173	127
4	5,198	208
5	825	33
6	1,197	48
7	504	20
Total	13,541	542

The samples will be analyzed for PCBs by EPA Method 8082 and Soxhlet extraction. The sampling means and methods, including QA/QC and data validation procedures, will be conducted in accordance with the QAPP provided in Appendix 1.

Per the decision flow chart provided as Figure 6, if a soil sample result exceeds a PCB concentration of 30 mg/kg, an additional 6-inches of soil will be excavated from the grid location (10' by 10' area) and an additional four discrete sample will be collected for analysis. This procedure will be repeated until all soil samples within the SEH area are below 30 mg/kg. The CTDEEP will be notified once the SEH condition has been abated.

5.5 PHASE III SOIL EXCAVATIONS

Phase III excavations will address soils containing PCBs at concentrations greater than 10 mg/kg but less than 30 mg/kg. We estimate that approximately 1,323 tons of soil will be generated from excavating the seven areas identified on Figure 10 to a depth of about 1-foot to 1.5-feet below existing grade. The flowchart on Figure 6 diagrams the soil removal and confirmatory sample decision-making criteria for Phase III soil excavations.

The seven areas will be systematically and carefully excavated to prevent redistribution of PCB contamination. Significant excavation outside of the limits of the six areas will not be allowed unless deemed necessary by confirmatory sample results. The excavated soils will be temporarily stockpiled in the prepared Waste Storage Area located in the eastern portion of the Site. Once disposal approvals are obtained, the soils will be loaded onto permitted dump trailers for off-site disposal at a permitted TSCA landfill or other disposal facility.

5.5.1 Phase III Confirmatory Soil Sampling

Confirmatory soil sampling will be completed to demonstrate that seven areas have been abated to concentrations less than 10 mg/kg. Confirmatory sampling in the Phase III excavation areas is proposed to be completed on a 10-foot (or 3 meter) grid. Figure 11 shows the proposed confirmation sampling grid at each of the seven areas.

Confirmation soil samples will be designated "PIII" for Phase III, then by the area designation, then by the grid designation (e.g. row and column), and then by the depth (PIII-2-H5/0-0.5'). All samples will originally be obtained from a depth of 0 to 0.5-feet immediately following excavation. All samples will be obtained on a 10-foot grid (or 3-meter). Only discrete



soil sampling is proposed. Based on the estimated areas, the following number of confirmatory soil samples will be generated:

Phase III Area Designations	Area (sq ft)	No. of Samples on 10' (3m) centers
1	1,064	11
2	1,202	12
3	5,846	58
4	8,438	84
5	891	9
6	3,673	37
7	1,910	19
Total	21,960	230

The samples will be analyzed for PCBs by EPA Method 8082 and Soxhlet extraction. The sampling, including QA/QC procedures, will be conducted in accordance with the QAPP provided in Appendix 1.

Per the decision flow chart provided as Figure 6, if a soil sample result exceeds a PCB concentration of 10 mg/kg, an additional 6-inches of soil will be excavated from the grid location (20 foot by 20-foot area) and an additional four discrete sample will be collected for analysis. This procedure will be repeated until all soil samples within the seven subject areas are below 10 mg/kg.

5.6 PHASE IV SOIL EXCAVATIONS

Based on regulatory approval requirements, decisions by the City of Bristol, and contractor cost estimates, it may be possible to meet residential remedial standards on the entire 5.6-acres of affected property located to the east of and including the Eversource easement. If conducted, Phase IV excavations would be completed on the eastern portion of the Site from Middle Street westerly up to and including the Eversource powerline easement (total of an additional approximately 2-acres). Soils will be excavated to a depth of 1 to 2 feet below existing grade to address soils previously delineated to contain PCBs at concentrations greater than 1 mg/kg. Phase IV excavations will be conducted from east to west towards the location of the Soil Consolidation Area to minimize the potential for cross contaminating the clean subgrade. We estimate that up to approximately 6,050 tons of soil would be generated which would then be placed within the SCA, identified on Figure 11. The flowchart on Figure 6 diagrams the soil removal and confirmatory sample decision-making criteria for Phase IV soil excavations.

The soils will be systematically and carefully excavated to prevent redistribution of PCB contamination. Significant excavation outside of the vertical and horizontal limits of the area will not be allowed unless deemed necessary based on confirmatory sample results. The excavated soils will be transported to the SCA in the western portion of the Site where they will be placed, compacted, and capped.



5.6.1 Construction of Soil Consolidation Area

The location of the SCA is depicted on Figure 11. A profile of the conceptual SCA is depicted on Figure 11A.

The final design of this area will be adjusted based on: the final volumes of soils to be consolidated and capped; regulatory requirements to be developed as part of the approval of this risk-based clean-up plan; and, the requirements of the final beneficial reuse of the Site (e.g. fuel cell energy park or another industrial/commercial user).

Construction of the SCA will include clearing the area and excavating and stockpiling clean fill to approximately Elevation 210. The bottom elevation of the SCA (Elv. 210) is approximately 4-feet above the seasonal high groundwater table. Contaminated fill will not be placed below the seasonal high groundwater table. Due to topography, the ground surface along the eastern, western and southern portions of the SCA will need to be sloped and the slopes temporarily stabilized. The SCA will receive soils containing as-found PCB concentrations less than 10 mg/kg. After completion of remedial excavations, a warning layer/liner (layer of orange snow fence or equivalent material) will be placed to delineate the top and bottom of the PCB contaminated fill. PCB contaminated soils will be capped and rendered inaccessible/isolated by the foundation system for the fuel cells or 2-feet to 4-feet of clean fill. The final grade of the SCA will be completed at approximately Elv. 215 and will consist of gravel.

5.6.2 Remediation of Southwestern Wetland Area

Once required wetland approvals are obtained, remaining PCB impacted soils will be removed from the wetlands regulated areas in accordance with the wetland approvals. The wetland application for the City of Bristol is included in Appendix 4. The targeted clean-up standard for PCBs in wetlands areas is the analytical Limit of Detection, as summarized above in Section 3.7. If dewatering is necessary to allow for the removal of the impacted soils, the dewatering wastewaters will be handled in accordance with the dewatering general permit to the sanitary sewer. Under the general permit, the discharge limit for total PCBs is 1 ug/l.

5.6.3 Phase IV Confirmatory Soil Sampling

Confirmatory soil sampling will be completed over the 9 areas shown on Figure 11 have been abated to concentrations less than 1 mg/kg. Confirmatory sampling in the Phase IV excavation areas is proposed to be completed on a 30-foot (or 10 meter) grid. Figure 11 shows the proposed confirmation sampling grid at each of the nine areas.

Confirmation soil samples will be designated "PIV" for Phase IV and then by the grid designation (e.g. row and column), and then by the depth (e.g. PIV-F10/0-0.5'). All samples will be obtained from a depth of 0 to 0.5-feet immediately following excavation. All samples will be obtained on a 30-foot grid (or 10-meter). Only discrete sampling is proposed. Based on the estimated areas, the following number of confirmatory soil samples will be generated:



Phase IV Area Designation	Area (sqft)	No. of Samples on 30' (9m) centers
1	22,445	25
2	7,331	8
3	1,581	2
4	10,318	11
5	734	1
6	29,115	32
7	504	1
8	30,109	33
9	7,268	8
Total	109,405	122

Per the decision flow chart provided as Figure 6, if a non-wetland soil sample result exceeds a PCB concentration of 1 mg/kg, an additional 6-inches of soil will be excavated from the grid location 30 foot by 30-foot area) and an additional four discrete samples will be collected within the grid for analysis. This procedure will be repeated until all soil samples within the subject area are below 1 mg/kg. In a wetland area, if the PCB concentration exceeds the Limit of Detection (presumed to be in the range of 15 ug/kg to 30 ug/kg), an additional 6-inches of soil will be excavated from the grid location 30 foot by 30-foot area) and an additional four discrete samples will be collected within the grid for analysis.

5.7 DECONTAMINATION PROCEDURES

Decontamination procedures will be performed on equipment that comes into contact with PCB contaminated soil in accordance with 40 CFR Part 761.79 and the Standard Operation Procedure included in Appendix 5. The following steps will be followed to ensure that equipment is decontaminated:

- A decontamination area will be located in the northeastern portion of the Site. All equipment used in the EZ will be cleaned and wipe tested for PCBs before leaving the remediation area. Equipment used in remediation activities will be decontaminated by power washing, scrub brushes, and organic solvents. Decontamination procedures are attached in Appendix 6.
- Reusable field sampling equipment will be decontaminated prior to soil collection at each sample location to prevent cross-contamination of samples.
- Unless it is decontaminated, field sampling equipment will be disposed of at a PCB permitted facility.
- Wash water will be collected in 55-gallon drums or a settling tank and disposed of off-site in accordance with federal regulations.



- Wipe sampling will be conducted on equipment used in remediation prior to leaving the EZ as follows:
 - Wipe sample areas will be 100 cm² (40 CFR 761.310).
 - One wipe sample will be collected from each square meter for equipment with a surface area of up to three square meters (40 CFR 761.302).
 - For equipment with an area greater than three square meters, three wipe samples, or one wipe sample for every ten square meters (whichever results in the greater number of samples) will be collected (40 CFR 761.302).
 - For equipment with irregularly shaped surfaces, every square meter will be sampled (40 CFR 761.302)
 - If wipe sample results indicate the presence of PCBs below a concentration of 10 µg/cm³, equipment can be removed from the Site (40 CFR 761.79).

5.8 OPERATION AND MAINTENANCE

Once all PCB contaminated soil is either excavated and disposed off-site (or capped within the SCA), operation and maintenance (O&M) and institutional controls will be initiated. This includes inspection and maintenance of the SCA area, stormwater controls, and surveyed benchmarks. Inspection will be conducted to identify areas of concern or in need of repair (e.g. settlement of cover, erosion in vegetated areas). Annual inspection reports outlining findings will be prepared and will recommend corrective actions to the City of Bristol. Maintenance and/or corrective actions will be required as concerns are identified.

Institutional or administrative controls, such as an environmental land use restriction (ELUR), will be placed on all or a portion of the property to control land use and prohibit activities which might disrupt contaminated soils in the Soil Consolidation Area. At a minimum, the southern portion of the Site (south of the overhead electrical transmission lines and in the area of the SCA) will have an Industrial/Commercial ELUR (residential use restriction) recorded on the property deed. In addition, engineered controls such as fencing and signage will be installed to discourage access and limit potential exposures to trespassers. Institutional controls will be reviewed through annual inspections and reporting. Engineered controls may not be necessary depending on the timing of redevelopment of the property and/or concentrations of PCB impacted soils which are left on-site.

6.0 PROPOSED FUTURE DEVELOPMENT

The eastern two-thirds of the Site (from and including the overhead Eversource easement to Middle Street) will be remediated to meet industrial/commercial standards for PCBs (less than 10 mg/kg) and will be made available for commercial development. The most remote western portion of the Site will be remediated to meet industrial/commercial standards for PCBs (less than 10 mg/kg) and may also be used to consolidate soils containing PCBs. These soils will be placed in a Soil Consolidation Area which can be designed to store between 4,050 to 5,500 cubic yards of soils in place.

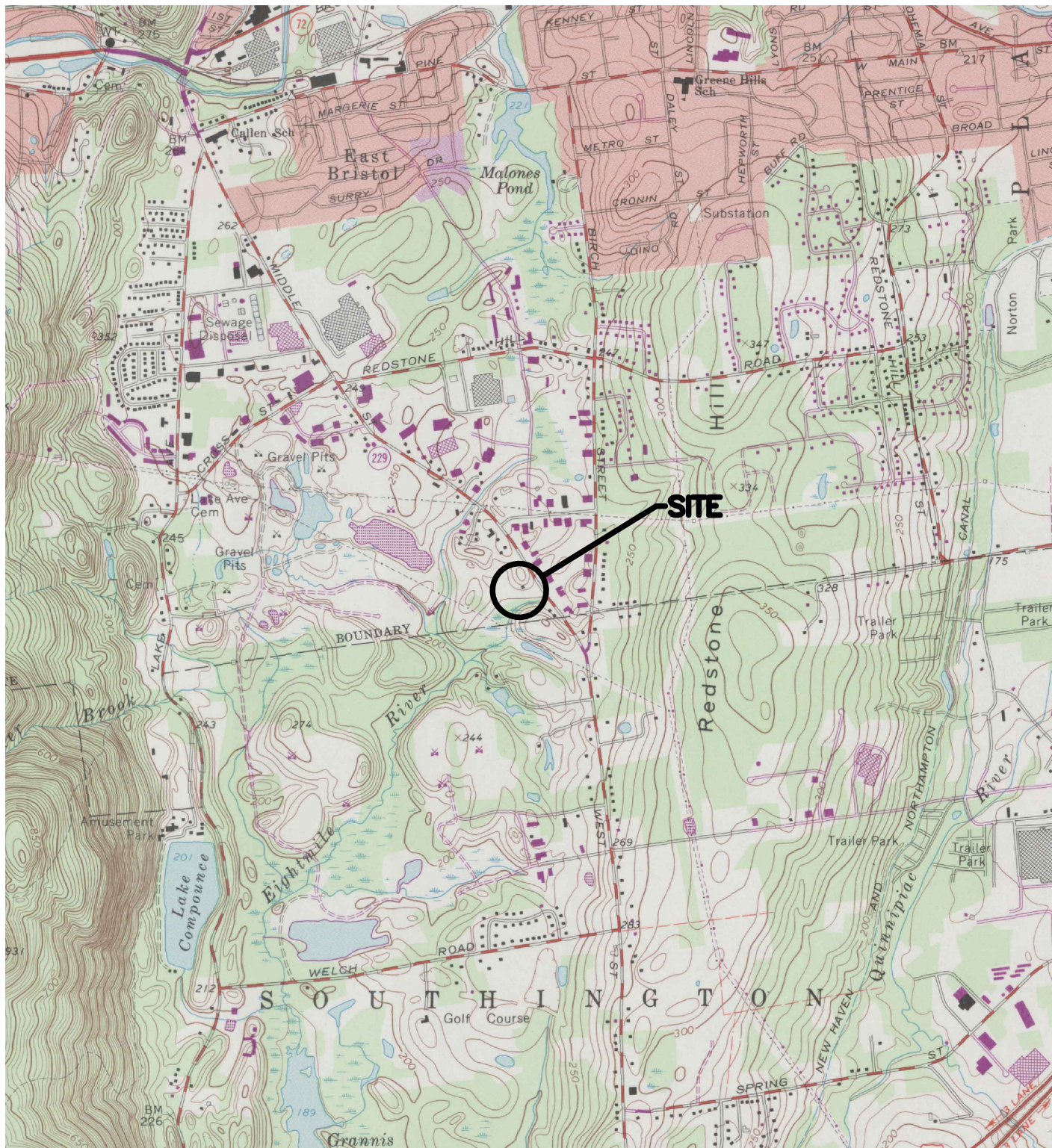


7.0 SCHEDULE

Immediately following EPA's approval of this plan, the City of Bristol is prepared to submit a Request for Proposal to qualified remedial contractors to complete the work. The approved Risk-Based Remediation Plan will be a critical document to guide the successful completion of the work. The city will also complete the public notice requirements specified in Section 5.1 above.

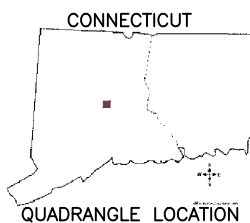
The City of Bristol is committed to meet the remedial objectives and to complete this remediation in as timely a fashion as possible and based on the anticipated regulatory approvals.

FIGURES



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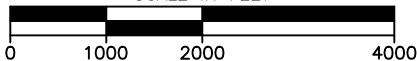
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LOCUS PLAN 894 MIDDLE STREET BRISTOL, CONNECTICUT

REFERENCE:
U.S.G.S. 7.5 MINUTE QUADRANGLE: BRISTOL, CONNECTICUT. 1984

SCALE IN FEET



PROJECT NO. 90680.01

DATE JUNE 2017

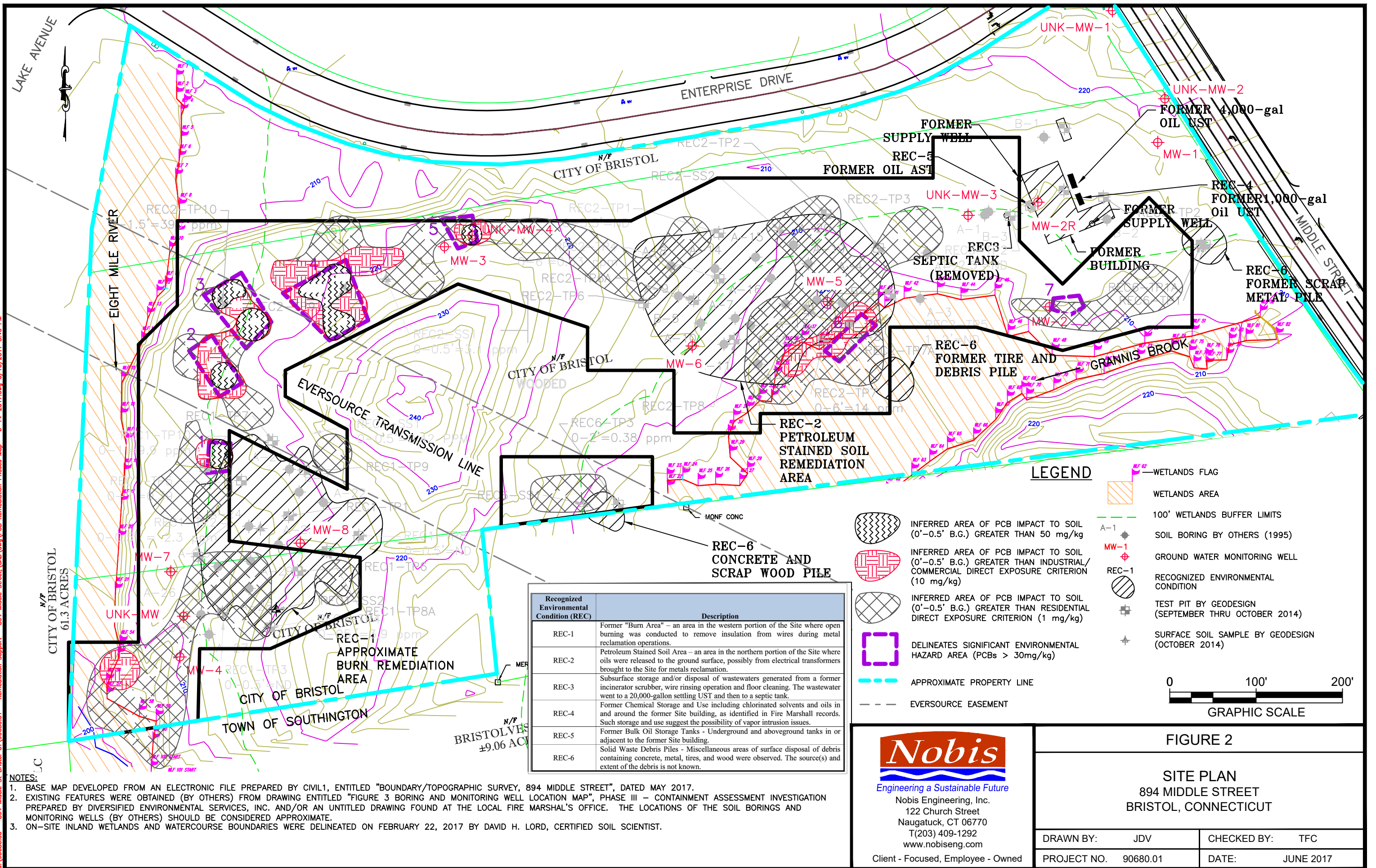
FIGURE NO. 1

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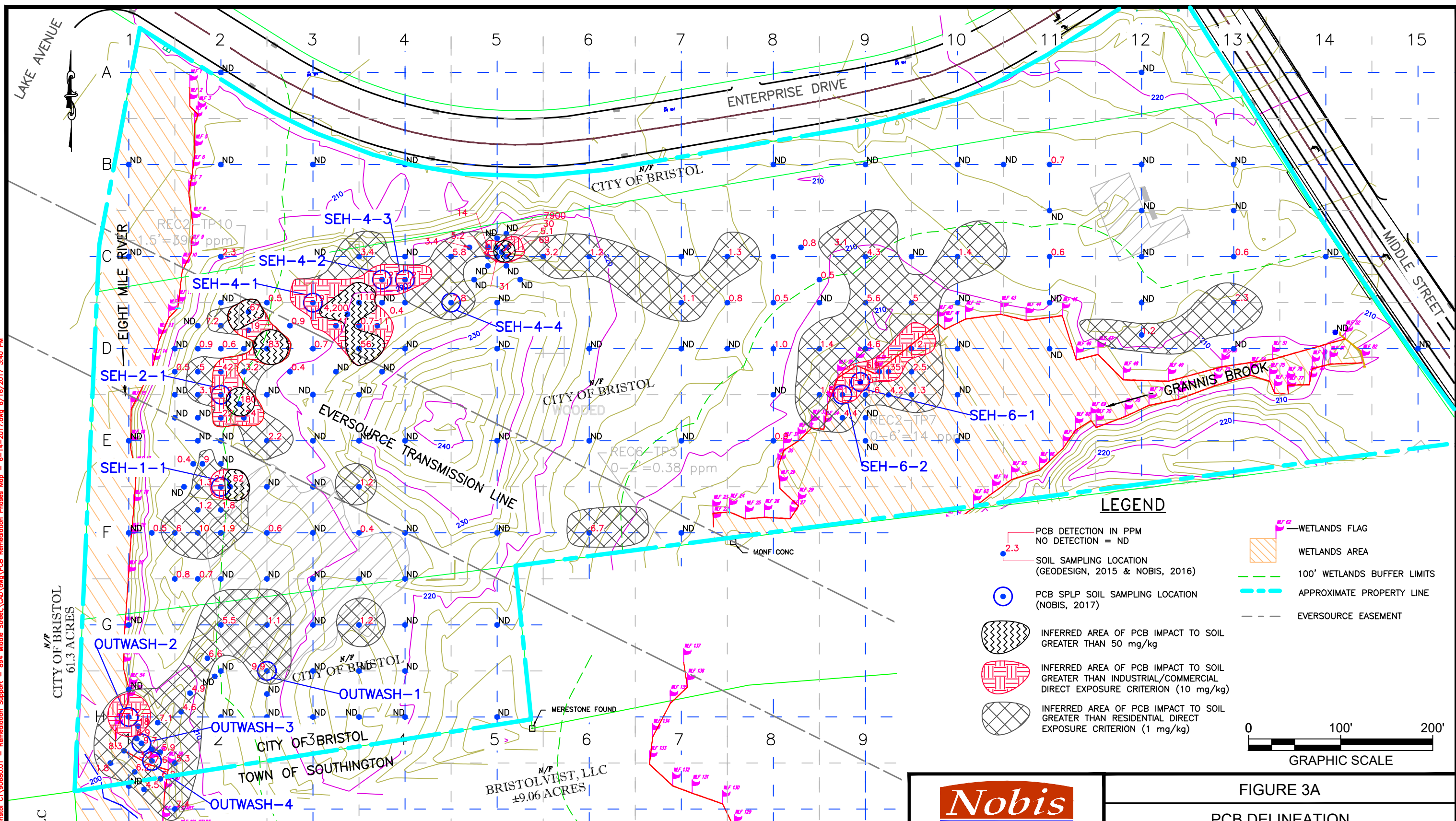
JDV

REVIEWED BY:

TFC



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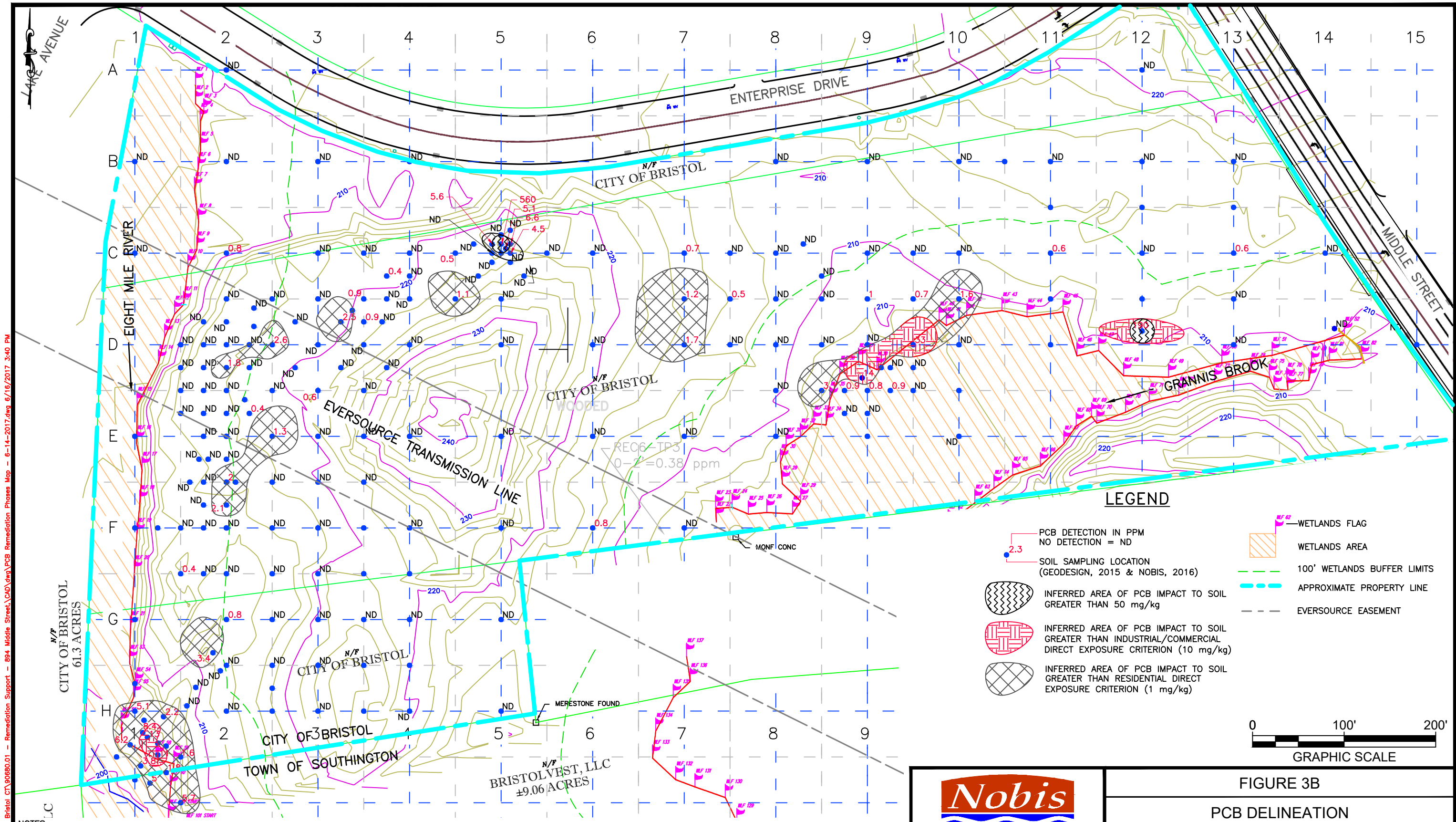


NOTES:

1. BASE MAPS AND TOPOGRAPHIC CONTOURS DEVELOPED FROM ELECTRONIC FILES PREPARED BY CIVIL 1, ENTITLED "BOUNDARY/TOPOGRAPHIC SURVEY, 894 MIDDLE STREET", AND DATED MAY 2017.
2. EXISTING FEATURES WERE OBTAINED (BY OTHERS) FROM DRAWING ENTITLED "FIGURE 3 BORING AND MONITORING WELL LOCATION MAP", PHASE III - CONTAINMENT ASSESSMENT INVESTIGATION PREPARED BY DIVERSIFIED ENVIRONMENTAL SERVICES, INC. AND/OR AN UNTITLED DRAWING FOUND AT THE LOCAL FIRE MARSHAL'S OFFICE. THE LOCATIONS OF THE SOIL BORINGS AND MONITORING WELLS (BY OTHERS) SHOULD BE CONSIDERED APPROXIMATE.
3. GEODESIGN (2015) SAMPLE LOCATIONS WERE OBTAINED USING A TRIMBLE GeoXH GPS.
4. THE DEPTHS AND THICKNESSES OF INFERRED ENVIRONMENTAL IMPACT WERE GENERALIZED FROM AN INTERPOLATION BETWEEN SAMPLE LOCATIONS. THE TRANSITION BETWEEN MATERIALS MAY BE FAR MORE OR LESS GRADUAL THAN INDICATED. INFORMATION ON ACTUAL SUBSURFACE CONDITIONS EXIST ONLY AT THE LOCATIONS INDICATED. NOTE, TOO, THAT THESE CONDITIONS MAY CHANGE OVER TIME. THE DELINEATION LIMITS WERE USED FOR ANALYTICAL PURPOSES AND, UNLESS SPECIFICALLY STATED OTHERWISE, SHOULD NOT BE USED BY THE CONTRACTOR AS A BASIS OF REMEDIATION COST ESTIMATES.

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FIGURE 3A			
PCB DELINEATION SAMPLING RESULTS (0' TO 0.5' B.G.) 894 MIDDLE STREET BRISTOL, CONNECTICUT			
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NOTES:
1. BASE MAPS AND TOPOGRAPHIC CONTOURS DEVELOPED FROM ELECTRONIC FILES PROVIDED BY CIVIL 1, ENTITLED "BOUNDARY/ TOPOGRAPHIC SURVEY, 894 MIDDLE STREET", DATED MAY 2017.
2. EXISTING FEATURES WERE OBTAINED (BY OTHERS) FROM DRAWING ENTITLED "FIGURE 3 BORING AND MONITORING WELL LOCATION MAP", PHASE III - CONTAINMENT ASSESSMENT INVESTIGATION PREPARED BY DIVERSIFIED ENVIRONMENTAL SERVICES, INC. AND/OR AN UNTITLED DRAWING FOUND AT THE LOCAL FIRE MARSHAL'S OFFICE. THE LOCATIONS OF THE SOIL BORINGS AND MONITORING WELLS (BY OTHERS) SHOULD BE CONSIDERED APPROXIMATE.
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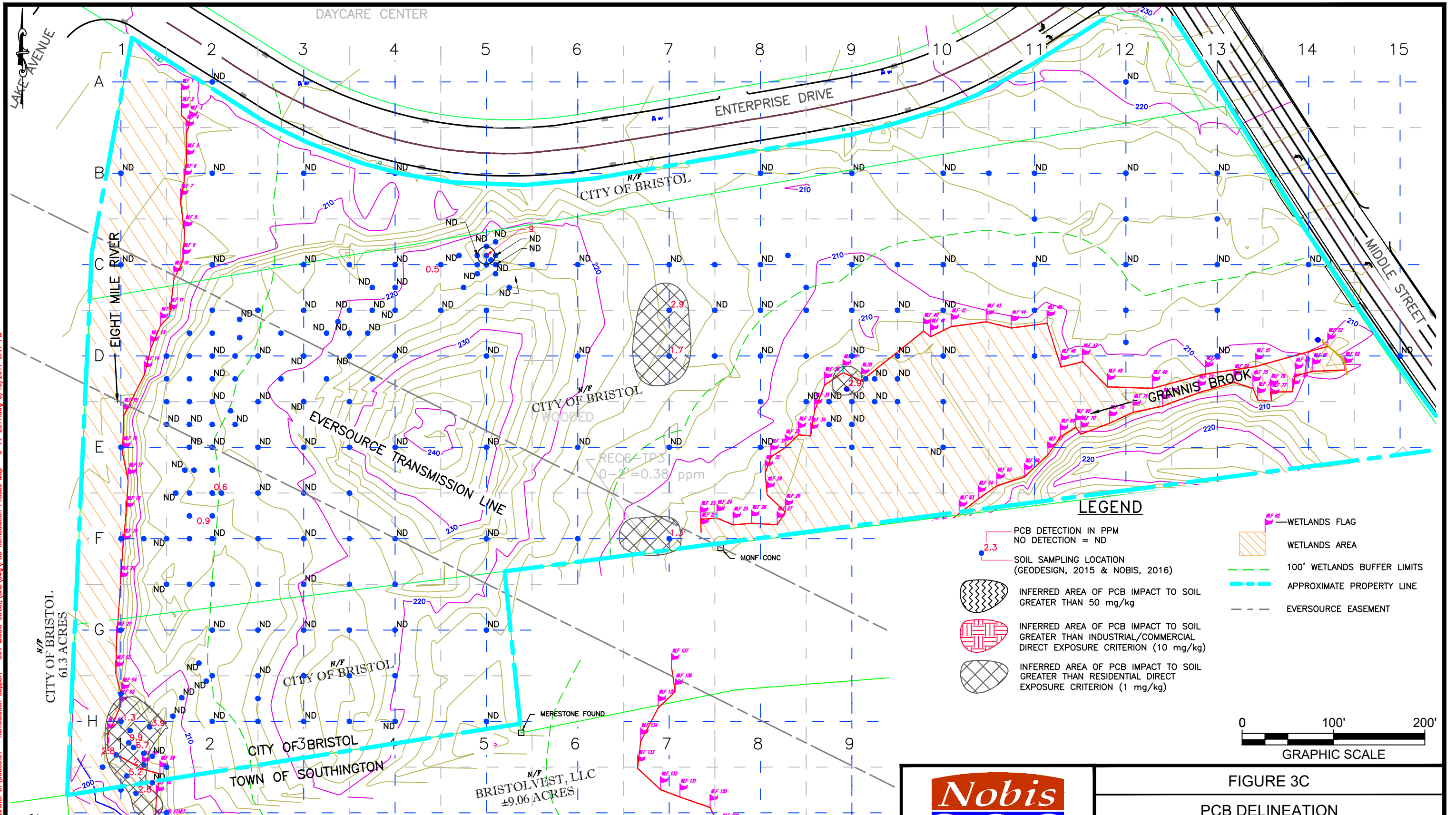
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FIGURE 3B

PCB DELINEATION
SAMPLING RESULTS (0.5' TO 1.5' B.G.)
894 MIDDLE STREET
BRISTOL, CONNECTICUT

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NOTES:

1. BASE MAPS AND TOPOGRAPHIC CONTOURS DEVELOPED FROM ELECTRONIC FILES PROVIDED BY CIVIL 1, ENTITLED "BOUNDARY/TOPOGRAPHIC SURVEY, 894 MIDDLE STREET", DATED MAY 2017.
2. EXISTING FEATURES WERE OBTAINED (BY OTHERS) FROM DRAWING ENTITLED "FIGURE 3 BORING AND MONITORING WELL LOCATION MAP", PHASE III - CONTAINMENT ASSESSMENT INVESTIGATION PREPARED BY DIVERSIFIED ENVIRONMENTAL SERVICES, INC. AND/OR AN UNTITLED DRAWING FOUND AT THE LOCAL FIRE MARSHAL'S OFFICE. THE LOCATIONS OF THE SOIL BORINGS AND MONITORING WELLS (BY OTHERS) SHOULD BE CONSIDERED APPROXIMATE.
3. GEODESIGN (2015) SAMPLE LOCATIONS WERE OBTAINED USING A TRIMBLE GeoXH GPS.
4. THE DEPTHS AND THICKNESSES OF INFERRED ENVIRONMENTAL IMPACT WERE GENERALIZED FROM AN INTERPOLATION BETWEEN SAMPLE LOCATIONS. THE TRANSITION BETWEEN MATERIALS MAY BE FAR MORE OR LESS GRADUAL THAN INDICATED. INFORMATION ON ACTUAL SUBSURFACE CONDITIONS EXIST ONLY AT THE LOCATIONS INDICATED. NOTE, TOO, THAT THESE CONDITIONS MAY CHANGE OVER TIME. THE DELINEATION LIMITS WERE USED FOR ANALYTICAL PURPOSES AND, UNLESS SPECIFICALLY STATED OTHERWISE, SHOULD NOT BE USED BY THE CONTRACTOR AS A BASIS OF REMEDIATION COST ESTIMATES.



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FIGURE 3C

PCB DELINEATION
SAMPLING RESULTS (1.5' TO 3.5' B.G.)
894 MIDDLE STREET
BRISTOL, CONNECTICUT

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DATE: JUNE 2017

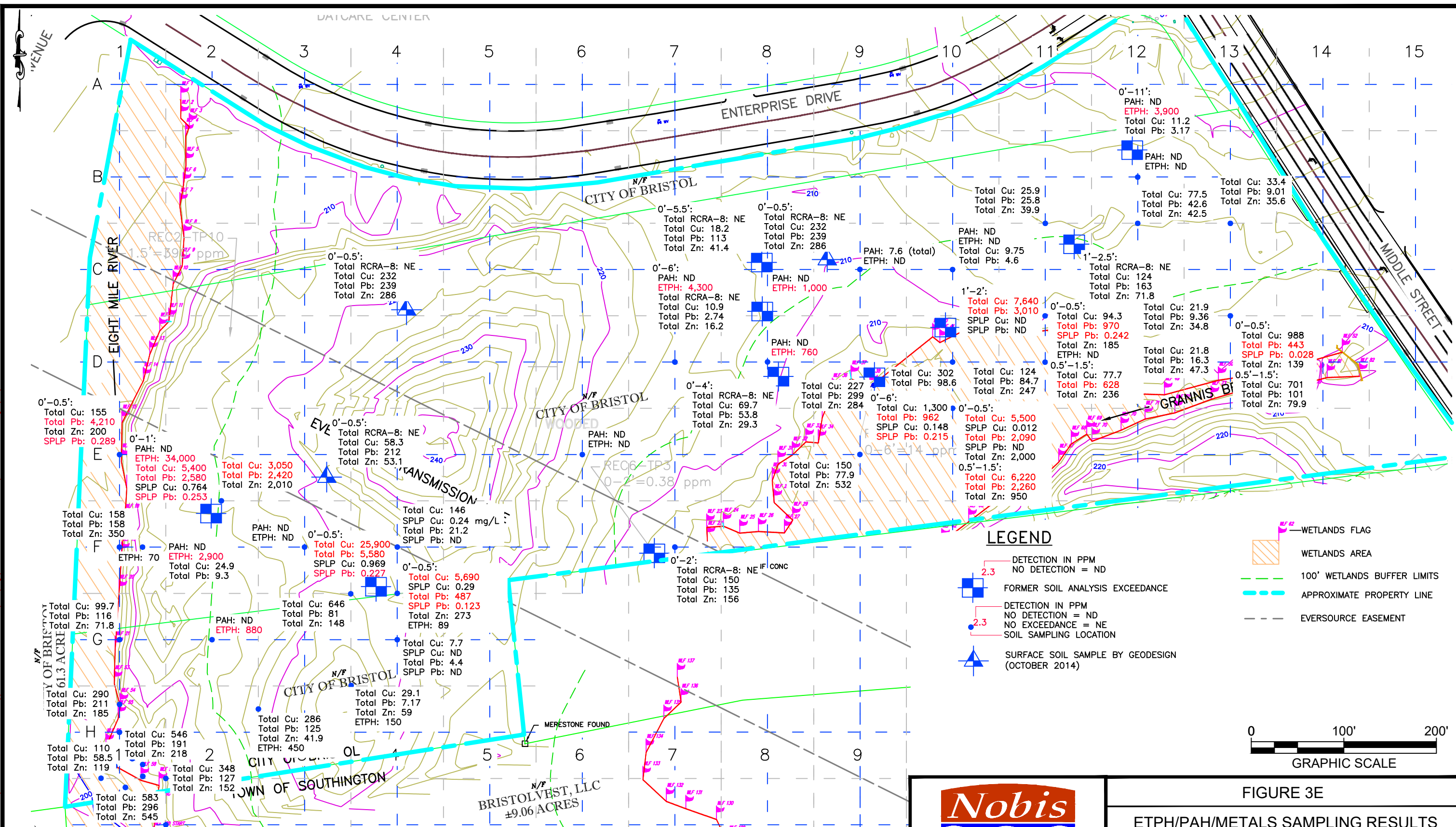


FIGURE 3E

ETPH/PAH/METALS SAMPLING RESULTS
(DEPTH VARIES)
894 MIDDLE STREET
BRISTOL, CONNECTICUT

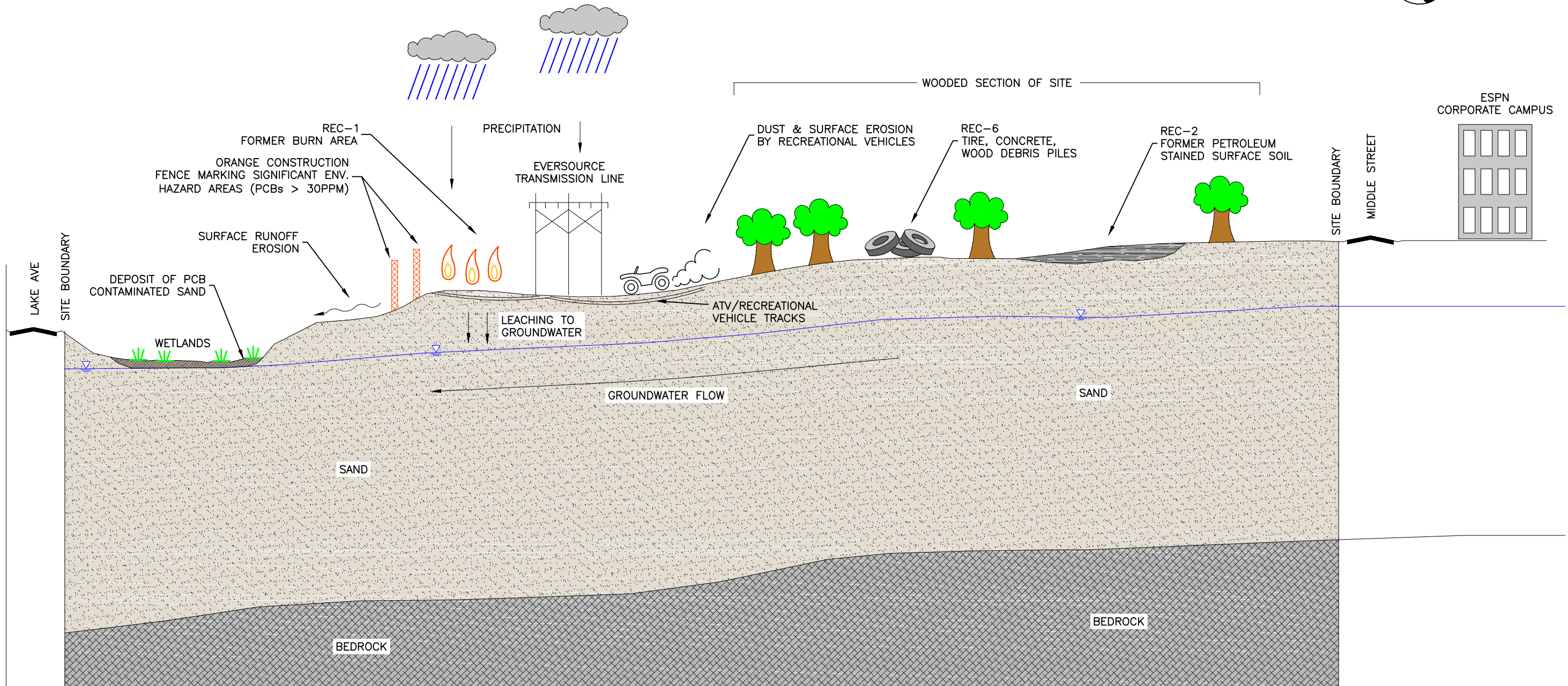
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LEGEND

	ASPHALT/ROAD
	SAND
	BEDROCK
	WATER

NOT TO SCALE

NOTES:

1. NOT DRAWN TO SCALE
2. LOCATIONS OF SITE FEATURES DEPICTED HEREON ARE APPROXIMATE AND GIVEN FOR ILLUSTRATIVE PURPOSES ONLY.



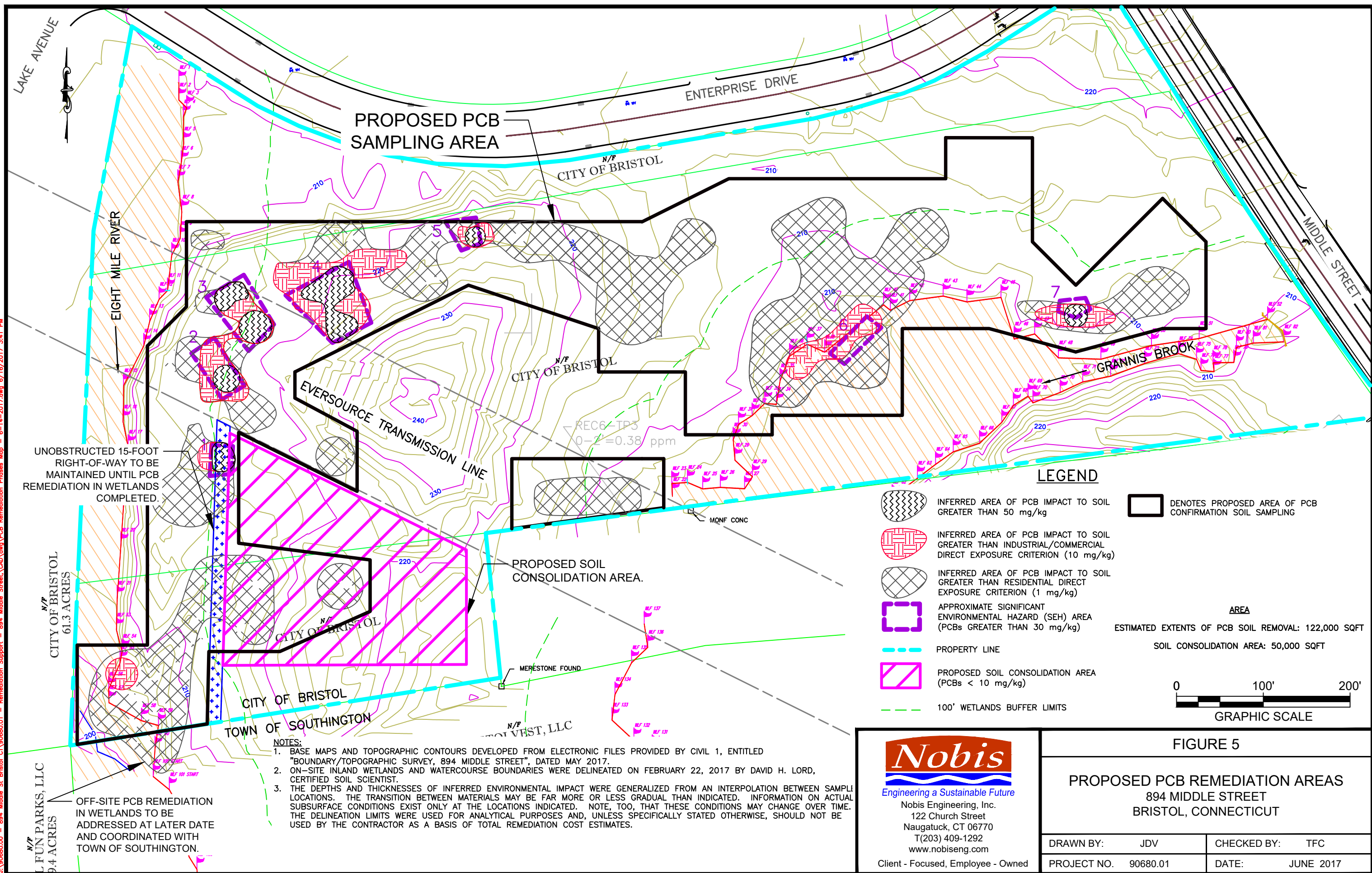
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FIGURE 4

CONCEPTUAL SITE MODEL
894 MIDDLE STREET
BRISTOL, CONNECTICUT

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PHASE I

- SET UP TEMPORARY FACILITIES
- CLEAR AND GRUB
- SET-UP WASTE STORAGE AREA
- CONSTRUCT SOIL CONSOLIDATION AREA

PHASE II

DELINEATE EXTENT OF
PCB SOIL REMOVAL
AREAS

AS-FOUND
SAMPLING
RESULTS
(PCBs >30 PPM)

YES

EXCAVATE AND DISPOSE
AT PERMITTED TSCA
LANDFILL AS REMEDIATION
WASTE

POST EXCAVATION
ENVIRONMENTAL
SAMPLING RESULTS
(CONFIRM PCBs
< 30 PPM)

NO

YES

NO

YES

NO

AS-FOUND PCB RESULTS
< 30 PPM

PHASE III

AS-FOUND
SAMPLING
RESULTS
(30 PPM > PCBs
> 10 PPM)

YES

EXCAVATE AND
DISPOSE AT PERMITTED
PCB DISPOSAL FACILITY
(PCBs < 30 PPM)

POST EXCAVATION
ENVIRONMENTAL
SAMPLING RESULTS
(CONFIRM PCBs
< 10 PPM)

YES

NO

YES

NO

AS-FOUND PCB RESULTS
< 10 PPM

PHASE IV

AS-FOUND
SAMPLING
RESULTS
(10 PPM > PCBs
> 1 PPM)

YES

EXCAVATE, PLACE AND
COMPACT SOILS IN SCA
(1 PPM < PCBs < 10 PPM)
SOIL PLACED IN SCA TO
HAVE ENVIRONMENTAL
LAND USE RESTRICTION
(ELUR)

POST EXCAVATION
ENVIRONMENTAL
SAMPLING RESULTS
(CONFIRM PCBs
< 1 PPM)

YES

NO

AS-FOUND
PCBs < 1 PPM

YES

LEAVE SOILS IN PLACE
(PCBs < 1 PPM)

NOTES:

1. IN-SITU SAMPLING RESULTS BASED ON GEODESIGN/ NOBIS PHASE II AND III RESULTS.
2. POST EXCAVATION CONFIRMATION SAMPLING WILL BE COMPLETED IN ACCORDANCE WITH THE APPROVED RISK BASED PLAN.
3. DISPOSAL SAMPLING FOR OFF-SITE DISPOSAL PARAMETERS WILL BE COMPLETED PRIOR TO OFF-SITE DISPOSAL.
4. SOIL CONSOLIDATION AREA (SCA) WILL BE LINED WITH GEOTEXTILE, DEMARCATION LAYER AND COVERED WITH 2-4 FEET OF CLEAN SOIL PLUS A VEGETATED COVER OR 6-INCHES OF ASPHALT.



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FIGURE 6

DECISION FLOW CHART
MANAGEMENT OF PCB REMEDIATION WASTE
SCHEMATIC OF REMEDIAL APPROACH
894 MIDDLE STREET
BRISTOL, CONNECTICUT

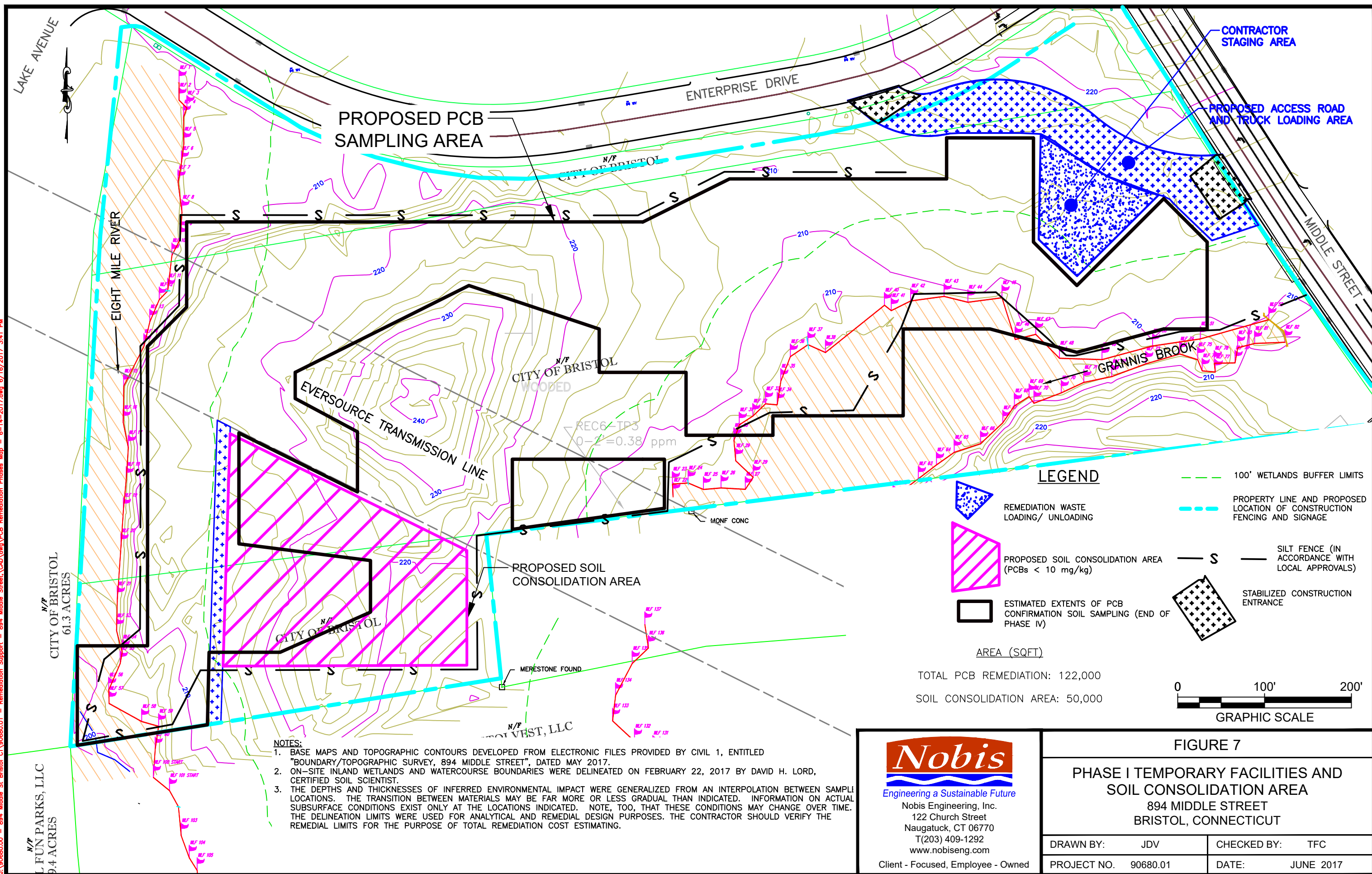
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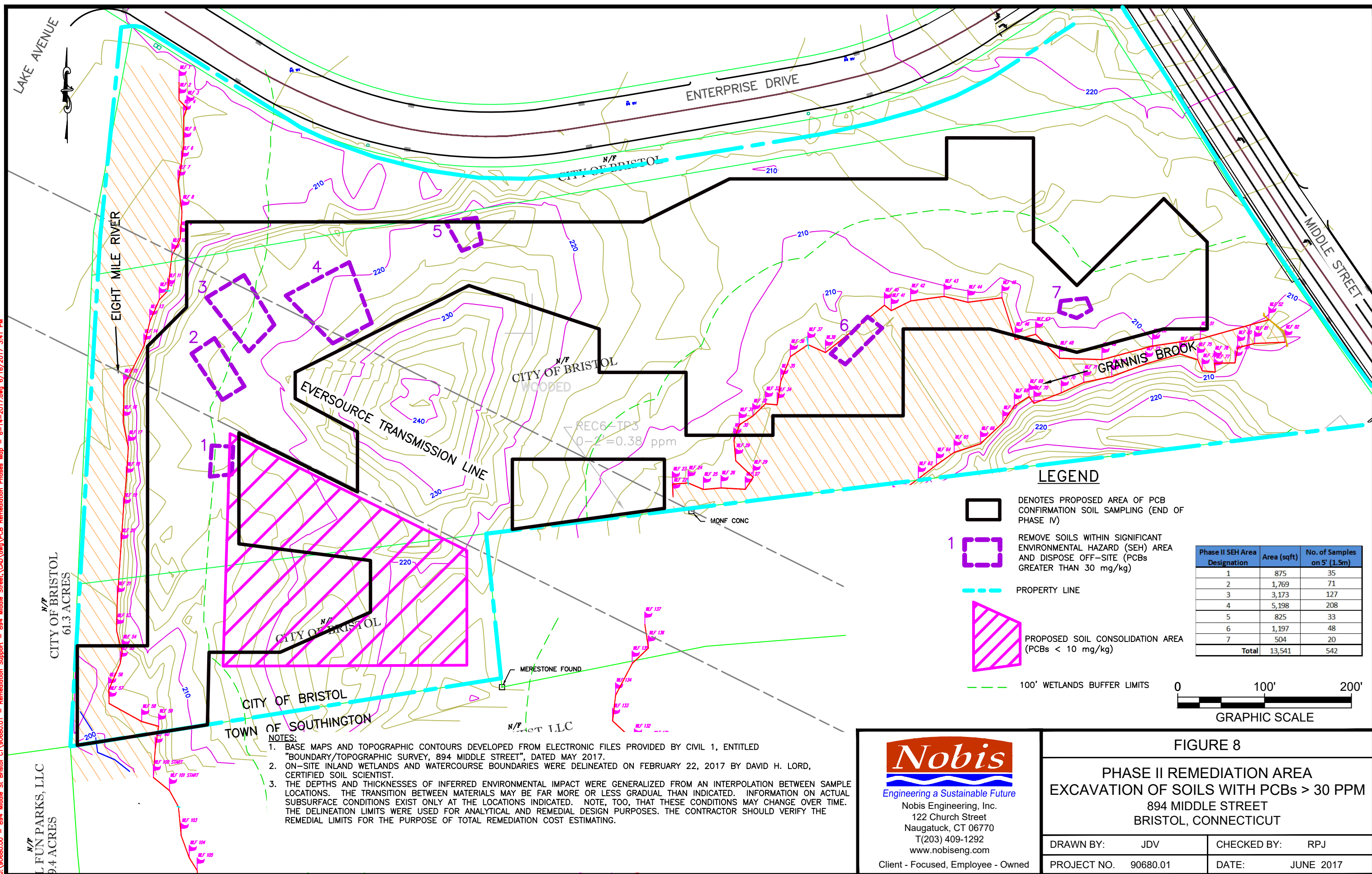
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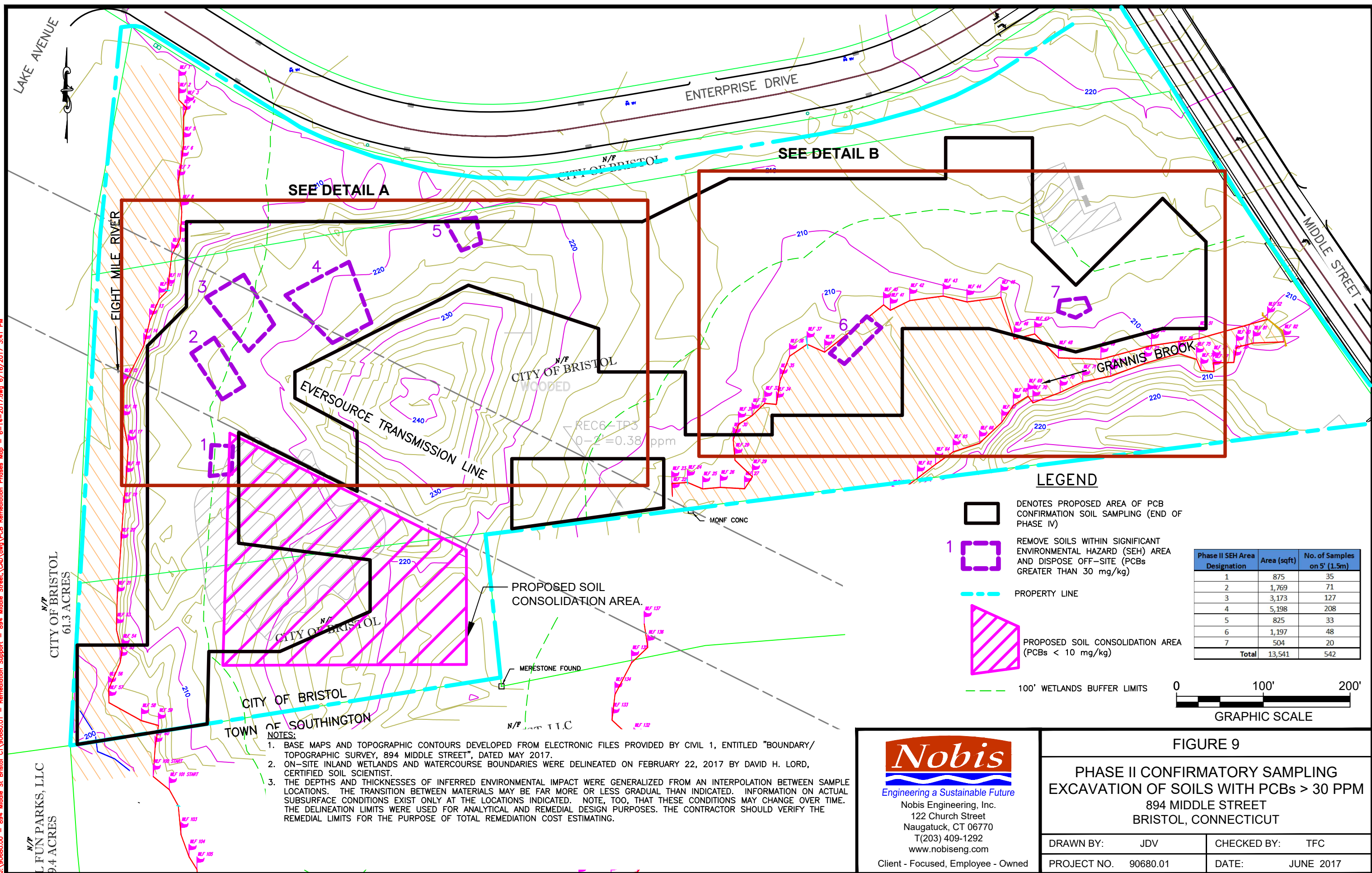
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FIGURE 8

PHASE II REMEDIATION AREA
EXCAVATION OF SOILS WITH PCBs > 30 PPM
894 MIDDLE STREET
BRISTOL, CONNECTICUT

DRAWN BY:	JDV	CHECKED BY:	RPJ
PROJECT NO.	90680.01	DATE:	JUNE 2017

J:\90680.00 - 894 Middle St Bristol CT\90680.01 - Remediation Support - 894 Middle Street\CAD\dwg\PCB Remediation Phases Map - 6-14-2017.dwg 6/16/2017 3:41 PM



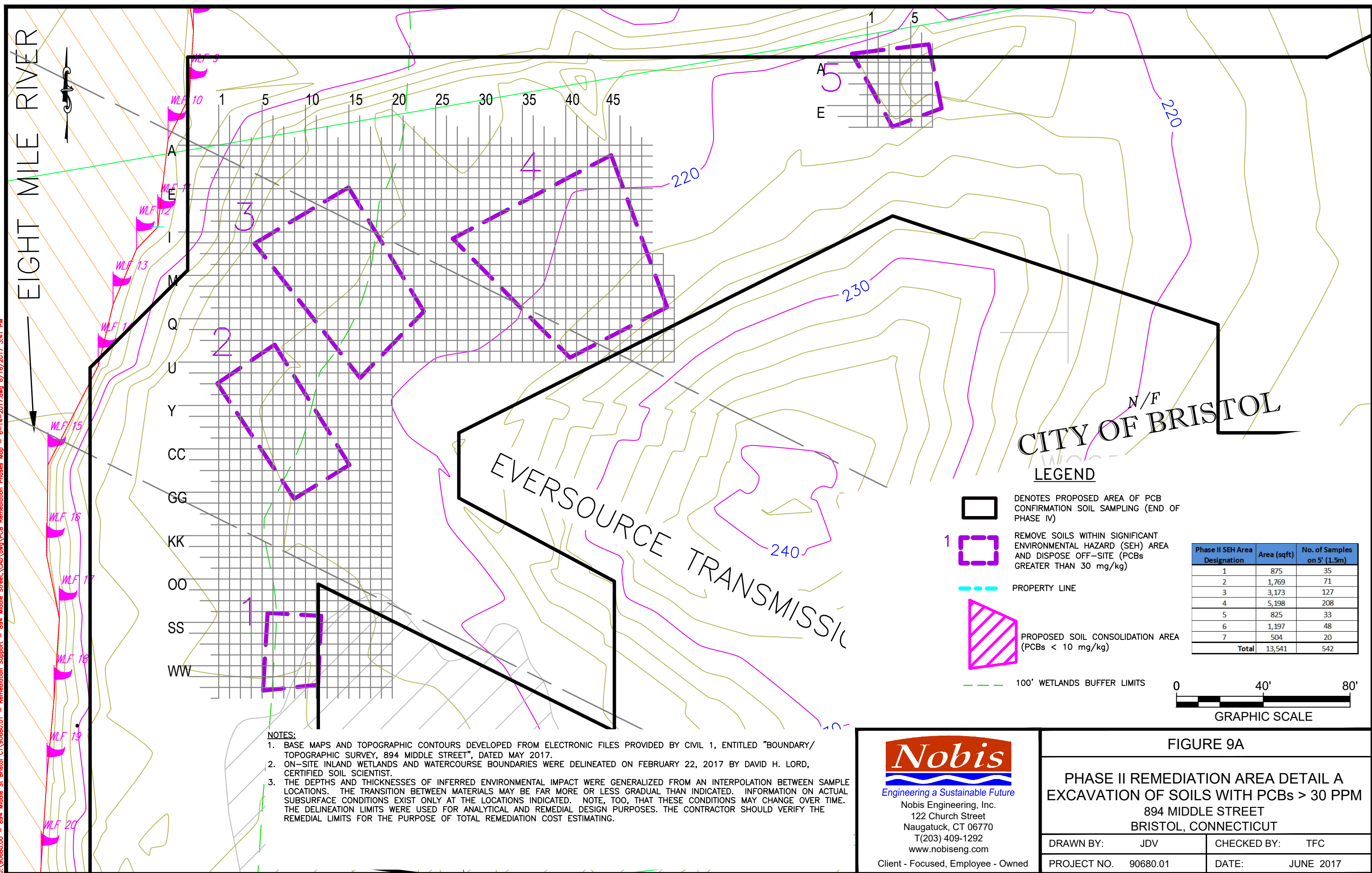
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FIGURE 9

PHASE II CONFIRMATORY SAMPLING
EXCAVATION OF SOILS WITH PCBs > 30 PPM
894 MIDDLE STREET
BRISTOL, CONNECTICUT

DRAWN BY:	JDV	CHECKED BY:	TFC
PROJECT NO.	90680.01	DATE:	JUNE 2017

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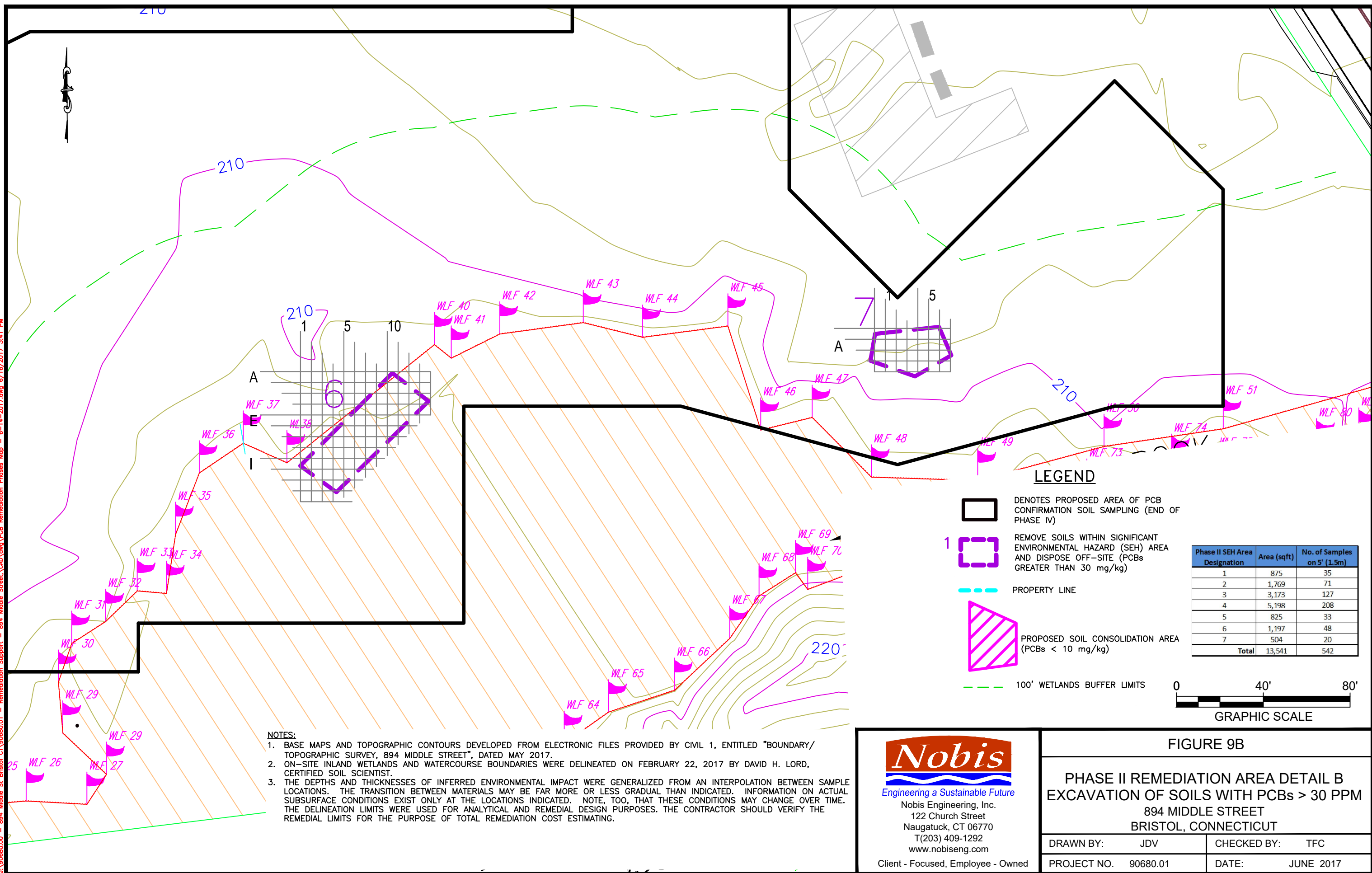
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FIGURE 9A

**PHASE II REMEDIATION AREA DETAIL A
EXCAVATION OF SOILS WITH PCBs > 30 PPM
894 MIDDLE STREET
BRISTOL, CONNECTICUT**

DRAWN BY: JDV	CHECKED BY: TFC
PROJECT NO. 90680.01	DATE: JUNE 2017

J:\90680.00 - 894 Middle St. Bristol CT\90680.01 - Remediation Support - 894 Middle Street\CAD\dwg\PCB Remediation Phases Map - 6-14-2017.dwg 6/16/2017 3:41 PM



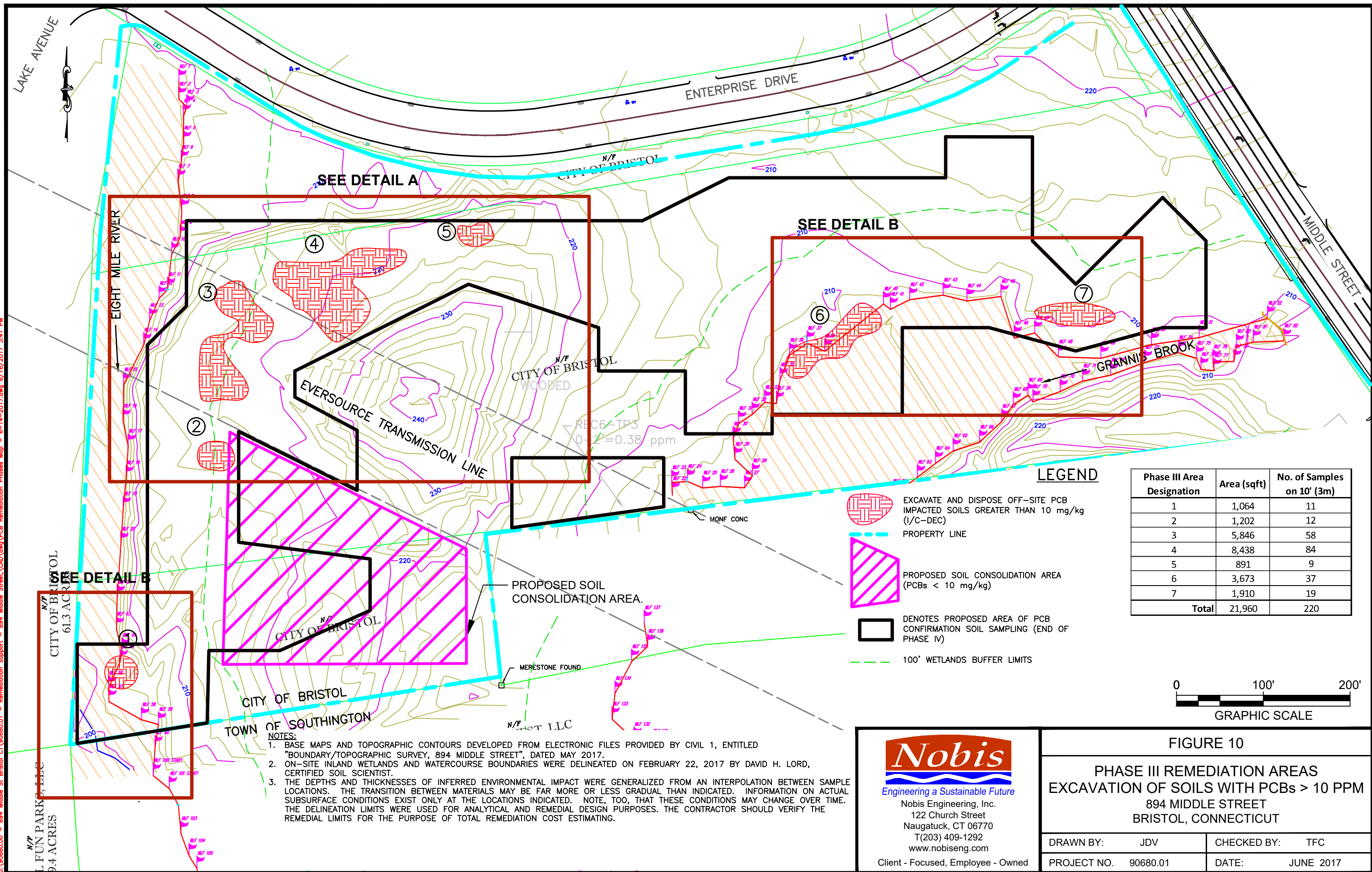
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FIGURE 9B

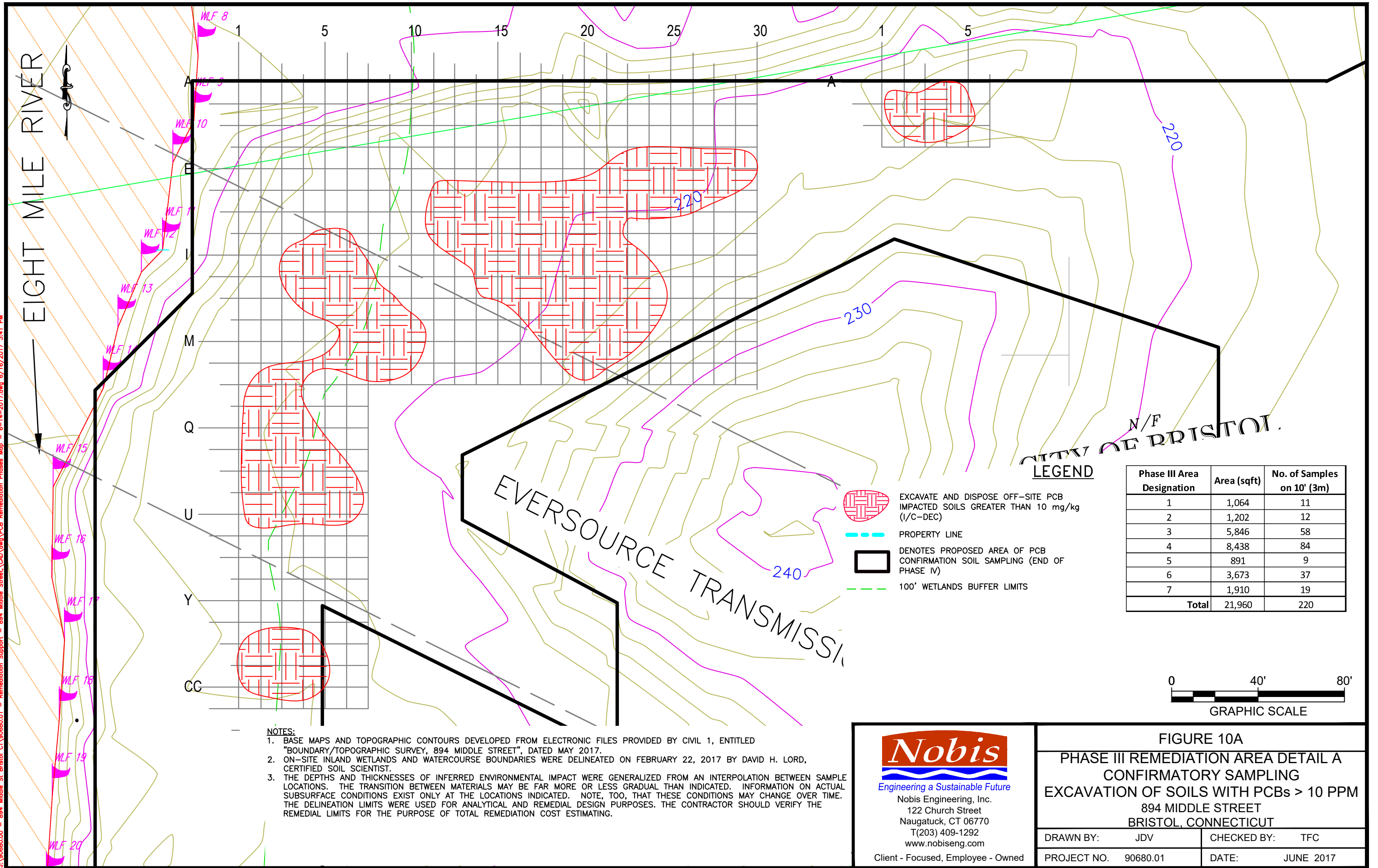
PHASE II REMEDIATION AREA DETAIL B
EXCAVATION OF SOILS WITH PCBs > 30 PPM
894 MIDDLE STREET
BRISTOL, CONNECTICUT

DRAWN BY: JDV	CHECKED BY: TFC
PROJECT NO. 90680.01	DATE: JUNE 2017

J:\90680.00 - 894 Middle St Bristol CT\90680.01 - Remediation Support - 894 Middle Street\CAD\dwg\PCB Remediation Phases Map - 6-14-2017.dwg 6/16/2017 3:41 PM



J:\90680.00 - 894 Middle St. Bristol CT\90680.01 - Remediation Support - 894 Middle Street\CAD\dwg\PCB Remediation Phases Map - 6-14-2017.dwg 6/16/2017 3:41 PM

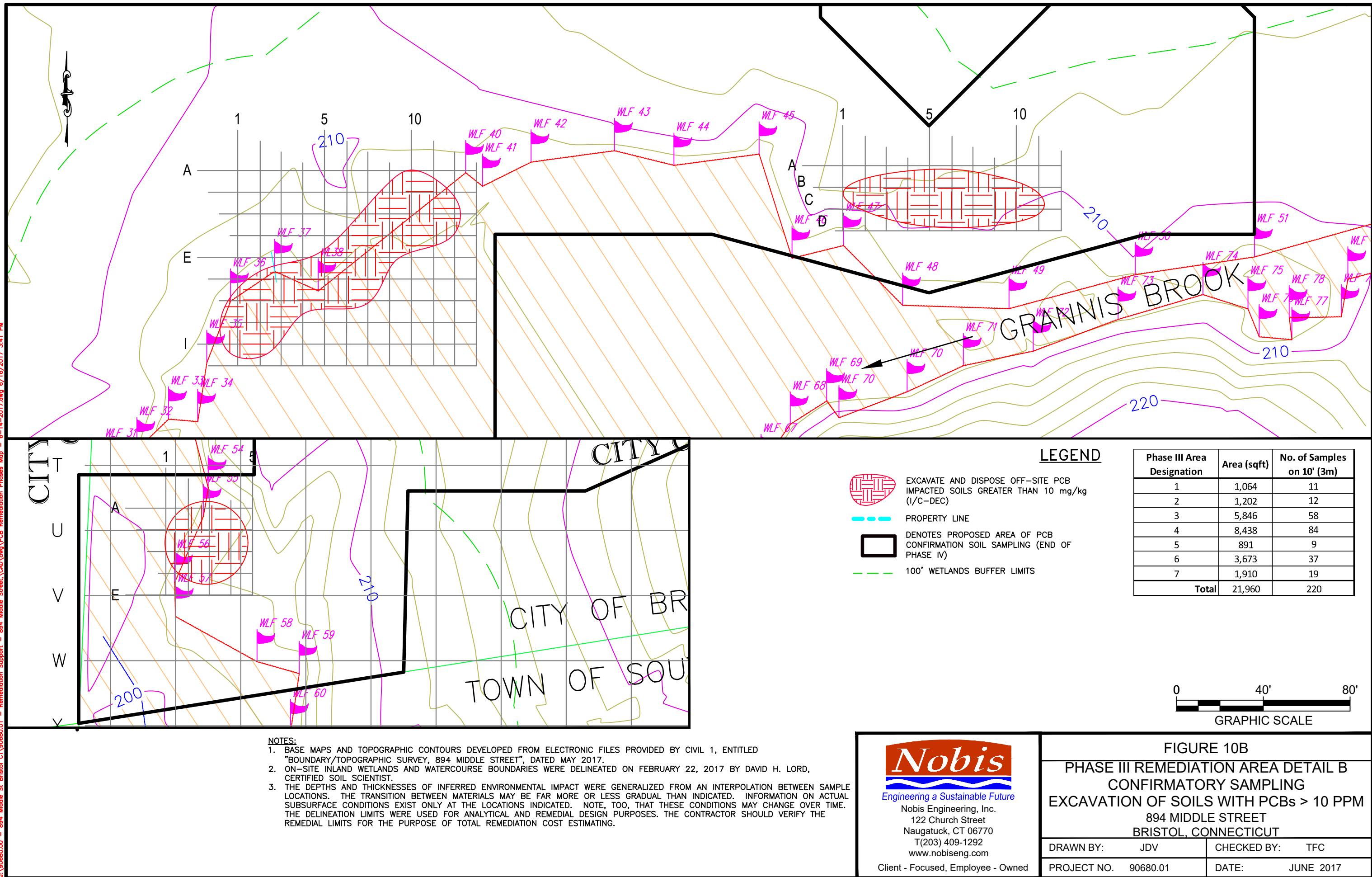


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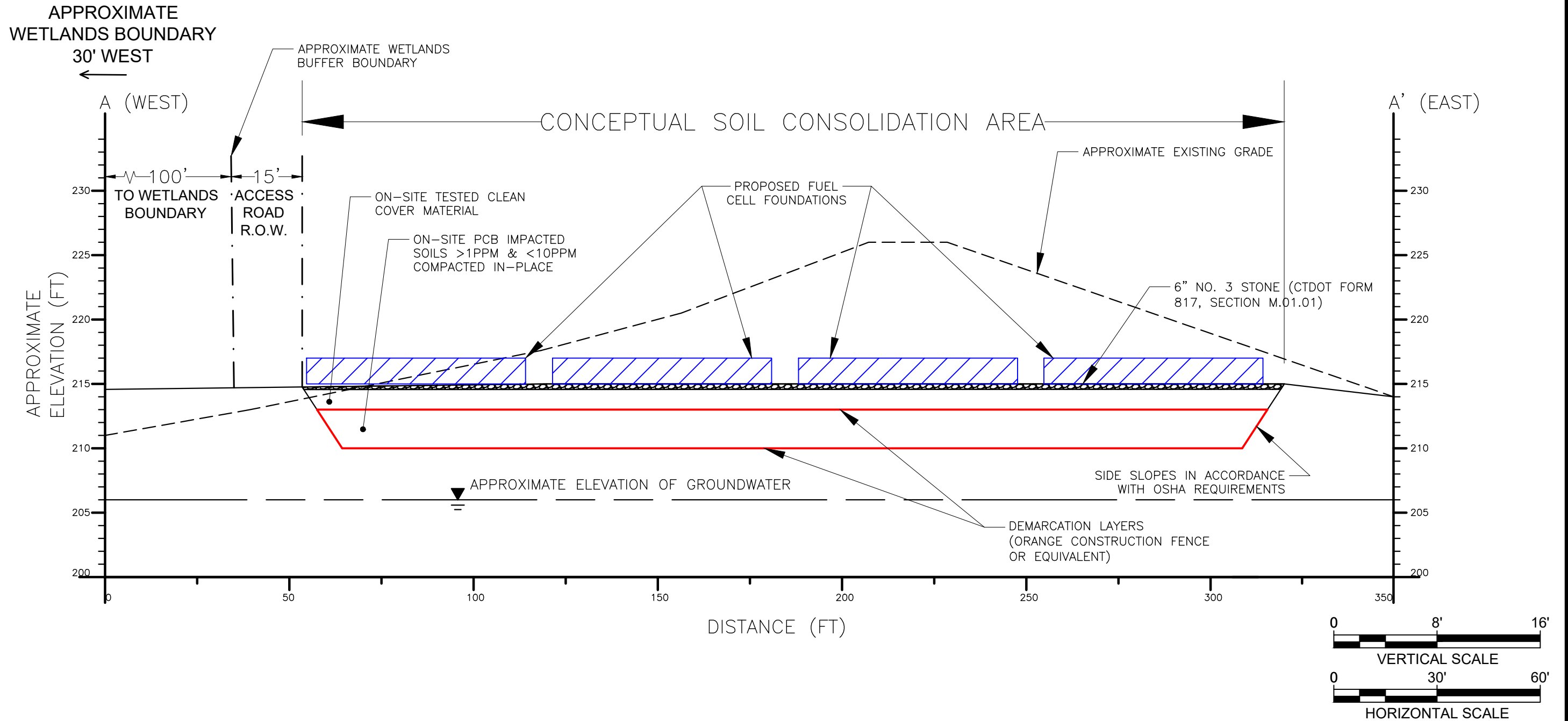
FIGURE 10A
PHASE III REMEDIATION AREA DETAIL A
CONFIRMATORY SAMPLING
EXCAVATION OF SOILS WITH PCBs > 10 PPM
894 MIDDLE STREET
BRISTOL, CONNECTICUT

DRAWN BY: JDV	CHECKED BY: TFC
PROJECT NO. 90680.01	DATE: JUNE 2017

J:\90680.00 - 894 Middle St Bristol CT\90680.01 - Remediation Support - 894 Middle Street\CAD\dwg\PCB Remediation Phases Map - 6-14-2017.dwg 6/16/2017 3:41 PM



J:\90680.00 - 894 Middle St Bristol CT\90680.01 - Remediation Support - 894 Middle Street\CAD\dwg\PCB Remediation Phases Map - 6-14-2017.dwg 6/16/2017 3:42 PM



NOTES:

1. PCB IMPACTED SOIL VOLUME (>1PPM TO <10PPM) IS APPROXIMATELY 4,050 CUBIC YARDS (INCLUDES 25% CONTINGENCY). SOIL CONSOLIDATION AREA DESIGN TO ACCOMMODATE APPROXIMATELY 5,500 CY OF PCB IMPACTED SOILS. COVER MATERIAL WILL BE APPROXIMATELY 3,750 TO 5,200 CUBIC YARDS.
2. APPROXIMATE GROUNDWATER ELEVATION 206± BASED ON OCTOBER 17, 2014 MEASUREMENT FROM MW-8.



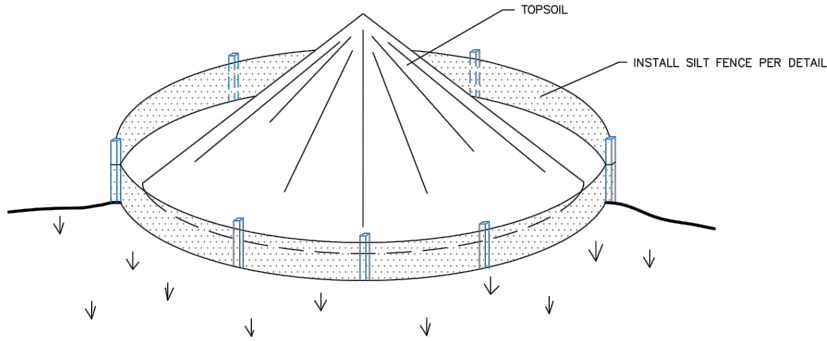
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FIGURE 11A

**CROSS SECTION A-A'
SOIL CONSOLIDATION AREA
894 MIDDLE STREET
BRISTOL, CONNECTICUT**

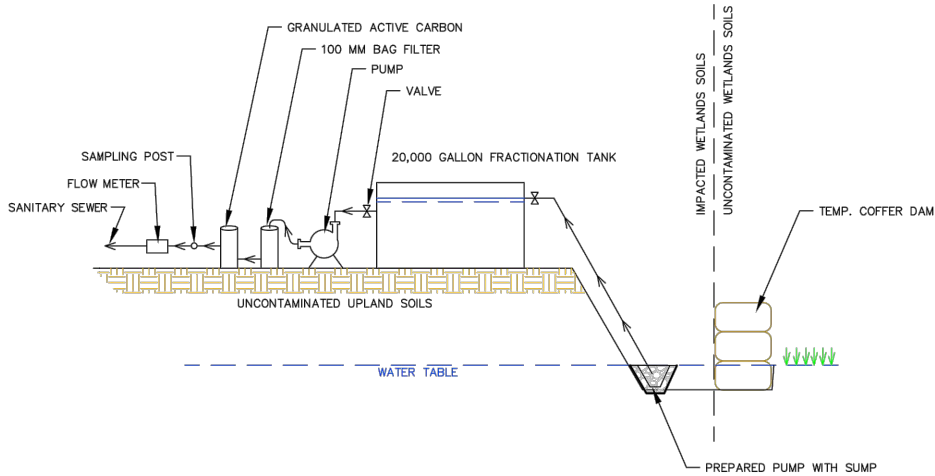
DRAWN BY:	JDV	CHECKED BY:	TFC
PROJECT NO.	90680.01	DATE:	JUNE 2017

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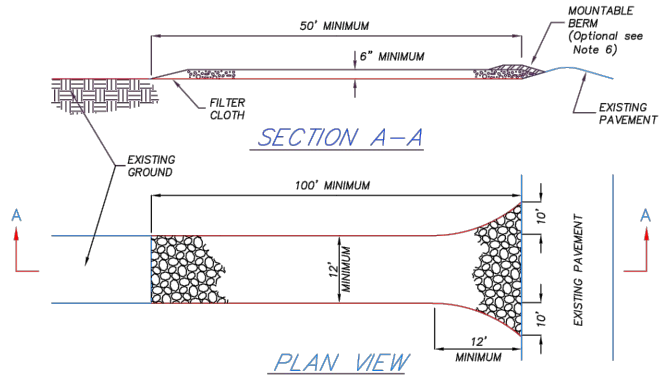


- STOCKPILE MANAGEMENT PER 2002 CT GUIDELINES FOR E & S CONTROL:
1. LOCATE STOCKPILE SO THAT NATURAL DRAINAGE IS NOT OBSTRUCTED.
 2. DIVERT RUNOFF WATER AWAY FROM OR AROUND THE STOCKPILE.
 3. INSTALL A GEOTEXTILE SILT FENCE OR HAY BALE BARRIER AROUND THE STOCKPILE AREA APPROXIMATELY 10 FEET FROM PROPOSED TOE OF THE SLOPE.
 4. THE SIDE SLOPES OF STOCKPILED MATERIAL SHOULD BE NO STEEPER THAN 2:1.
 5. STOCKPILES THAT ARE NOT TO BE USED WITHIN 30 DAYS NEED TO BE SEEDED AND MULCHED IMMEDIATELY AFTER FORMATION OF THE STOCKPILE.
 6. AFTER STOCKPILE HAS BEEN REMOVED, THE SITE SHOULD BE GRADED AND PERMANENTLY STABILIZED.

TEMPORARY TOPSOIL STOCKPILE
N.T.S.

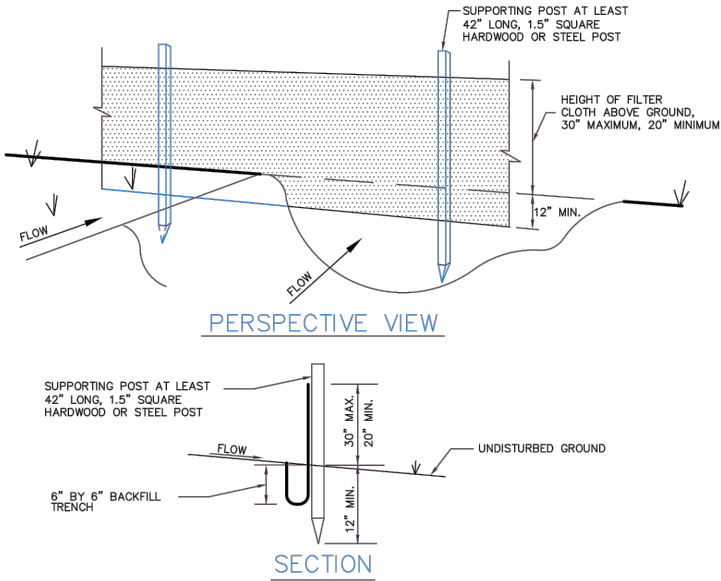


DEWATERING WASTEWATER FLOW SCHEMATIC
N.T.S.



- NOTES:
1. STONE SIZE - USE 1" - 2" STONE, OR RECLAIMED OR RECYCLED CONCRETE EQUIVALENT.
 2. LENGTH - AS REQUIRED, BUT NOT LESS THAN 100 FEET.
 3. THICKNESS - NOT LESS THAN SIX (6) INCHES.
 4. WIDTH - 12 FOOT MINIMUM, BUT NOT LESS THAN THE FULL WIDTH AT POINTS WHERE INGRESS OR EGRESS OCCURS. 24 FOOT MINIMUM IF SINGLE ENTRANCE TO SITE.
 5. FILTER CLOTH - TO BE PLACED OVER THE ENTIRE AREA PRIOR TO PLACING OF STONE.
 6. SURFACE WATER - ALL SURFACE WATER FLOWING OR DIVERTED TOWARD CONSTRUCTION ENTRANCES SHALL BE PIPED ACROSS THE ENTRANCE. IF PIPING IS IMPRACTICAL, A MOUNTABLE BERM WITH 5:1 SLOPES WILL BE PERMITTED.
 7. MAINTENANCE - THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OF FLOWING OF SEDIMENT ONTO PUBLIC RIGHTS-OF-WAY. THIS MAY REQUIRE PERIODIC TOP DRESSING WITH ADDITIONAL STONE AS CONDITIONS DEMAND AND REPAIR AND/OR CLEANOUT OF ANY MEASURE USED TO TRAP SEDIMENT. ALL SEDIMENT SPILLED, DRIPPED, WASHED OR TRACKED ONTO PUBLIC RIGHTS-OF-WAY MUST BE REMOVED IMMEDIATELY.
 8. WASHING - WHEELS SHALL BE CLEANED TO REMOVE SEDIMENT PRIOR TO ENTRANCE ONTO PUBLIC RIGHTS-OF-WAY. WHEN WASHING IS REQUIRED, IT SHALL BE DONE ON AN AREA STABILIZED WITH STONE AND WHICH DRAINS INTO AN APPROVED SEDIMENT TRAPPING DEVICE.
 9. PERIODIC INSPECTION AND NEEDED MAINTENANCE SHALL BE PROVIDED AFTER EACH RAIN.

STABILIZED
CONSTRUCTION ENTRANCE



CONSTRUCTION NOTES FOR SILT FENCE

1. EXCAVATE A TRENCH A MINIMUM OF 6 INCHES DEEP AND 6 INCHES WIDE ON THE UP SIDE OF THE FENCE LOCATION.
 2. DRIVE SUPPORT POSTS ON THE DOWN SLOPE SIDE OF THE TRENCH TO A DEPTH OF AT LEAST 12 INCHES INTO ORIGINAL GROUND.
 3. STAPLE OR SECURE THE GEOTEXTILE TO THE SUPPORT POSTS PER MANUFACTURER'S INSTRUCTIONS SUCH THAT AT LEAST 6 INCHES OF GEOTEXTILE LIES WITHIN THE TRENCH.
 4. BACKFILL THE TRENCH WITH TAMPED SOIL OR AGGREGATE OVER THE GEOTEXTILE.
- POSTS: 1.5" SQUARE HARDWOOD OR STEEL
- FILTER CLOTH: MIRAFI 100X, ENVIROFENCE OR APPROVED EQUAL

SILT FENCE DETAIL



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FIGURE 12

DETAILS
894 MIDDLE STREET
BRISTOL, CONNECTICUT

DRAWN BY: JDV
PROJECT NO. 90680.01

CHECKED BY: TFC
DATE: JUNE 2017

CITY OF BRISTOL
BRISTOL, CT

DETAILS

894 MIDDLE STREET
(LOT 17, 17-3, 17-4-1)

BRISTOL CONNECTICUT



CORNERSTONE PROFESSIONAL PARK, SUITE D-101
43 SHERMAN HILL ROAD
WOODBURY (203) 266-0778 CONNECTICUT

DRAWN: BS
SCALE: AS NOTED
DATE: 6 JUN 2017
PROJ. NO.: 3448
CADD FILE NAME: 3448
DRAWING NO.: C - 2.0

TABLES

TABLE 1
SUMMARY OF DETECTED ORGANIC COMPOUNDS IN SOIL SAMPLES
PHASE II ENVIRONMENTAL SITE ASSESSMENT
894 MIDDLE STREET
BRISTOL, CONNECTICUT

Parameter	REMEDIAL STANDARDS			REC1-TP2 (0-0.5 FT)	REC1-TP3 (0-0.5 FT)	REC1-TP4 (0-0.5 FT)	REC1-TP8 (0-0.5 FT)	REC1-TP88 (0-0.5 FT) QA/QC DUP	REC1-TP10 (0-1 FT)	REC1-TP5 (0-7 FT)	REC2-TP4 (0-6 FT)	REC2-TP1 (0-5.5 FT)
	GB-PMC	I/C-DEC	R-DEC									
Volatile Organic Compounds in ug/kg												
Total VOCs	Varies			NT	NT	NT	None Detected	None Detected	NT	NT	None Detected	NT
Polynuclear Aromatic Hydrocarbons (PAHs) in ug/kg												
Benz(a)anthracene	1,000	7,800	1,000	NT	NT	NT	< 260	< 250	< 6,500	NT	< 240	NT
Benzo(a)pyrene	1,000	1,000	1,000				< 260	< 250	< 6,500		< 240	
Benzo(b)fluoranthene	1,000	7,800	1,000				270	280	< 6,500		< 240	
Benzo(ghi)perylene	42,000	2,500,000	1,000,000				< 260	< 250	< 6,500		< 240	
Chrysene	1,000	780,000	84,000				< 260	< 250	< 6,500		< 240	
Fluoranthene	56,000	2,500,000	1,000,000				< 260	< 250	< 6,500		< 240	
Indeno(1,2,3-cd)pyrene	1,000	7,800	1,000				< 260	< 250	< 6,500		< 240	
Phenanthrene	40,000	2,500,000	1,000,000				< 260	< 250	< 6,500		< 240	
Pyrene	40,000	2,500,000	1,000,000				470	650	< 6,500		< 240	
Extractable Total Petroleum Hydrocarbons (ETPH) in mg/kg												
ETPH	2,500	2,500	500	NT	NT	NT	400	300	34,000	NT	4,300	NT
Polychlorinated Biphenyls (PCBs) in ug/kg												
PCB-1016	NA	10,000	1,000	< 360	< 360	< 370	< 370	< 360	< 1,900	< 340	< 350	< 380
PCB-1221		10,000	1,000	< 360	< 360	< 370	< 370	< 360	< 1,900	< 340	< 350	< 380
PCB-1232		10,000	1,000	< 360	< 360	< 370	< 370	< 360	< 1,900	< 340	< 350	< 380
PCB-1242		10,000	1,000	< 360	< 360	< 370	< 370	< 360	< 1,900	< 340	< 350	< 380
PCB-1248		10,000	1,000	< 360	< 360	< 370	< 370	< 360	< 1,900	< 340	< 350	< 380
PCB-1254		10,000	1,000	< 360	< 360	3,900	1000	770	< 1,900	390	530	< 380
PCB-1260		10,000	1,000	2,300	< 360	< 370	< 370	< 360	9,900	< 340	< 350	< 380
PCB-1262		10,000	1,000	< 360	< 360	< 370	< 370	< 360	< 1,900	< 340	< 350	< 380
PCB-1268		10,000	1,000	< 360	< 360	< 370	< 370	< 360	< 1,900	< 340	< 350	< 380
Total PCBs		10,000	1,000	2,300	< 360	3,900	1000	770	9,900	390	530	< 380

Legend

Result Detected	
Result Exceeds Criteria	

R-DEC = Residential Direct Exposure Criteria
I/C-DEC = Industrial/Commercial Direct Exposure Criteria
GB-PMC= GB Pollutant Mobility Criteria
< 270 = Not Detected Above Laboratory Detection Limit
NA = Not Applicable
NT = Not Tested
NE = None Established

Notes

1. Samples were obtained on September 29, 30, and October 2, 2014 by GeoDesign, Inc and submitted to Phoenix Environmental Laboratories of Manchester, Connecticut.
2. Remedial standards were obtained from the Connecticut Remediation Standard Regulations 22a-133k-2.
3. Soil sample "REC1-TP8" was duplicated and submitted blind to the laboratory for analysis as "REC1-TP88" for quality assurance and quality control (QA/QC) purposes.

TABLE 1
SUMMARY OF DETECTED ORGANIC COMPOUNDS IN SOIL SAMPLES
PHASE II ENVIRONMENTAL SITE ASSESSMENT
894 MIDDLE STREET
BRISTOL, CONNECTICUT

Parameter	REMEDIAL STANDARDS			REC2-TP5 (1-2 FT)	REC2-TP7 (0-6 FT)	REC2-TP10 (0-1.5FT)	REC3-TP1 (0-11 FT)	REC3-TP2 (1-2.5 FT)	REC4-TP1 (1-5 FT)	REC5-TP1 (1-2 FT)	REC5-TP2 (6-8 FT)	REC6-TP3 (0-2 FT)
	GB-PMC	I/C-DEC	R-DEC									
Volatile Organic Compounds in ug/kg												
Total VOCs	Varies			NT	NT	NT	None Detected	None Detected	NT	NT	NT	None Detected
Polynuclear Aromatic Hydrocarbons (PAHs) in ug/kg												
Benz(a)anthracene	1,000	7,800	1,000	< 270	NT	NT	< 240	420	< 240	310	< 250	< 260
Benzo(a)pyrene	1,000	1,000	1,000	< 270			< 240	430	< 240	310	< 250	< 260
Benzo(b)fluoranthene	1,000	7,800	1,000	360			< 240	600	< 240	490	< 250	< 260
Benzo(ghi)perylene	42,000	2,500,000	1,000,000	< 270			< 240	360	< 240	320	< 250	< 260
Benzo(k)fluoranthene	1,000	78,000	8,400	< 270			< 240	< 240	< 240	< 240	< 250	< 260
Chrysene	1,000	780,000	84,000	290			< 240	520	< 240	370	< 250	< 260
Dibenz(a,h)anthracene	NE	1,000	NE	< 270			< 240	< 240	< 240	< 240	< 250	< 260
Fluoranthene	56,000	2,500,000	1,000,000	440			< 240	670	< 240	620	< 250	< 260
Fluorene	56,000	2,500,000	1,000,000	< 270			< 240	< 240	< 240	< 240	< 250	< 260
Indeno(1,2,3-cd)pyrene	1,000	7,800	1,000	< 270			< 240	270	< 240	< 240	< 250	< 260
Naphthalene	56,000	2,500,000	1,000,000	< 270			< 240	< 240	< 240	< 240	< 250	< 260
Phenanthrene	40,000	2,500,000	1,000,000	< 270			< 240	310	< 240	250	< 250	< 260
Pyrene	40,000	2,500,000	1,000,000	510	< 240	750	< 240	540	< 250	< 260		
Extractable Total Petroleum Hydrocarbons in mg/kg												
ETPH	2,500	2,500	500	170	NT	NT	3,900	< 52	< 53	< 260	< 54	< 54
PCB-1016	NA	10,000	1,000	< 380	< 3,800	< 91,000	< 350	< 340	NT	NT	NT	< 360
PCB-1221		10,000	1,000	< 380	< 3,800	< 91,000	< 350	< 340				< 360
PCB-1232		10,000	1,000	< 380	< 3,800	< 91,000	< 350	< 340				< 360
PCB-1242		10,000	1,000	< 380	< 3,800	< 91,000	< 350	< 340				< 360
PCB-1248		10,000	1,000	< 380	< 3,800	< 91,000	< 350	550				< 360
PCB-1254		10,000	1,000	< 380	< 3,800	390,000	< 350	< 340				380
PCB-1260		10,000	1,000	< 380	14,000	< 91,000	< 350	< 340				< 360
PCB-1262		10,000	1,000	< 380	< 3,800	< 91,000	< 350	< 340				< 360
PCB-1268		10,000	1,000	< 380	< 3,800	< 91,000	< 350	< 340				< 360
Total PCBs		10,000	1,000	< 380	14,000	390,000	< 350	< 340				380

Legend

Result Detected	
Result Exceeds Criteria	

R-DEC = Residential Direct Exposure Criteria
I/C-DEC = Industrial/Commercial Direct Exposure Criteria
GB-PMC= GB Pollutant Mobility Criteria
< 270 = Not Detected Above Laboratory Detection Limit
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Notes

1. Samples were obtained on September 29, 30, and October 2, 2014 by GeoDesign, Inc and submitted to Phoenix Environmental Laboratories of Manchester, Connecticut.
2. Remedial standards were obtained from the Connecticut Remediation Standard Regulations 22a-133k-2.
3. Soil sample "REC1-TP8" was duplicated and submitted blind to the laboratory for analysis as "REC1-TP88" for quality assurance and quality control (QA/QC) purposes.

TABLE 2
SUMMARY OF PCB ANALYTICAL RESULTS IN SOIL SAMPLES
PHASE III PCB DELINEATION
FORMER LAVIERO METALS
894 MIDDLE STREET
BRISTOL, CT

Sample Designation and Depth	Analytical Result By PCB Aroclor (ug/kg)									Total PCB Aroclors
	PCB-1016	PCB-1221	PCB-1232	PCB-1242	PCB-1248	PCB-1254	PCB-1260	PCB-1262	PCB-1268	
A-12/0-6 INCHES	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	Not Detected
A-12/18-36 INCHES	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	Not Detected
A-12/6-18 INCHES	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	Not Detected
A-2/0.5-1.5 FEET	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	Not Detected
A-2/0-0.5 FEET	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	Not Detected
A-2/1.5-3.5 FEET	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	Not Detected
B.5-12/0-0.5 FEET	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	Not Detected
B.5-13/0-0.5 FEET	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	Not Detected
B.75-5.1/0-6 INCHES	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	Not Detected
B.75-5.1/18-36 INCHES	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	Not Detected
B.75-5.1/6-18 INCHES	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	Not Detected
B.8-5/0-6 INCHES	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	Not Detected
B.8-5/18-43 INCHES	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	Not Detected
B.8-5/6-18 INCHES	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	Not Detected
B.9-4.7/0-6 INCHES	< 370	< 370	< 370	< 370	< 370	3400	< 370	< 370	< 370	3400
B.9-4.7/18-44 INCHES	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	Not Detected
B.9-4.7/6-18 INCHES	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	Not Detected
B.9-4.9/0-6 INCHES	< 3500	< 3500	< 3500	< 3500	14000	< 3500	< 3500	< 3500	< 3500	14000
B.9-4.9/18-43 INCHES	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	Not Detected
B.9-4.9/6-18 INCHES	< 3500	< 3500	< 3500	< 3500	< 3500	< 3500	5600	< 3500	< 3500	5600
B.9-5.1/0-6 INCHES	< 3600	< 3600	< 3600	< 3600	30000	< 3600	< 3600	< 3600	< 3600	30000
B.9-5.1/18-46 INCHES	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	Not Detected
B.9-5.1/6-18 INCHES	< 1700	< 1700	< 1700	< 1700	6600	< 1700	< 1700	< 1700	< 1700	6600
B.9-5/0-0.5 FEET	< 1800000	< 1800000	< 1800000	< 1800000	< 1800000	7900000	< 1800000	< 1800000	< 1800000	7900000
B.9-5/0.5-1.5 FEET	< 180000	< 180000	< 180000	< 180000	< 180000	560000	< 180000	< 180000	< 180000	560000
B.9-5/1.5-3.5 FEET	< 1700	< 1700	< 1700	< 1700	< 1700	9000	< 1700	< 1700	< 1700	9000
B.95-5.05/0-2 FEET	< 1900	< 1900	< 1900	< 1900	< 1900	5,100	< 1900	< 1900	< 1900	5100
B.9-8.3/0-8 INCHES	< 350	< 350	< 350	< 350	< 350	*	*	< 350	< 350	770
B.9-8.3/8-18 INCHES	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	Not Detected
B-1/0.5-1.5 FEET	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	Not Detected
B-1/0-0.5 FEET	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	Not Detected
B-1/1.5-3.5 FEET	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	Not Detected
B-10.5/0-0.5 FEET	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	Not Detected
B-10/0-6 INCHES	< 330	< 330	< 330	< 330	< 330	< 330	< 330	< 330	< 330	Not Detected
B-10/18-32 INCHES	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	Not Detected
B-10/6-18 INCHES	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	Not Detected
B-11/0-6 INCHES	< 360	< 360	< 360	< 360	< 360	710	< 360	< 360	< 360	710
B-11/18-35 INCHES	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	Not Detected
B-11/6-18 INCHES	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	Not Detected
B-12/0-6 INCHES	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	Not Detected
B-12/18-35 INCHES	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	Not Detected
B-12/6-18 INCHES	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	Not Detected
B-13/0-6 INCHES	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	Not Detected
B-13/18-36 INCHES	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	Not Detected
B-13/6-18 INCHES	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	Not Detected
B-2/0.5-1.5 FEET	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	Not Detected
B-2/0-0.5 FEET	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	Not Detected
B-2/1.5-3.5 FEET	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	Not Detected
B-3/0.5-1.5 FEET	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	Not Detected
B-3/0-0.5 FEET	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	Not Detected
B-3/1.5-3.5 FEET	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	Not Detected
B-4/0.5-1.5 FEET	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	Not Detected
B-4/0-0.5 FEET	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	Not Detected
B-4/1.5-3.5 FEET	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	Not Detected
B5-11/0-0.5 FEET	< 430	< 430	< 430	< 430	< 430	< 430	< 430	< 430	< 430	Not Detected
B-8/0.5-1.5 FEET	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	Not Detected
B-8/0-0.5 FEET	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	Not Detected
B-8/1.5-3.5 FEET	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	Not Detected
B-9/0.5-1.5 FEET	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	Not Detected
B-9/0-0.5 FEET	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	Not Detected
B-9/1.5-3.5 FEET	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	Not Detected
C.1-4.9/0-6 INCHES	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	Not Detected

TABLE 2
SUMMARY OF PCB ANALYTICAL RESULTS IN SOIL SAMPLES
PHASE III PCB DELINEATION
FORMER LAVIERO METALS
894 MIDDLE STREET
BRISTOL, CT

Sample Designation and Depth	Analytical Result By PCB Aroclor (ug/kg)									Total PCB Aroclors
	PCB-1016	PCB-1221	PCB-1232	PCB-1242	PCB-1248	PCB-1254	PCB-1260	PCB-1262	PCB-1268	
C.1-4.9/18-47 INCHES	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	Not Detected
C.1-4.9/6-18 INCHES	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	Not Detected
C.1-5.1/0-6 INCHES	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	Not Detected
C.1-5.1/18-45 INCHES	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	Not Detected
C.1-5.1/6-18 INCHES	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	Not Detected
C.25-3.75/0-6 INCHES	< 1800	< 1800	< 1800	< 1800	*	*	*	< 1800	< 1800	12000
C.25-3.75/18-46 INCHES	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	Not Detected
C.25-3.75/6-18 INCHES	< 370	< 370	< 370	< 370	380	< 370	< 370	< 370	< 370	380
C.25-4.75/0.5-1.5 FEET	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	Not Detected
C.25-4.75/0-0.5 FEET	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	Not Detected
C.25-4/0-6 INCHES	< 3500	< 3500	< 3500	< 3500	12000	< 3500	< 3500	< 3500	< 3500	12000
C.25-4/18-45 INCHES	< 330	< 330	< 330	< 330	< 330	< 330	< 330	< 330	< 330	Not Detected
C.25-4/6-18 INCHES	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	Not Detected
C.25-5.25/0.5-1.5 FEET	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	Not Detected
C.25-5.25/0-0.5 FEET	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	Not Detected
C.5-10/0.5-1.5 FEET	< 350	< 350	< 350	< 350	< 350	*	*	< 350	< 350	1600
C.5-10/0-0.5 FEET	< 330	< 330	< 330	< 330	< 330	< 330	< 330	< 330	< 330	Not Detected
C.5-10/1.5-3.5 FEET	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	Not Detected
C.5-11/0-0.5 FEET	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	Not Detected
C.5-12/0-0.5 FEET	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	Not Detected
C.5-13/0.5-1.5 FEET	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	Not Detected
C.5-13/0-0.5 FEET	< 460	< 460	< 460	< 460	< 460	2,300	< 460	< 460	< 460	2300
C.5-2.5/0.5-1.5 FEET	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	Not Detected
C.5-2.5/0-0.5 FEET	< 360	< 360	< 360	< 360	500	< 360	< 360	< 360	< 360	500
C.5-2/0.5-1.5 FEET	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	Not Detected
C.5-2/0-0.5 FEET	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	Not Detected
C.5-3.5/0.5-1.5 FEET	< 370	< 370	< 370	< 370	860	< 370	< 370	< 370	< 370	860
C.5-3.5/0-0.5 FEET	< 18000	< 18000	< 18000	< 18000	110000	< 18000	< 18000	< 18000	< 18000	110000
C.5-3.5/1.5-3.5 FEET	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	Not Detected
C.5-3.75/0-6 INCHES	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	Not Detected
C.5-3.75/18-43 INCHES	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	Not Detected
C.5-3.75/6-18 INCHES	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	Not Detected
C.5-3/0-6 INCHES	< 1800	< 1800	< 1800	< 1800	19000	< 1800	< 1800	< 1800	< 1800	19000
C.5-3/18-36 INCHES	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	Not Detected
C.5-3/6-18 INCHES	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	Not Detected
C.5-4.5/0.5-1.5 FEET	< 350	< 350	< 350	< 350	< 350	1100	< 350	< 350	< 350	1100
C.5-4.5/0-0.5 FEET	< 1800	< 1800	< 1800	< 1800	< 1800	7800	< 1800	< 1800	< 1800	7800
C.5-4.5/1.5-3.5 FEET	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	Not Detected
C.5-4/0-6 INCHES	< 360	< 360	< 360	< 360	< 360	< 360	400	< 360	< 360	400
C.5-4/18-46 INCHES	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	Not Detected
C.5-4/6-18 INCHES	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	Not Detected
C.5-5/0.5-1.5 FEET	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	Not Detected
C.5-5/0-0.5 FEET	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	Not Detected
C.5-7.5/0.5-1.5 FEET	< 370	< 370	< 370	< 370	< 370	460	< 370	< 370	< 370	460
C.5-7.5/0-0.5 FEET	< 370	< 370	< 370	< 370	< 370	840	< 370	< 370	< 370	840
C.5-7.5/1.5-3.5 FEET	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	Not Detected
C.5-7/0-5 INCHES	< 370	< 370	< 370	< 370	< 370	1100	< 370	< 370	< 370	1100
C.5-7/13-25 INCHES	< 410	< 410	< 410	< 410	< 410	< 410	2900	< 410	< 410	2900
C.5-7/25-40 INCHES	< 340	< 340	< 340	< 340	< 340	*	*	< 340	< 340	1900
C.5-7/5-13 INCHES	< 360	< 360	< 360	< 360	1200	< 360	< 360	< 360	< 360	1200
C.5-8.5/0-8 INCHES	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	Not Detected
C.5-8.5/8-18 INCHES	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	Not Detected
C.5-8/0.5-1.5 FEET	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	Not Detected
C.5-8/0-0.5 FEET	< 330	< 330	< 330	< 330	< 330	500	< 330	< 330	< 330	500
C.5-8/1.5-3.5 FEET	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	Not Detected
C.5-9.5/0-8 INCHES	< 1700	< 1700	< 1700	< 1700	< 1700	5000	< 1700	< 1700	< 1700	5000
C.5-9.5/18-34 INCHES	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	Not Detected
C.5-9.5/8-18 INCHES	< 360	< 360	< 360	< 360	< 360	*	*	< 360	< 360	660
C.5-9/0.5-1.5 FEET	< 350	< 350	< 350	< 350	< 350	*	*	< 350	< 350	1000
C.5-9/0-0.5 FEET	< 1800	< 1800	< 1800	< 1800	< 1800	*	*	< 1800	< 1800	5600
C.5-9/1.5-3.5 FEET	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	Not Detected
C.6-2.3/0-6 INCHES	< 18000	< 18000	< 18000	< 18000	67000	< 18000	< 18000	< 18000	< 18000	67000
C.6-2.3/18-32 INCHES	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	Not Detected

TABLE 2
SUMMARY OF PCB ANALYTICAL RESULTS IN SOIL SAMPLES
PHASE III PCB DELINEATION
FORMER LAVIERO METALS
894 MIDDLE STREET
BRISTOL, CT

Sample Designation and Depth	Analytical Result By PCB Aroclor (ug/kg)									Total PCB Aroclors
	PCB-1016	PCB-1221	PCB-1232	PCB-1242	PCB-1248	PCB-1254	PCB-1260	PCB-1262	PCB-1268	
C.6-2.3/6-18 INCHES	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	Not Detected
C.625-3.375/0-0.5 FEET	< 400000	< 400000	< 400000	< 400000	4,200,000	*	< 400000	< 400000	< 400000	4200000
C.75-1.75/0.5-1.5 FEET	< 330	< 330	< 330	< 330	< 330	< 330	< 330	< 330	< 330	Not Detected
C.75-1.75/0-0.5 FEET	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	Not Detected
C.75-2.75/0.5-1.5 FEET	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	Not Detected
C.75-2.75/0-0.5 FEET	< 380	< 380	< 380	< 380	< 380	850	< 380	< 380	< 380	850
C.75-2/0.5-1.5 FEET	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	Not Detected
C.75-2/0-0.5 FEET	< 1800	< 1800	< 1800	< 1800	< 1800	7200	< 1800	< 1800	< 1800	7200
C.75-3.25/0.5-1.5 FEET	< 350	< 350	< 350	< 350	2500	< 350	< 350	< 350	< 350	2500
C.75-3.25/0-0.5 FEET	< 3600	< 3600	< 3600	< 3600	41000	< 3600	< 3600	< 3600	< 3600	41000
C.75-3.25/1.5-3.5 FEET	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	Not Detected
C.75-3.5/0-6 INCHES	< 370	< 370	< 370	< 370	700	< 370	< 370	< 370	< 370	700
C.75-3.5/18-47 INCHES	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	Not Detected
C.75-3.5/6-18 INCHES	< 350	< 350	< 350	< 350	860	< 350	< 350	< 350	< 350	860
C.8-14.1/0-0.5 FEET	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	Not Detected
C.8-14.1/0-1.5 FEET	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	Not Detected
C.8-2.3/0-0.5 FEET	< 1900	< 1900	< 1900	< 1900	< 1900	19000	< 1900	< 1900	< 1900	19000
C.85-12/0.5-1.5 FEET	< 18000	< 18000	< 18000	< 18000	190,000	< 18000	< 18000	< 18000	< 18000	190000
C.85-12/0-0.5 FEET	< 390	< 390	< 390	< 390	1,200	< 390	< 390	< 390	< 390	1200
C-1/0.5-1.5 FEET	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	Not Detected
C-1/0-0.5 FEET	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	Not Detected
C-1/1.5-3.5 FEET	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	Not Detected
C-10/0-6 INCHES	< 360	< 360	< 360	< 360	< 360	1400	< 360	< 360	< 360	1400
C-10/18-39 INCHES	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	Not Detected
C-10/6-18 INCHES	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	Not Detected
C-11/0-6 INCHES	< 370	< 370	< 370	< 370	< 370	640	< 370	< 370	< 370	640
C-11/18-40 INCHES	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	Not Detected
C-11/6-18 INCHES	< 350	< 350	< 350	< 350	< 350	640	< 350	< 350	< 350	640
C-12/0-6 INCHES	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	Not Detected
C-12/18-38 INCHES	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	Not Detected
C-12/6-18 INCHES	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	Not Detected
C-13/0-6 INCHES	< 350	< 350	< 350	< 350	< 350	580	< 350	< 350	< 350	580
C-13/18-36 INCHES	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	Not Detected
C-13/6-18 INCHES	< 360	< 360	< 360	< 360	< 360	600	< 360	< 360	< 360	600
C-14/0-6 INCHES	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	Not Detected
C-14/18-35 INCHES	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	Not Detected
C-14/6-18 INCHES	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	Not Detected
C2.5-8.5/0-8 INCHES	< 350	< 350	< 350	< 350	< 350	*	*	< 350	< 350	540
C2.5-8.5/8-18 INCHES	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	Not Detected
C-2/0.5-1.5 FEET	< 360	< 360	< 360	< 360	< 360	750	< 360	< 360	< 360	750
C-2/0-0.5 FEET	< 380	< 380	< 380	< 380	< 380	2300	< 380	< 380	< 380	2300
C-2/1.5-3.5 FEET	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	Not Detected
C-3.5/0.5-1.5 FEET	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	Not Detected
C-3.5/0-0.5 FEET	< 340	< 340	< 340	< 340	3400	< 340	< 340	< 340	< 340	3400
C3.75-3.7/0-6 INCHES	< 1700	< 1700	< 1700	< 1700	11000	< 1700	< 1700	< 1700	< 1700	11000
C3.75-3.7/18-44 INCHES	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	Not Detected
C3.75-3.7/6-18 INCHES	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	Not Detected
C-3/0-6 INCHES	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	Not Detected
C-3/18-38 INCHES	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	Not Detected
C-3/6-18 INCHES	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	Not Detected
C-4.5/0.5-1.5 FEET	< 350	< 350	< 350	< 350	510	< 350	< 350	< 350	< 350	510
C-4.5/0-0.5 FEET	< 360	< 360	< 360	< 360	*	*	*	< 360	< 360	5800
C-4.5/1.5-3.5 FEET	< 330	< 330	< 330	< 330	470	< 330	< 330	< 330	< 330	470
C-4.9/0.5-1.5 FEET	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	Not Detected
C-4.9/0-0.5 FEET	< 1700	< 1700	< 1700	< 1700	5200	< 1700	< 1700	< 1700	< 1700	5200
C-4/0-6 INCHES	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	Not Detected
C-4/18-36 INCHES	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	Not Detected
C-4/6-18 INCHES	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	Not Detected
C-5.1/0.5-1.5 FEET	< 350	< 350	< 350	< 350	< 350	4500	< 350	< 350	< 350	4500
C-5.1/0-0.5 FEET	< 18000	< 18000	< 18000	< 18000	69000	< 18000	< 18000	< 18000	< 18000	69000
C-5.1/1.5-3.5 FEET	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	Not Detected
C-5.5/0.5-1.5 FEET	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	Not Detected
C-5.5/0-0.5 FEET	< 350	< 350	< 350	< 350	*	*	*	< 350	< 350	3200

TABLE 2
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PHASE III PCB DELINEATION
FORMER LAVIERO METALS
894 MIDDLE STREET
BRISTOL, CT

Sample Designation and Depth	Analytical Result By PCB Aroclor (ug/kg)									Total PCB Aroclors
	PCB-1016	PCB-1221	PCB-1232	PCB-1242	PCB-1248	PCB-1254	PCB-1260	PCB-1262	PCB-1268	
C-5/0-6 INCHES	< 3800	< 3800	< 3800	< 3800	31000	< 3800	< 3800	< 3800	< 3800	31000
C-5/18-34 INCHES	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	Not Detected
C-5/6-18 INCHES	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	Not Detected
C-6/0-6 INCHES	< 360	< 360	< 360	< 360	< 360	1200	< 360	< 360	< 360	1200
C-6/18-38 INCHES	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	Not Detected
C-6/6-18 INCHES	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	Not Detected
C-7.5/0-8 INCHES	< 340	< 340	< 340	< 340	< 340	*	*	< 340	< 340	1300
C-7.5/8-18 INCHES	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	Not Detected
C-7/0-6 INCHES	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	Not Detected
C-7/18-36 INCHES	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	Not Detected
C-7/6-18 INCHES	< 360	< 360	< 360	< 360	< 360	< 360	710	< 360	< 360	710
C-8/0-5 INCHES	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	Not Detected
C-8/13-26 INCHES	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	Not Detected
C-8/5-13 INCHES	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	Not Detected
C-9.5/0-8 INCHES	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	Not Detected
C-9.5/8-18 INCHES	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	Not Detected
C-9/0-6 INCHES	< 1800	< 1800	< 1800	< 1800	< 1800	*	*	< 1800	< 1800	4300
C-9/18-36 INCHES	< 430	< 430	< 430	< 430	< 430	< 430	< 430	< 430	< 430	Not Detected
C-9/6-18 INCHES	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	Not Detected
D.25-1.5/0.5-1.5 FEET	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	Not Detected
D.25-1.5/0-0.5 FEET	< 350	< 350	< 350	< 350	< 350	530	< 350	< 350	< 350	530
D.25-1.75/0.5-1.5 FEET	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	Not Detected
D.25-1.75/0-0.5 FEET	< 1800	< 1800	< 1800	< 1800	< 1800	5000	< 1800	< 1800	< 1800	5000
D.25-2.25/0.5-1.5 FEET	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	Not Detected
D.25-2.25/0-0.5 FEET	< 350	< 350	< 350	< 350	< 350	3200	< 350	< 350	< 350	3200
D.25-2.75/0.5-1.5 FEET	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	Not Detected
D.25-2.75/0-0.5 FEET	< 350	< 350	< 350	< 350	350	< 350	< 350	< 350	< 350	350
D.25-2/0.5-1.5 FEET	< 370	< 370	< 370	< 370	< 370	1800	< 370	< 370	< 370	1800
D.25-2/0-0.5 FEET	< 3600	< 3600	< 3600	< 3600	< 3600	42000	< 3600	< 3600	< 3600	42000
D.25-2/1.5-3.5 FEET	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	Not Detected
D.25-3.25/0.5-1.5 FEET	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	Not Detected
D.25-3.25/0-0.5 FEET	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	Not Detected
D.25-3.75/0.5-1.5 FEET	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	Not Detected
D.25-3.75/0-0.5 FEET	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	Not Detected
D.25-9.15 (0-0.5 FT)	< 2900	< 2900	< 2900	< 2900	< 2900	6,900	< 2900	< 2900	< 2900	6900
D.25-9.25/0.5-1.5 FEET	< 500	< 500	< 500	< 500	< 500	< 500	< 500	< 500	< 500	Not Detected
D.25-9.25/0-0.5 FEET	< 3300	< 3300	< 3300	< 3300	< 3300	*	*	< 3300	< 3300	35000
D.25-9.25/1.5-3.5 FEET	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	Not Detected
D.25-9.5/0.5-1.5 FEET	< 530	< 530	< 530	< 530	< 530	< 530	< 530	< 530	< 530	Not Detected
D.25-9.5/0-0.5 FEET	< 770	< 770	< 770	< 770	< 770	2500	< 770	< 770	< 770	2500
D.25-9.5/1.5-3.5 FEET	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	Not Detected
D.4-9/0.5-1.5 FEET	< 2100	< 2100	< 2100	< 2100	< 2100	*	*	< 2100	< 2100	14000
D.4-9/0-0.5 FEET	< 2200	< 2200	< 2200	< 2200	< 2200	*	*	< 2200	< 2200	10000
D.4-9/1.5-3.5 FEET	< 400	< 400	< 400	< 400	< 400	*	*	< 400	< 400	2900
D.4-9/3.5-5.5 FEET	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	Not Detected
D.5-1.5/0.5-1.5 FEET	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	Not Detected
D.5-1.5/0-0.5 FEET	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	Not Detected
D.5-1.75/0.5-1.5 FEET	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	Not Detected
D.5-1.75/0-0.5 FEET	< 360	< 360	< 360	< 360	< 360	3100	< 360	< 360	< 360	3100
D.5-2.5/0-6 INCHES	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	Not Detected
D.5-2.5/18-38 INCHES	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	Not Detected
D.5-2.5/6-18 INCHES	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	Not Detected
D.5-2/0-6 INCHES	< 3700	< 3700	< 3700	< 3700	12000	< 3700	< 3700	< 3700	< 3700	12000
D.5-2/18-38 INCHES	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	Not Detected
D.5-2/6-18 INCHES	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	Not Detected
D.5-3.0/0-6 INCHES	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	Not Detected
D.5-3.0/18-39 INCHES	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	Not Detected
D.5-3.0/6-18 INCHES	< 350	< 350	< 350	< 350	< 350	600	< 350	< 350	< 350	600
D.5-3.5/0.5-1.5 FEET	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	Not Detected
D.5-3.5/0-0.5 FEET	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	Not Detected
D.5-8.5/0.5-1.5 FEET	< 360	< 360	< 360	< 360	< 360	*	*	< 360	< 360	3100
D.5-8.5/0-0.5 FEET	< 340	< 340	< 340	< 340	< 340	*	*	< 340	< 340	1600
D.5-8.5/1.5-3.5 FEET	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	Not Detected

TABLE 2
SUMMARY OF PCB ANALYTICAL RESULTS IN SOIL SAMPLES
PHASE III PCB DELINEATION
FORMER LAVIERO METALS
894 MIDDLE STREET
BRISTOL, CT

Sample Designation and Depth	Analytical Result By PCB Aroclor (ug/kg)									Total PCB Aroclors
	PCB-1016	PCB-1221	PCB-1232	PCB-1242	PCB-1248	PCB-1254	PCB-1260	PCB-1262	PCB-1268	
D.5-8.75/0.5-1.5 FEET	< 410	< 410	< 410	< 410	< 410	< 410	880	< 410	< 410	880
D.5-8.75/0-0.5 FEET	< 2500	< 2500	< 2500	< 2500	< 2500	*	*	< 2500	< 2500	17000
D.5-8.75/1.5-3.5 FEET	< 440	< 440	< 440	< 440	< 440	< 440	< 440	< 440	< 440	Not Detected
D.5-8/0-8 INCHES	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	Not Detected
D.5-8/8-18 INCHES	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	Not Detected
D.5-9.0/0.5-1.5 FEET	< 440	< 440	< 440	< 440	< 440	*	*	< 440	< 440	770
D.5-9.0/0-0.5 FEET	< 650	< 650	< 650	< 650	< 650	*	*	< 650	< 650	1600
D.5-9.0/1.5-3.5 FEET	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	Not Detected
D.5-9.25/0.5-1.5 FEET	< 640	< 640	< 640	< 640	< 640	< 640	890	< 640	< 640	890
D.5-9.25/0-0.5 FEET	< 610	< 610	< 610	< 610	< 610	*	*	< 610	< 610	4200
D.5-9.25/1.5-3.5 FEET	< 430	< 430	< 430	< 430	< 430	< 430	< 430	< 430	< 430	Not Detected
D.5-9.5/0.5-1.5 FEET	< 560	< 560	< 560	< 560	< 560	< 560	< 560	< 560	< 560	Not Detected
D.5-9.5/0-0.5 FEET	< 1200	< 1200	< 1200	< 1200	< 1200	1300	< 1200	< 1200	< 1200	1300
D.6-2.2/0-0.5 FEET	< 110000	< 110000	< 110000	< 110000	< 110000	180,000	< 110000	< 110000	< 110000	180000
D.75-1.5/0-6 INCHES	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	Not Detected
D.75-1.5/18-44 INCHES	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	Not Detected
D.75-1.5/6-18 INCHES	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	Not Detected
D.75-1.745/18-45 INCHES	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	Not Detected
D.75-1.75/0-6 INCHES	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	Not Detected
D.75-1.75/6-18 INCHES	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	Not Detected
D.75-2.25/0.5-1.5 FEET	< 350	< 350	< 350	< 350	< 350	360	< 350	< 350	< 350	360
D.75-2.25/0-0.5 FEET	< 3500	< 3500	< 3500	< 3500	< 3500	24000	< 3500	< 3500	< 3500	24000
D.75-2.25/1.5-3.5 FEET	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	Not Detected
D.75-2/0.5-1.5 FEET	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	Not Detected
D.75-2/0-0.5 FEET	< 3600	< 3600	< 3600	< 3600	< 3600	22000	< 3600	< 3600	< 3600	22000
D.75-8.75/0.5-1.5 FEET	< 450	< 450	< 450	< 450	< 450	< 450	< 450	< 450	< 450	Not Detected
D.75-8.75/0-0.5 FEET	< 610	< 610	< 610	< 610	< 610	*	*	< 610	< 610	4400
D.75-8.75/1.5-3.5 FEET	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	Not Detected
D.75-9/0.5-1.5 FEET	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	Not Detected
D.75-9/0-0.5 FEET	< 440	< 440	< 440	< 440	< 440	< 440	< 440	< 440	< 440	Not Detected
D.75-9/1.5-3.5 FEET	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	Not Detected
D-1.5/0.5-1.5 FEET	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	Not Detected
D-1.5/0-0.5 FEET	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	Not Detected
D-1.75/0.5-1.5 FEET	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	Not Detected
D-1.75/0-0.5 FEET	< 340	< 340	< 340	< 340	< 340	890	< 340	< 340	< 340	890
D-10/0.5- 1.5 FEET	< 430	< 430	< 430	< 430	< 430	< 430	< 430	< 430	< 430	Not Detected
D-10/0-0.5 FEET	< 720	< 720	< 720	< 720	< 720	< 720	< 720	< 720	< 720	Not Detected
D-10/1.5-3.5 FEET	< 440	< 440	< 440	< 440	< 440	< 440	< 440	< 440	< 440	Not Detected
D-11/0-0.5 FEET	< 930	< 930	< 930	< 930	< 930	< 930	< 930	< 930	< 930	Not Detected
D-13/0.5-1.5 FEET	< 450	< 450	< 450	< 450	< 450	< 450	< 450	< 450	< 450	Not Detected
D-13/0-0.5 FEET	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	Not Detected
D-13/1.5-3.5 FEET	< 550	< 550	< 550	< 550	< 550	< 550	< 550	< 550	< 550	Not Detected
D-15/0-6 INCHES	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	Not Detected
D-15/18-29 INCHES	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	Not Detected
D-15/6-18 INCHES	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	Not Detected
D-2.5/0-6 INCHES	< 19000	< 19000	< 19000	< 19000	< 19000	83,000	< 19000	< 19000	< 19000	83000
D-2.5/18-36 INCHES	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	Not Detected
D-2.5/6-18 INCHES	< 370	< 370	< 370	< 370	< 370	2600	< 370	< 370	< 370	2600
D-2/0-6 INCHES	< 350	< 350	< 350	< 350	< 350	590	< 350	< 350	< 350	590
D-2/18-34 INCHES	< 180	< 180	< 180	< 180	< 180	< 180	< 180	< 180	< 180	Not Detected
D-2/6-18 INCHES	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	Not Detected
D-3.5/0-6 INCHES	< 19000	< 19000	< 19000	< 19000	56000	< 19000	< 19000	< 19000	< 19000	56000
D-3.5/18-37 INCHES	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	Not Detected
D-3.5/6-18 INCHES	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	Not Detected
D-3/0-6 INCHES	< 370	< 370	< 370	< 370	690	< 370	< 370	< 370	< 370	690
D-3/18-36 INCHES	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	Not Detected
D-3/6-18 INCHES	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	Not Detected
D-4/0.5-1.5 FEET	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	Not Detected
D-4/0-0.5 FEET	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	Not Detected
D-4/1 5-3.5 FEET	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	Not Detected
D-5/0-6 INCHES	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	Not Detected
D-5/18-32 INCHES	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	Not Detected
D-5/6-18 INCHES	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	Not Detected

TABLE 2
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PHASE III PCB DELINEATION
FORMER LAVIERO METALS
894 MIDDLE STREET
BRISTOL, CT

Sample Designation and Depth	Analytical Result By PCB Aroclor (ug/kg)									Total PCB Aroclors
	PCB-1016	PCB-1221	PCB-1232	PCB-1242	PCB-1248	PCB-1254	PCB-1260	PCB-1262	PCB-1268	
D5-10/0-0.5 FEET	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000	Not Detected
D-6/0-6 INCHES	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	Not Detected
D-6/18-32 INCHES	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	Not Detected
D-6/6-18 INCHES	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	Not Detected
D-7.5/0-8 INCHES	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	Not Detected
D-7.5/8-18 INCHES	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	Not Detected
D-7/0-5 INCHES	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	Not Detected
D-7/13-23 INCHES	< 340	< 340	< 340	< 340	< 340	1700	< 340	< 340	< 340	1700
D-7/23-57 INCHES	< 330	< 330	< 330	< 330	< 330	< 330	< 330	< 330	< 330	Not Detected
D-7/5-13 INCHES	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	Not Detected
D-8.5/0-8 INCHES	< 370	< 370	< 370	< 370	< 370	< 370	1400	< 370	< 370	1400
D-8.5/8-18 INCHES	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	Not Detected
D-8/0-6 INCHES	< 360	< 360	< 360	< 360	< 360	< 360	1000	< 360	< 360	1000
D-8/18-39 INCHES	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	Not Detected
D-8/6-18 INCHES	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	Not Detected
D-9.5/0.5-1.5 FEET	< 4800	< 4800	< 4800	< 4800	33000	< 4800	< 4800	< 4800	< 4800	33000
D-9.5/0-0.5 FEET	< 1700	< 1700	< 1700	< 1700	*	*	*	< 1700	< 1700	12000
D-9.5/1.5-3.5 FEET	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	Not Detected
D-9/0-6 INCHES	< 1900	< 1900	< 1900	< 1900	< 1900	< 1900	4600	< 1900	< 1900	4600
D-9/18-34 INCHES	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	Not Detected
D-9/6-18 INCHES	< 430	< 430	< 430	< 430	< 430	< 430	< 430	< 430	< 430	Not Detected
E.25-1.7/0-6 INCHES	< 340	< 340	< 340	< 340	< 340	370	< 340	< 340	< 340	370
E.25-1.7/18-42 INCHES	< 330	< 330	< 330	< 330	< 330	< 330	< 330	< 330	< 330	Not Detected
E.25-1.7/6-18 INCHES	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	Not Detected
E.25-1.8/0.5-1.5 FEET	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	Not Detected
E.25-1.8/0-0.5 FEET	< 1700	< 1700	< 1700	< 1700	< 1700	9000	< 1700	< 1700	< 1700	9000
E.25-2/0.5-1.5 FEET	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	Not Detected
E.25-2/0-0.5 FEET	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	Not Detected
E.5-1.75/0.5-1.5 FEET	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	Not Detected
E.5-1.75/0-0.5 FEET	< 350	< 350	< 350	< 350	< 350	1300	< 350	< 350	< 350	1300
E.5-2.1/0-0.5 FEET	< 23000	< 23000	< 23000	< 23000	< 23000	< 23000	82,000	< 23000	< 23000	82000
E.5-2.5/0-6 INCHES	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	Not Detected
E.5-2.5/18-42 INCHES	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	Not Detected
E.5-2.5/6-18 INCHES	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	Not Detected
E.5-2/0.5-1.5 FEET	< 360	< 360	< 360	< 360	< 360	2000	< 360	< 360	< 360	2000
E.5-2/0-0.5 FEET	< 3500	< 3500	< 3500	< 3500	< 3500	24000	< 3500	< 3500	< 3500	24000
E.5-2/1.5-3.5 FEET	< 360	< 360	< 360	< 360	< 360	< 360	620	< 360	< 360	620
E.5-3.5/0.5-1.5 FEET	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	Not Detected
E.5-3.5/0-0.5 FEET	< 360	< 360	< 360	< 360	< 360	*	*	< 360	< 360	1200
E.5-3/0-6 INCHES	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	Not Detected
E.5-3/18-38 INCHES	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	Not Detected
E.5-3/6-18 INCHES	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	Not Detected
E.75-1.75/0.5-1.5 FEET	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	Not Detected
E.75-1.75/0-0.5 FEET	< 340	< 340	< 340	< 340	< 340	1200	< 340	< 340	< 340	1200
E.75-2/0.5-1.5 FEET	< 360	< 360	< 360	< 360	< 360	< 360	2100	< 360	< 360	2100
E.75-2/0-0.5 FEET	< 360	< 360	< 360	< 360	< 360	< 360	1800	< 360	< 360	1800
E.75-2/1.5-3.5 FEET	< 370	< 370	< 370	< 370	< 370	< 370	850	< 370	< 370	850
E-1.75/0-6 INCHES	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	Not Detected
E-1.75/18-46 INCHES	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	Not Detected
E-1.75/6-18 INCHES	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	Not Detected
E-1/0-0.5 FEET	< 760	< 760	< 760	< 760	< 760	< 760	< 760	< 760	< 760	Not Detected
E-10/0.5-1.5 FEET	< 480	< 480	< 480	< 480	< 480	< 480	< 480	< 480	< 480	Not Detected
E-10/0-0.5 FEET	< 490	< 490	< 490	< 490	< 490	< 490	< 490	< 490	< 490	Not Detected
E-10/1.5-3.5 FEET	< 620	< 620	< 620	< 620	< 620	< 620	< 620	< 620	< 620	Not Detected
E-2.5/0-6 INCHES	< 340	< 340	< 340	< 340	< 340	2200	< 340	< 340	< 340	2200
E-2.5/14-21 INCHES	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	Not Detected
E-2.5/6-14 INCHES	< 360	< 360	< 360	< 360	< 360	1300	< 360	< 360	< 360	1300
E-2/0-6 INCHES	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	Not Detected
E-2/18-38 INCHES	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	Not Detected
E-2/6-18 INCHES	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	Not Detected
E-3.5/0.5-1.5 FEET	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	Not Detected
E-3.5/0-0.5 FEET	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	Not Detected
E-3/0-6 INCHES	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	Not Detected

TABLE 2
SUMMARY OF PCB ANALYTICAL RESULTS IN SOIL SAMPLES
PHASE III PCB DELINEATION
FORMER LAVIERO METALS
894 MIDDLE STREET
BRISTOL, CT

Sample Designation and Depth	Analytical Result By PCB Aroclor (ug/kg)									Total PCB Aroclors
	PCB-1016	PCB-1221	PCB-1232	PCB-1242	PCB-1248	PCB-1254	PCB-1260	PCB-1262	PCB-1268	
E-3/18-38 INCHES	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	Not Detected
E-3/6-18 INCHES	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	Not Detected
E-4/0-5 INCHES	< 440	< 440	< 440	< 440	< 440	< 440	< 440	< 440	< 440	Not Detected
E-4/13-29 INCHES	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	Not Detected
E-4/5-13 INCHES	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	Not Detected
E-5/0-6 INCHES	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	Not Detected
E-5/18-34 INCHES	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	Not Detected
E-5/6-18 INCHES	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	Not Detected
E5-1.6/0-6 INCHES	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	Not Detected
E5-1.6/18-44 INCHES	< 330	< 330	< 330	< 330	< 330	< 330	< 330	< 330	< 330	Not Detected
E5-1.6/6-18 INCHES	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	Not Detected
E-6/0-6 INCHES	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	Not Detected
E-6/18-40 INCHES	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	Not Detected
E6/6-18 INCHES	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	Not Detected
E-7/0-6 INCHES	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	Not Detected
E-7/18-38 INCHES	< 330	< 330	< 330	< 330	< 330	< 330	< 330	< 330	< 330	Not Detected
E-7/6-18 INCHES	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	Not Detected
E-8/0.5-1.5 FEET	< 450	< 450	< 450	< 450	< 450	< 450	< 450	< 450	< 450	Not Detected
E-8/0-0.5 FEET	< 520	< 520	< 520	< 520	< 520	910	< 520	< 520	< 520	910
E-8/1.5-3.5 FEET	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	Not Detected
E-9/0-0.5 FEET	< 890	< 890	< 890	< 890	< 890	< 890	< 890	< 890	< 890	Not Detected
F.5-1.5/0.5-1.5 FEET	< 340	< 340	< 340	< 340	< 340	< 340	420	< 340	< 340	420
F.5-1.5/0-0.5 FEET	< 340	< 340	< 340	< 340	< 340	< 340	800	< 340	< 340	800
F.5-1.5/1.5-3.5 FEET	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	Not Detected
F.5-1.75/0.5-1.5 FEET	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	Not Detected
F.5-1.75/0-0.5 FEET	< 350	< 350	< 350	< 350	< 350	< 350	700	< 350	< 350	700
F.5-2.5/0.5-1.5 FEET	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	Not Detected
F.5-2.5/0-0.5 FEET	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	Not Detected
F.5-2/0.5-1.5 FEET	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	Not Detected
F.5-2/0-0.5 FEET	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	Not Detected
F.5-3.5/0-0.5 FEET	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	Not Detected
F.5-3/0-6 INCHES	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	Not Detected
F.5-3/18-36 INCHES	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	Not Detected
F.5-3/6-18 INCHES	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	Not Detected
F.5-4/0-0.5 FEET	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	Not Detected
F-1 25/0-0.5 FEET	< 380	< 380	< 380	< 380	< 380	520	*	< 380	< 380	520
F-1.5/0-6 INCHES	< 1700	< 1700	< 1700	< 1700	6000	< 1700	< 1700	< 1700	< 1700	6000
F-1.5/18-42 INCHES	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	Not Detected
F-1.5/6-18 INCHES	< 330	< 330	< 330	< 330	< 330	< 330	< 330	< 330	< 330	Not Detected
F-1.75/0.5-1.5 FEET	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	Not Detected
F-1.75/0-0.5 FEET	< 2100	< 2100	< 2100	< 2100	< 2100	10000	< 2100	< 2100	< 2100	10000
F-1/0-0.5 FEET	< 730	< 730	< 730	< 730	< 730	< 730	< 730	< 730	< 730	Not Detected
F-2.5/0.5-1.5 FEET	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	Not Detected
F-2.5/0-0.5 FEET	< 360	< 360	< 360	< 360	< 360	640	< 360	< 360	< 360	640
F-2/0-6 INCHES	< 360	< 360	< 360	< 360	< 360	*	*	< 360	< 360	1900
F-2/18-36 INCHES	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	Not Detected
F-2/6-18 INCHES	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	Not Detected
F-3.5/0-0.5 FEET	< 350	< 350	< 350	< 350	< 350	350	*	< 350	< 350	350
F-3/0-6 INCHES	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	Not Detected
F-3/18-36 INCHES	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	Not Detected
F-3/6-18 INCHES	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	Not Detected
F-4/0-6 INCHES	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	Not Detected
F-4/18-33 INCHES	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	Not Detected
F-4/6-18 INCHES	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	Not Detected
F-5/0-6 INCHES	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	Not Detected
F-5/18-32 INCHES	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	Not Detected
F-5/6-18 INCHES	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	Not Detected
F-6/0.5-1.5 FEET	< 350	< 350	< 350	< 350	< 350	830	< 350	< 350	< 350	830
F-6/0-0.5 FEET	< 1800	< 1800	< 1800	< 1800	< 1800	6700	< 1800	< 1800	< 1800	6700
F-7/0-6 INCHES	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	Not Detected
F-7/18-35 INCHES	< 400	< 400	< 400	< 400	< 400	*	*	< 400	< 400	1300
F-7/35-59 INCHES	< 410	< 410	< 410	< 410	< 410	1300	< 410	< 410	< 410	1300
G.4-1.8/0-8 INCHES	< 1700	< 1700	< 1700	< 1700	< 1700	*	*	< 1700	< 1700	6600

TABLE 2
SUMMARY OF PCB ANALYTICAL RESULTS IN SOIL SAMPLES
PHASE III PCB DELINEATION
FORMER LAVIERO METALS
894 MIDDLE STREET
BRISTOL, CT

Sample Designation and Depth	Analytical Result By PCB Aroclor (ug/kg)									Total PCB Aroclors
	PCB-1016	PCB-1221	PCB-1232	PCB-1242	PCB-1248	PCB-1254	PCB-1260	PCB-1262	PCB-1268	
G.4-1.8/8-18 INCHES	< 350	< 350	< 350	< 350	< 350	*	*	< 350	< 350	3400
G.5-2.5/0-0.5 FEET	< 1700	< 1700	< 1700	< 1700	< 1700	9900	< 1700	< 1700	< 1700	9900
G.5-2.5/1.5-3.5 FEET	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	Not Detected
G.5-2/0.5-1.5 FEET	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	Not Detected
G.5-2/0-0.5 FEET	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	Not Detected
G.5-3.5/0-0.5 FEET	< 430	< 430	< 430	< 430	< 430	< 430	< 430	< 430	< 430	Not Detected
G.5-3/0.5-1.5 FEET	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	Not Detected
G.5-3/0-0.5 FEET	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	Not Detected
G.5-4/0-0.5 FEET	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	Not Detected
G.6-1.9/0-8 INCHES	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	Not Detected
G.6-1.9/18-35 INCHES	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	Not Detected
G.6-1.9/8-18 INCHES	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	Not Detected
G.75-1.7/0-8 INCHES	< 1700	< 1700	< 1700	< 1700	< 1700	*	*	< 1700	< 1700	4900
G.75-1.7/18-35 INCHES	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	Not Detected
G.75-1.7/8-18 INCHES	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	Not Detected
G.75-2.5/0-0.5 FEET	< 460	< 460	< 460	< 460	< 460	< 460	< 460	< 460	< 460	Not Detected
G.9-1.6/0-8 INCHES	< 1700	< 1700	< 1700	< 1700	< 1700	< 1700	4600	< 1700	< 1700	4600
G.9-1.6/18-32 INCHES	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	Not Detected
G.9-1.6/8-18 INCHES	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	Not Detected
G-1/0-0.5 FEET	< 680	< 680	< 680	< 680	< 680	< 680	< 680	< 680	< 680	Not Detected
G-2.5/0.5-1.5 FEET	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	Not Detected
G-2.5/0-0.5 FEET	< 350	< 350	< 350	< 350	< 350	1100	< 350	< 350	< 350	1100
G-2.5/1.5-3.5 FEET	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	Not Detected
G-2/0-6 INCHES	< 1700	< 1700	< 1700	< 1700	< 1700	< 1700	5500	< 1700	< 1700	5500
G-2/18-32 INCHES	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	Not Detected
G-2/6-18 INCHES	< 360	< 360	< 360	< 360	< 360	*	*	< 360	< 360	840
G-3.5 0-0.5 FT	< 370	< 370	< 370	< 370	< 370	*	1,200	< 370	< 370	1200
G-3.5/0.5-1.5 FEET	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	Not Detected
G-3/0-6 INCHES	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	Not Detected
G-3/18-40 INCHES	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	Not Detected
G-3/6-18 INCHES	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	Not Detected
G-4/0-6 INCHES	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	Not Detected
G-4/18-32 INCHES	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	Not Detected
G-4/6-18 INCHES	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	Not Detected
G-5/0.5-1.5 FEET	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	Not Detected
G-5/0-0.5 FEET	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	Not Detected
G-5/1.5-3.5 FEET	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	Not Detected
G7-1/0-0.5 FEET	< 820	< 820	< 820	< 820	< 820	< 820	< 820	< 820	< 820	Not Detected
H.1-1.1/0-2 FEET	< 4100	< 4100	< 4100	< 4100	< 4100	< 4100	18000	< 4100	< 4100	18000
H.25-1.1/0-5 INCHES	< 1700	< 1700	< 1700	< 1700	< 1700	*	*	< 1700	< 1700	6900
H.25-1.1/13-23 INCHES	< 2100	< 2100	< 2100	< 2100	< 2100	*	*	< 2100	< 2100	6700
H.25-1.1/23-47 INCHES	< 610	< 610	< 610	< 610	< 610	2000	< 610	< 610	< 610	2000
H.25-1.1/5-13 INCHES	< 1900	< 1900	< 1900	< 1900	< 1900	*	*	< 1900	< 1900	13000
H.3-1.1/ 1.5-3.5 FEET	< 2400	< 2400	< 2400	< 2400	< 2400	*	*	< 2400	< 2400	9900
H.3-1.1/0.5-1.5 FEET	< 1900	< 1900	< 1900	< 1900	< 1900	*	*	< 1900	< 1900	8400
H.3-1.1/0-0.5 FEET	< 1800	< 1800	< 1800	< 1800	< 1800	< 1800	9700	< 1800	< 1800	9700
H.3-1.1/3.5-5.5 FEET	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000	1000	< 1000	< 1000	1000
H.35-1.25/0-2 FEET	< 390	< 390	< 390	< 390	< 390	3,200	< 390	< 390	< 390	3200
H.4-0.9/0-8 INCHES	< 1900	< 1900	< 1900	< 1900	< 1900	*	*	< 1900	< 1900	8300
H.4-0.9/15-21 INCHES	< 410	< 410	< 410	< 410	< 410	*	*	< 410	< 410	2800
H.4-0.9/21-45 INCHES	< 590	< 590	< 590	< 590	< 590	*	*	< 590	< 590	1700
H.4-0.9/8-15 INCHES	< 2000	< 2000	< 2000	< 2000	< 2000	*	*	< 2000	< 2000	6200
H.4-1.3/0-8 INCHES	< 2000	< 2000	< 2000	< 2000	< 2000	*	*	< 2000	< 2000	5900
H.4-1.3/18-30 INCHES	< 550	< 550	< 550	< 550	< 550	< 550	< 550	< 550	< 550	Not Detected
H.4-1.3/8-18 INCHES	< 470	< 470	< 470	< 470	< 470	< 470	< 470	< 470	< 470	Not Detected
H.5-0.8 0-0.5 FT	< 400	< 400	< 400	< 400	< 400	1,800	*	< 400	< 400	1800
H.5-1.25/0-8 INCHES	< 2100	< 2100	< 2100	< 2100	< 2100	7600	< 2100	< 2100	< 2100	7600
H.5-1.25/16-24 INCHES	< 690	< 690	< 690	< 690	< 690	*	*	< 690	< 690	2000
H.5-1.25/24-48 INCHES	< 420	< 420	< 420	< 420	< 420	*	*	< 420	< 420	4300
H.5-1.25/8-16 INCHES	< 2300	< 2300	< 2300	< 2300	< 2300	*	*	< 2300	< 2300	11000
H.5-1.5/0-0.5 FEET	< 390	< 390	< 390	< 390	< 390	5,300	*	< 390	< 390	5300
H.6-1.1/0-5 INCHES	< 550	< 550	< 550	< 550	< 550	*	*	< 550	< 550	6200

TABLE 2
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PHASE III PCB DELINEATION
FORMER LAVIERO METALS
894 MIDDLE STREET
BRISTOL, CT

Sample Designation and Depth	Analytical Result By PCB Aroclor (ug/kg)									Total PCB Aroclors
	PCB-1016	PCB-1221	PCB-1232	PCB-1242	PCB-1248	PCB-1254	PCB-1260	PCB-1262	PCB-1268	
H.6-1.1/13-28 INCHES	< 460	< 460	< 460	< 460	< 460	*	*	< 460	< 460	5200
H.6-1.1/28-52 INCHES	< 670	< 670	< 670	< 670	< 670	830	< 670	< 670	< 670	830
H.6-1.1/5-13 INCHES	< 410	< 410	< 410	< 410	< 410	*	*	< 410	< 410	3800
H.7-1.3/0-6 INCHES	< 2000	< 2000	< 2000	< 2000	< 2000	*	*	< 2000	< 2000	6200
H.7-1.3/18-35 INCHES	< 460	< 460	< 460	< 460	< 460	< 460	< 460	< 460	< 460	Not Detected
H.7-1.3/6-18 INCHES	< 690	< 690	< 690	< 690	< 690	1800	< 690	< 690	< 690	1800
H.75-1/0-0.5 FEET	< 720	< 720	< 720	< 720	< 720	< 720	< 720	< 720	< 720	Not Detected
H.8-1.2/0-5 INCHES	< 420	< 420	< 420	< 420	< 420	*	*	< 420	< 420	4500
H.8-1.2/10-22 INCHES	< 590	< 590	< 590	< 590	< 590	*	*	< 590	< 590	2800
H.8-1.2/22-44 INCHES	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	Not Detected
H.8-1.2/5-10 INCHES	< 410	< 410	< 410	< 410	< 410	*	*	< 410	< 410	5000
H-1.3/0-8 INCHES	< 3700	< 3700	< 3700	< 3700	< 3700	*	*	< 3700	< 3700	7100
H-1.3/18-30 INCHES	< 350	< 350	< 350	< 350	< 350	*	*	< 350	< 350	3900
H-1.3/30-48 INCHES	< 460	< 460	< 460	< 460	< 460	< 460	< 460	< 460	< 460	Not Detected
H-1.3/8-18 INCHES	< 360	< 360	< 360	< 360	< 360	*	*	< 360	< 360	2200
H-1/0.5-1.5 FEET	< 420	< 420	< 420	< 420	< 420	*	*	< 420	< 420	5100
H-1/0-0.5 FEET	< 2000	< 2000	< 2000	< 2000	< 2000	12000	< 2000	< 2000	< 2000	12000
H-1/1.5-3.5 FEET	< 650	< 650	< 650	< 650	< 650	1300	< 650	< 650	< 650	1300
H-1/3.5-5.5 FEET	< 660	< 660	< 660	< 660	< 660	< 660	< 660	< 660	< 660	Not Detected
H-2.5/0-0.5 FEET	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	Not Detected
H-2/0.5-1.5 FEET	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	Not Detected
H-2/0-0.5 FEET	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	Not Detected
H-2/1.5-3.5 FEET	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	Not Detected
H-3.5/0-0.5 FEET	< 430	< 430	< 430	< 430	< 430	< 430	< 430	< 430	< 430	Not Detected
H-3/0.5-1.5 FEET	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	Not Detected
H-3/0-0.5 FEET	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	Not Detected
H-3/1.5-3.5 FEET	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	Not Detected
H-4/0.5-1.5 FEET	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	Not Detected
H-4/0-0.5 FEET	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	Not Detected
H-4/1.5-3.5 FEET	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	Not Detected
H-5/0.5-1.5 FEET	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	Not Detected
H-5/0-0.5 FEET	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	Not Detected
H-5/1.5-3.5 FEET	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	Not Detected
H5-0.5/0.5-1.5 FEET	< 520	< 520	< 520	< 520	< 520	1600	< 520	< 520	< 520	1600
H5-1.5/0-0.5 FEET	< 420	< 420	< 420	< 420	< 420	3300	< 420	< 420	< 420	3300
I-1.5 /0-0.5 FEET	< 770	< 770	< 770	< 770	< 770	7,400	*	< 770	< 770	7400
I-1.5/0.5-1.5 FEET	< 870	< 870	< 870	< 870	< 870	5700	< 870	< 870	< 870	5700
QUALITY ASSURANCE/QUALITY CONTROL ANALYSES										
EQUIPMENT BLANK-1	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	Not Detected
*D-33.55/0-6 INCHES	< 18000	< 18000	< 18000	< 18000	30000	< 18000	< 18000	< 18000	< 18000	30000
HR.4-1.3/0-8 INCHES	< 3900	< 3900	< 3900	< 3900	< 3900	*	*	< 3900	< 3900	16000
CR-7.5/0-8 INCHES	< 350	< 350	< 350	< 350	< 350	*	*	< 350	< 350	1400
*D-99/6-18 INCHES	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	Not Detected

Legend:

< 360 = Not Detected Above Laboratory Detection Limit

R-DEC = Residential Direct Exposure Criterion (>1,000 ug/kg)

I/C-DEC = Industrial/Commercial Direct Exposure Criterion (>10,000 ug/kg)

*	= An analytical detection where the specific aroclor is not readily discernable based on the chromatogram
1400	= Exceedance of residential remedial criteria (R-DEC)
14,000	= Exceedance of industrial/commercial criteria (I/C-DEC)
31,000	= Exceedance of Significant Environmental Hazard (SEH)

Notes

1. Samples were obtained between July 13, 2015 and May 5, 2016 by Nobis Engineering and GeoDesign, Inc.

Analyses were performed by Phoenix Environmental Laboratories of Manchester, CT using Soxhlet extraction. per section 11.9.3 of SW846 method 8082, when multiple Aroclor's of PCBs are present and the aroclor is no longer recognizable, quantitation may be performed by comparing the total area of the PCB pattern to that of the aroclor

2. Remedial standards were obtained from the Connecticut Remediation Standard Regulations 22a-133k-2.

3. Significant Environmental Hazard Criteria for PCBs in soils applies to concentrations greater than 30,000 ug/kg located within 18-inches of ground surface, in accordance with CGS 22a-6u.

4. Conversion from micrograms per kilogram to parts per million is: 1,000 ug/kg = 1 mg/kg = 1 part per million (ppm).

TABLE 3
TOTAL AND SPLP EXTRACTABLE PCBS IN SOIL SAMPLES
894 Middle Street
Bristol, CT

Analyte	Remedial Standard			OUTWASH 1	OUTWASH 2	OUTWASH 3 0-0.5 FT	OUTWASH 3 0.5-1 FT	OUTWASH 3 1-1.5 FT	OUTWASH 4	SEH-1 1	SEH-2 1	SEH-4 1	SEH-4 2	SEH-4 3	SEH-4 4	SEH-6 1	SEH-6 2
	R-DEC	I/C-DEC	GB-PMC														
Polychlorinated Biphenyls (Results in ug/kg)																	
PCB-1016	1,000	10,000	NE	< 370	< 1700	< 2300	< 440	< 4900	< 5300	< 3700	< 3600	< 1800	< 3700	< 3700	< 3700	< 2600	< 680
PCB-1221	1,000	10,000	NE	< 370	< 1700	< 2300	< 440	< 4900	< 5300	< 3700	< 3600	< 1800	< 3700	< 3700	< 3700	< 2600	< 680
PCB-1232	1,000	10,000	NE	< 370	< 1700	< 2300	< 440	< 4900	< 5300	< 3700	< 3600	< 1800	< 3700	< 3700	< 3700	< 2600	< 680
PCB-1242	1,000	10,000	NE	< 370	< 1700	< 2300	< 440	< 4900	< 5300	< 3700	< 3600	< 1800	< 3700	< 3700	< 3700	< 2600	< 680
PCB-1248	1,000	10,000	NE	< 370	< 1700	< 2300	< 440	< 4900	< 5300	< 3700	< 3600	< 1800	< 3700	< 3700	< 3700	< 2600	< 680
PCB-1254	1,000	10,000	NE	1,700	2,000	< 2300	< 440	8,400	9,800	< 3700	34,000	3,100	8,500	5,300	19,000	< 2600	< 680
PCB-1260	1,000	10,000	NE	< 370	< 1700	7,100	4,500	< 4900	< 5300	3,900	< 3600	< 1800	< 3700	< 3700	< 3700	15,000	1,200
PCB-1262	1,000	10,000	NE	< 370	< 1700	< 2300	< 440	< 4900	< 5300	< 3700	< 3600	< 1800	< 3700	< 3700	< 3700	< 2600	< 680
PCB-1268	1,000	10,000	NE	< 370	< 1700	< 2300	< 440	< 4900	< 5300	< 3700	< 3600	< 1800	< 3700	< 3700	< 3700	< 2600	< 680
Total PCBs				1,700	2,000	7,100	4,500	8,400	9,800	3,900	34,000	3,100	8,500	5,300	19,000	15,000	1,200
SPLP Extractable Polychlorinated Biphenyls (Results in ug/l)																	
PCB-1016	NE	NE	5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	NT	< 0.50	< 0.50	< 0.50	NT	< 0.50	< 0.50
PCB-1221	NE	NE	5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	NT	< 0.50	< 0.50	< 0.50	NT	< 0.50	< 0.50
PCB-1232	NE	NE	5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	NT	< 0.50	< 0.50	< 0.50	NT	< 0.50	< 0.50
PCB-1242	NE	NE	5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	NT	< 0.50	< 0.50	< 0.50	NT	< 0.50	< 0.50
PCB-1248	NE	NE	5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	NT	< 0.50	< 0.50	< 0.50	NT	< 0.50	< 0.50
PCB-1254	NE	NE	5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	1.2	< 0.50	NT	0.62	< 0.50	< 0.50	NT	< 0.50	< 0.50
PCB-1260	NE	NE	5	< 0.50	< 0.50	0.5	5.5	< 0.50	< 0.50	2.1	NT	< 0.50	< 0.50	< 0.50	NT	< 0.50	< 0.50
PCB-1262	NE	NE	5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	NT	< 0.50	< 0.50	< 0.50	NT	< 0.50	< 0.50
PCB-1268	NE	NE	5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	NT	< 0.50	< 0.50	< 0.50	NT	< 0.50	< 0.50
Total SPLP Extractable PCBs (ug/L)				ND	ND	0.5	5.5	ND	1.2	2.1	NT	0.62	ND	ND	NT	ND	ND

Legend:
< 360 = Not Detected Above Laboratory Detection Limit of 370 ug/kg
R-DEC = Residential Direct Exposure Criterion (>1,000 ug/kg)
I/C-DEC = Industrial/Commercial Direct Exposure Criterion (>10,000 ug/kg)
GB-PMC = Pollutant Mobility Criteria for GB groundwater

0.5	= Analytical Detection
1400	= Exceedance of residential remedial criteria (R-DEC)
14,000	= Exceedance of industrial/commercial criteria (I/C-DEC)
31,000	= Exceedance of Significant Environmental Hazard (SEH)

Notes
1. Samples were obtained by Nobis on April 11, 2017. Analyses were performed by Phoenix Environmental Laboratories of Manchester, CT using Soxhlet extraction.
2. Remedial standards were obtained from the Connecticut Remediation Standard Regulations 22a-133k-2.

APPENDIX 1
QUALITY ASSURANCE PROJECT PLAN (QAPP)



GEOTECHNICAL | CONSTRUCTION | ENVIRONMENTAL
ENGINEERS and SCIENTISTS

**QUALITY ASSURANCE PROJECT PLAN
RFA NO. 14116
PHASE II ENVIRONMENTAL SITE ASSESSMENT
894 MIDDLE STREET
BRISTOL, CT**

Prepared for:
City of Bristol
Bristol Development Authority
111 North Main Street
Bristol, CT 06010

Prepared By:
GeoDesign Inc.
984 Southford Road
Middlebury, CT 06762

June 2014
Revised August 2014
File No. 3583-2.0

Form A



GEOTECHNICAL | CONSTRUCTION | ENVIRONMENTAL
ENGINEERS and SCIENTISTS

August 27, 2014
File No. 3503-003.0

Mr. Robert Reinhart
Quality Assurance Project Plan Coordinator
EPA Region 1 New England
One Congress Street, Suite 1100 (HBT)
Boston, MA 02114-2023

Via email: reinhart.robert@epamail.epa.gov

Re: Quality Assurance Project Plan (QAPP) - Revised
RFA No. 14116
Phase II Environmental Site Assessment
894 Middle Street
Bristol, CT

Dear Mr. Reinhart:

Geo**Design**, Inc. (Geo**Design**) is providing the following Quality Assurance Project Plan (QAPP) for the above-referenced project which is being completed under an EPA Brownfield Grant Administered by the Valley Council of Governments on behalf of the City of Bristol. The QAPP incorporates guidance published by the US Environmental Protection Agency and the Connecticut Department of Energy and Environmental Protection. Per U.S. EPA guidance, this QAPP has the following components:

Form A	Title and Approval
Form B	Organization Chart
Form C	Problem Definitions
Form D	Project Time Line
Form E	Sampling Design
Form F-1	Method and SOP Reference Table
Form F-2	Sampling and Analytical Method Requirements
Form G	Preventative Maintenance of Field Equipment
Form H	Calibration and Corrective Action – Field Equipment
Form I	Preventative Maintenance – Laboratory Equipment
Form J	Calibration and Corrective Action
Form K	Sample Handling and Custody Requirements
Form L	Analytical Precision and Accuracy
Form M	Field and Laboratory Quality Control Requirements
Form N	Data Management and Documentation



Quality Assurance Project Plan-Form A
Assessment of 894 Middle Street, Bristol, CT
File No. 3503-003.0 – August 27, 2014
Page A-2

Form O	Assessment and Response Actions
Form P	Project Reports
Form Q1	Verification of Sampling Procedures
Form Q2	Data Verification and Validation
Form R	Data Usability

The environmental sampling tasks included under our scope of work are:

1. Sampling of soil and groundwater at the locations of the Recognized Environmental Conditions and Areas of Concern identified in our Phase I Environmental Site Assessment dated March 4, 2014;

If you have any questions or require additional information, please call.

Regards,

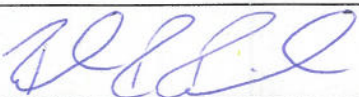
Daniel White, LEP
QA Officer

Timothy Carr, LEP
Principal

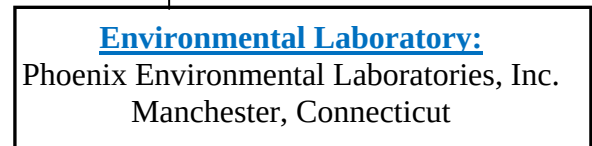
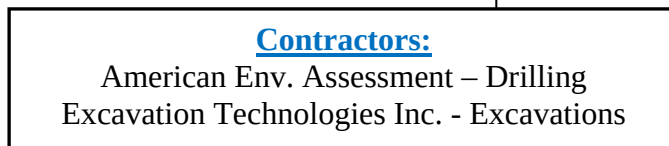
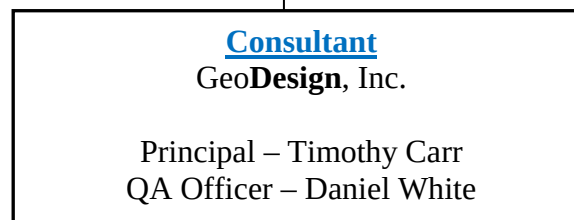
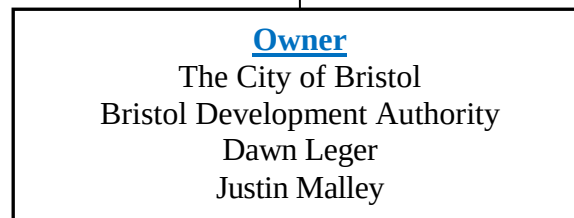
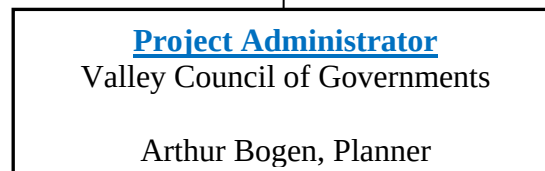
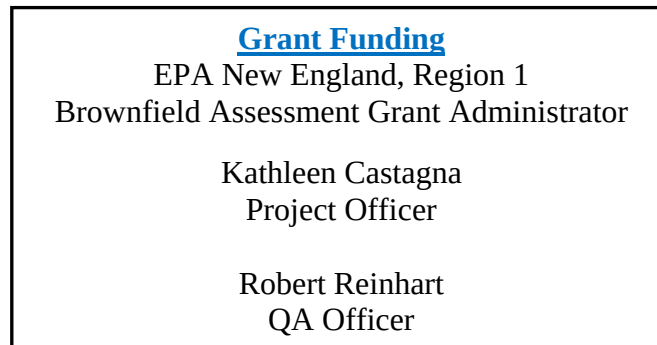
Appendices:	Appendix 1	Figures
	Appendix 2	Standard Operating Procedures
		Soil Borings
		Test Pits
		Groundwater Sampling
	Appendix 3	Phoenix Laboratory Qualifications and QAPP Information



FORM A: TITLE AND APPROVALS
QUALITY ASSURANCE PROJECT PLAN
PHASE II ENVIRONMENTAL SITE ASSESSMENT
894 MIDDLE STREET, BRISTOL, CT

Project Role	Name	Signature	Date
Project Manager	Timothy Carr, LEP		8/27/2014
QA Manager	Daniel E. White		6/5/2014
Valley Council of Governments Coordinator	Arthur Bogen		
US EPA Project Officer	Kathleen Castagna		09/05/14
US EPA QA Officer	Robert Reinhart		9/5/14

FORM B
PROJECT ORGANIZATION CHART AND RESPONSIBILITIES
QUALITY ASSURANCE PROJECT PLAN – RFA No. 14116
PHASE II ENVIRONMENTAL SITE ASSESSMENT
894 MIDDLE STREET
BRISTOL, CT



FORM B
PROJECT ORGANIZATION CHART AND RESPONSIBILITIES
QUALITY ASSURANCE PROJECT PLAN
PASE II ENVIRONMENTAL SITE ASSESSMENT
894 MIDDLE STREET
BRISTOL, CT

This project is being undertaken by Geo**Design**, Inc. (Geo**Design**) of Middlebury, Connecticut under contract with the City of Bristol Development Authority with funding from a Brownfield Assessment Grant from the US Environmental Protection Agency (EPA). The EPA Project Officer is Kathleen Castagna. The EPA QA Officer is Robert Reinhart.

The Project Administrator is the Valley Council of Governments.

The Following personnel have project responsibilities, as follows:

Timothy Carr is the Project Manager. Mr. Carr has responsibility for overall implementation of the work and technical quality of all deliverables. Mr. Carr is responsible for budgeting, contacting, monitoring and directing field activities.

Daniel White will provide oversight of field activities to ensure that the environmental sampling and documentation meet the project objectives and conform to the required quality assurance and quality control aspects of the investigation, in accordance with this Quality Assurance Project Plan.

Subcontracted services will be provided by Phoenix Environmental Laboratory of Manchester, Connecticut. The probable drilling subcontractor is American Environmental Assessment of Hartford, Connecticut. The probable excavation subcontractor is Excavation Technologies, Inc. of Cheshire, Connecticut.



**FORM C – PROBLEM DEFINITIONS
QUALITY ASSURANCE PROJECT PLAN No. 14116
894 MIDDLE STREET
BRISTOL, CT**

INTRODUCTION

GeoDesign's objectives for this work are to provide an assessment of subsurface environmental conditions at the locations of Recognized Environmental Conditions (RECs) and identify the presence of oil or hazardous materials in Site soil and groundwater relative to state remedial criteria.

The Site location is shown on Figure 1 in Appendix 1. A Site Plan is provided as Figure 2.

SITE HISTORY

Prior to 1953, the Site consisted of undeveloped land. From 1953 through, at least, 1977, J. Laviero Metals, Co. operated a metal reclamation operation at the property. Electrical transformers were brought to the Site property where oil was drained and copper wire was removed. The transformer oil, which may have contained Polychlorinated biphenyls (PCBs), was drummed and removed from the Site. Insulation on the copper wire was removed by open burning (the burn area) enhanced with transformer/capacitor oil. The wire was then rinsed with water. Ash, oil, PCBs, and combustion products (Semi-Volatile Organic Compounds or SVOCs) were released to the ground surface during these operations. The de-insulation process was later done in an incinerator with an air pollution control water scrubber. The ash was washed off manually and was reportedly reclaimed because it contained copper, aluminum, and brass. No generation rate is known. Incinerator waste including grit, particulates and ash were drummed and hauled to Bristol Landfill at the rate of about four drums per year. The Site was not listed as a RCRA generator of hazardous waste.

Four petroleum tanks were formerly located on the Site. These included: a 4,000-gallon heating oil underground storage tank (UST), a 1,000-gallon heating oil UST, a 275-gallon heating oil above ground storage tank (AST), and a 275-gallon kerosene AST. The tanks were reportedly removed.

PREVIOUS ENVIRONMENTAL REPORTS

Previous investigation reports were provided by the City of Bristol. These included:

1. Surface Soil Sampling and Groundwater Study for Polychlorinated Biphenyls; York Wastewater Consultants (YWC), Inc. August 1984.
2. Plan for Excavation, testing, and Disposal of Contaminated Soils; September 1987.
3. Site Assessment Report; HRP Associates. February 26, 1988.
4. Preliminary Soil Contamination Site Survey; RM Jones and Co. October 28, 1988.
5. Phase I Environmental Site Assessment Report; HRP. September 9, 1994.
6. Phase I Environmental Site Assessment; Diversified Environmental Services. March 21, 1995.



7. Phase II Environmental Site Investigation; Diversified Environmental Services. May 10, 1995.
8. Phase III Containment Assessment Investigation; Diversified Environmental Services. August 2, 1995.

Based on the data collected during previous investigation PCBs, Metals, and TPH are present in soils on the Subject Site at concentrations in excess of Remediation Standard Regulation criteria. Specifically, elevated concentrations of PCBs Copper, Lead, and Zinc were identified in the Burn Area (REC-1); elevated TPH and TCLP Lead were identified in the Petroleum Stained Soil Area (REC-2); and elevated concentrations of PCBs were detected in the Solid Waste Debris Piles (REC 6).

CONCEPTUAL SITE MODEL

The property is currently unoccupied. A one-story industrial building was previously located in the northeastern portion of the Site property. Two dip-tank degreasers and a lacquer room were reportedly situated in the building in the past.

The Site was served by two drinking water wells. Reportedly the wells extended to depths of 15 feet into surficial deposits. One of the wells had been situated within the Site building. No information was found regarding the disposition of the wells. Laviero operated a wire burning incinerator and a scrubber unit which discharged untreated wastewaters to the ground without a permit. The discharge was sampled and analyzed by the DEP, who found high levels of heavy metals. The operation discontinued in 1980 following DEP's findings. The floor drains in the site building were ordered sealed by the DEP at the same time.

The Site is located within a commercial/industrial area in the City of Bristol, with a portion of the Site property situated in the Town of Southington. Surrounding properties are currently occupied primarily by communications companies (ESPN), restaurants, office buildings, and residences. The Site slopes moderately to the west and south.

According to the CT Environmental Conditions Online database, the Site is located within the Eightmile River drainage basin (5201-00). Groundwater underlying the Site is classified "GB". The Connecticut Department of Energy and Environmental Protection (DEEP) Water Quality Standards (WQS) defines Class GB groundwater as "Ground water within a historically highly urbanized area or an area of intense industrial activity and where public water supply service is available. Such ground water may not be suitable for human consumption without treatment due to waste discharges, spills or leaks of chemicals or land use impacts."

The nearest downgradient surface water body, Eightmile River located on the southeastern portion of the Site, is classified "B". Class B surface waters are known or presumed to meet Criteria which support designated uses. Class B designated uses include: habitat for fish and other aquatic life and wildlife; recreation; navigation; and industrial and agricultural water supply.



Physical setting information was obtained from the CT Environmental Conditions Online (http://www.cteco.uconn.edu/advanced_viewer.htm). Surficial materials (i.e. unconsolidated materials below the top 0- to 18-inch layer of developed soil”) over most of the Site consist of Sand (s) composed mainly of very coarse to fine sand, commonly in well-sorted layers. Coarser layers may contain up to 25 percent gravel particles, generally granules and pebbles. Finer layers may contain some very fine sand, silt, and clay (delta-foreset beds, very distal fluvial deposits, or windblown sediment). Surficial material in the wetland area in the southeastern portion of the Site is described as Floodplain Alluvium overlying undifferentiated Coarse (sand and gravel) deposits (a/sg). Floodplain Alluvium (a) consists of sand, gravel, silt, and some organic material, on the floodplains of modern streams. The texture of alluvium commonly varies over short distances both laterally and vertically, and is often similar to the texture of adjacent glacial deposits. Along smaller streams, alluvium is commonly less than 5 ft thick. The alluvium overlies Sand and Gravel (sg) composed of mixtures of gravel and sand within individual layers and as alternating layers. Sand and gravel layers generally range from 25 to 50 percent gravel particles and from 50 to 75 percent sand particles and are well- to poorly-sorted. Bedding may be distorted and faulted due to post-depositional collapse. It is likely that some deposits within this map unit actually are gravel or sand and gravel overlying sand. It is less likely that some of these deposits are sand (fluvial deposits or delta-topset beds).

According to the Bedrock Geologic Map of Connecticut (Connecticut Geological and Natural History Survey, 1985) obtained online at <http://tmsc.org/geology/bedrock/>, bedrock under the Subject Site consists of New Haven Arkose (TRnh). The New Haven Arkose is described as red, pink, and gray coarse-grained, locally conglomeratic, poorly sorted and indurated arkose, interbedded with brick-red micaceous, locally shaly siltstone and fine-grained feldspathic clayey sandstone. Groundwater flow is primarily through interconnected pore spaces and bedding planes. Groundwater flow direction is controlled primarily by topography but may be altered significantly by water-bearing fractures in the bedrock.

CT Environmental Conditions Online identified wetlands areas along the southern boundary Site and adjoining properties to the south. No aquifer protection areas were identified within a 1-mile radius of the Site.

RECOGNIZED ENVIRONMENTAL CONDITIONS (RECs)

GeoDesign’s Phase I ESA identified six Recognized Environmental Conditions (RECs) at the Site associated with historic industrial activities. A REC is identified when the presence, or likely presence of hazardous under conditions that indicate an existing release, a past release or the material threat of a release into structures on the property or the soil, groundwater or surface water on the property. The six RECs and Areas of Concern identified at the Site can be summarized as follows:



Form C – Problem Definitions
Quality Assurance Project Plan
894 Middle Street, Bristol, CT
File No. 3503-3.0 – August 27, 2014
Page No. C-4

REC DESIGNATION	REC DESCRIPTION	AREAS OF CONCERN	CONTAMINANTS OF CONCERN
RECOGNIZED ENVIRONMENTAL CONDITIONS			
REC-1	Former "Burn Area"	AOC-1: Contamination from surface burning of wire to remove insulation. The extent of prior remediation is not well documented.	VOCs, SVOCs, TPH, PCBs, corrosives, metals
REC-2	Petroleum Stained Soil Area	AOC-2: Surficial contamination from unspecified sources. This area was investigated by DES and others.	VOCs, SVOCs, TPH, PCBs, corrosives, metals
REC-3	Subsurface disposal of wastewaters generated from a former incinerator scrubber, wire rinsing operation and floor cleaning. The wastewater went to a 20,000-gallon settling UST and then to a septic tank.	AOC-3: Former 20,000-gallon UST	VOCs, SVOCs, TPH, PCBs, corrosives, metals
		AOC-4 - Former septic tank and leaching field	
REC-4	Former Chemical Storage and Use Including Solvents and Oils (locations identified in Fire Marshall records)	AOC-5: Lacquer Room inside former building.	VOCs, SVOCs, TPH
		AOC-6: Two "Trichlor" dip tanks for metal degreasing located inside former building.	VOCs, SVOCs, TPH
REC-5	Former Bulk Oil Storage Tanks - Underground and Aboveground	AOC-7: Former 4,000 gallon oil tank located east of the building.	VOCs, SVOCs, TPH
		AOC-8: Former 1,000 gallon oil tank located east of the building.	
		AOC-9: 275-gal aboveground oil tank outside west side of former building.	
		AOC-10: 275-gal aboveground kerosene tank inside northern portion of building	
REC-6	Solid Waste Debris Piles	Miscellaneous Areas: Surface disposal of debris containing concrete, metal, tires, and wood were observed. The source(s) of the debris is not known.	VOCs, SVOCs, TPH, PCBs, metals
AREA OF CONCERN			
N/A	Former Water Supply Wells	Two water supply wells located near former building could act as conduit for contaminant migration to groundwater and deep aquifer.	(TPH, PCBs, VOCs, RCRA-8 Metals in groundwater)



FORM D
PROJECT DESCRIPTION
QUALITY ASSURANCE PROJECT PLAN
894 MIDDLE STREET
BRISTOL, CT

The following project timeline is estimated based on the current status of this Phase I and Phase II Environmental Assessment of the property

Task	Estimated Start Date	Duration	Completion Date
Phase I ESA	January 2014	9 weeks	March 2014
Project QAPP	June 2014	4 weeks	July 2014
QAPP Revision 1	August 2014	3 days	August 2014
Phase II ESA			
-Field Work	September 2014	2 weeks	September 2014
-Report	October 2014	3 weeks	October 2014

The schedule cannot account for delays due to factors that are not under our control and assumes that access and approvals are provided in a timely manner.



FORM E
SAMPLING DESIGN
QUALITY ASSURANCE PROJECT PLAN
894 MIDDLE STREET, BRISTOL, CT

PHASE II SAMPLING RATIONALE

The environmental sampling tasks included in this QAPP include sampling of soil and groundwater at the locations of the Recognized Environmental Conditions identified in Form D and our Phase I Environmental Site Assessment dated March 2014. Proposed sampling locations are indicated on Figure 2 in Appendix 1. The proposed locations are subject to change depending on field observations. Due to the undeveloped nature of the Site, the primary means of exploration will consist of test pit excavations.

CONTAMINANTS OF CONCERN

Based on historic activities, the Contaminants of Concern consist of: Volatile Organic Compounds (VOCs), polynuclear aromatic hydrocarbons (PAHs), Total Petroleum Hydrocarbons (TPH), Polychlorinated biphenyls (PCBs), corrosives, arsenic, barium, cadmium, chromium, lead, mercury, selenium, silver, copper, zinc, and aluminum.

HEALTH AND SAFETY

The work will be performed in accordance with a site specific Health & Safety Plan (HASP) and by personnel with the required training under OSHA regulations 29 CFR 1910.120.

An emphasis will also be placed on the physical hazards typical of drilling work. Safety procedures will be reviewed before drilling work commences and as needed during the work. A photoionization detector (PID) will be used to monitor ambient air during drilling. PID screening will also be performed on jarred soil samples from each boring.

SOIL SAMPLING & ANALYSES

Drilling, geologic sampling, and installation of the wells will be performed in general accordance with RCRA/CERCLA procedures and guidelines specified by the USEPA and the CTDEEP.

Geoprobe Borings

Three geoprobe borings will be completed within and/or downgradient of Areas of Concern, as identified in the table in Form C and on Figure 2. The borings are primarily located at proposed monitoring well locations which will be installed downgradient of or within the locations of the identified Recognized Environmental Conditions and Areas of Concern. The number of explorations which can be completed will be subject to site conditions, access and budgetary constraints. The borings will be converted to groundwater monitoring wells.



Borings will be completed using a Geoprobe to a depth of approximately 5-feet below the water table or drilling refusal. Detailed boring logs will be maintained by the field geologist/engineer during drilling operations.

Soil samples will be obtained continuously from the ground surface to the maximum depth explored in unconsolidated material. Each macrocore sample will be advanced with dedicated polyacetate liners. Soil strata and observations from the borings will be summarized on a boring log. A Standard Operating Procedure for logging borings is provided in Appendix 2.

Test Pits

Approximately twenty-two test pits will be completed within Areas of Concern and RECs, as identified on Table E-1 (attached) and indicated on Figure 2. The locations include test pits in areas of chemical use and storage, septic systems, and underground tanks. The number of explorations which can be completed will be subject to site conditions, access and budgetary constraints.

Test pits will be completed using a backhoe to a depth of approximately 6 to 12-feet below grade. Detailed descriptions of subsurface materials and conditions will be maintained by the field geologist/engineer during excavation operations. Soil strata and observations from the test pits will be summarized on a test pit log. A Standard Operating Procedure for logging test pits is provided in Appendix 2.

Selection of Soil Samples for Analysis

Soil samples will be selected based on location, color, odor and photoionization detector (PID) screening results for specific COCs. Soil samples submitted for analysis of VOCs will be discrete samples and preserved in accordance with CTDEEP guidance¹. Soil samples will be screened in the field using a MiniRae 2000 PID fitted with a 10.6V lamp. The PID will have been calibrated to read in parts per million relative to a benzene air standard. The maximum meter response for each sample will be recorded on the boring log.

Soil samples will be selected for laboratory analysis based on location, specific contaminants of concern, sample depth, PID screening results, and/or visual and olfactory field observations. The selection of a soil sample for analysis will depend on the location of the boring and nature of potential contamination (most elevated PID readings or observed staining). At least one sample analysis will be analyzed from each REC, per the schedule identified on Table E-1 (attached). Selected soil samples will be submitted for the following analyses:

- Volatile Organic Compounds by EPA Method 8260B;
- Polynuclear Aromatic Hydrocarbons by EPA Method 8270C;

¹ State of Connecticut Department of Energy and Environmental Protection, "Guidance for Collecting and Preserving Soil and Sediment Samples for Laboratory Determination of Volatile Organic Compounds", Ver. 2, February 28, 2006.



- Extractable Total Petroleum Hydrocarbons (ETPH);
- Polychlorinated Biphenyl (PCB) by EPA Method 8082 using Soxhlet extraction; and,
- Total arsenic, barium, cadmium, chromium (total), lead, mercury, selenium silver, aluminum, copper, and zinc.

Sample analyses will be performed in accordance with the schedule provided on the attached Table E-1. Soil samples obtained from the boring samples will be submitted to Phoenix Environmental Laboratories of Manchester, Connecticut for analysis using the CTDEEP's Reasonable Confidence Protocols. Chain of custody protocols will be followed during the handling and delivery of the samples to the laboratory.

Test pits will be backfilled with the excavated material.

Monitoring Well Installations

Approximately three groundwater monitoring wells will be installed using 2-inch diameter PVC screen and casing. These are identified as MW-5 through MW-7 on Figure 2. Existing wells have been identified at the locations shown on Figure 2 and will be incorporated into the monitoring network.

Newly installed monitoring wells will be screened across the water table using 5 to 10 foot screen sections with a slot size of 0.010 inches. The annular space between the well screen and borehole will be backfilled to the extent possible with silica sand to at least 1-foot above the top of the screen using No. 2 sand. An approximate 1 to 2-foot thick bentonite pellet seal will be placed above the sand filter pack. The remaining annulus will be backfilled with drill cuttings to approximately ½-foot below ground surface.

The groundwater monitoring wells will be finished with a flush mounted road box and/or raised steel protective casing with locking lid. The protective casing will be cemented in place and a formed concrete collar will be constructed. The concrete cement surface seal will be sloped to shed surface water away from the casing. Well installation materials and associated measurements will be documented on a well installation diagram form.

Monitoring Well Development

Following installation, the wells will be developed using a variety of groundwater removal methods (submersible, centrifugal or peristaltic pumps). A well development log will be maintained indicating the time, date and method of development; duration of development; total volume of water removed; turbidity; specific conductance and pH measurements. Stable pH and specific conductance measurements. The turbidity will be evaluated to such that the water is as clear as possible with a target of less than 10 NTU.



GROUNDWATER SAMPLING & ANALYSES

Three existing and up to three new groundwater monitoring wells will be sampled for COCs. A total of six water samples are anticipated. A Standard Operating Procedure for groundwater sampling is provided in Appendix 2.

Groundwater Sampling

Following well development, the monitoring wells will be sampled. Table E-2 provides a listing of wells and proposed analytical parameters.

The groundwater monitoring wells will be sampled for constituents of concern using low flow purging techniques² and per the Standard Operating Procedure included in Appendix 2. Purging will most likely be performed using peristaltic pump using dedicated downhole tubing. Stabilization parameters will include pH, temperature, specific conductance, and turbidity. Since this sampling is not intended for monitored natural attenuation purposes, oxidation-reduction potential is not necessarily required to be monitored. Once these parameters have stabilized, and in accordance with EPA New England's procedure, groundwater samples will be obtained for the following analyses, as follows:

Analytical Parameter	Sample Container	Preservative	Holding Time
pH & Specific Conductance	Plastic or glass container	None	Field readings
Volatile Organic Compounds by EPA Method 8260B	2-40 ml glass vials with Teflon septa (no bubbles)	Hydrochloric Acid, Cool 4° C	14 days
Polynuclear Aromatic Hydrocarbons by EPA Method 8270C	1-1 liter amber glass	Cool 4° C	7 days
Polychlorinated Biphenyls	1-1 liter amber glass	Cool 4° C	7 days
Dissolved metal elements (As, Ba, Cd, Cr, Pb, Hg, Se, Ag, Cu, Zn & Al)	1-liter plastic	Filter with 45 µm then Nitric Acid pH<2	6 months/ 28 days for Hg

Groundwater samples will be collected in laboratory supplied containers and submitted to Phoenix Environmental Laboratories of Manchester, Connecticut for analyses in accordance with the CTDEEP's Reasonable Confidence Protocols. Chain of custody protocols will be followed during the handling and delivery of the samples to the laboratory.

Sample analyses will be performed in accordance with the schedule provided on the attached Table E-2.

² United States EPA Region I, "Low Stress (low flow) Purging and Sampling Procedure for the Collection of Groundwater Samples From Monitoring Wells", Revised January 19, 2010.

TABLE E-1
BREAKDOWN OF RECs, AOCs, COCs AND PROPOSED SOIL SAMPLE ANALYSES
QUALITY ASSURANCE PROJECT PLAN
894 Middle Street, Bristol, CT

REC Designation	REC Description	Areas of Concern	Contaminants of Concern	Sample Designations	Proposed No. of Soil Analyses							COMMENT
					VOC	PAH	ETPH	PCB	Metals	SPLP/ TCLP Metals	Soil pH - Corrosivity	
REC-1	Former "Burn Area"	AOC-1: Contamination from surface burning of wire to remove insulation. The extent of prior remediation is not well documented.	VOCs, PAHs, TPH, PCBs, corrosives, RCRA-8 metals, aluminum, copper and zinc	REC1-TP1 through REC1-TP-8	1	2	2	6	1	2	1	Sample selection based on odor, color and PID screening results.
REC-2	Petroleum stained soil area	AOC-2: Surficial contamination from potential storage of electrical transformers or from unspecified sources. This area was investigated by DES and others.	VOCs, PAHs, TPH, PCBs, corrosives, RCRA-8 metals, aluminum, copper and zinc	REC2-TP1 through REC2-TP-8	1	2	2	5	5	2	1	Sample selection based on odor, color and PID screening results.
REC-3	Subsurface disposal of wastewaters generated from a former incinerator scrubber, wire rinsing operation and floor cleaning. The wastewater went to a 20,000-gallon settling UST and then to a septic tank.	AOC-3: Former 20,000-gallon UST	VOCs, PAHs, TPH, PCBs, corrosives, metals	REC3-TP1	1	1	1	1	1		1	Sample selection based on odor, color and PID screening results.
		AOC-4 - Former septic tank and leaching field	VOCs, PAHs, TPH, PCBs, corrosives, metals	REC3-TP2	1	1	1	1	1		1	
REC-4	Former Chemical Storage and Use Including Solvents and Oils (locations identified in Fire Marshall records)	AOC-5: Lacquer Room inside former building.	VOCs, PAHs, TPH	REC4-TP1	1	1	1					Sample selection based on odor, color and PID screening results.
		AOC-6: Two "Trichlor" dip tanks for metal degreasing located inside former building.										
REC-5	Former Bulk Oil Storage Tanks - Underground and Aboveground	AOC-7: Former 4,000 gallon oil tank located east of the building.	VOCs, PAHs, TPH	REC5-TP1	1	1	1					Sample selection based on odor, color and PID screening results.
		AOC-8: Former 1,000 gallon oil tank located east of the building.										
		AOC-9: 275-gal aboveground oil tank outside west side of former building.		REC5-TP2	1	1	1					
		AOC-10: 275-gal aboveground kerosene tank inside northern portion of building										
REC-6	Solid Waste Debris Piles	Miscellaneous Areas: Surface disposal of debris containing concrete, metal, tires, and wood were observed. The source(s) of the debris is not known.	VOCs, PAHs, TPH, PCBs, metals	REC6-TP1 REC6-TP2 REC6-TP-3	1	1	1	1	1			Sample selection based on odor, and color.
Environmental QA/QC Sample Duplicate Analyses					1	1	1	1	1	1	1	
Total No. of Analyses					9	11	11	15	10	5	5	

TABLE E-2
BREAKDOWN OF PROPOSED GROUNDWATER SAMPLE ANALYSES
QUALITY ASSURANCE PROJECT PLAN
894 MIDDLE STREET, BRISTOL, CT

Well ID	Proposed Laboratory Analyses				COMMENT
	VOC	PAH	PCBs	Dissolved RCRA-8, Al, Cu and Zn	
MW-2	1	1		1	Existing well which is inferred downgradient of REC-3, -4, -5 and -6a
MW-3	1	1		1	Existing well which is inferred sidegradient or downgradient of REC-2
MW-4	1	1	1	1	Existing well which is located within REC-1
MW-5	1	1	1	1	Proposed well located within REC-2
MW-6	1	1		1	Proposed well which is inferred downgradient of REC-2
MW-7	1	1		1	Proposed well which is Inferred downgradient of REC-2 and REC-6b
Blind Duplicate	1	1	1	1	Environmental QA/QC Sample Duplicate Analyses at one of the named wells above (to be designated)
Total No. of Sample Analyses	7	7	3	7	

Notes:

1. References relative to downgradient locations are based on an inferred southwester groundwater flow and regional topography and drainage characteristics.
2. The placement and selection of groundwater monitoring wells may change based on physical constraints and the results of field observations.



FORM F-1
ANALYTICAL METHOD AND SOP REFERENCE TABLE
QUALITY ASSURANCE PROJECT PLAN
894 MIDDLE STREET
BRISTOL, CT

FIELD STANDARD OPERATING PROCEDURES - APPENDIX 2

No.	Field SOP Reference	Description
1	Geoprobe Boring Sampling and Logging	Standard Operating Procedure for geoprobe soil boring sampling. See Appendix 2.
2	Test Pit Sampling and Logging	Standard Operating Procedure for test pit soil sampling. See Appendix 2.
3	Groundwater Sampling	Standard Operating Procedure for Groundwater Sampling. See Appendix 2.

LABORATORY STANDARD OPERATING PROCEDURES - APPENDIX 3

No.	Analytical Method Reference	Project Analytical SOPs
1	Connecticut extractable total petroleum hydrocarbons-EPA Method CT ETPH	Connecticut extractable total petroleum hydrocarbons-CT EPA Method-CT ETPH; SOP Doc No. 605, Effective date 3/16/2005 by Phoenix Environmental Laboratories
2	Total Petroleum Hydrocarbons - EPA Method 8015B	Total petroleum hydrocarbons - EPA Method 8015B; SOP Doc No. 634.DRO, Effective date 3/10/2006 by Phoenix Environmental Laboratories
3	SW-846 Method 8270/625	Semi-volatile organic compounds EPA Method 8270; SOP Doc No. 601, Effective date 10/16/2009 by Phoenix Environmental Laboratories
4	Total and dissolved RCRA 8-Metals SW-846 Method 6010 and EPA 200.7	Total and dissolved RCRA 8-Metals, Copper, Zinc, and Aluminium SW-846 Method 6010 and EPA 200.7; SOP Doc No. 505, Effective date 5/6/2009 by Phoenix Environmental Laboratories
5	Total and dissolved Mercury by EPA Methods 245.1 and 7471	Determination of Mercury by Automated Cold Vapor Atomic Absorption; SOP Doc No. 503, Effective date 10/15/2009 by Phoenix Environmental Laboratories
6	PCBs Method 8082A	PCB by Method 8082A; SOP Doc No. 622, Effective date 6/25/2011 by Phoenix Environmental Laboratories
7	SW-846 Method 8260/624	Volatile organic compounds EPA method 8260; SOP Doc No. 602, Effective date 10/19/2009 by Phoenix Environmental Laboratories



FORM G
PREVENTATIVE MAINTENANCE - FIELD EQUIPMENT
QUALITY ASSURANCE PROJECT PLAN
894 MIDDLE STREET
BRISTOL, CT

Instrument	Activity	Frequency
MiniRAE 2000 Photoionization Detector (PID)	Check Battery	Before each use
	Cleaning the lamp	As needed based on calibration span precision or erratic readings
	Filters	Once every 10 hours of use
	Calibration Gas	Order new canister when <10 psi remaining
pH and Specific Conductance Meter	Check Battery	Once per month or as needed
	Probe Cleaning	Once per month or as needed
	Calibration solutions	Based on expiration of calibration solution



FORM H
CALIBRATION AND CORRECTIVE ACTION - FIELD EQUIPMENT
QUALITY ASSURANCE PROJECT PLAN
894 MIDDLE STREET
BRISTOL, CT

Instrument	Activity	Calibration Frequency	Acceptance Criteria	Corrective Action
MiniRAE 2000 PID	Calibration with commercially supplied isobutylene calibration gas	Beginning of the day	±10% of span gas concentration	Initiate trouble shooting sequence (bulb clean etc.)
		Before each use	±10% of span gas concentration	Recalibrate
YSI 6-series Multiparameter Probe Rented From U.S. Environmental Rental.	Specific conductance	Check before and after	±10% of standard	Recalibrate, clean/check probe, review manual. If all else fails, return to U.S. Environmental Rental
	pH	Check before and after. Three point calibration in pH=4, 7 and 10 standard buffered solutions.	± 0.3 in pH 7 buffer and other bracketing buffer (pH4 or pH10)	
	DO	Check before and after	+ 0.5 mg/l of sat. value	
	Turbidity	Check before and after	±2 NTUs	

Note:

Calibration will be performed in accordance with "STANDARD OPERATING PROCEDURE FOR CALIBRATION AND FIELD MEASUREMENT PROCEDURES FOR THE YSI MODEL 6-SERIES SONDES (INCLUDING: TEMPERATURE, pH, SPECIFIC CONDUCTANCE, TURBIDITY, AND DISSOLVED OXYGEN), EPA New England - Region 1, 5/31/2002

FORM I
PREVENTATIVE MAINTENANCE - LABORATORY EQUIPMENT
QUALITY ASSURANCE PROJECT PLAN
894 MIDDLE STREET
BRISTOL, CT

See Attachment 3 PHOENIX QUALITY ASSURANCE MANUAL

Instrument	Activity	Frequency	SOP Ref.



FORM J
CALIBRATION AND CORRECTIVE ACTION - LABORATORY EQUIPMENT
QUALITY ASSURANCE PROJECT PLAN
894 MIDDLE STREET
BRISTOL, CT

See Appendix 3: PHOENIX QUALITY ASSURANCE MANUAL

Instrument	Activity	Frequency	Acceptance Criteria	Corrective Action	SOP Ref.

FORM K
SAMPLE HANDLING AND CUSTODY REQUIREMENTS
QUALITY ASSURANCE PROJECT PLAN
894 MIDDLE STREET
BRISTOL, CT

Successful analysis depends on the capacity to produce valid data and to demonstrate such validity. In addition to proper sample collection and handling, appropriate sample identification and chain-of-custody (COC) procedures are necessary to help support the validity of the data. The procedures for sample handling and chain-of-custody forms will conform to standard industry practice and guidance published by the U.S. EPA and others.

Sampling bottles, jars, and containers will be prepared by the designated laboratory and will be packaged delivered to the office and/or Site (if necessary) with the appropriate preservatives.

Successful analysis depends on the capability to produce valid data and to demonstrate such validity. In addition to proper sample collection and handling, appropriate sample identification and COC procedures are necessary to support the validity of the data. Information which will be written on sample labels as well as the COC includes:

- Site Name;
- Date and Time Sample Collected;
- Personnel Collecting the Sample;
- Sample Identification (including depth for soil samples); and
- Appropriate Preservative

The following laboratory supplied chain of custody will be appropriately completed for soil and groundwater samples. The form will specify specific sample analyses for specific Contaminants of Concern based on the sampling design and data objectives.

[illegible]

Chain of Custody Form




GEODESIGN
INCORPORATED

984 Southford Road
Middlebury, CT 06762

Sample ID: _____ Job No. _____
Date: _____ Time: _____
Job Name: _____
Location: _____
Parameters: _____

Environmental Sample Label

CUSTODY SEAL

GeoDesign, Inc., 984 Southford Rd, Middlebury, CT

Sampler Signature: _____
Date: _____
Time: _____

Sample Custody Seal

FORM L
ANALYTICAL PRECISION & ACCURACY
QUALITY ASSURANCE PROJECT PLAN
PHOENIX ANALYTICAL LABORATORIES

POTENTIAL CONTAMINANTS OF CONCERN	Soils							Groundwater						
	Precision (% RPD)	Accuracy (% R)	Reporting Limit	Units	Remedial Criteria			Precision (% RPD)	Accuracy (% R)	Reporting Limit	Units	Remedial Criteria		
					GB-PMC	I/C-DEC	R-DEC					GWPC	R-GWVC	SWPC
Volatiles By SW 8260														
1,1,1,2-Tetrachloroethane	<30	70-130	5.3	ug/Kg	200	220,000	24,000	<30	70-130	1	ug/L	1	12	NE
1,1,1-Trichloroethane	<30	70-130	5.3	ug/Kg	40,000	1,000,000	500,000	<30	70-130	1	ug/L	200	20,400	62,000
1,1,2,2-Tetrachloroethane	<30	70-130	3.2	ug/Kg	100	29,000	3,100	<30	70-130	0.5	ug/L	0.5	23	110
1,1,2-Trichloroethane	<30	70-130	5.3	ug/Kg	1,000	100,000	11,000	<30	70-130	1	ug/L	5	8,000	1,260
1,1-Dichloroethane	<30	70-130	5.3	ug/Kg	14,000	1,000,000	500,000	<30	70-130	1	ug/L	70	34,600	NE
1,1-Dichloroethene	<30	70-130	5.3	ug/Kg	1,400	9,500	1,000	<30	70-130	1	ug/L	7	1	96
1,1-Dichloropropene	<30	70-130	5.3	ug/Kg	NE	NE	NE	<30	70-130	1	ug/L	NE	NE	NE
1,2,3-Trichlorobenzene	<30	70-130	5.3	ug/Kg	NE	NE	NE	<30	70-130	1	ug/L	NE	NE	NE
1,2,3-Trichloropropane	<30	70-130	5.3	ug/Kg	NE	NE	NE	<30	70-130	1	ug/L	NE	NE	NE
1,2,4-Trichlorobenzene	<30	70-130	5.3	ug/Kg	NE	2,500,000	680,000	<30	70-130	1	ug/L	70	NE	NE
1,2,4-Trimethylbenzene	<30	70-130	5.3	ug/Kg	NE	1,000,000	500,000	<30	70-130	1	ug/L	350	NE	NE
1,2-Dibromo-3-chloropropane	<30	70-130	5.3	ug/Kg	NE	4,100	440	<30	70-130	1	ug/L	NE	NE	NE
1,2-Dibromoethane	<30	70-130	5.3	ug/Kg	100	67	7	<30	70-130	1	ug/L	0.05	4	NE
1,2-Dichlorobenzene	<30	70-130	5.3	ug/Kg	3,100	1,000,000	500,000	<30	70-130	1	ug/L	600	30,500	170,000
1,2-Dichloroethane	<30	70-130	5.3	ug/Kg	200	63,000	6,700	<30	70-130	0.6	ug/L	1	21	2,970
1,2-Dichloropropane	<30	70-130	5.3	ug/Kg	1,000	84,000	9,000	<30	70-130	1	ug/L	5	14	NE
1,3,5-Trimethylbenzene	<30	70-130	5.3	ug/Kg	NE	1,000,000	500,000	<30	70-130	1	ug/L	350	NE	NE
1,3-Dichlorobenzene	<30	70-130	5.3	ug/Kg	120,000	1,000,000	500,000	<30	70-130	1	ug/L	600	24,200	26,000
1,3-Dichloropropane	<30	70-130	5.3	ug/Kg	NE	NE	NE	<30	70-130	1	ug/L	NE	NE	NE
1,4-Dichlorobenzene	<30	70-130	5.3	ug/Kg	15,000	240,000	26,000	<30	70-130	1	ug/L	75	50,000	26,000
2,2-Dichloropropane	<30	70-130	5.3	ug/Kg	NE	NE	NE	<30	70-130	1	ug/L	NE	NE	NE
2-Chlorotoluene	<30	70-130	5.3	ug/Kg	NE	1,000,000	500,000	<30	70-130	1	ug/L	NE	NE	NE
2-Hexanone	<30	70-130	26	ug/Kg	NE	NE	NE	<30	70-130	5	ug/L	NE	NE	NE
2-Isopropyltoluene	<30	70-130	5.3	ug/Kg	NE	NE	NE	<30	70-130	1	ug/L	NE	NE	NE
4-Chlorotoluene	<30	70-130	5.3	ug/Kg	NE	1,000,000	500,000	<30	70-130	1	ug/L	NE	NE	NE
4-Methyl-2-pentanone	<30	70-130	26	ug/Kg	14,000	1,000,000	500,000	<30	70-130	5	ug/L	350	50,000	NE
Acetone	<30	70-130	32	ug/Kg	140,000	1,000,000	500,000	<30	70-130	25	ug/L	700	50,000	NE
Acrylonitrile	<30	70-130	5.3	ug/Kg	100	11,000	1,100	<30	70-130	5	ug/L	0.5	NE	20
Benzene	<30	70-130	5.3	ug/Kg	200	200,000	21,000	<30	70-130	0.7	ug/L	1	215	710
Bromobenzene	<30	70-130	5.3	ug/Kg	NE	NE	NE	<30	70-130	1	ug/L	NE	NE	NE
Bromochloromethane	<30	70-130	5.3	ug/Kg	NE	NE	NE	<30	70-130	1	ug/L	NE	NE	NE
Bromodichloromethane	<30	70-130	5.3	ug/Kg	NE	92,000	9,900	<30	70-130	0.5	ug/L	0.56	NE	NE
Bromoform	<30	70-130	5.3	ug/Kg	800	720,000	78,000	<30	70-130	1	ug/L	4	920	10,800
Bromomethane	<30	70-130	5.3	ug/Kg	NE	1,000,000	95,000	<30	70-130	1	ug/L	9.8	NE	NE
Carbon Disulfide	<30	70-130	5.3	ug/Kg	NE	1,000,000	500,000	<30	70-130	5	ug/L	700	NE	NE
Carbon tetrachloride	<30	70-130	5.3	ug/Kg	1,000	44,000	4,700	<30	70-130	1	ug/L	5	16	132
Chlorobenzene	<30	70-130	5.3	ug/Kg	20,000	1,000,000	500,000	<30	70-130	1	ug/L	100	1,800	420,000
Chloroethane	<30	70-130	5.3	ug/Kg	NE	NE	NE	<30	70-130	1	ug/L	NE	NE	NE
Chloroform	<30	70-130	5.3	ug/Kg	1,200	940,000	100,000	<30	70-130	1	ug/L	6	287	14,100
Chloromethane	<30	70-130	5.3	ug/Kg	NE	440,000	47,000	<30	70-130	1	ug/L	2.7	NE	NE

POTENTIAL CONTAMINANTS OF CONCERN	Soils							Groundwater						
	Precision (% RPD)	Accuracy (% R)	Reporting Limit	Units	Remedial Criteria			Precision (% RPD)	Accuracy (% R)	Reporting Limit	Units	Remedial Criteria		
					GB-PMC	I/C-DEC	R-DEC					GWPC	R-GWVC	SWPC
cis-1,2-Dichloroethene	<30	70-130	5.3	ug/Kg	14,000	1,000,000	500,000	<30	70-130	1	ug/L	70	NE	NE
cis-1,3-Dichloropropene	<30	70-130	5.3	ug/Kg	NE	NE	NE	<30	70-130	0.4	ug/L	NE	NE	NE
Dibromochloromethane	<30	70-130	3.2	ug/Kg	100	68,000	7,300	<30	70-130	0.5	ug/L	0.5	NE	1,020
Dibromomethane	<30	70-130	5.3	ug/Kg	NE	NE	NE	<30	70-130	1	ug/L	NE	NE	NE
Dichlorodifluoromethane	<30	70-130	5.3	ug/Kg	NE	NE	NE	<30	70-130	1	ug/L	350	NE	NE
Ethylbenzene	<30	70-130	5.3	ug/Kg	10,100	1,000,000	500,000	<30	70-130	1	ug/L	700	50,000	580,000
Hexachlorobutadiene	<30	70-130	5.3	ug/Kg	NE	73,000	7,900	<30	70-130	0.4	ug/L	0.45	NE	NE
Isopropylbenzene	<30	70-130	5.3	ug/Kg	NE	1,000,000	500,000	<30	70-130	1	ug/L	30	NE	NE
m&p-Xylene	<30	70-130	5.3	ug/Kg	NE	NE	NE	<30	70-130	1	ug/L	NE	NE	NE
Methyl Ethyl Ketone	<30	70-130	32	ug/Kg	80,000	1,000,000	500,000	<30	70-130	5	ug/L	400	50,000	NE
Methyl t-butyl ether (MTBE)	<30	70-130	11	ug/Kg	20,000	1,000,000	500,000	<30	70-130	1	ug/L	70	50,000	NE
Methylene chloride	<30	70-130	5.3	ug/Kg	1,000	760,000	82,000	<30	70-130	1	ug/L	5	50,000	48,000
Naphthalene	<30	70-130	5.3	ug/Kg	NE	2,500,000	1,000,000	<30	70-130	1	ug/L	280	NE	NE
n-Butylbenzene	<30	70-130	5.3	ug/Kg	NE	1,000,000	500,000	<30	70-130	1	ug/L	61	NE	NE
n-Propylbenzene	<30	70-130	5.3	ug/Kg	NE	1,000,000	500,000	<30	70-130	1	ug/L	61	NE	NE
o-Xylene	<30	70-130	5.3	ug/Kg	NE	NE	NE	<30	70-130	1	ug/L	NE	NE	NE
p-Isopropyltoluene	<30	70-130	5.3	ug/Kg	NE	1,000,000	500,000	<30	70-130	1	ug/L	30	NE	NE
sec-Butylbenzene	<30	70-130	5.3	ug/Kg	NE	1,000,000	500,000	<30	70-130	1	ug/L	61	NE	NE
Styrene	<30	70-130	5.3	ug/Kg	20,000	1,000,000	500,000	<30	70-130	1	ug/L	100	580	NE
tert-Butylbenzene	<30	70-130	5.3	ug/Kg	NE	1,000,000	500,000	<30	70-130	1	ug/L	61	NE	NE
Tetrachloroethene	<30	70-130	5.3	ug/Kg	1,000	110,000	12,000	<30	70-130	1	ug/L	5	1,500	88
Tetrahydrofuran (THF)	<30	70-130	11	ug/Kg	NE	NE	NE	<30	70-130	2.5	ug/L	NE	NE	NE
Toluene	<30	70-130	5.3	ug/Kg	67,000	1,000,000	500,000	<30	70-130	1	ug/L	1,000	23,500	4,000,000
Total Xylenes	<30	70-130	5.3	ug/Kg	19,500	1,000,000	500,000	<30	70-130	2	ug/L	530	21,300	NE
trans-1,2-Dichloroethene	<30	70-130	5.3	ug/Kg	20,000	1,000,000	500,000	<30	70-130	1	ug/L	100	NE	NE
trans-1,3-Dichloropropene	<30	70-130	5.3	ug/Kg	NE	NE	NE	<30	70-130	0.4	ug/L	NE	NE	NE
trans-1,4-dichloro-2-butene	<30	70-130	11	ug/Kg	NE	NE	NE	<30	70-130	5	ug/L	NE	NE	NE
Trichloroethene	<30	70-130	5.3	ug/Kg	1,000	520,000	56,000	<30	70-130	1	ug/L	5	219	2,340
Trichlorofluoromethane	<30	70-130	5.3	ug/Kg	NE	1,000,000	500,000	<30	70-130	1	ug/L	1,300	NE	NE
Trichlorotrifluoroethane	<30	70-130	5.3	ug/Kg	NE	NE	NE	<30	70-130	1	ug/L	20,000	NE	NE
Vinyl chloride	<30	70-130	5.3	ug/Kg	400	3,000	320	<30	70-130	1	ug/L	2	2	15,750

POTENTIAL CONTAMINANTS OF CONCERN	Soils							Groundwater						
	Precision (% RPD)	Accuracy (% R)	Reporting Limit	Units	Remedial Criteria			Precision (% RPD)	Accuracy (% R)	Reporting Limit	Units	Remedial Criteria		
					GB-PMC	I/C-DEC	R-DEC					GWPC	R-GWVC	SWPC
Polynuclear Aromatic Hydrocarbons - Semivolatile Organic Compounds By SW 8270														
2-Methylnaphthalene	<30	30-130	290	ug/Kg	NE	2,500,000	474,000	<20	30-130	0.1	ug/L	49	NE	NE
Acenaphthene	<30	30-130	290	ug/Kg	NE	2,500,000	1,000,000	<20	30-130	0.1	ug/L	420	NE	6.1
Acenaphthylene	<30	30-130	290	ug/Kg	84,000	2,500,000	1,000,000	<20	30-130	0.1	ug/L	420	NE	0.3
Anthracene	<30	30-130	290	ug/Kg	400,000	2,500,000	1,000,000	<20	30-130	0.1	ug/L	2,000	NE	1,100,000
Benz(a)anthracene	<30	30-130	290	ug/Kg	1,000	7,800	1,000	<20	30-130	0.02	ug/L	0.06	NE	0.3
Benzo(a)pyrene	<30	30-130	290	ug/Kg	1,000	1,000	1,000	<20	30-130	0.02	ug/L	0.2	NE	0.3
Benzo(b)fluoranthene	<30	30-130	290	ug/Kg	1,000	7,800	1,000	<20	30-130	0.02	ug/L	0.08	NE	0.3
Benzo(ghi)perylene	<30	30-130	290	ug/Kg	NE	2,500,000	1,000,000	<20	30-130	0.1	ug/L	210	NE	4.92
Benzo(k)fluoranthene	<30	30-130	290	ug/Kg	1,000	78,000	8,400	<20	30-130	0.02	ug/L	0.5	NE	0.3
Chrysene	<30	30-130	290	ug/Kg	NE	780,000	84,000	<20	30-130	0.02	ug/L	4.8	NE	NE
Dibenz(a,h)anthracene	<30	30-130	290	ug/Kg	NE	1,000	1,000	<20	30-130	0.01	ug/L	0.2	NE	0.01
Fluoranthene	<30	30-130	290	ug/Kg	56,000	2,500,000	1,000,000	<20	30-130	0.1	ug/L	280	NE	3,700
Fluorene	<30	30-130	290	ug/Kg	56,000	2,500,000	1,000,000	<20	30-130	0.1	ug/L	280	NE	140,000
Indeno(1,2,3-cd)pyrene	<30	30-130	290	ug/Kg	NE	7,800	1,000	<20	30-130	0.02	ug/L	0.2	NE	NE
Naphthalene	<30	30-130	290	ug/Kg	56,000	2,500,000	1,000,000	<20	30-130	0.1	ug/L	280	NE	24
Phenanthrene	<30	30-130	290	ug/Kg	40,000	2,500,000	1,000,000	<20	30-130	0.07	ug/L	200	NE	0.077
Pyrene	<30	30-130	290	ug/Kg	40,000	2,500,000	1,000,000	<20	30-130	0.1	ug/L	200	NE	110,000
TPH By CT ETPH/8015														
Ext. Petroleum HC	<30	50-150	59	mg/Kg	2,500	2,500	500	<20	50-150	78	ug/L	250	NE	NE
PCBs By 3540C/8082														
PCB-1016	<30	40-140	84	ug/Kg	NE	10,000	1,000	<20	40-140	0.5	ug/L	0.5	NE	0.5
PCB-1221	<30	40-140	84	ug/Kg	NE	10,000	1,000	<20	40-140	0.5	ug/L	0.5	NE	0.5
PCB-1232	<30	40-140	84	ug/Kg	NE	10,000	1,000	<20	40-140	0.5	ug/L	0.5	NE	0.5
PCB-1242	<30	40-140	84	ug/Kg	NE	10,000	1,000	<20	40-140	0.5	ug/L	0.5	NE	0.5
PCB-1248	<30	40-140	84	ug/Kg	NE	10,000	1,000	<20	40-140	0.5	ug/L	0.5	NE	0.5
PCB-1254	<30	40-140	84	ug/Kg	NE	10,000	1,000	<20	40-140	0.5	ug/L	0.5	NE	0.5
PCB-1260	<30	40-140	84	ug/Kg	NE	10,000	1,000	<20	40-140	0.5	ug/L	0.5	NE	0.5
PCB-1262	<30	40-140	84	ug/Kg	NE	10,000	1,000	<20	40-140	0.5	ug/L	0.5	NE	0.5
PCB-1268	<30	40-140	84	ug/Kg	NE	10,000	1,000	<20	40-140	0.5	ug/L	0.5	NE	0.5

POTENTIAL CONTAMINANTS OF CONCERN	Soils							Groundwater						
	Precision (% RPD)	Accuracy (% R)	Reporting Limit	Units	Remedial Criteria			Precision (% RPD)	Accuracy (% R)	Reporting Limit	Units	Remedial Criteria		
					GB-PMC	I/C-DEC	R-DEC					GWPC	R-GWVC	SWPC
INORGANICS - METALS & CYANIDE														
Aluminum	<30	40-140	3.8	mg/Kg	NE	NE	NE	<20	40-140	0.001	mg/L	NE	NE	NE
Arsenic	<30	40-140	0.8	mg/Kg	NE	10	10	<20	40-140	0.004	mg/L	0.05	NE	0.004
Barium	<30	40-140	0.38	mg/Kg	NE	140,000	4,700	<20	40-140	0.002	mg/L	1	NE	NE
Cadmium	<30	40-140	0.38	mg/Kg	NE	1000	34	<20	40-140	0.001	mg/L	0.005	NE	0.006
Chromium	<30	40-140	0.38	mg/Kg	NE	NE	NE	<20	40-140	0.001	mg/L	0.05	NE	NE
Copper	<30	40-140	0.38	mg/kg	NE	76,000	2,500	<20	40-140	0.001	mg/L	1300000	NE	0.048
Lead	<30	40-140	0.38	mg/Kg	NE	1,000	400	<20	40-140	0.002	mg/L	0.015	NE	0.013
Mercury	<30	40-140	0.08	mg/Kg	NE	610	20	<20	40-140	0.0002	mg/L	0.002	NE	0.0004
Nickel	<30	40-140	0.38	mg/Kg	NE	7,500	1,400	<20	40-140	0.002	mg/L	0.1	NE	0.88
Selenium	<30	40-140	1.5	mg/Kg	NE	10,000	340	<20	40-140	0.04	mg/L	0.05	NE	0.05
Silver	<30	40-140	0.38	mg/Kg	NE	10,000	340	<20	40-140	0.003	mg/L	0.036	NE	0.012
Zinc	<30	40-140	0.38	mg/Kg	NE	610,000	20,000	<20	40-140	0.004	mg/L	5000000	NE	0.123

Note:

In accordance with the Reasonable Confidence Protocols, the analytical laboratory will make all reasonable efforts to maintain reporting limits below applicable remedial criteria. Matrix interferences and other factors may require adjustment of reporting limits. These will be identified in the RCP checklist and related laboratory comments, based on the analyses performed and the sample matrix.



FORM M
FIELD QUALITY CONTROL REQUIREMENTS
QUALITY ASSURANCE PROJECT PLAN
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The procedures and requirements contained in *EPA Requirements for Quality Assurance Project Plans*, October, 1997. EPA QA/R-5 (Draft Final), or latest revision, should be followed. The following field quality control samples will be obtained:

Quality Control Sample Type	Frequency	Acceptance Criteria	Comment
Blind Duplicate	1 per 20 samples	See below for non-aqueous and aqueous samples	
Equipment Blank	1 per day	See below	Not required if dedicated sample equip. is used
VOA Trip Blank	1 per cooler per day	Non-detected for VOCs	Laboratory blank detections may be subtracted

RELATIVE PERCENT DIFFERENCE (RPD) ACCEPTABILITY CRITERIA

The following summary of RPD acceptability criteria for aqueous and non-aqueous samples was obtained from: “EPA New England Environmental Data Review Supplement For Regional Data Review Elements and Superfund Specific Guidance/Procedures” (April 22, 2013)

Non-Aqueous Field Duplicates

- a. Calculate the RPD for all analytes detected at concentrations greater than or equal to the sample quantitation limit (SQL) in the non-aqueous field duplicate pair.
 - If any analyte is detected at concentrations greater than or equal to 2x the SQL in both aqueous field duplicate samples and has an absolute RPD greater than 50%, then the reviewer should estimate (J) positive detects for the affected analyte in both samples.
 - If any analyte is detected at concentrations greater than or equal to the SQL but less than 2x the quantitation limit in both non-aqueous field duplicate samples and has an absolute RPD greater than 50%, then the reviewer should use professional judgment to accept, or estimate (J) the positive detects for that analyte taking into consideration the increased variability of data near the SQL.
 - If any analyte has one positive detect that is greater than or equal to 2x the SQL and a duplicate positive detect that is greater than or equal to the SQL but less than twice the SQL, the absolute RPD exceeds 50%, then the reviewer should use professional judgment to qualify detects for that analysis in the duplicate sample.
- b. Do not calculate RPDs in the following situations; rather, use the following guidance to evaluate the non-aqueous field duplicates:



Field Quality Control Requirements – Form M
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- If any analyte has a non-detect (or value reported as less than the SQL) and the duplicate positive detect that is greater or equal to 2x the SQL, then the reviewer should estimate (J) the positive detect and (UJ) the non-detect for that analyte.
- If any analyte has a non-detect or a reported value below the SQL and the duplicate has a detect that is greater than or equal to the SQL but less than 2x the SQL, then the reviewer should use professional judgment to qualify the positive detects and non-detects for that analyte EQADR–Supplement0 Final Version # 0 April 22, 2013 Page 41 of 105
- If any analyte is a non-detect or is less than the SQL in both of the field duplicate samples, then no action is taken.

Aqueous Field Duplicates

- a. Calculate the RPD for all analytes detected at concentrations greater than or equal to 2x the SQL in the aqueous field duplicate pair.
 - If any analyte is detected at concentrations greater than or equal to 2x the SQL in both aqueous field duplicate samples and has an absolute RPD greater than 30%, then the reviewer should estimate (J) positive detects for the affected analyte in the duplicate samples.
 - If any analyte is detected at concentrations greater than or equal to the SQL but less than 2x the quantitation limit in both aqueous field duplicate samples and has an absolute RPD greater than 30%, then the reviewer should use professional judgment to accept or estimate (J) the positive detects for the analyte in the duplicate samples considering the increased variability near the SQL.
 - If any analyte has one positive detect that is greater than or equal to 2x the SQL and a duplicate positive detect that is greater than or equal to the SQL but less than twice the SQL, and the absolute RPD exceeds 30%, then the reviewer should use professional judgment to qualify detects for that analyte in the duplicate sample.
- b. Do not calculate RPDs in the following situations; use the following guidance to evaluate the aqueous field duplicates:
 - If any analyte has a non-detect (or value reported as less than the SQL) and the duplicate has a positive detect that is greater than or equal to 2x the SQL, then the reviewer should estimate (J) the positive detect and (UJ) the non-detect for that analyte.
 - If any analyte has a non-detect or a reported value below the SQL and the duplicate has a detect that is greater than or equal to the SQL but less than 2x the SQL, then the reviewer should use professional judgment to qualify the positive detects and non-detects.
 - If any analyte is a non-detect or is less than the SQL in both of the field duplicate samples, then no action is taken.



FORM N
DATA MANAGEMENT AND DOCUMENTATION
QUALITY ASSURANCE PROJECT PLAN
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Field data will be recorded in a bound waterproof notebook. Notes will include the date, sampling location, weather conditions, any measurements taken, and any problems encountered in the field. Examples of boring and test pits logs, groundwater sampling forms, and chain of custody documentation area provided in the Standard Operating Procedures included in Appendix 2. Sample labels and the chain of custodies will be clearly written and consistent with one another.

Analytical samples are recorded by the certified laboratory in a bound notebook, specific for each instrument. A brief narrative is included at the end of each analytical run that includes any problems encountered with the standards, samples, blanks or QC samples. Some of the automated analytical equipment (GCs and GC/MSs) have computer generated analytical runs which automatically flag and note any problems on the computer run. If any corrective action is taken, it will be noted in narrative in the instrument notebook (see the laboratory QAPP for more detail).

The following deliverables will be provided by the laboratory:

1. Client's Name
2. Project Number
3. Laboratory Sample ID
4. Client Sample ID
5. Collection Date
6. Sample Matrix
7. Analyses
8. Analytical Results/Data Results Sheets
9. Reporting Limits
10. Reporting Units
11. Dilution Factor
12. Date Analyzed
13. Method Blank Results
14. Surrogate Recoveries and Acceptance Limits
15. Matrix Spike/Matrix Spike Duplicate Results and Acceptance Limits
16. Spike/Duplicate Results and Acceptance Limits
17. Laboratory Control Sample Results and Acceptance Limits
18. Project Narrative which contains all observations and deviations



Types of information the laboratory will provide include:

1. Analytical Summary Sheets
2. QC Summary Sheets
3. RCP Summary Sheet and back-up

The following will be maintained by the laboratory:

- All raw data including chromatograms
- Copies of Instrument Logbooks
- Copies of internal chains of custody.
- PE sample results.
- ICP Serial Dilution Results
- ICP Interference Check Sample Results

All reports are generated in hard-copy form and electronic data deliverables will be provided in Excel format.



FORM O
SAMPLING ASSESSMENT & RESPONSE ACTIONS
QUALITY ASSURANCE PROJECT PLAN
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Geo**Design** personnel and the quality assurance manager will review field sampling procedures, field sampling instrumentation, data quality, and project management systems at their discretion at any time during the study to assess the usability and validity of the data. Any reviews such as this will help ensure that the data collection and analysis methods presented in this QAPP will result in the collection data necessary to achieve the goals of this project

ASSESSMENT AND RESPONSE ACTIONS

Assessment and response actions (internal and external) are generally implemented during project activities to ensure that elements of the QAPP are correctly implemented and that the quality of the data generated is adequate for project objectives. Types of assessments may include:

- Management system reviews;
- Surveillance;
- Performance and Systems Audits;
- Audits of data quality; and,
- Data quality assessments.

The following sections describe briefly each type of assessment activity listed above. The QA manager, who is organizationally independent of the project management team, usually performs internal audits. Technically qualified personnel of other organizations such as the US EPA or CTDEEP, perform external assessments.

Management System Review

This review consists of a qualitative assessment of organizational and data collection operations to ensure that sufficient management controls are in place and implemented to adequately plan, perform, and assess the results of the project. Geo**Design** conducts management system reviews of its Quality Management System (QMS).

Surveillance

Surveillance is continual or frequent monitoring of project status and records at each level of the organization to ensure that specified requirements are being fulfilled. Surveillance is conducted by the project manager formally with written documentation or informally.



Performance and System Audits

The project manager will monitor and audit the performance of the QA/QC procedures. All information produced or obtained in the course of the field activities is subject to audit at any time and therefore must be reliable, gathered with the appropriate attention to detail and maintained with full integrity in accordance with respective SOPs and laboratory quality assurance systems. If warranted (i.e., if problems are encountered) the quality assurance manager may conduct a field audit and/or laboratory audit while field and laboratory activities are continuing.

Each laboratory addresses performance and system audits within their quality assurance systems.

Corrective Actions

The achievement and maintenance of the stated data quality objectives will be monitored by a continuous assessment of the work performed. At various times throughout the sampling and analysis program, situations may arise that will require some degree of corrective action, ranging from simple corrections on routine field documentation to systematic problems that necessitate shutting down sample analyses until the problem is identified and corrected. Situations requiring corrective action are to be handled and documented in both the field and the laboratory for the purposes of this project work.

Field Situations

In the field, numerous situations, such as equipment or instrument malfunction, may occur and require subsequent corrective action. Wherever possible, immediate corrective action should be taken, and must be clearly described in the field logbooks. No other formal documentation is required unless further corrective action is deemed necessary. Any problem or situation, which cannot be solved through immediate corrective action, will fall into the long term corrective action category. The steps for long-term corrective action are as follows:

- Identification and definition of the problem.
- Investigation and determination of the cause of the problem.
- Determination and implementation of a corrective action to eliminate the problem.
- Verification that the corrective action has eliminated the problem.

The field personnel noting the problem will document it and bring it to the attention of the project manager. The project manager will investigate the situation and determine who will be responsible for implementing the corrective action. The project manager will verify that the corrective action has been taken, appears effective, and, at appropriate later dates, verify that the



Sampling Assessment and Response Actions – Form O

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problem has been resolved. The successfully implemented corrective action must be fully documented by the project manager.

Laboratory Situations

As a result of system audit, a technical audit, or observation of or by laboratory personnel, discrepancies may be found which affect the validity or quality of analytical data. Corrective actions will be implemented to correct the deficiency or weakness and to identify any analytical data that may have been affected. Wherever possible, immediate corrective action procedures shall be employed. Immediate corrective actions taken must be noted in the laboratory logbooks, but no other formal documentation is required unless further corrective action is deemed necessary. The need for long-term corrective action should be addressed in the laboratory quality assurance system.

If any corrective actions taken affect the quality and integrity of the data generated during a specific site investigation then it is the responsibility of the laboratory to address the impact on the data generated and inform the project manager in writing.



FORM P
PROJECT REPORTS
QUALITY ASSURANCE PROJECT PLAN
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BRISTOL, CT

The project report will include text to describe the rationale and means and methods of the work. The report will also include maps showing the location of all sampling points, logs of all test borings, analytical data summary tables, laboratory analytical reports, documentation of data validation. The text will present conclusions and recommendations regarding the environmental status of the site and implications with respect to site use or redevelopment.

The laboratory will provide a copy of the analytical results as an electronic data download (EDD) and Adobe Acrobat format. The analytical data will be assembled and evaluated with respect to the Remediation Standard Regulations and presented in an appendix of the report.

Electronic copies of the report will be distributed to the organizations and contacts indicated on Form B. Hardcopies of the report will be available on request.



FORMS Q-1 & Q-2
VERIFICATION OF SAMPLING PROCEDURES
DATA VERIFICATION AND VALIDATION
QUALITY ASSURANCE PROJECT PLAN
894 MIDDLE STREET
BRISTOL, CT

Q-1 VERIFICATION OF SAMPLING PROCEDURES

All sampling procedures will be reviewed with the field personnel. Qualified and experience personnel will perform and oversee all sampling events. All personnel that perform field sampling activities have been trained in the regulatory guidance documents, field equipment and procedures pursuant to this QAPP.

Field personnel will be given a copy of this QAPP prior to performing any field sampling activity or directed by the project manager as to what sampling procedures are to be employed. The project manager will speak to the field sampling team on a daily basis to verify that the sampling procedures specified in this QAPP are being followed. These managerial controls will verify that the sampling procedures contained in this QAPP are utilized.

The project manager will be responsible to verify that the sampling procedures are appropriate to meet the objectives at the proposed investigations.

Q-2 DATA VERIFICATION AND VALIDATION

The laboratory will perform internal validation procedures as per their SOPs. The QC Officer will evaluate the data in conformance with the Connecticut Reasonable Confidence Protocols to validate the laboratory data deliverables.

The following tasks will be performed and documented in the validation section of the final site activities report. A discussion will also be provided that includes any observations and conclusions about the quality of the data and any limitations on the way it should be used.

A. Summary of Technical Usability will include the following verification:

- Laboratory and laboratory project number
- Number of samples and sample field identifications (IDs) submitted to the laboratory by comparing the laboratory narrative to the chain-of-custody
- The laboratory sample IDs
- List parameters analyzed by comparing the laboratory narrative to the chain-of-custody

B. Technical Issues Affecting Accuracy will include review of:

- Sampling holding times compared to acceptable holding times
- Laboratory control sample recoveries compared to acceptable laboratory control sample recoveries as established by the method standard operating procedures of the laboratory internal procedures



- Matrix spike recoveries compared to acceptable matrix spike recoveries as established by the method standard operating procedures of the laboratory internal procedures

C. Technical Issues Affecting Precision and Representativeness

- The relative percent differences (RPD) will be calculated between samples and sample duplicates and between matrix spikes and matrix spikes duplicates. The acceptable RPD for soil is an $RPD < 50\%$ and the acceptable RPD for water is an $RPD < 30\%$.

D. Technical Issues Affecting Sensitivity

The data will be reviewed and commented on if problems are identified in:

- Method blanks
- Equipment blanks
- Laboratory reported minimum detection limits (MDLs)

E. Summary of Completeness, Documentation, and Chain-of-Custody Issues

The data deliverables package for the following components:

- Laboratory narrative
- Data result sheets
- Method blank results
- Surrogate recoveries and acceptance limits
- Matrix spike/matrix spike duplicate results and acceptance limits
- Laboratory control sample results and acceptance limits
- Project narrative including all observations and deviations

If any sample or QC issues are documented that are not included as part of the data package deliverables, the laboratory will be contacted, copies of relevant information obtained, and a discussion of any limitations on the use of the data will be presented in the validation section of the final reports. If the data deliverables package is incomplete the laboratory will be contacted and requested to provide the missing documentation.



FORM R
DATA USABILITY
QUALITY ASSURANCE PROJECT PLAN
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VERIFICATION AND VALIDATION REQUIREMENTS

The quality assurance manager or project manager will be responsible for verifying and validating all chain-of-custody forms and laboratory analysis data, while field personnel are responsible for the verification and validation of measurements and sample collection methods taken in the field.

Sub-contractors are responsible for verifying that all deliverables submitted to Geo**Design** are consistent with the QAPP. Any deviations from the criteria specified in the QAPP must be disclosed to Geo**Design** at the time of submission.

Analytical chemistry data will be reviewed according to “EPA New England Environmental Data Review Supplement For Regional Data Review Elements and Superfund Specific Guidance/Procedures” (April 22, 2013). All data will be subjected to review modeled after the EPA Tier I guideline. The Tier I review will include a review of completeness. In addition, this review will compare selected QC parameters with the acceptance criteria described in the QAPP. If necessary and appropriate as addressed by the laboratory analytical data that requires changes to the analyte concentrations reported by the laboratory (e.g., analytes that are rejected or changed to “non-detect at the reporting limit” with an elevated reporting limit due to blank contamination) will be explained in the data validation narrative. Qualifiers may also be applied to data that fails to satisfy the acceptance criteria.

FIELD CORRECTIVE ACTIONS

If situations arise in the field, such as equipment or instrumentation malfunctions, the corrective actions taken to remedy the problem should be documented either in writing or contacting the project manager. No formal documentation is required unless specified by the project manager.

LABORATORY SITUATIONS

Samples are analyzed in conjunction with quality control samples. If all sample data are within quality control specifications, the data and the quality control information are reported in the laboratory’s standard format. If a problem is encountered, the laboratory supervisor is notified and the problem is resolved. Geo**Design** will be notified of all such occurrences in writing.

PRESENT FIELD DUPLICATE RESULTS

Field duplicate results will be presented in the data summary tables.



COMPARABILITY

Soil and groundwater results will be compared to the Connecticut Remediation Standard Regulation (RSR) soil and groundwater criteria as follows:

1. Soils
 - Residential Direct Exposure Criteria (R-DEC)
 - Industrial/Commercial Direct Exposure Criteria (I/C-DEC)
 - GA groundwater Pollutant Mobility Criteria (GB-PMC)
2. Groundwater
 - • Surface Water Protection Criteria
 - • Residential Volatilization Criteria
 - • Industrial/Commercial Volatilization Criteria

SENSITIVITY

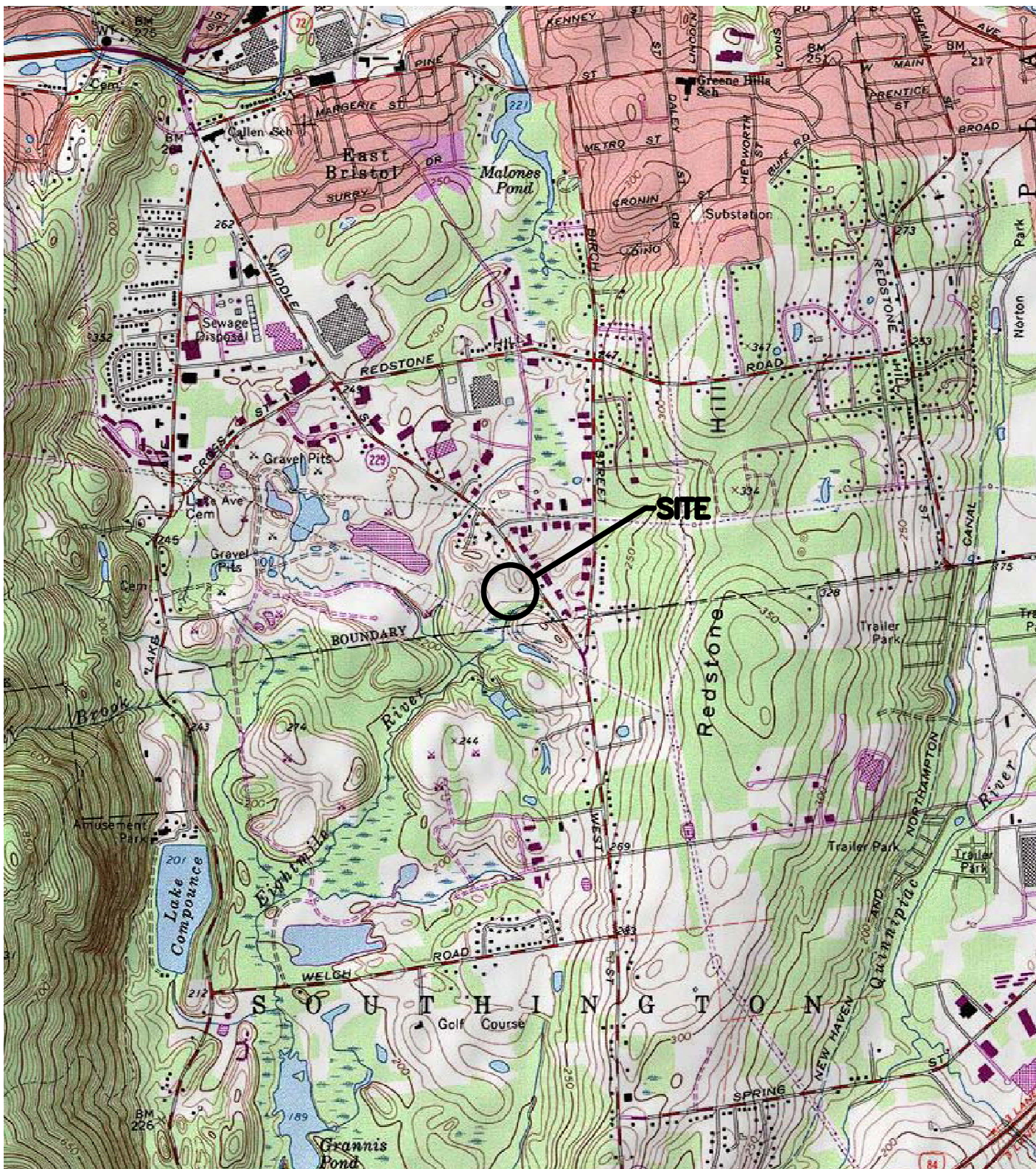
The soil and groundwater results, analytical detection limits, and reporting limits will be compared to the RSRs to verify that they are below remedial criteria. If detection limits or reporting limits are found above a remedial criterion, the laboratory will be contacted to rerun the sample to achieve a lower detection limit. If it is not possible to achieve detection limits below the RSR criteria due to matrix interference or other causes, the result will be flagged in the report. Typical analytical reporting limits with comparison to remedial criteria for each analyte are compared on Form L.

USABILITY AND COMPLETENESS SUMMARY

The usability of the data will be evaluated to demonstrate if it meets overall data quality objectives. After data validation and verification, all data with the exception of rejected data will be used for project decisions. Data gaps or unusable data will be noted in the reports.

APPENDIX 1

FIGURES



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CONNECTICUT



QUADRANGLE LOCATION

AREA PLAN 894 MIDDLE STREET BRISTOL, CONNECTICUT

REFERENCE:
U.S.G.S. 7.5 MINUTE QUADRANGLE: BRISTOL, CONNECTICUT.
FIGURE WAS CREATED USING TOPO! 2003 SOFTWARE.

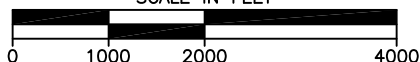
DRAWN BY:

CPF

REVIEWED BY:

TFC

SCALE IN FEET



QAPP 42

PROJECT NO.

3503-003.00

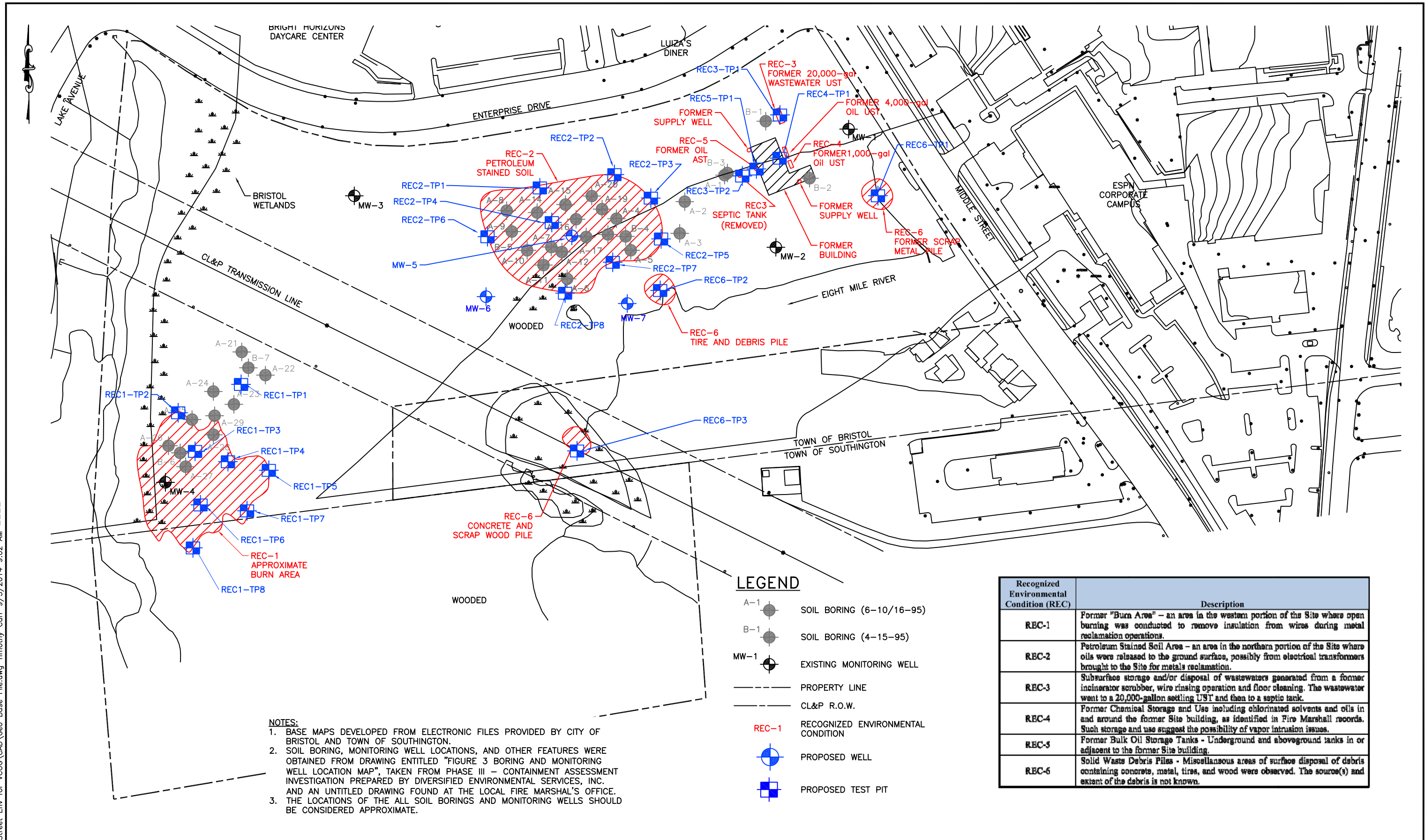
DATE

12/30/13

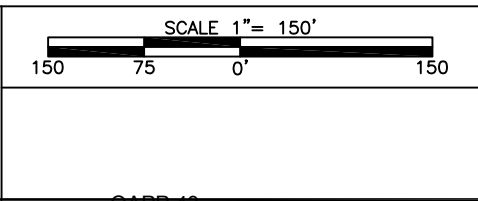
FIGURE NO.

1

M:\CL\3503\03 Middle Street Env for VCOG\CAD\Geo Base File.dwg Timothy Corr 9/3/2014 9:02 AM -----

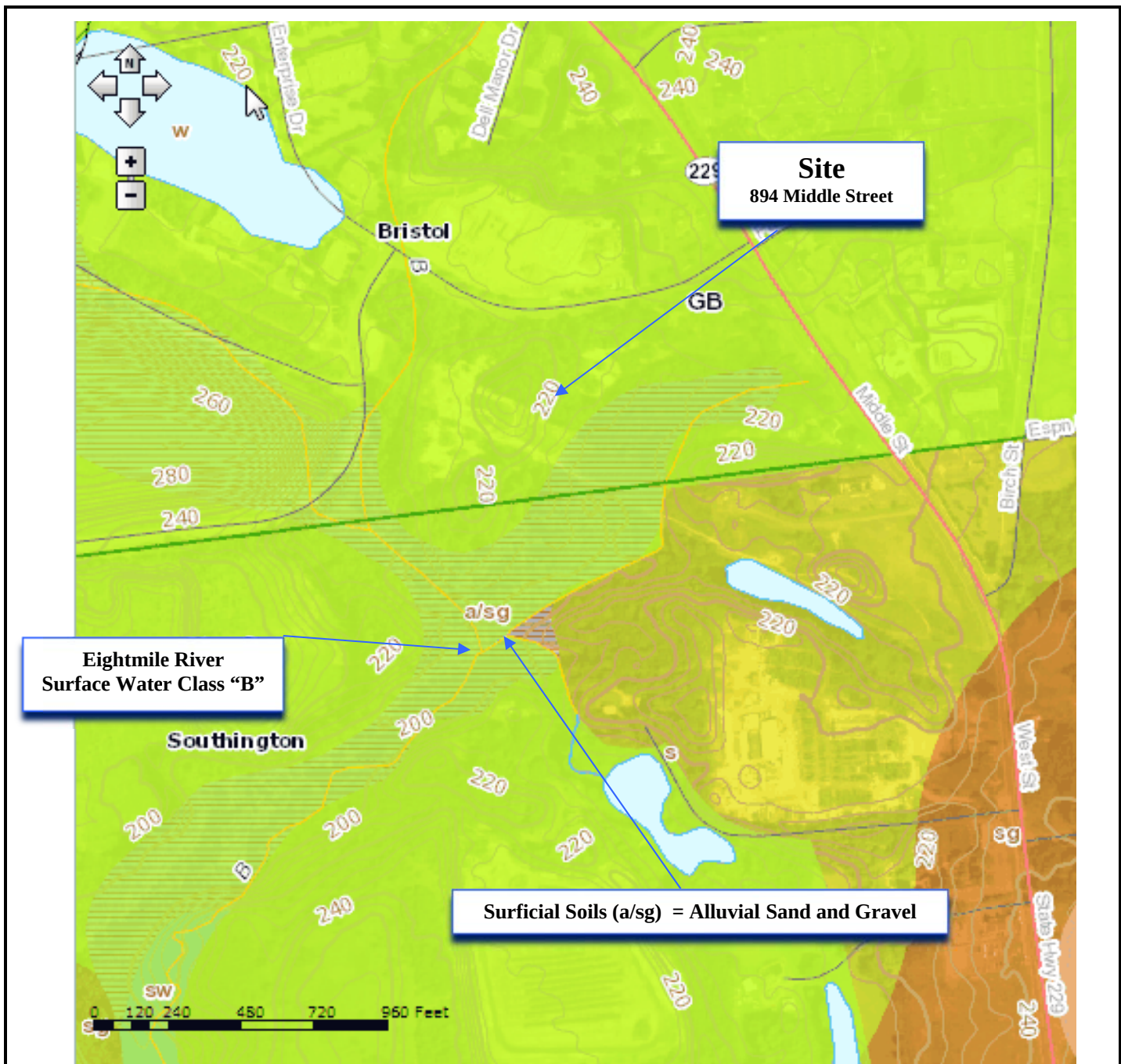


DESIGNED BY DW						
DRAWN BY CPF						
CHECKED BY TFC						
APPROVED BY TFC	NO.	DATE			DRWN	CHKD APPVD
REVISIONS						



PROJECT PHASE I & II ENVIRONMENTAL SITE ASSESSMENT 894 MIDDLE STREET BRISTOL, CONNECTICUT	
DWG. TITLE	SITE PLAN

PROJECT NO.	3503-003.00
SCALE	DATE
AS NOTED	12/30/13
FIGURE NO.	2



Notes:

Data obtained from the Connecticut Department of Environmental Protection's Geographic Information Systems (GIS) data download web page and Connecticut Environmental Conditions Online (CT ECO). The information was obtained from an internet download. Layers include orthophotography, groundwater and surface water classifications, and surficial geology.

 GEODESIGN INCORPORATED GEOTECHNICAL ENGINEERS AND ENVIRONMENTAL CONSULTANTS 984 Southford Road, Middlebury, CT 06762, Phone: 203-758-8836		CT ECO MAPPING 894 MIDDLE STREET BRISTOL, CONNECTICUT	
Drawn By: NBK		Scale:	Project No. 3583-002.00
Checked By: TFC		See Map	Figure No. 3

APPENDIX 2
PCB LABORATORY RESULTS

APPENDIX 3
DIOXIN LABORATORY RESULTS

Report Prepared for:

Alyssa Epstein
Nobis Engineering
378 Chase Avenue
Suite 301
Waterbury CT 06704

**REPORT OF
LABORATORY
ANALYSIS FOR
PCDD/PCDF**

Report Prepared Date:

March 23, 2016

Report Information:

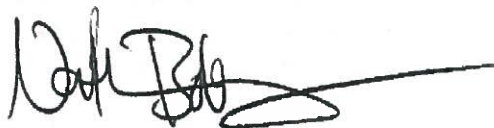
Pace Project #: 10339845
Sample Receipt Date: 02/26/2016
Client Project #: 90680.00 894 Middle Street, Br
Client Sub PO #: 90680.00
State Cert #: PH-0256

Invoicing & Reporting Options:

The report provided has been invoiced as a Level 2 PCDD/PCDF Report. If an upgrade of this report package is requested, an additional charge may be applied.

Please review the attached invoice for accuracy and forward any questions to Nathan Boberg, your Pace Project Manager.

This report has been reviewed by:



March 23, 2016

Nathan Boberg, Project Manager

(612) 607-6444 (fax)
nathan.boberg@pacelabs.com



Report of Laboratory Analysis

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The results relate only to the samples included in this report.

DISCUSSION

This report presents the results from the analyses performed on five samples submitted by a representative of Nobis Engineering. The samples were analyzed for the presence or absence of polychlorodibenzo-p-dioxins (PCDDs) and polychlorodibenzofurans (PCDFs) using a modified version of USEPA Method 8290. The reporting limits were set to correspond to the lowest calibration points and were adjusted for sample amount and dilution.

Second column confirmation analyses of 2,3,7,8-TCDF values obtained from the primary (DB5-MS) column are performed only when specifically requested for a project and only when the values are above the concentration of the lowest calibration standard. Typical resolution for this isomer using the DB5-MS column ranges from 25-30%.

The recoveries of the isotopically-labeled PCDD/PCDF internal standards in the sample extracts ranged from 33-107%. Except for one low value, which was flagged "R" on the results table, the labeled standard recoveries obtained for this project were within the 40-135% target range specified in Method 8290. Also, since the quantification of the native 2,3,7,8-substituted congeners was based on isotope dilution, the data were automatically corrected for variation in recovery and accurate values were obtained.

Concentrations above the calibration range were flagged "E" and should be regarded as estimates. Values obtained from the analysis of a diluted extract were flagged "D".

A laboratory method blank was prepared and analyzed with each sample batch as part of our routine quality control procedures. The results show the blanks to be free of PCDDs and PCDFs at the reporting limits. These results indicate that the sample processing steps did not contribute significantly to the levels reported for the field samples.

Laboratory spike samples were also prepared with the sample batches using clean sand that had been fortified with native standard materials. The results show that the spiked native compounds were recovered at 86-125%. These results were within the target range for the method. Matrix spikes were prepared with the sample batches using sample materials from separate projects; results from these analyses will be provided upon request.

The responses obtained for the labeled PeCDF congeners in calibration standard analysis U160322B_15 were outside the target range. As specified in our procedures, the averages of the daily response factors for these compounds were used in the calculations for the samples from this runshift. The affected values were flagged "Y" on the results tables. It should be noted that the accuracy of the native congener determinations was not impacted by these deviations.

REPORT OF LABORATORY ANALYSIS

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Minnesota Laboratory Certifications

Authority	Certificate #	Authority	Certificate #
A2LA	2926.01	Mississippi	MN00064
Alabama	40770	Montana	92
Alaska	MN00064	Nebraska	
Arizona	AZ0014	Nevada	MN_00064_200
Arkansas	88-0680	New Jersey (NE	MN002
California	01155CA	New York (NEL	11647
Colorado	MN00064	North Carolina	27700
Connecticut	PH-0256	North Dakota	R-036
EPA Region 8	8TMS-Q	Ohio	4150
Florida (NELAP	E87605	Oklahoma	D9922
Georgia (DNR)	959	Oregon (ELAP)	MN200001-005
Guam	959	Oregon (OREL	MN300001-001
Hawaii	SLD	Pennsylvania	68-00563
Idaho	MN00064	Puerto Rico	MN00064
Illinois	200012	Saipan	MP0003
Indiana	C-MN-01	South Carolina	74003001
Indiana	C-MN-01	Tennessee	TN02818
Iowa	368	Texas	T104704192-08
Kansas	E-10167	Utah (NELAP)	MN00064
Kentucky	90062	Virginia	00251
Louisiana	03086	Washington	C755
Maine	2007029	West Virginia	9952C
Maryland	322	Wisconsin	999407970
Michigan	9909	Wyoming	8TMS-Q
Minnesota	027-053-137		

REPORT OF LABORATORY ANALYSIS

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Report No.....10339845

Appendix A

Sample Management

CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

W0339015



Section A Required Client Information: Company: <u>Nobis Engineering</u> Address: <u>378 Chubb Ave Suite 301</u> Waterbury CT 06704 Email To: <u>nobiseng@nobiseng.com</u> Phone: <u>516 647 4274</u> Fax: Requested Due Date/TAT:		Section B Required Project Information: Report To: <u>cepsien@nobiseng.com</u> Copy To: Purchase Order No.: <u>90680-00</u> Project Name: <u>894 Middle Street, Bn 101</u> Project Number: <u>90680-00</u>		Section C Invoice Information: Attention: <u>Accounts Payable</u> Company Name: <u>Nobis Engineering</u> Address: <u>18 Chenell Dr Concord MA 03301</u> Pace Quote Reference: Pace Project Manager: Pace Profile #:	
Regulatory Agency ☐ NPDES ☐ GROUND WATER ☐ DRINKING WATER ☐ UST ☒ RCRA ☐ OTHER		Site Location STATE: <u>CT</u>		Page: <u>1</u> of <u>1</u> 2022524	

ITEM #	Section D Required Client Information	Matrix Codes MATRIX / CODE	COLLECTED		SAMPLE TYPE (G=GRAB C=COMP)	MATRIX CODE (see valid codes to left)	RELINQUISHED BY / AFFILIATION		DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS	Pace Project No. / Lab I.D.
			COMPOSITE START	COMPOSITE END/GRAB			DATE	TIME							
1	C.025-3.375	Drinking Water			SL G		2/17/16	11:00	38						001
2	D.25-9.15	Water			SL G			1:30							002
3	D.0-2.2	Waste Water			SL G			11:40							003
4	E.5-2.1	Product			SL G			12:10							004
5	H.1-1.1	Soil/Solid			SL G			12:40							005
6		Oil													
7		Wipe													
8		Air													
9		Tissue													
10		Other													
11															
12															

ADDITIONAL COMMENTS <u>Samples contain PCBs</u>		RELINQUISHED BY / AFFILIATION <u>Nobiseng</u>		DATE <u>2/25/16</u>		TIME <u>12:00</u>		ACCEPTED BY / AFFILIATION <u>[Signature]</u>		DATE <u>2/25/16</u>		TIME <u>10:00</u>		SAMPLE CONDITIONS Received on Ice (Y/N) <u>Y</u> Cooled (Y/N) <u>Y</u> Sealed Cooler (Y/N) <u>Y</u> Samples Intact (Y/N) <u>Y</u>	
ORIGINAL															
SAMPLER NAME AND SIGNATURE PRINT Name of SAMPLER: <u>Aussa Epstein</u> SIGNATURE of SAMPLER: <u>[Signature]</u> DATE Signed (MM/DD/YY): <u>2/25/16</u>															

*Important Note: By signing this form you are accepting Pace's NET 30 day payment terms and agreeing to late charges of 1.5% per month for any invoices not paid within 30 days.

	Document Name: Sample Condition Upon Receipt Form	Document Revised: 05Jan2016 Page 1 of 1
	Document No.: F-MN-L-213-rev.15	Issuing Authority: Pace Minnesota Quality Office

Sample Condition Upon Receipt

Client Name:

Project #:

WO#: 10339845



Courier: ☒ Fed Ex ☐ UPS ☐ USPS ☐ Client
☐ Commercial ☐ Pace ☐ SpeedDee ☐ Other: _____
 Tracking Number: **7757 3072 2860**

Custody Seal on Cooler/Box Present? ☒ Yes ☐ No Seals Intact? ☒ Yes ☐ No

Packing Material: ☒ Bubble Wrap ☐ Bubble Bags ☐ None ☐ Other: _____ Temp Blank? ☒ Yes ☐ No

Thermometer Used: ☐ 151401163 ☐ 151401164 ☒ B88A912167504 ☐ B88A0143310098
 Type of Ice: ☒ Wet ☐ Blue ☐ None ☐ Samples on ice, cooling process has begun

Cooler Temp Read (°C): **5.3** Cooler Temp Corrected (°C): **5.9** Biological Tissue Frozen? ☐ Yes ☐ No ☒ N/A
 Temp should be above freezing to 6°C Correction Factor: **10.1** Date and Initials of Person Examining Contents: **KAC 2/26/16**

USDA Regulated Soil (☐ N/A, water sample)

Did samples originate in a quarantine zone within the United States: AL, AR, AZ, CA, FL, GA, ID, LA, MS, NC, NM, NY, OK, OR, SC, TN, TX or WA (check maps)? ☐ Yes ☒ No
 Did samples originate from a foreign source (internationally, including Hawaii and Puerto Rico)? ☐ Yes ☒ No

If Yes to either question, fill out a Regulated Soil Checklist (F-MN-Q-338) and include with SCUR/COC paperwork.

	COMMENTS:
Chain of Custody Present? ☒ Yes ☐ No ☐ N/A	1.
Chain of Custody Filled Out? ☒ Yes ☐ No ☐ N/A	2.
Chain of Custody Relinquished? ☒ Yes ☐ No ☐ N/A	3.
Sampler Name and/or Signature on COC? ☒ Yes ☐ No ☐ N/A	4.
Samples Arrived within Hold Time? ☒ Yes ☐ No ☐ N/A	5.
Short Hold Time Analysis (<72 hr)? ☐ Yes ☒ No ☐ N/A	6.
Rush Turn Around Time Requested? ☐ Yes ☒ No ☐ N/A	7.
Sufficient Volume? ☒ Yes ☐ No ☐ N/A	8.
Correct Containers Used? ☒ Yes ☐ No ☐ N/A	9.
-Pace Containers Used? ☒ Yes ☐ No ☐ N/A	
Containers Intact? ☒ Yes ☐ No ☐ N/A	10.
Filtered Volume Received for Dissolved Tests? ☐ Yes ☐ No ☒ N/A	11. Note if sediment is visible in the dissolved container
Sample Labels Match COC? ☐ Yes ☒ No ☐ N/A	12. no time on containers
-Includes Date/Time/ID/Analysis Matrix: SL	
All containers needing acid/base preservation have been checked? ☐ Yes ☐ No ☒ N/A	13. ☐ HNO ₃ ☐ H ₂ SO ₄ ☐ NaOH ☐ HCl
All containers needing preservation are found to be in compliance with EPA recommendation? ☐ Yes ☐ No ☒ N/A	Sample #
(HNO ₃ , H ₂ SO ₄ , HCl<2; NaOH >9 Sulfide, NaOH>12 Cyanide) Exceptions: VOA, Coliform, TOC, Oil and Grease, DRO/8015 (water) DOC ☐ Yes ☐ No ☒ N/A	Initial when completed: _____ Lot # of added preservative: _____
Headspace in VOA Vials (>6mm)? ☐ Yes ☐ No ☒ N/A	14.
Trip Blank Present? ☐ Yes ☐ No ☒ N/A	15.
Trip Blank Custody Seals Present? ☐ Yes ☐ No ☒ N/A	
Pace Trip Blank Lot # (if purchased): _____	

CLIENT NOTIFICATION/RESOLUTION

Field Data Required? ☐ Yes ☐ No

Person Contacted: _____ Date/Time: _____

Comments/Resolution: _____

Project Manager Review: **[Signature]**

Date: **2/26/16**

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e. out of hold, incorrect preservative, out of temp, incorrect containers).

Reporting Flags

- A = Reporting Limit based on signal to noise
- B = Less than 10x higher than method blank level
- C = Result obtained from confirmation analysis
- D = Result obtained from analysis of diluted sample
- E = Exceeds calibration range
- I = Interference present
- J = Estimated value
- Nn = Value obtained from additional analysis
- P = PCDE Interference
- R = Recovery outside target range
- S = Peak saturated
- U = Analyte not detected
- V = Result verified by confirmation analysis
- X = %D Exceeds limits
- Y = Calculated using average of daily RFs
- * = See Discussion

REPORT OF LABORATORY ANALYSIS

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Report No.....10339845

Report No.....10339845_8290

Page 7 of 17

Appendix B

Sample Analysis Summary

Method 8290 Sample Analysis Results

Client - Nobis Engineering

Client's Sample ID	C.625-3.375		
Lab Sample ID	10339845001		
Filename	U160307B_07		
Injected By	SMT		
Total Amount Extracted	10.1 g	Matrix	Solid
% Moisture	16.6	Dilution	NA
Dry Weight Extracted	8.42 g	Collected	02/17/2016 11:00
ICAL ID	U160204	Received	02/26/2016 10:00
CCal Filename(s)	U160307A_19 & U160307B_15	Extracted	03/03/2016 19:00
Method Blank ID	BLANK-49236	Analyzed	03/08/2016 07:33

Native Isomers	Conc ng/Kg	EMPC ng/Kg	RL ng/Kg	Internal Standards	ng's Added	Percent Recovery
2,3,7,8-TCDF	1700.0	—	1.2 E	2,3,7,8-TCDF-13C	2.00	80
Total TCDF	22000.0	—	1.2 E	2,3,7,8-TCDD-13C	2.00	93
				1,2,3,7,8-PeCDF-13C	2.00	81
2,3,7,8-TCDD	ND	—	1.2	2,3,4,7,8-PeCDF-13C	2.00	79
Total TCDD	1.2	—	1.2	1,2,3,7,8-PeCDD-13C	2.00	87
				1,2,3,4,7,8-HxCDF-13C	2.00	76
1,2,3,7,8-PeCDF	470.0	—	5.9	1,2,3,6,7,8-HxCDF-13C	2.00	77
2,3,4,7,8-PeCDF	960.0	—	5.9	2,3,4,6,7,8-HxCDF-13C	2.00	77
Total PeCDF	5600.0	—	5.9	1,2,3,7,8,9-HxCDF-13C	2.00	75
				1,2,3,4,7,8-HxCDD-13C	2.00	72
1,2,3,7,8-PeCDD	ND	—	5.9	1,2,3,6,7,8-HxCDD-13C	2.00	69
Total PeCDD	ND	—	5.9	1,2,3,4,6,7,8-HpCDF-13C	2.00	71
				1,2,3,4,7,8,9-HpCDF-13C	2.00	70
1,2,3,4,7,8-HxCDF	240.0	—	5.9	1,2,3,4,6,7,8-HpCDD-13C	2.00	83
1,2,3,6,7,8-HxCDF	69.0	—	5.9	OCDD-13C	4.00	71
2,3,4,6,7,8-HxCDF	60.0	—	5.9			
1,2,3,7,8,9-HxCDF	74.0	—	5.9	1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	870.0	—	5.9	1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	ND	—	5.9	2,3,7,8-TCDD-37Cl4	0.20	89
1,2,3,6,7,8-HxCDD	ND	—	5.9			
1,2,3,7,8,9-HxCDD	ND	—	5.9			
Total HxCDD	9.5	—	5.9			
1,2,3,4,6,7,8-HpCDF	130.0	—	5.9	Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	110.0	—	5.9	Equivalence: 520 ng/Kg		
Total HpCDF	440.0	—	5.9	(Using 2005 WHO Factors)		
1,2,3,4,6,7,8-HpCDD	35.0	—	5.9			
Total HpCDD	75.0	—	5.9			
OCDF	290.0	—	12.0			
OCDD	240.0	—	12.0			

Conc = Concentration (Totals include 2,3,7,8-substituted isomers).

EMPC = Estimated Maximum Possible Concentration

RL = Reporting Limit

ND = Not Detected

NA = Not Applicable

NC = Not Calculated

Results reported on a dry weight basis and are valid to no more than 2 significant figures.

E = Exceeds calibration range

REPORT OF LABORATORY ANALYSIS

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Method 8290 Sample Analysis Results

Client - Nobis Engineering

Client's Sample ID	D.25-9.15		
Lab Sample ID	10339845002		
Filename	U160307B_08		
Injected By	SMT		
Total Amount Extracted	10.0 g	Matrix	Solid
% Moisture	45.8	Dilution	NA
Dry Weight Extracted	5.42 g	Collected	02/17/2016 13:30
ICAL ID	U160204	Received	02/26/2016 10:00
CCal Filename(s)	U160307A_19 & U160307B_15	Extracted	03/03/2016 19:00
Method Blank ID	BLANK-49236	Analyzed	03/08/2016 08:19

Native Isomers	Conc ng/Kg	EMPC ng/Kg	RL ng/Kg	Internal Standards	ng's Added	Percent Recovery
2,3,7,8-TCDF	21.0	—	1.8	2,3,7,8-TCDF-13C	2.00	80
Total TCDF	140.0	—	1.8	2,3,7,8-TCDD-13C	2.00	92
				1,2,3,7,8-PeCDF-13C	2.00	80
2,3,7,8-TCDD	ND	—	1.8	2,3,4,7,8-PeCDF-13C	2.00	75
Total TCDD	2.0	—	1.8	1,2,3,7,8-PeCDD-13C	2.00	86
				1,2,3,4,7,8-HxCDF-13C	2.00	73
1,2,3,7,8-PeCDF	ND	—	9.2	1,2,3,6,7,8-HxCDF-13C	2.00	74
2,3,4,7,8-PeCDF	18.0	—	9.2	2,3,4,6,7,8-HxCDF-13C	2.00	73
Total PeCDF	130.0	—	9.2	1,2,3,7,8,9-HxCDF-13C	2.00	76
				1,2,3,4,7,8-HxCDD-13C	2.00	74
1,2,3,7,8-PeCDD	ND	—	9.2	1,2,3,6,7,8-HxCDD-13C	2.00	69
Total PeCDD	ND	—	9.2	1,2,3,4,6,7,8-HpCDF-13C	2.00	72
				1,2,3,4,7,8,9-HpCDF-13C	2.00	80
1,2,3,4,7,8-HxCDF	19.0	—	9.2	1,2,3,4,6,7,8-HpCDD-13C	2.00	90
1,2,3,6,7,8-HxCDF	11.0	—	9.2	OCDD-13C	4.00	77
2,3,4,6,7,8-HxCDF	16.0	—	9.2			
1,2,3,7,8,9-HxCDF	ND	—	9.2	1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	140.0	—	9.2	1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	ND	—	9.2	2,3,7,8-TCDD-37Cl4	0.20	88
1,2,3,6,7,8-HxCDD	ND	—	9.2			
1,2,3,7,8,9-HxCDD	ND	—	9.2			
Total HxCDD	27.0	—	9.2			
1,2,3,4,6,7,8-HpCDF	71.0	—	9.2	Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	ND	—	9.2	Equivalence: 13 ng/Kg		
Total HpCDF	110.0	—	9.2	(Using 2005 WHO Factors)		
1,2,3,4,6,7,8-HpCDD	54.0	—	9.2			
Total HpCDD	100.0	—	9.2			
OCDF	62.0	—	18.0			
OCDD	410.0	—	18.0			

Conc = Concentration (Totals include 2,3,7,8-substituted isomers).
EMPC = Estimated Maximum Possible Concentration
RL = Reporting Limit

ND = Not Detected
NA = Not Applicable
NC = Not Calculated

Results reported on a dry weight basis and are valid to no more than 2 significant figures.

REPORT OF LABORATORY ANALYSIS

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Method 8290 Sample Analysis Results

Client - Nobis Engineering

Client's Sample ID	D.6-2.2		
Lab Sample ID	10339845003		
Filename	U160307B_09		
Injected By	SMT		
Total Amount Extracted	10.0 g	Matrix	Solid
% Moisture	15.5	Dilution	NA
Dry Weight Extracted	8.45 g	Collected	02/17/2016 11:40
ICAL ID	U160204	Received	02/26/2016 10:00
CCal Filename(s)	U160307A_19 & U160307B_15	Extracted	03/03/2016 19:00
Method Blank ID	BLANK-49236	Analyzed	03/08/2016 09:06

Native Isomers	Conc ng/Kg	EMPC ng/Kg	RL ng/Kg	Internal Standards	ng's Added	Percent Recovery
2,3,7,8-TCDF	2000.0	—	1.2 E	2,3,7,8-TCDF-13C	2.00	93
Total TCDF	6400.0	—	1.2 E	2,3,7,8-TCDD-13C	2.00	107
				1,2,3,7,8-PeCDF-13C	2.00	82
2,3,7,8-TCDD	ND	—	1.2	2,3,4,7,8-PeCDF-13C	2.00	80
Total TCDD	7.1	—	1.2	1,2,3,7,8-PeCDD-13C	2.00	94
				1,2,3,4,7,8-HxCDF-13C	2.00	72
1,2,3,7,8-PeCDF	150.0	—	5.9	1,2,3,6,7,8-HxCDF-13C	2.00	68
2,3,4,7,8-PeCDF	440.0	—	5.9	2,3,4,6,7,8-HxCDF-13C	2.00	73
Total PeCDF	1900.0	—	5.9	1,2,3,7,8,9-HxCDF-13C	2.00	77
				1,2,3,4,7,8-HxCDD-13C	2.00	85
1,2,3,7,8-PeCDD	ND	—	5.9	1,2,3,6,7,8-HxCDD-13C	2.00	73
Total PeCDD	ND	—	5.9	1,2,3,4,6,7,8-HpCDF-13C	2.00	74
				1,2,3,4,7,8,9-HpCDF-13C	2.00	85
1,2,3,4,7,8-HxCDF	150.0	—	5.9	1,2,3,4,6,7,8-HpCDD-13C	2.00	94
1,2,3,6,7,8-HxCDF	72.0	—	5.9	OCDD-13C	4.00	78
2,3,4,6,7,8-HxCDF	45.0	—	5.9			
1,2,3,7,8,9-HxCDF	33.0	—	5.9	1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	570.0	—	5.9	1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	ND	—	5.9	2,3,7,8-TCDD-37Cl4	0.20	127
1,2,3,6,7,8-HxCDD	7.1	—	5.9			
1,2,3,7,8,9-HxCDD	6.9	—	5.9			
Total HxCDD	63.0	—	5.9			
1,2,3,4,6,7,8-HpCDF	110.0	—	5.9	Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	36.0	—	5.9	Equivalence: 370 ng/Kg		
Total HpCDF	220.0	—	5.9	(Using 2005 WHO Factors)		
1,2,3,4,6,7,8-HpCDD	110.0	—	5.9			
Total HpCDD	230.0	—	5.9			
OCDF	84.0	—	12.0			
OCDD	840.0	—	12.0			

Conc = Concentration (Totals include 2,3,7,8-substituted isomers).

EMPC = Estimated Maximum Possible Concentration

RL = Reporting Limit

ND = Not Detected

NA = Not Applicable

NC = Not Calculated

Results reported on a dry weight basis and are valid to no more than 2 significant figures.

E = Exceeds calibration range

REPORT OF LABORATORY ANALYSIS

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Method 8290 Sample Analysis Results

Client - Nobis Engineering

Client's Sample ID	E.5-2.1		
Lab Sample ID	10339845004-R		
Filename	U160322B_13		
Injected By	SMT		
Total Amount Extracted	13.1 g	Matrix	Solid
% Moisture	24.3	Dilution	10
Dry Weight Extracted	9.91 g	Collected	02/17/2016 12:10
ICAL ID	U160204	Received	02/26/2016 10:00
CCal Filename(s)	U160322A_17 & U160322B_15	Extracted	03/18/2016 21:45
Method Blank ID	BLANK-49491	Analyzed	03/23/2016 10:11

Native Isomers	Conc ng/Kg	EMPC ng/Kg	RL ng/Kg	Internal Standards	ng's Added	Percent Recovery
2,3,7,8-TCDF	97	—	10 D	2,3,7,8-TCDF-13C	2.00	88 D
Total TCDF	720	—	10 D	2,3,7,8-TCDD-13C	2.00	93 D
				1,2,3,7,8-PeCDF-13C	2.00	66 YD
2,3,7,8-TCDD	ND	—	10 D	2,3,4,7,8-PeCDF-13C	2.00	65 YD
Total TCDD	ND	—	10 D	1,2,3,7,8-PeCDD-13C	2.00	88 D
				1,2,3,4,7,8-HxCDF-13C	2.00	98 D
1,2,3,7,8-PeCDF	ND	—	50 D	1,2,3,6,7,8-HxCDF-13C	2.00	89 D
2,3,4,7,8-PeCDF	100	—	50 D	2,3,4,6,7,8-HxCDF-13C	2.00	87 D
Total PeCDF	770	—	50 D	1,2,3,7,8,9-HxCDF-13C	2.00	33 RD
				1,2,3,4,7,8-HxCDD-13C	2.00	86 D
1,2,3,7,8-PeCDD	ND	—	50 D	1,2,3,6,7,8-HxCDD-13C	2.00	72 D
Total PeCDD	ND	—	50 D	1,2,3,4,6,7,8-HpCDF-13C	2.00	67 D
				1,2,3,4,7,8,9-HpCDF-13C	2.00	69 D
1,2,3,4,7,8-HxCDF	98	—	50 D	1,2,3,4,6,7,8-HpCDD-13C	2.00	70 D
1,2,3,6,7,8-HxCDF	66	—	50 D	OCDD-13C	4.00	83 D
2,3,4,6,7,8-HxCDF	90	—	50 D			
1,2,3,7,8,9-HxCDF	ND	—	50 D	1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	850	—	50 D	1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	ND	—	50 D	2,3,7,8-TCDD-37Cl4	0.20	93 D
1,2,3,6,7,8-HxCDD	ND	—	50 D			
1,2,3,7,8,9-HxCDD	ND	—	50 D			
Total HxCDD	51	—	50 D			
1,2,3,4,6,7,8-HpCDF	320	—	50 D	Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	ND	—	50 D	Equivalence: 72 ng/Kg		
Total HpCDF	430	—	50 D	(Using 2005 WHO Factors)		
1,2,3,4,6,7,8-HpCDD	150	—	50 D			
Total HpCDD	300	—	50 D			
OCDF	230	—	100 D			
OCDD	800	—	100 D			

Conc = Concentration (Totals include 2,3,7,8-substituted isomers).

EMPC = Estimated Maximum Possible Concentration

RL = Reporting Limit

ND = Not Detected

NA = Not Applicable

NC = Not Calculated

Results reported on a dry weight basis and are valid to no more than 2 significant figures.

R = Recovery outside target range

D = Result obtained from analysis of diluted sample

Y = Calculated using average of daily RFs

REPORT OF LABORATORY ANALYSIS

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Method 8290 Sample Analysis Results

Client - Nobis Engineering

Client's Sample ID	H.1-1.1		
Lab Sample ID	10339845005		
Filename	U160308A_10		
Injected By	SMT		
Total Amount Extracted	10.0 g	Matrix	Solid
% Moisture	20.2	Dilution	NA
Dry Weight Extracted	7.98 g	Collected	02/17/2016 12:40
ICAL ID	U160204	Received	02/26/2016 10:00
CCal Filename(s)	U160308A_01 & U160308A_16	Extracted	03/03/2016 19:00
Method Blank ID	BLANK-49236	Analyzed	03/08/2016 22:32

Native Isomers	Conc ng/Kg	EMPC ng/Kg	RL ng/Kg	Internal Standards	ng's Added	Percent Recovery
2,3,7,8-TCDF	200.0	—	1.3	2,3,7,8-TCDF-13C	2.00	86
Total TCDF	3500.0	—	1.3	2,3,7,8-TCDD-13C	2.00	98
				1,2,3,7,8-PeCDF-13C	2.00	75
2,3,7,8-TCDD	4.2	—	1.3	2,3,4,7,8-PeCDF-13C	2.00	68
Total TCDD	150.0	—	1.3	1,2,3,7,8-PeCDD-13C	2.00	81
				1,2,3,4,7,8-HxCDF-13C	2.00	63
1,2,3,7,8-PeCDF	82.0	—	6.3	1,2,3,6,7,8-HxCDF-13C	2.00	60
2,3,4,7,8-PeCDF	240.0	—	6.3	2,3,4,6,7,8-HxCDF-13C	2.00	68
Total PeCDF	2900.0	—	6.3	1,2,3,7,8,9-HxCDF-13C	2.00	77
				1,2,3,4,7,8-HxCDD-13C	2.00	80
1,2,3,7,8-PeCDD	18.0	—	6.3	1,2,3,6,7,8-HxCDD-13C	2.00	61
Total PeCDD	230.0	—	6.3	1,2,3,4,6,7,8-HpCDF-13C	2.00	65
				1,2,3,4,7,8,9-HpCDF-13C	2.00	76
1,2,3,4,7,8-HxCDF	180.0	—	6.3	1,2,3,4,6,7,8-HpCDD-13C	2.00	86
1,2,3,6,7,8-HxCDF	140.0	—	6.3	OCDD-13C	4.00	62
2,3,4,6,7,8-HxCDF	200.0	—	6.3			
1,2,3,7,8,9-HxCDF	37.0	—	6.3	1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	1500.0	—	6.3	1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	20.0	—	6.3	2,3,7,8-TCDD-37Cl4	0.20	91
1,2,3,6,7,8-HxCDD	36.0	—	6.3			
1,2,3,7,8,9-HxCDD	38.0	—	6.3			
Total HxCDD	350.0	—	6.3			
1,2,3,4,6,7,8-HpCDF	710.0	—	6.3	Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	47.0	—	6.3	Equivalence: 200 ng/Kg		
Total HpCDF	1100.0	—	6.3	(Using 2005 WHO Factors)		
1,2,3,4,6,7,8-HpCDD	560.0	—	6.3			
Total HpCDD	1000.0	—	6.3			
OCDF	370.0	—	13.0			
OCDD	3900.0	—	13.0			

Conc = Concentration (Totals include 2,3,7,8-substituted isomers).

EMPC = Estimated Maximum Possible Concentration

RL = Reporting Limit

ND = Not Detected

NA = Not Applicable

NC = Not Calculated

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REPORT OF LABORATORY ANALYSIS

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Method 8290 Blank Analysis Results

Lab Sample ID	BLANK-49236	Matrix	Solid
Filename	U160307A_15	Dilution	NA
Total Amount Extracted	75.2 g	Extracted	03/03/2016 19:00
ICAL ID	U160204	Analyzed	03/07/2016 20:54
CCal Filename(s)	U160307A_03 & U160307A_18	Injected By	BAL

Native Isomers	Conc ng/Kg	EMPC ng/Kg	RL ng/Kg	Internal Standards	ng's Added	Percent Recovery
2,3,7,8-TCDF	ND	—	0.13	2,3,7,8-TCDF-13C	2.00	95
Total TCDF	ND	—	0.13	2,3,7,8-TCDD-13C	2.00	110
				1,2,3,7,8-PeCDF-13C	2.00	94
2,3,7,8-TCDD	ND	—	0.13	2,3,4,7,8-PeCDF-13C	2.00	90
Total TCDD	ND	—	0.13	1,2,3,7,8-PeCDD-13C	2.00	106
				1,2,3,4,7,8-HxCDF-13C	2.00	87
1,2,3,7,8-PeCDF	ND	—	0.66	1,2,3,6,7,8-HxCDF-13C	2.00	84
2,3,4,7,8-PeCDF	ND	—	0.66	2,3,4,6,7,8-HxCDF-13C	2.00	88
Total PeCDF	ND	—	0.66	1,2,3,7,8,9-HxCDF-13C	2.00	87
				1,2,3,4,7,8-HxCDD-13C	2.00	91
1,2,3,7,8-PeCDD	ND	—	0.66	1,2,3,6,7,8-HxCDD-13C	2.00	78
Total PeCDD	ND	—	0.66	1,2,3,4,6,7,8-HpCDF-13C	2.00	68
				1,2,3,4,7,8,9-HpCDF-13C	2.00	73
1,2,3,4,7,8-HxCDF	ND	—	0.66	1,2,3,4,6,7,8-HpCDD-13C	2.00	80
1,2,3,6,7,8-HxCDF	ND	—	0.66	OCDD-13C	4.00	72
2,3,4,6,7,8-HxCDF	ND	—	0.66			
1,2,3,7,8,9-HxCDF	ND	—	0.66	1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	ND	—	0.66	1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	ND	—	0.66	2,3,7,8-TCDD-37Cl4	0.20	95
1,2,3,6,7,8-HxCDD	ND	—	0.66			
1,2,3,7,8,9-HxCDD	ND	—	0.66			
Total HxCDD	ND	—	0.66			
1,2,3,4,6,7,8-HpCDF	ND	—	0.66	Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	ND	—	0.66	Equivalence: 0.00 ng/Kg		
Total HpCDF	ND	—	0.66	(Using 2005 WHO Factors)		
1,2,3,4,6,7,8-HpCDD	ND	—	0.66			
Total HpCDD	ND	—	0.66			
OCDF	ND	—	1.30			
OCDD	ND	—	1.30			

Conc = Concentration (Totals include 2,3,7,8-substituted isomers).

EMPC = Estimated Maximum Possible Concentration

RL = Reporting Limit

Results reported on a total weight basis and are valid to no more than 2 significant figures.

REPORT OF LABORATORY ANALYSIS

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Method 8290 Blank Analysis Results

Lab Sample ID	BLANK-49491	Matrix	Solid
Filename	U160322A_04	Dilution	NA
Total Amount Extracted	20.1 g	Extracted	03/18/2016 21:45
ICAL ID	U160204	Analyzed	03/22/2016 14:01
CCal Filename(s)	U160322A_01 & U160322A_17	Injected By	SMT

Native Isomers	Conc ng/Kg	EMPC ng/Kg	RL ng/Kg	Internal Standards	ng's Added	Percent Recovery
2,3,7,8-TCDF	ND	—	0.50	2,3,7,8-TCDF-13C	2.00	92
Total TCDF	ND	—	0.50	2,3,7,8-TCDD-13C	2.00	102
				1,2,3,7,8-PeCDF-13C	2.00	97
2,3,7,8-TCDD	ND	—	0.50	2,3,4,7,8-PeCDF-13C	2.00	89
Total TCDD	ND	—	0.50	1,2,3,7,8-PeCDD-13C	2.00	100
				1,2,3,4,7,8-HxCDF-13C	2.00	91
1,2,3,7,8-PeCDF	ND	—	2.50	1,2,3,6,7,8-HxCDF-13C	2.00	92
2,3,4,7,8-PeCDF	ND	—	2.50	2,3,4,6,7,8-HxCDF-13C	2.00	91
Total PeCDF	ND	—	2.50	1,2,3,7,8,9-HxCDF-13C	2.00	89
				1,2,3,4,7,8-HxCDD-13C	2.00	83
1,2,3,7,8-PeCDD	ND	—	2.50	1,2,3,6,7,8-HxCDD-13C	2.00	75
Total PeCDD	ND	—	2.50	1,2,3,4,6,7,8-HpCDF-13C	2.00	62
				1,2,3,4,7,8,9-HpCDF-13C	2.00	65
1,2,3,4,7,8-HxCDF	ND	—	2.50	1,2,3,4,6,7,8-HpCDD-13C	2.00	70
1,2,3,6,7,8-HxCDF	ND	—	2.50	OCDD-13C	4.00	75
2,3,4,6,7,8-HxCDF	ND	—	2.50			
1,2,3,7,8,9-HxCDF	ND	—	2.50	1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	ND	—	2.50	1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	ND	—	2.50	2,3,7,8-TCDD-37Cl4	0.20	95
1,2,3,6,7,8-HxCDD	ND	—	2.50			
1,2,3,7,8,9-HxCDD	ND	—	2.50			
Total HxCDD	ND	—	2.50			
1,2,3,4,6,7,8-HpCDF	ND	—	2.50	Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	ND	—	2.50	Equivalence: 0.00 ng/Kg		
Total HpCDF	ND	—	2.50	(Using 2005 WHO Factors)		
1,2,3,4,6,7,8-HpCDD	ND	—	2.50			
Total HpCDD	ND	—	2.50			
OCDF	ND	—	5.00			
OCDD	ND	—	5.00			

Conc = Concentration (Totals include 2,3,7,8-substituted isomers).

EMPC = Estimated Maximum Possible Concentration

RL = Reporting Limit

Results reported on a total weight basis and are valid to no more than 2 significant figures.

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Method 8290 Laboratory Control Spike Results

Lab Sample ID	LCS-49237	Matrix	Solid
Filename	U160308A_15	Dilution	NA
Total Amount Extracted	75.5 g	Extracted	03/03/2016 19:00
ICAL ID	U160204	Analyzed	03/09/2016 02:27
CCal Filename(s)	U160308A_01 & U160308A_16	Injected By	SMT
Method Blank ID	BLANK-49236		

Native Isomers	Qs (ng)	Qm (ng)	% Rec.	Internal Standards	ng's Added	Percent Recovery
2,3,7,8-TCDF	0.20	0.22	109	2,3,7,8-TCDF-13C	2.0	80
Total TCDF				2,3,7,8-TCDD-13C	2.0	93
				1,2,3,7,8-PeCDF-13C	2.0	78
2,3,7,8-TCDD	0.20	0.17	86	2,3,4,7,8-PeCDF-13C	2.0	74
Total TCDD				1,2,3,7,8-PeCDD-13C	2.0	85
				1,2,3,4,7,8-HxCDF-13C	2.0	71
1,2,3,7,8-PeCDF	1.0	1.1	108	1,2,3,6,7,8-HxCDF-13C	2.0	69
2,3,4,7,8-PeCDF	1.0	1.1	106	2,3,4,6,7,8-HxCDF-13C	2.0	71
Total PeCDF				1,2,3,7,8,9-HxCDF-13C	2.0	76
				1,2,3,4,7,8-HxCDD-13C	2.0	76
1,2,3,7,8-PeCDD	1.0	1.0	101	1,2,3,6,7,8-HxCDD-13C	2.0	67
Total PeCDD				1,2,3,4,6,7,8-HpCDF-13C	2.0	72
				1,2,3,4,7,8,9-HpCDF-13C	2.0	84
1,2,3,4,7,8-HxCDF	1.0	1.1	108	1,2,3,4,6,7,8-HpCDD-13C	2.0	98
1,2,3,6,7,8-HxCDF	1.0	1.1	107	OCDD-13C	4.0	71
2,3,4,6,7,8-HxCDF	1.0	0.97	97			
1,2,3,7,8,9-HxCDF	1.0	1.0	102	1,2,3,4-TCDD-13C	2.0	NA
Total HxCDF				1,2,3,7,8,9-HxCDD-13C	2.0	NA
1,2,3,4,7,8-HxCDD	1.0	1.1	111	2,3,7,8-TCDD-37Cl4	0.20	88
1,2,3,6,7,8-HxCDD	1.0	1.1	113			
1,2,3,7,8,9-HxCDD	1.0	1.2	119			
Total HxCDD						
1,2,3,4,6,7,8-HpCDF	1.0	1.0	104			
1,2,3,4,7,8,9-HpCDF	1.0	1.0	101			
Total HpCDF						
1,2,3,4,6,7,8-HpCDD	1.0	0.99	99			
Total HpCDD						
OCDF	2.0	1.8	90			
OCDD	2.0	2.2	109			

Qs = Quantity Spiked
Qm = Quantity Measured
Rec. = Recovery (Expressed as Percent)
R = Recovery outside of target range

Y = RF averaging used in calculations
Nn = Value obtained from additional analysis
NA = Not Applicable
* = See Discussion

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Method 8290 Laboratory Control Spike Results

Lab Sample ID	LCS-49492		
Filename	U160322A_02	Matrix	Solid
Total Amount Extracted	20.7 g	Dilution	NA
ICAL ID	U160204	Extracted	03/18/2016 21:45
CCal Filename(s)	U160322A_01 & U160322A_17	Analyzed	03/22/2016 12:29
Method Blank ID	BLANK-49491	Injected By	SMT

Native Isomers	Qs (ng)	Qm (ng)	% Rec.	Internal Standards	ng's Added	Percent Recovery
2,3,7,8-TCDF	0.20	0.23	116	2,3,7,8-TCDF-13C	2.0	62
Total TCDF				2,3,7,8-TCDD-13C	2.0	71
				1,2,3,7,8-PeCDF-13C	2.0	73
2,3,7,8-TCDD	0.20	0.18	92	2,3,4,7,8-PeCDF-13C	2.0	69
Total TCDD				1,2,3,7,8-PeCDD-13C	2.0	76
				1,2,3,4,7,8-HxCDF-13C	2.0	78
1,2,3,7,8-PeCDF	1.0	1.1	107	1,2,3,6,7,8-HxCDF-13C	2.0	79
2,3,4,7,8-PeCDF	1.0	1.0	104	2,3,4,6,7,8-HxCDF-13C	2.0	82
Total PeCDF				1,2,3,7,8,9-HxCDF-13C	2.0	80
				1,2,3,4,7,8-HxCDD-13C	2.0	71
1,2,3,7,8-PeCDD	1.0	1.0	103	1,2,3,6,7,8-HxCDD-13C	2.0	70
Total PeCDD				1,2,3,4,6,7,8-HpCDF-13C	2.0	58
				1,2,3,4,7,8,9-HpCDF-13C	2.0	58
1,2,3,4,7,8-HxCDF	1.0	1.1	108	1,2,3,4,6,7,8-HpCDD-13C	2.0	62
1,2,3,6,7,8-HxCDF	1.0	1.1	109	OCDD-13C	4.0	60
2,3,4,6,7,8-HxCDF	1.0	0.99	99			
1,2,3,7,8,9-HxCDF	1.0	1.0	101	1,2,3,4-TCDD-13C	2.0	NA
Total HxCDF				1,2,3,7,8,9-HxCDD-13C	2.0	NA
1,2,3,4,7,8-HxCDD	1.0	1.2	115	2,3,7,8-TCDD-37Cl4	0.20	68
1,2,3,6,7,8-HxCDD	1.0	1.1	114			
1,2,3,7,8,9-HxCDD	1.0	1.2	125			
Total HxCDD						
1,2,3,4,6,7,8-HpCDF	1.0	1.1	112			
1,2,3,4,7,8,9-HpCDF	1.0	1.0	104			
Total HpCDF						
1,2,3,4,6,7,8-HpCDD	1.0	1.1	112			
Total HpCDD						
OCDF	2.0	2.1	104			
OCDD	2.0	2.4	119			

Qs = Quantity Spiked
Qm = Quantity Measured
Rec. = Recovery (Expressed as Percent)
R = Recovery outside of target range

Y = RF averaging used in calculations
Nn = Value obtained from additional analysis
NA = Not Applicable
* = See Discussion

REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, Inc.

**APPENDIX 4
WETLANDS APPLICATION
CITY OF BRISTOL**

**BRISTOL CONSERVATION COMMISSION
INLAND WETLANDS AGENCY
FORM IW-1 (Application for a Wetlands Permit)**

APPLICATION NO. _____

DATE FILED: _____

APPROVED: _____

DENIED: _____

1. APPLICANT:

Name: City of Bristol - Department of Public Works Signature: _____

Address: 111 North Main Street City: Bristol State: CT Zip 06010

Telephone No.: 860-584-6113 [] home [—] work

2. PROPERTY OWNER(S):

Name: City of Bristol - Mayor Ken Cockayne Signature: _____

Address: 111 North Main Street City: Bristol State: CT Zip 06010

Telephone No.: 860-584-6250 [] home [—] work

3. DESCRIBE THE SUBJECT PROPERTY:

Address or Location: 894 Middle Street

Assessor's Map No.: 04-17 Assessor's Lot No.(s): 3 & 4-1

Description of wetlands (location, approximate area to be disturbed, vegetation, etc.): The wetlands areas consist of soil types Ru (103) and Sa (108). There is also a watercourse in the southwest of the property adjacent to wetlands flags 55-60. Please see the attached soils report for additional information.

4. DESCRIBE THE PROPOSED ACTIVITY AND ITS PURPOSE: Environmental remediation of the site is required to remove PCBs in accordance with state and federal requirements. Please see attached letter from Nobis Engineering Inc. to the U.S. EPA.

5. CHECK THE STATEMENT WHICH APPLIES TO THE PROPOSED ACTIVITY:

- [] a. The proposed activity is either a use permitted as of right or a non-regulated use, under subsection _____ of Section 4 of the Inland Wetlands Regulations. *See instructions for submission requirements.*
- [] b. The proposed activity is not regulated because it is greater than 100 feet from a wetlands or watercourse or will not adversely affect the wetlands or watercourse. *See instructions for submission requirements.*
- [—] c. The proposed activity is a regulated activity and will occur:
[—] in a wetlands or watercourse
[—] within 100 feet of a wetlands or watercourse
[—] beyond 100 feet of a wetlands or watercourse

6. FLOW CALCULATIONS:

Does a watercourse flow through the subject property?

[—] yes [] no

If "yes", see instructions for submission requirements.

**BRISTOL CONSERVATION COMMISSION
INLAND WETLANDS AGENCY
FORM IW-1/Page 2**

7. AUTHORIZATIONS AND CERTIFICATIONS:

- a. I/we hereby authorize the commissioners and agents of the Bristol Inland Wetlands Agency to inspect the subject property at reasonable times, both before and after a final decision has been made regarding this application or request.
- b. I/we hereby certify that, if a portion of the subject property is located within 500 feet of the boundary of an adjoining municipality, I/we have caused written notice of the proposed activity to be sent to the Inland Wetlands and Watercourses Agency of such municipality by certified mail, return receipt requested, on the date that I/we submitted this application to the City of Bristol.
- c. I/we hereby certify that I/we am/are familiar with the information included in this application and am/are aware that the law provides that any person who commits, takes part in, or assists in any violation of any provision of Sections 22a-36 through 22a-45, inclusive, of the Connecticut General Statutes, including regulations adopted by the Commissioner of Environmental Protection and ordinances and regulations of the City of Bristol through its Inland Wetlands Agency, shall be assessed a civil penalty of not more than one thousand dollars for each offense. I/we further certify that I/we am/are aware that it is a violation of law to obtain a wetlands permit or ruling through deception or through inaccurate or misleading information.

8. SUBMISSION REQUIREMENTS:

The following shall be included as part of this application:

- filing fee – make checks payable to "City of Bristol"

Wetlands Permit

total project size: one acre or less – \$185

total project size: more than one acre – \$185 *plus* \$40 per additional acre or portion thereof

Extension of Unexpired Permit

total project size: one acre or less – \$110

total project size: more than one acre – \$135

Modification of Existing Permit

total project size: one acre or less – \$135

total project size: more than one acre – \$160

NOTE: Application filing fees include \$60 state fee.

- ten copies of a Site Plan showing existing and proposed conditions in relation to the wetlands and/or watercourses, prepared in accordance with Section 7.8 of the Regulations
- any other information as may be required by the Agency

INSTRUCTION SHEET FOR FORM IW-1

This application form is to be used for the following:

- a request for a wetlands permit to conduct a "regulated activity";
- a request to extend an unexpired wetlands permit;
- a request to modify an existing wetlands permit;
- a request for a ruling as to whether a proposed activity in a regulated area is permitted "as of right" or qualifies as a "nonregulated use" under Section 4 of the Inland Wetlands Regulations (hereinafter referred to as "the Regulations"); and,
- a request for a ruling as to whether a proposed activity beyond 100 feet of a wetlands or watercourse is a regulated activity which requires a wetlands permit.

If you are seeking a boundary change to a wetlands or watercourse, use Form IW-2.

1. **APPLICANT:** Indicate the name, address and telephone number of the person, partnership, corporation or other legal entity in whose name the permit will be issued, if approved. The application must be signed by the applicant or the applicant's authorized representative.
2. **PROPERTY OWNER:** Indicate the name, address and telephone number of the person, partnership, corporation or other legal entity which owns the subject property. If there is more than one property owner, provide this information for each additional owner on a separate sheet. The application must be signed by all of the property owners or their authorized representatives. If the property owner is the same as the applicant, indicate "same as applicant".
3. **DESCRIPTION OF PROPERTY:** Describe the subject property in sufficient detail to allow the Inland Wetlands Agency to identify: (a) the wetlands and watercourses on the property; (b) the areas of wetlands or watercourses to be disturbed; and (c) the soil types and vegetation present. If you need additional space, indicate "continued on attached sheet(s)" and use a separate sheet or sheets. If you are submitting a report which provides this information, indicate "see attached report" and submit the report with your application.

Example: "Property consists of 2.3 acres adjacent to Coppermine Brook. The rear (northwestern portion) contains approximately .5 acres of wetlands along the brook varying from 15 to 150 feet in width. A small pocket of unconnected wetlands appears on the City's maps at the front (southeastern section) but cannot be verified by field research. Vegetation varies from grass to dense woods near the brook. Approximately .1 acres of actual wetlands may be disturbed for a road crossing."

4. **DESCRIPTION/PURPOSE OF PROPOSED ACTIVITY:** Indicate the nature of and the reason for the proposed activity, e.g., "filling of a wetlands to construct a single-family house" or "installation of a culvert in a watercourse for a subdivision road crossing."

5. **CATEGORY OF THE PROPOSED ACTIVITY:**

- (a) If the proposed activity will occur in or within 100 feet of a wetlands or watercourse, you may request a ruling from the Agency that the proposal is an "as of right" use or a "nonregulated" use under Section 4 of the Regulations. If you believe this provision applies, check statement 5a. on the application, indicate the specific subsection of Section 4 on which you base your determination and attach a sheet which explains your reasoning. The Agency will make a ruling on your request no later than the next regularly scheduled meeting following the meeting at which it was received.
- (b) If the proposed activity will occur at a distance greater than 100 feet from a wetlands or watercourse, you may request a ruling from the Agency that the proposal is not a "regulated activity" as defined under Section 2.1(p) of the Regulations. If you believe this provision applies, check statement 5b. on the application and attach a sheet which explains your reasoning. You must also demonstrate to the Agency's satisfaction that the activity will cause no adverse environmental impact to the wetlands or watercourses on or adjacent to the subject property.

The fact that a proposed activity falls outside the 100-foot "buffer" area of a wetlands or watercourse does not automatically classify it as a nonregulated activity. Oftentimes, a proposed activity will affect a wetlands or watercourse even though it will take place beyond the 100-foot buffer. In such instances, the activity is considered to be "regulated" and thus requires the filing of a complete application for a wetlands permit.

As a general rule, the closer the proposed activity is to a wetlands or watercourse, the more likely that it will be considered a regulated activity. Topography, the nature of the proposed activity and the amount of area to be disturbed are all weighed in making the determination. For example, steep slopes might cause soil sedimentation and erosion from construction to potentially reach a wetlands or watercourse even though the activity is more than 100 feet from the wetlands or watercourse.

If there are wetlands or watercourses on or adjacent to the subject property and you are seeking a ruling that the proposed activity is outside the 100-foot buffer area and is nonregulated, you must also demonstrate to the Agency's satisfaction that the activity will cause no adverse environmental impact to the wetlands or watercourses.

Best rule of thumb: if there is ANY QUESTION about the effects of a proposed activity on a wetlands or watercourse, and if time is at all a critical factor in getting an Agency ruling on your request, you should file a complete application.

(c) Regulated activities are defined in Section 2.1(p) of the Regulations. In general, any of the following activities automatically constitute a regulated activity and thus require a wetlands permit from the Agency:

1. Activities in a wetlands or watercourse: any operation within or use of a wetlands or watercourse involving removal or deposition of material; or any obstruction, construction, alteration or pollution of such wetlands or watercourse;
 2. Activities within 100 feet of a wetlands or watercourse: any earth moving, filling, construction, clear-cutting of trees, or installation of septic systems;
 3. Activities further than 100 feet from a wetlands or watercourse if there is a potentially adverse impact on the wetlands or watercourse.
6. FLOW CALCULATIONS: If a watercourse flows from or through the subject property and the proposed activity may affect its rate of flow, the present flow during a 25-year storm and the proposed flow during a 25-year storm as a result of the proposed activity must be calculated – in cubic feet per second (c.f.s.) – and certified by a licensed professional engineer. Attach a sheet with the necessary calculations.

Since the Agency may request supplementary information in connection with an application, it is advisable to submit similar information for 50- and/or 100-year storms if the proposal is significant. If such information is not relevant to your application, please explain.

7. AUTHORIZATIONS AND CERTIFICATIONS: Please read the authorizations and certifications carefully, as they affect your rights and impose certain obligations upon you. If you do not understand any of them, do not sign the application until they have been explained to you. Also note that, if required, documentation of notice to a neighboring municipality's Inland Wetlands Agency must be provided to the Agency before it will act on your application.

8. SUBMISSION REQUIREMENTS: The Agency's application fee schedule is as follows:

Wetlands Permit

total project size: one acre or less – \$185

total project size: more than one acre – \$185 plus \$40 per additional acre or portion thereof

Extension of Unexpired Permit

total project size: one acre or less – \$110

total project size: more than one acre – \$135

Modification of Existing Permit

total project size: one acre or less – \$135

total project size: more than one acre – \$160

NOTE: Application filing fees include \$60 state fee.

IS YOUR PROPOSAL A SIGNIFICANT ACTIVITY?

If you are applying for a wetlands permit, the Agency will first determine whether or not your proposal constitutes a "significant activity." This is important because significant activities require a public hearing and the submission of more supporting documentation than does an activity determined to be non-significant. Be sure to attach all information necessary to allow the Agency to determine if your proposal will be treated as a significant or a non-significant activity.

To assist the Agency in making this determination, you should be prepared at the first meeting at which your application is received to answer the following questions and to explain the facts upon which your answers are based:

- a. Will the proposed activity involve the deposit or removal of material in or near a regulated area?
- b. Will the proposed activity change the natural channel or inhibit the natural dynamics of a watercourse system?
- c. Will the proposed activity cause any decrease in the natural capacity of a wetlands or watercourse to: support desirable fisheries, wildlife, or other biological life; prevent flooding; supply water; assimilate waste; facilitate drainage; or provide recreation or open space?
- d. Will the proposed activity cause turbidity, siltation or sedimentation in a wetlands or watercourse?
- e. Will the proposed activity diminish the flow of a natural watercourse or the groundwater levels of the regulated area?
- f. Will the proposed activity cause or have the potential of causing pollution of groundwater, a wetlands or watercourse?
- g. Will the proposed activity create conditions that may adversely affect the health, welfare and safety of any individual or the community?
- h. Will the proposed activity destroy a wetlands or watercourse?
- i. Will the proposed activity have a major effect or substantial impact on the area for which this application has been filed or on another part of a wetlands or watercourse?

IF YOUR PROPOSAL IS DETERMINED TO BE A SIGNIFICANT ACTIVITY

If your proposal is determined to be a significant activity, you will be required to submit (a) the additional information listed in Section 7.4 of the Regulations, and (b) a description of the alternatives which you considered to your proposed activity. (Under the Regulations, the Agency will not issue a wetlands permit unless it finds that a feasible and prudent alternative to the proposed activity does not exist.)

ACTIVITIES REQUIRING THE APPROVAL OF OTHER AGENCIES

For certain proposed activities, the Agency's jurisdiction is coincident with that of other agencies. If your proposal involves one or more of the following, you must obtain the approval of the appropriate Federal or State agency:

- a. construction or modification of a dam,
- b. construction or placement of an obstruction within a stream channel encroachment line,
- c. diversion of water in excess of 50,000 gallons of water per day or any other diversion where the tributary watershed area above the point of diversion is 100 acres or more,
- d. discharge into the waters of the state under Sections 22a-365 et seq. of the Connecticut General Statutes, or,
- e. discharge of fill or dredged materials into wetlands as defined under Federal law (Army Corps of Engineers)

Soil Resource Consultants

P.O. Box 752 Meriden, CT 06450

June 7, 2017

SRC Job No. 17-01

Emily Jones, P.E.
Civil 1
Cornerstone Professional Park, Suite 101
43 Sherman Hill Road
Woodbury, CT 06798

Dear Ms. Jones:

Re: Wetland Delineation - 894 Middle Street - Bristol, CT

At your request, I have completed an onsite investigation of this site. The purpose of my investigation was to identify and delineate the onsite inland wetlands and watercourse boundaries. The field work was completed on February 22, 2017.

The wetland and watercourse boundaries were marked with blue plastic flagging numbered **WF-1** to **WF-137**. Please refer to the enclosed sketch for the approximate location of the inland wetland and watercourse boundaries and selected wetland flag numbers. The sketch is not drawn to scale but is a field drawn representation of wetland and watercourse configurations. Flag numbers at property lines and other readily identifiable landmarks can be used to locate wetland lines in the field.

The wetland soil map prepared for this site is a refinement of data found in the **Soil Survey of Hartford County**. Each map unit is composed of a unique combination of soils. Areas with the same symbol have a similar soil composition. The Natural Resource Conservation Service in Connecticut presently uses a "Unified Soil Legend" which utilizes a unique number for each soil map unit. This numbering system has replaced the older use of letter designations. To facilitate this transition, I have included the new number system in parentheses for each map unit.

The map units described below are based on data collected at this particular site. Soil surveys in Connecticut were originally conducted for primarily agricultural purposes and do not provide site specific information. The minimum area delineated on a soil survey map sheet is approximately 2-3 acres in size. For this reason there may be some differences between the following information and that published in the Soil Survey.

INLAND WETLAND SOILS

The identification of inland wetland areas on this site is based on my field observations of test borings and the guidelines of the **National Cooperative Soil Survey Program**. Test borings were done using a shovel and or hand auger. In Connecticut inland wetland soil categories include poorly drained soils, very poorly drained soils, alluvial and flood plain soils.

Ru (103)

The **Ru** map unit is composed primarily of Rippowam (originally named Rumney) soils on 0 to 5 percent slopes. These soils are very deep and poorly drained. They formed in alluvial sediments. Typically they have fine sandy loam textures overlying stratified sand and gravel to a depth of 60 inches or more.

Sa (108)

The **Sa** map unit is composed primarily of Saco soils on 0 to 5 percent slopes. These are very deep and very poorly drained. They formed in silty alluvial deposits. Saco soils are stratified with silt loam and very fine sandy loam materials. Below a depth of 40 inches these soils are composed of stratified sand. Saco soils have a high ground water table that is within 6 inches of the soil surface for the majority of the year.

W\C

The **W\C** designation refers to the existence of a watercourse on the subject property. The watercourse is a well defined channel or ditch area that conveys excess surface water runoff from its drainage area as well as groundwater seepage areas and or inland wetland soil areas.

NON-WETLAND SOILS

The non-wetland soils were not studied or mapped in detail. Some observations were made of these soils during the process of identifying the inland wetland areas. Random soil boring locations were marked with pink and black stripped plastic ribbons. The following map unit descriptions do not constitute a detailed soil investigation of these upland areas, but may be used as a guide in site planning.

Hk (38)

The **Hk** map unit consists primarily of Hinckley soils on 3 to 15 percent slopes. Hinckley soils are very deep and excessively drained. These soils formed in glacial outwash materials. Typically Hinckley soils have gravelly sandy loam surface and subsoil layers overlying stratified sand and gravel to a depth of 60 inches or more.

This soil map unit was observed in the far southwestern corner of the site.

Ud (308)

The **Ud** map unit consists of well to excessively drained disturbed soils. It is composed of filled areas and areas consisting of both cut and fill. Soils in this map unit have been extensively disturbed by grading and filling activities associated with the existing developed\altered portions of this site.

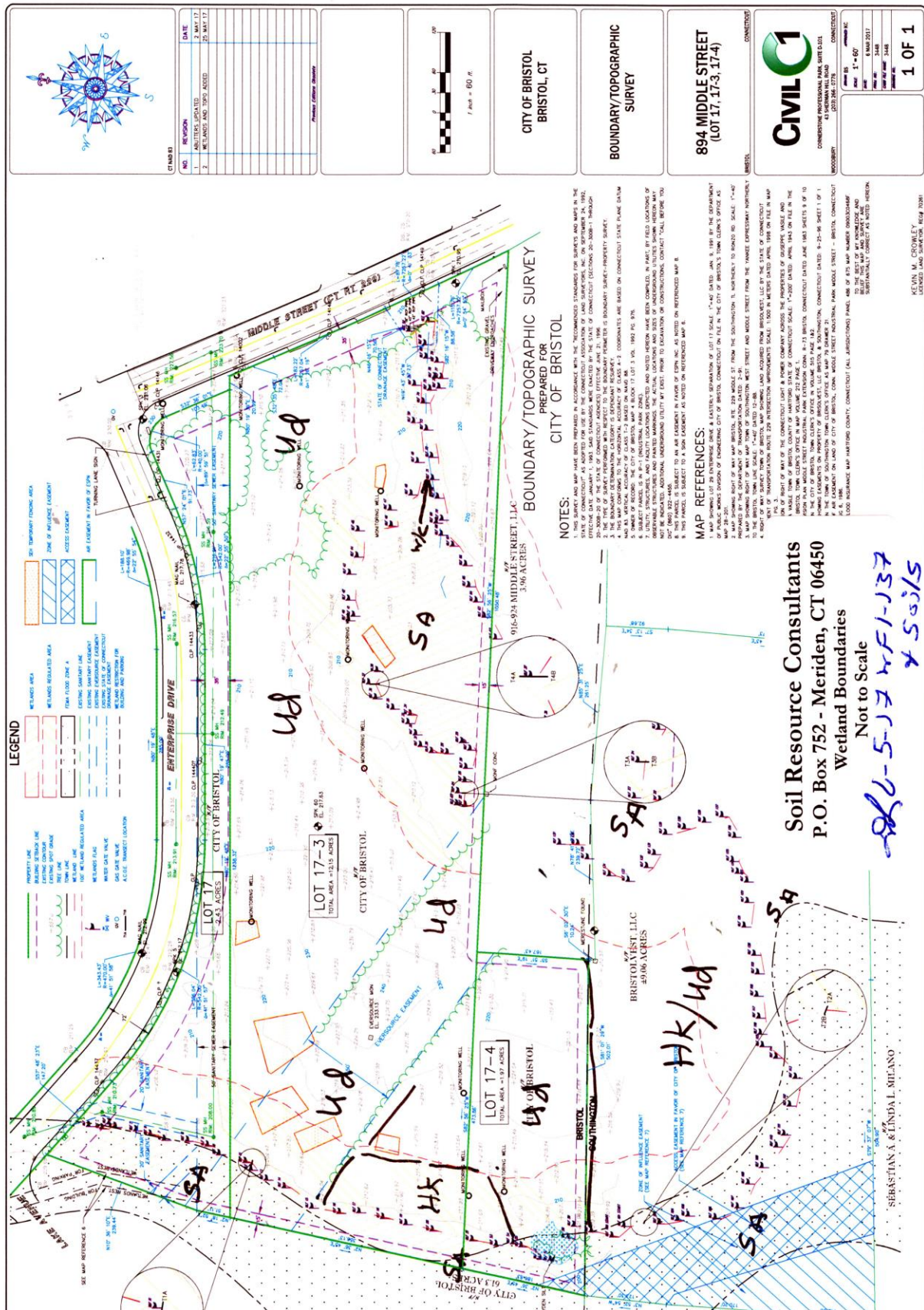
Classification into natural soil units is impossible. This map unit is referred to taxonomically as Udorthents. Original diagnostic soil horizons are not present. Soils in this map unit have a wide range of characteristics. Textures are predominantly gravelly sandy loams. Permeability can be variable due to the lack of soil profile structure caused by the grading activities.

If you have any questions regarding this report, or need additional assistance with this site, please contact me. Environmental planning and wetland impact evaluation services are also available upon request. I am available to attend Inland Wetland Commission meetings and site walks.

Sincerely,



David H. Lord
Certified Soil Scientist
& Environmental Consultant





DRAFT

April 4, 2017
File No. 90680.01

Ms. Kimberly Tisa
U.S. Environmental Protection Agency
5 Post Office Square, Suite 100
Mail Code: OSRR07-2
Boston, MA 02109-3912

Re: Application for Risk-Based Clean-up of Polychlorinated Biphenyls
894 Middle Street
Bristol, Connecticut
REM ID No. 12906

Dear Ms. Tisa:

On behalf of the City of Bristol, Nobis Engineering (Nobis) has prepared this Application for Risk-Based Cleanup and Disposal Approval of Polychlorinated Biphenyls (PCBs) at the property known as 894 Middle Street in Bristol, Connecticut (Site). This application has been prepared in accordance with 40 CFR 761.61(c) and the United States Environmental Protection Agency's (USEPA's) "Risk-Based Cleanup and Disposal Approval § 761.61(c) Checklist".

Relatively low levels of PCBs (generally less than 50 mg/kg) have been distributed across portions of this approximately 17-acre Site by the former operations of Laviero Metals. The objective of this application is to obtain the USEPA's approval to remediate the Site to meet industrial/commercial remedial thresholds for PCBs (i.e. PCBs less than 10 mg/kg or part per million).

Our remediation plan includes a combination or hybrid of self-implementing and risk-based clean-up and disposal options in 40 CFR 761.61. Therefore, the approval of the EPA Administrator is required. This application requests the USEPA's and the CTDEEP's approval of this Risk-Based Cleanup and Disposal Plan to meet the following primary and secondary objectives:

1. A primary objective is to mitigate seven areas where as-found PCB concentrations in soils exceed the state's Significant Environmental Hazard threshold of 30 mg/kg. These soils will be disposed at a permitted off-site disposal facility.
2. A primary objective is to excavate and dispose of soils containing as-found PCB concentrations more than 10 mg/kg to permitted off-site disposal facilities.
3. If project costs and regulatory approvals proposed under this plan allow, a secondary objective is to excavate and consolidate most impacted soils containing PCBs at concentrations less than 10 mg/kg to a "Soil Consolidation Area" located in a remote portion of the Site. Following remedial excavation, a large portion of the Site would meet residential criteria for PCBs. The remote western portion of the Site would consolidate impacted soils up to the industrial/commercial standard (PCBs less than 10 mg/kg) and



DRAFT

will be capped. The Soil Consolidation Area would be the subject of an Environmental Land Use Restriction (ELUR); and,

4. Perform post-excavation soil sampling at alternate confirmatory sample densities than the 1.5 meter by 1.5-meter grid (or 5 foot by 5-foot grid), specified by 40 CFR 761.265. Based on the size of the impacted area and the results of previous PCB analyses, we propose variable confirmatory sampling grid sizes varying between 1.5-meter, 3-meter, and 9-meter.

The initial assessment of the Site was completed in accordance with an EPA Brownfield Assessment Grant administered by the Naugatuck Valley Council of Governments. The City of Bristol has appropriated additional funds and was awarded a \$1.3 million grant from the Connecticut Department of Economic and Community Development (DECD) in support of environmental remediation to return this property to productive use. On November 3, 2016, based on an application submitted by the City of Bristol, the Site was accepted into the Connecticut Department of Energy and Environmental Protection's (CTDEEP's) Voluntary Remediation Program under Connecticut General Statutes 22a-133x.

On behalf of the City of Bristol, we appreciate your review and ultimate approval of this plan. We are available to discuss this application and proposed remedial approach at your convenience.

Sincerely,

NOBIS ENGINEERING, INC.

Raymond P. Janeiro, P.E.
Project Engineer

Timothy Carr, LEP
Senior Project Manager

cc: Justin Malley, Bristol Development Authority
Dawn Leger, Bristol Development Authority
Arthur Bogen, Naugatuck Valley Council of Governments
Ned Moore, Connecticut Department of Community and Economic Development
Patricia DeRosa, Connecticut Department of Energy and Environmental Protection
Gary Trombly, Connecticut Department of Energy and Environmental Protection
Jing Chen, Connecticut Department of Energy and Environmental Protection

CITY OF BRISTOL

894 MIDDLE STREET

CONSERVATION COMMISSION/ INLAND WETLANDS AGENCY PERMITTING SET



OWNER

CITY OF BRISTOL
MAYOR KEN COCKAYNE
111 NORTH MAIN STREET
BRISTOL, CT

APPLICANT

CITY OF BRISTOL
DEPARTMENT OF PUBLIC WORKS
111 NORTH MAIN STREET
BRISTOL, CT

ENGINEER/SURVEYOR

CIVIL 1
43 SHERMAN HILL ROAD, SUITE D-101
WOODBURY, CT

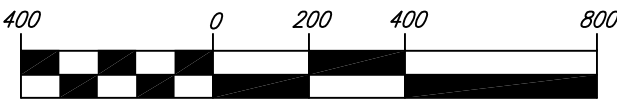
LEP SERVICES

NOBIS ENGINEERING INC.
122 CHURCH STREET
NAUGATUCK, CT

SOIL SCIENTIST

SOIL RESOURCE CONSULTANTS
P.O. BOX 752
MERIDEN, CT

PROJECT SITE VICINITY MAP

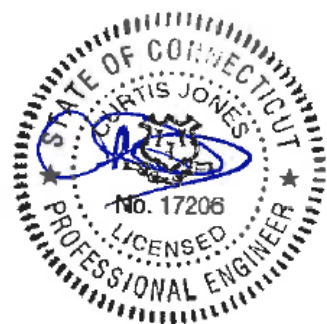


1 inch = 400 ft.

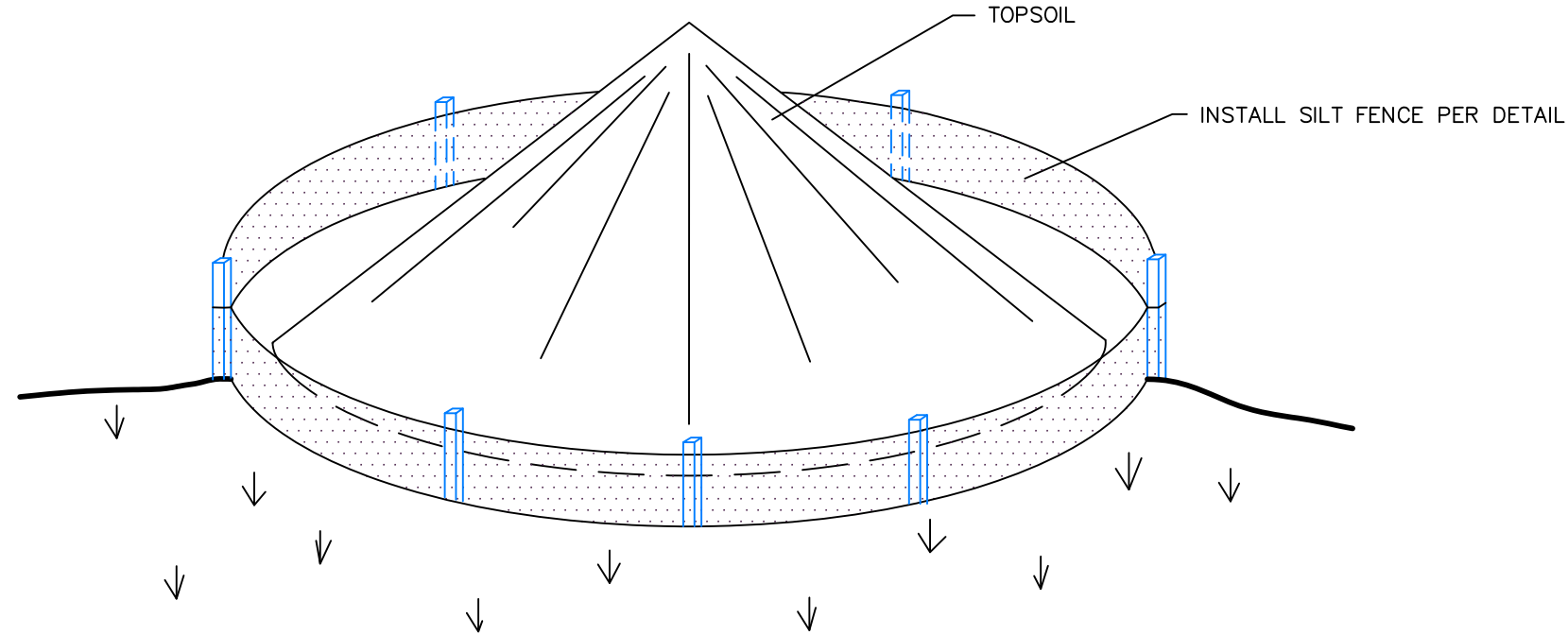


CORNERSTONE PROFESSIONAL PARK, SUITE D-101
43 SHERMAN HILL ROAD
WOODBURY (203) 266-0778 CONNECTICUT

JUNE 6, 2016



DRAWING NO.	SHEET NO.	DESCRIPTION
1	S-1.0	BOUNDARY & TOPOGRAPHIC SURVEY
2	C-1.0	SOIL REMEDIATION & EROSION CONTROL PLAN
3	C-2.0	DETAILS
4	C-3.0	EROSION CONTROL NARRATIVE & EARTHWORK QUANTITY ESTIMATES
5	C-3.1	CONSTRUCTION SEQUENCE

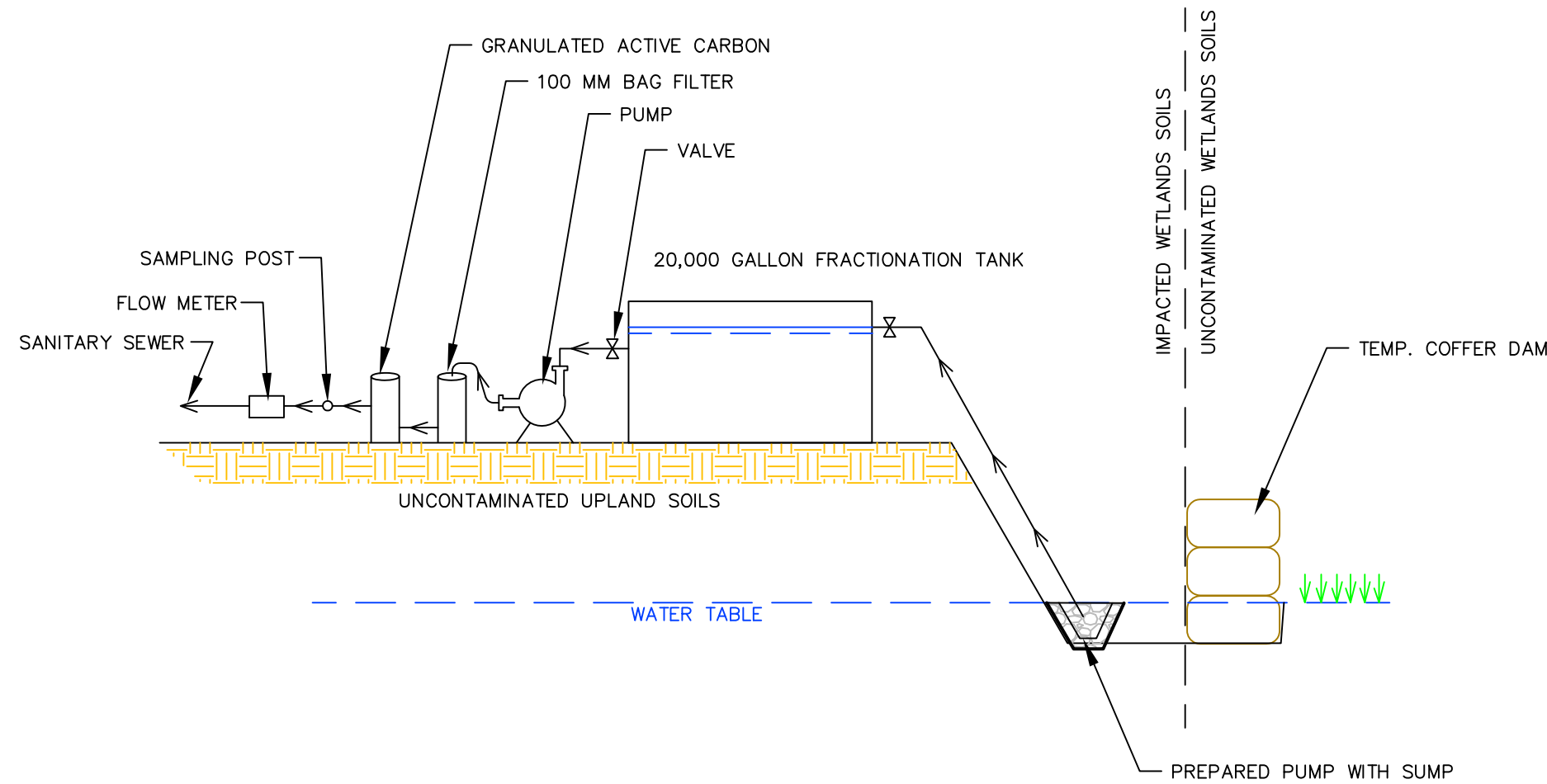


STOCKPILE MANAGEMENT PER 2002 CT GUIDELINES FOR E & S CONTROL:

1. LOCATE STOCKPILE SO THAT NATURAL DRAINAGE IS NOT OBSTRUCTED.
2. DIVERT RUNOFF WATER AWAY FROM OR AROUND THE STOCKPILE.
3. INSTALL A GEOTEXTILE SILT FENCE OR HAY BALE BARRIER AROUND THE STOCKPILE AREA APPROXIMATELY 10 FEET FROM PROPOSED TOE OF THE SLOPE.
4. THE SIDE SLOPES OF STOCKPILED MATERIAL SHOULD BE NO STEEPER THAN 2:1.
5. STOCKPILES THAT ARE NOT TO BE USED WITHIN 30 DAYS NEED TO BE SEEDED AND MULCHED IMMEDIATELY AFTER FORMATION OF THE STOCKPILE.
6. AFTER STOCKPILE HAS BEEN REMOVED, THE SITE SHOULD BE GRADED AND PERMANENTLY STABILIZED.

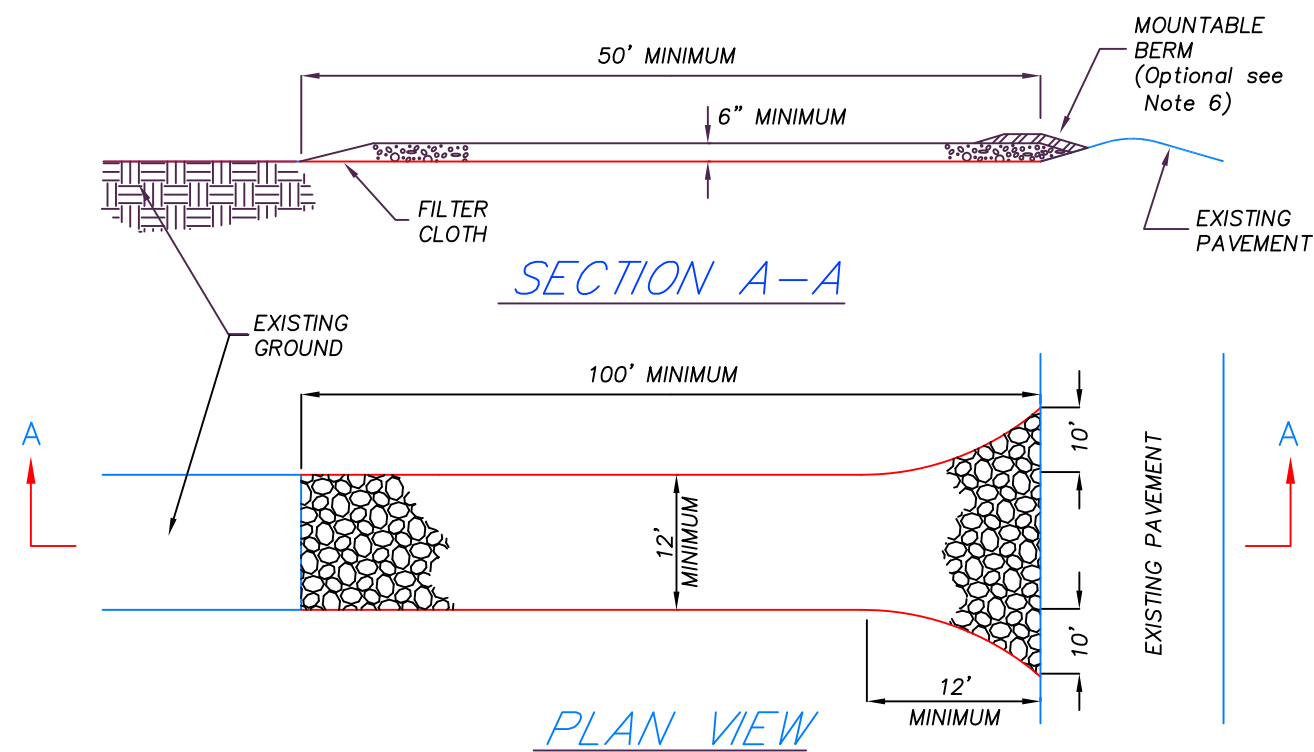
TEMPORARY TOPSOIL STOCKPILE

N.T.S.



DEWATERING WASTEWATER FLOW SCHEMATIC

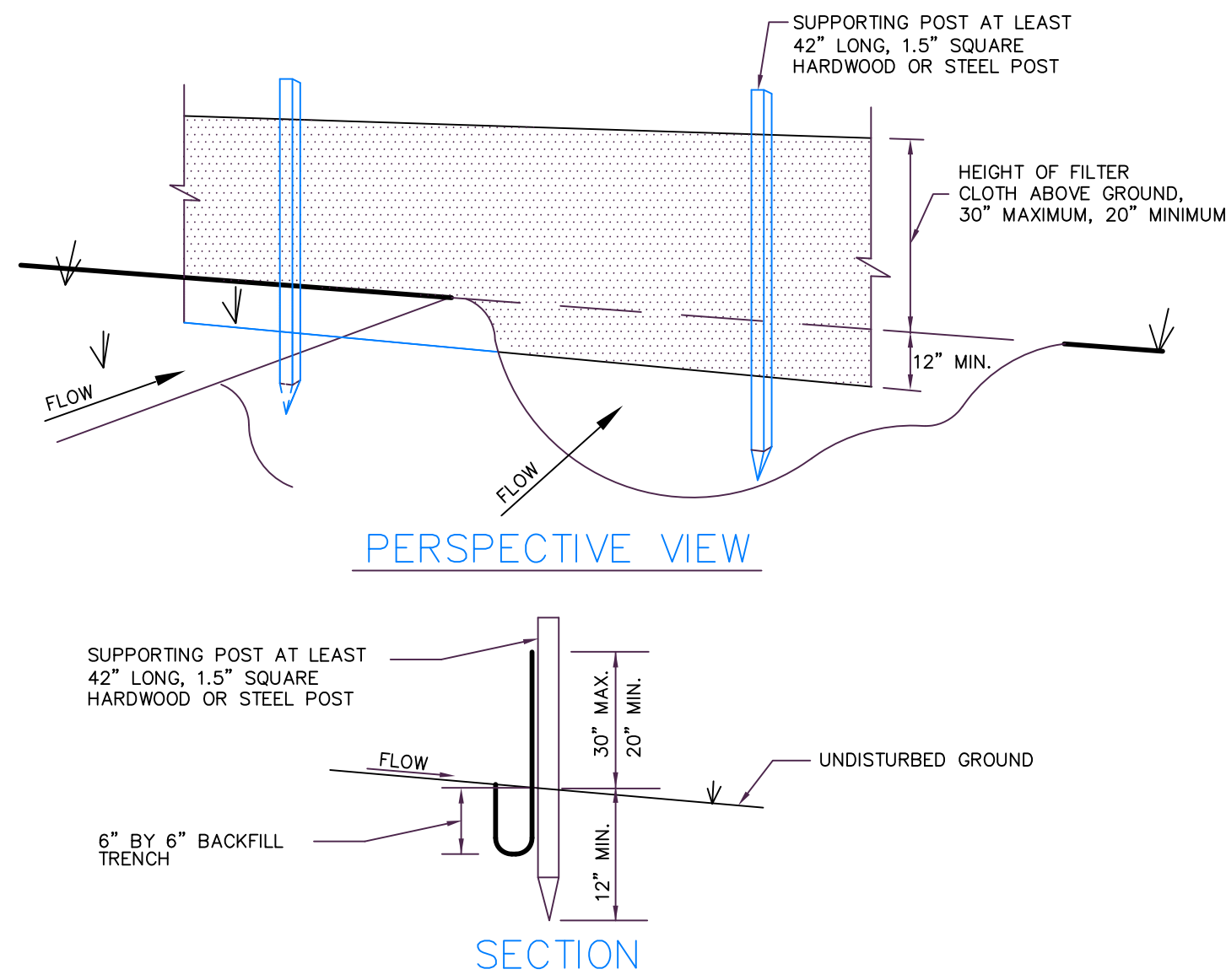
N.T.S.



NOTES:

1. STONE SIZE - USE 1" - 2" STONE, OR RECLAIMED OR RECYCLED CONCRETE EQUIVALENT.
2. LENGTH - AS REQUIRED, BUT NOT LESS THAN 100 FEET.
3. THICKNESS - NOT LESS THAN SIX (6) INCHES.
4. WIDTH - 12 FOOT MINIMUM, BUT NOT LESS THAN THE FULL WIDTH AT POINTS WHERE INGRESS OR EGRESS OCCURS. 24 FOOT MINIMUM IF SINGLE ENTRANCE TO SITE.
5. FILTER CLOTH - TO BE PLACED OVER THE ENTIRE AREA PRIOR TO PLACING OF STONE.
6. SURFACE WATER - ALL SURFACE WATER FLOWING OR DIVERTED TOWARD CONSTRUCTION ENTRANCES SHALL BE PIPED ACROSS THE ENTRANCE. IF PIPING IS IMPRACTICAL, A MOUNTABLE BERM WITH 5:1 SLOPES WILL BE PERMITTED.
7. MAINTENANCE - THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OF FLOWING OF SEDIMENT ONTO PUBLIC RIGHTS-OF-WAY. THIS MAY REQUIRE PERIODIC TOP DRESSING WITH ADDITIONAL STONE AS CONDITIONS DEMAND AND REPAIR AND/OR CLEANOUT OF ANY MEASURE USED TO TRAP SEDIMENT. ALL SEDIMENT SPILLED, DRIPPED, WASHED OR TRACKED ONTO PUBLIC RIGHTS-OF-WAY MUST BE REMOVED IMMEDIATELY.
8. WASHING - WHEELS SHALL BE CLEANED TO REMOVE SEDIMENT PRIOR TO ENTRANCE ONTO PUBLIC RIGHTS-OF-WAY. WHEN WASHING IS REQUIRED, IT SHALL BE DONE ON AN AREA STABILIZED WITH STONE AND WHICH DRAINS INTO AN APPROVED SEDIMENT TRAPPING DEVICE.
9. PERIODIC INSPECTION AND NEEDED MAINTENANCE SHALL BE PROVIDED AFTER EACH RAIN.

STABILIZED CONSTRUCTION ENTRANCE



CONSTRUCTION NOTES FOR SILT FENCE

1. EXCAVATE A TRENCH A MINIMUM OF 6 INCHES DEEP AND 6 INCHES WIDE ON THE UP SIDE OF THE FENCE LOCATION.
 2. DRIVE SUPPORT POSTS ON THE DOWN SLOPE SIDE OF THE TRENCH TO A DEPTH OF AT LEAST 12 INCHES INTO ORIGINAL GROUND.
 3. STAPLE OR SECURE THE GEOTEXTILE TO THE SUPPORT POSTS PER MANUFACTURER'S INSTRUCTIONS SUCH THAT AT LEAST 6 INCHES OF GEOTEXTILE LIES WITHIN THE TRENCH.
 4. BACKFILL THE TRENCH WITH TAMPED SOIL OR AGGREGATE OVER THE GEOTEXTILE.
- POSTS: 1.5" SQUARE HARDWOOD OR STEEL
- FILTER CLOTH: MIRAFI 100X, ENVIROFENCE OR APPROVED EQUAL

SILT FENCE DETAIL

CITY OF BRISTOL
BRISTOL, CT

DETAILS

894 MIDDLE STREET
(LOT 17, 17-3, 17-4-1)

BRISTOL CONNECTICUT

Civil C1

CORNERSTONE PROFESSIONAL PARK, SUITE D-101
43 SHERMAN HILL ROAD
WOODBURY CONNECTICUT (203) 266 - 0778

DRAWN: BS
SCALE: AS NOTED
DATE: 6 JUN 2017
PROJ. NO.: 3448
CADD FILE NAME: 3448
DRAWING NO.: C - 2.0

GENERAL PRINCIPLES

THE FOLLOWING GENERAL PRINCIPLES SHALL BE MAINTAINED AS EFFECTIVE MEANS OF MINIMIZING EROSION AND SEDIMENTATION DURING THE DEVELOPMENT PROCESS.

STRIPPING AWAY OF VEGETATION, REGRADING OR OTHER DEVELOPMENT SHALL BE DONE IN SUCH A WAY AS TO MINIMIZE EROSION.

TO THE GREATEST EXTENT PRACTICABLE GRADING AND EROSION CONTROL PLANS SHALL PRESERVE IMPORTANT NATURAL FEATURES, KEEP CUT AND FILL OPERATIONS TO A MINIMUM SO AS TO CREATE THE LEAST EROSION POTENTIAL AND ADEQUATELY HANDLE THE VOLUME AND VELOCITY OF SURFACE WATER RUNOFF.

WHENEVER FEASIBLE, NATURAL VEGETATION SHALL BE RETAINED, PROTECTED AND SUPPLEMENTED WHEREVER INDICATED ON THE SITE DEVELOPMENT PLANS.

THE DISTURBED AREA AND THE DURATION OF EXPOSURE SHALL BE KEPT TO A PRACTICAL MINIMUM.

DISTURBED SOILS SHALL BE STABILIZED AS QUICKLY AS POSSIBLE.

TEMPORARY VEGETATION AND/OR MULCHING SHALL BE USED TO PROTECT EXPOSED CRITICAL AREAS DURING DEVELOPMENT WHEN SOILS HAVE EROSION POTENTIAL AND ARE EXPECTED TO BE EXPOSED IN EXCESS OF 30 DAYS.

THE PERMANENT (FINAL) VEGETATION AND MECHANICAL EROSION CONTROL MEASURES SHALL BE INSTALLED AS SOON AS PRACTICAL DURING CONSTRUCTION.

ALL LAND WITHIN THE PROJECT LIMITS SHALL BE GRADED TO DRAIN AND DISPOSE OF SURFACE WATER WITHOUT PONDING.

LAND DISTURBANCE WILL BE KEPT TO A MINIMUM. RESTABILIZATION WILL BE SCHEDULED AS SOON AS PRACTICAL. NOT MORE THAN 5 ACRES WILL BE DISTURBED AT ANY ONE TIME.

ALL CONTROL MEASURES WILL BE MAINTAINED IN EFFECTIVE CONDITION THROUGHOUT THE CONSTRUCTION PERIOD.

THE RESPONSIBILITY FOR IMPLEMENTING THE EROSION AND SEDIMENT CONTROL PLAN WILL REST WITH THE OWNER OF RECORD. HE ACKNOWLEDGES THAT HE IS RESPONSIBLE FOR INFORMING ALL CONCERNED OF THE REQUIREMENTS OF THE PLAN AND FOR NOTIFYING THE PLANNING ADMINISTRATION OF ANY TRANSFER OF RESPONSIBILITY.

ADDITIONAL CONTROL MEASURES WILL BE INSTALLED DURING CONSTRUCTION IF NECESSARY OR REQUIRED.

CONCENTRATION OF SURFACE RUNOFF SHALL BE ONLY PERMITTED BY PIPING AND/OR THROUGH DRAINAGE SWALES OR NATURAL WATERCOURSES.

EXCAVATION AND FILLS --

SLOPES CREATED BY CUTS OR FILLS SHALL NOT BE STEEPER THAN 2:1 UNLESS NOTED SPECIFICALLY ON THE PLANS AND SHALL BE RESTABILIZED BY TEMPORARY OR PERMANENT MEASURES, AS REQUIRED DURING THE DEVELOPMENT PROCESS. EROSION CONTROL BLANKETS MAY BE USED ON SLOPES IN THE VICINITY OF WETLANDS REGULATED AREAS AND ON ADDITIONAL SLOPES AS NEEDED AS DIRECTED BY THE EROSION CONTROL INSPECTOR OR ENVIRONMENTAL CONSULTANT.

ADEQUATE PROVISIONS SHALL BE MADE TO PREVENT SURFACE WATER FROM DAMAGING THE CUT FACE OF EXCAVATIONS OR THE SLOPING SURFACES OF FILLS.

CUTS AND FILLS SHALL NOT ENDANGER ADJOINING PROPERTY.

ALL FILLS SHALL BE COMPACTED TO PROVIDE STABILITY OF MATERIAL AND TO PREVENT UNDESIRABLE SETTLEMENT. THE FILL SHALL BE SPREAD IN A SERIES OF LAYERS EACH NOT EXCEEDING TWELVE (12) INCHES IN THICKNESS AND SHALL BE COMPACTED BY A MECHANICAL ROLLER OR OTHER APPROVED METHOD AFTER EACH LAYER IS SPREAD.

FILLS SHALL NOT ENROACH ON NATURAL WATERCOURSES, CONSTRUCTED CHANNELS OR REGULATED FLOOD PLAIN AREAS, UNLESS PERMITTED BY LICENSE OR PERMIT FROM THE AUTHORITY HAVING JURISDICTION.

FILLS PLACED ADJACENT TO NATURAL WATERCOURSES, CONSTRUCTED CHANNELS OR FLOOD PLAINS SHALL HAVE SUITABLE PROTECTION AGAINST EROSION DURING PERIODS OF FLOODING.

GRADING SHALL NOT BE DONE IN SUCH A WAY AS TO DIVERT WATER ONTO THE PROPERTY OF ANOTHER LANDOWNER WITHOUT THEIR EXPRESS WRITTEN CONSENT.

DURING GRADING OPERATIONS, NECESSARY MEASURES FOR DUST CONTROL SHALL BE EXERCISED.

ALL EROSION AND SEDIMENT CONTROL MEASURES WILL BE CONSTRUCTED IN ACCORDANCE WITH THE STANDARDS AND SPECIFICATIONS OF THE 2002 CONNECTICUT GUIDELINES FOR SOIL EROSION AND SEDIMENT CONTROL (2002) – STATE OF CONNECTICUT DEP BULLETIN 34.

RESPONSIBILITY FOR THE PLAN

THE RESPONSIBILITY FOR IMPLEMENTING AND MAINTAINING THE EROSION AND SEDIMENTATION CONTROL PLAN RESTS WITH THE OWNER. THE OWNER SHALL BE HELD RESPONSIBLE FOR INFORMING ALL CONCERNED REGARDING RESPONSIBILITY OF THE PLAN.

THE RESPONSIBILITY OF ALL DRAINAGE, EROSION AND SEDIMENTATION CONTROL MEASURES WILL THEREFORE REST WITH THE OWNER.

WHENEVER SEDIMENTATION IS CAUSED BY STRIPPING VEGETATION AND/OR GRADING, IT SHALL BE THE RESPONSIBILITY OF THE PERSON, CORPORATION OR OTHER ENTITY HAVING RESPONSIBILITY TO REMOVE SEDIMENTATION FROM ALL LOWER PROPERTIES, DRAINAGE SYSTEMS AND WATERCOURSES AND TO REPAIR ANY DAMAGE AT THEIR EXPENSE AS QUICKLY AS POSSIBLE.

MAINTENANCE OF ALL DRAINAGE FACILITIES AND WATERCOURSES WITHIN ANY LAND DEVELOPMENT SHALL BE THE RESPONSIBILITY OF THE OWNER. ALL CONTROL MEASURES WILL BE MAINTAINED IN EFFECTIVE CONDITION THROUGHOUT THE CONSTRUCTION PERIOD.

IT SHALL BE THE RESPONSIBILITY OF ANY PERSON, CORPORATION OR OTHER ENTITY ENGAGING IN ANY ACT ON OR NEAR ANY STREAM, WATERCOURSE OR SWALE OR UPON OR RIGHT-OF-WAY THEREOF TO TAKE PRECAUTIONS AS NEARLY AS POSSIBLE IN ITS PRESENT STATE THAT SAME STREAM, WATERCOURSE, SWALE, FLOOD PLAIN OR RIGHT-OF-WAY FOR THE DURATION OF THE ACTIVITY AND TO RETURN IT TO ITS ORIGINAL OR EQUAL CONDITION AFTER SUCH ACTIVITY IS COMPLETED.

NO PERSON, CORPORATION OR OTHER ENTITY SHALL BLOCK, IMPEDE THE FLOW OF, ALTER, CONSTRUCT ANY STRUCTURE OR DEPOSIT ANY MATERIAL OR THING OR COMMIT ANY ACT WHICH AFFECTS NORMAL OR FLOOD FLOW IN ANY COMMUNAL STREAM OR WATERCOURSE WITHOUT HAVING OBTAINED PRIOR APPROVAL FROM THE ANY AGENCIES HAVE JURISDICTION OVER SUCH ACTIVITY.

SEEDING AND PLANTING REQUIREMENTS

SEEDBED PREPARATION

FINE GRADE AND RAKE SURFACE TO REMOVE STONES LARGER THAN 2" IN DIAMETER. INSTALL NEEDED EROSION CONTROL DEVICES SUCH AS SURFACE WATER DIVERSIONS, GRADE STABILIZATION STRUCTURES, SEDIMENT BASINS OR DRAINAGE CHANNELS TO MAINTAIN GRASSED AREAS. APPLY LIMESTONE AT A RATE OF 2 TONS/AC. OR 90 LBS/1000 SF UNLESS OTHERWISE REQUIRED ACCORDING TO SOIL TEST RESULTS. APPLY FERTILIZERS WITH 10-10-10 AT A RATE OF 300 LBS./AC. OR 7.5 LBS/1000 SF. AT LEAST 50% OF THE NITROGEN SHALL BE FROM ORGANIC SOURCES. WORK LIME AND FERTILIZER INTO SOIL UNIFORMITY TO A DEPTH OF 4" WITH A WHISK, SPRINGTOOTH HARROW OR OTHER SUITABLE EQUIPMENT FOLLOWING THE CONTOUR LINES.

SEED APPLICATION

APPLY GRASS MIXTURES AT RATES SPECIFIED BY HAND, CYCLONE SEEDER OR HYDROSEEDER. INCREASE SEED MIXTURE BY 10% IF HYDROSEEDER IS USED. LIGHTLY DRAG OR ROLL THE SEEDED SURFACE TO COVER SEED. SEEDING FOR SELECTED FINE GRASSES SHOULD BE DONE BETWEEN APRIL 1 AND JUNE 1 OR BETWEEN AUGUST 15 AND OCTOBER 15. IF SEEDING CANNOT BE DONE DURING THESE TIMES, REPEAT MULCHING PROCEDURE BELOW UNTIL SEEDING CAN TAKE PLACE OR SEED WITH A QUICK GERMINATING SEED MIXTURE TO STABILIZE SLOPES. A QUICK GERMINATING SEED MIXTURE (DOMESTIC RYE) CAN BE APPLIED BETWEEN JUNE 15 THROUGH AUGUST 15 AS APPROVED BY THE ENGINEER.

MULCHING

IMMEDIATELY FOLLOWING SEEDING, MULCH THE SEEDED SURFACE WITH STRAW, HAY OR WOOD FIBER AT A RATE OF 1.5 TO 2 TONS/AC, EXCEPT AS OTHERWISE SPECIFIED ELSEWHERE. MULCHES SHOULD BE FREE OF WEEDS AND COARSE MATTER. SPREAD MULCH BY HAND OR MULCH MOWER INTO SOIL SURFACE WITH TRACK MACHINE OR DISK HARROW SET STRAIGHT UP. MULCH MATERIAL SHOULD BE "TUCKED" APPROXIMATELY 2- 3" INTO THE SOIL SURFACE. CHEMICAL MULCH BINDERS OR NETTING, IN COMBINATION WITH THE STRAW, HAY OR WOOD FIBERS, WILL BE USED WHERE DIFFICULT SLOPES DO NOT ALLOW HARROWING BY MACHINES.

GRASS SEED MIXTURES

TEMPORARY COVERS	PERMANENT COVERS	
PERENNIAL RYEGRASS 20 LBS/AC.	CREeping RED FESCUE	40 LBS/AC.
ANNUAL RYEGRASS 20 LBS/AC.	CANADA BLUEGRASS	20 LBS/AC.

IN CASE OF AN EMERGENCY (E.G. SEVERE FLOODING, RAINS, OR OTHER ENVIRONMENTAL PROBLEMS): THE PARTY RESPONSIBLE AND THE CITY'S WEO SHALL BE NOTIFIED.

EMERGENCY CONTACT: MR. RAY ROGOZINSKI, CITY ENGINEER (860) 584-6113

TEMPORARY EROSION AND SEDIMENT CONTROL MEASURES

THE FOLLOWING ARE PLANNED AS TEMPORARY EROSION/SEDIMENTATION CONTROL MEASURES DURING CONSTRUCTION:

1. A CRUSHED STONE STABILIZED CONSTRUCTION ENTRANCE SHALL BE PLACED AT THE SITE ACCESS.

2. GEOTEXTILE SILT FENCE SHALL BE INSTALLED ALONG THE DOWN GRADIENT SIDE OF ALL FILL SECTIONS. IN AREAS ADJACENT TO WETLANDS THE SILT FENCE MAY BE BACKED BY STAKED HAYBALES FOR EXTRA PROTECTION. SILT FENCE WILL BE MAINTAINED IN PLACE UNTIL THE TRIBUTARY AREA PROTECTED BY THE FENCE IS REVEGETATED OR STABILIZED BY PERMANENT MEASURES. SYNTHETIC FILTER FABRIC, POST MATERIAL, SPACING AND EMBEDMENT, AND TRENCH DETAILS, SHALL BE AS SHOWN ON THE DRAWINGS. FILTER BARRIER SHALL BE INSPECTED IMMEDIATELY AFTER EACH RAINFALL GREATER THAN 0.1 INCH AND AT LEAST DAILY DURING PROLONGED RAINFALL. REFER TO THE CHAPTER 7 OF THE CT EROSION & SEDIMENT CONTROL "GUIDELINES" FOR ADDITIONAL MAINTENANCE REQUIREMENTS.

3. DUST CONTROL SHALL BE USED TO PREVENT BLOWING AND MOVEMENT OF DUST FROM EXPOSED SOIL SURFACES AND REDUCE THE PRESENCE OF DUST WHICH MAY CAUSE OFF-SITE DAMAGE, BE A HEALTH HAZARD TO HUMANS, WILDLIFE AND PLANT LIFE. THE NEED FOR DUST CONTROL WILL BE MINIMIZED BY REDUCING AREA OF LAND DISTURBANCE AT ANY ONE TIME, MAINTAINING AS MUCH VEGETATION AS PRACTICABLE, USE OF MULCHING AND TEMPORARY VEGETATIVE COVER. THE CONTRACTOR SHALL USE MECHANICAL SWEEPERS ON PAVED AREAS AND UTILIZE FINE WATER SPRAYS NEAR SOURCES OF DUST. THE EXPOSED SOIL AREAS SHALL BE PERIODICALLY MOISTENED. SPRAY-ON ADHESIVES DILUTED IN WATER MAY BE USED.

4. TEMPORARY SOIL STOCKPILES SHALL BE PROTECTED BY A SEDIMENT BARRIER. SIDE SLOPES OF THE STOCKPILES SHALL NOT EXCEED 2 TO 1. THE STOCKPILES SHALL BE STABILIZED WITHIN THIRTY DAYS OF FORMATION OF THE STOCKPILE BY TEMPORARY SEEDING OR COVERING WITH MULCH IF THEY ARE SUSCEPTIBLE TO EROSION.

5. TEMPORARY VEGETATIVE COVERS SHALL BE INSTALLED ON ALL DISTURBED AREAS NOT INTENDED FOR PRIMARY CONSTRUCTION AND HAVING THE POTENTIAL TO PRODUCE SEDIMENT AND CAUSE ON- AND OFF-SITE DAMAGES. SUCH AREAS BASED ON RECOMMENDATIONS SHALL BE COVERED WITH TOPSOIL AND SEEDED OF FIGURE 6-1 OF THE "GUIDELINES". FOR ADDITIONAL SEEDING REQUIREMENTS REFER TO CHAPTER 6 OF THE "GUIDELINES".

PERMANENT EROSION CONTROL MEASURES

ALL PERMANENT EROSION CONTROL MEASURES SHALL BE INSTALLED IN STRICT ACCORDANCE WITH THE RECOMMENDATIONS OF THE "GUIDELINES". THE FOLLOWING PERMANENT EROSION CONTROL MEASURES HAVE BEEN DESIGNED AS PART OF THE EROSION AND SEDIMENT CONTROL PLAN:

1. PERMANENT VEGETATIVE COVER SHALL BE ESTABLISHED ON ALL EXPOSED/DISTURBED AREAS THAT ARE NOT SUBJECT TO OTHER RESTORATION (PAVING, RIPRAP, ETC). OPEN SANDY & GRAVELLY SOILS THAT ARE NOT SUSCEPTIBLE TO EROSION OR SEDIMENTATION SHALL BE ALLOWED TO REMAIN IN PLACE. INSTALLATION AND MAINTENANCE REQUIREMENTS OF CHAPTER 6 OF THE "GUIDELINES" SHALL BE FOLLOWED. EXPOSED AREAS THAT HAVE THE POTENTIAL FOR EROSION SHALL BE LOAMED, LIMED, FERTILIZED AND SEEDED. LIMESTONE AND FERTILIZER SHALL BE APPLIED IN ACCORDANCE WITH THE RESULTS OF SOIL TESTING OR AS RECOMMENDED BY THE "GUIDELINES". ALL PERMANENT SEEDING WILL BE DONE IN THE SPRING OR LATE SUMMER (BEFORE OCTOBER 31). ANY AREAS TO BE SEEDED OUTSIDE OF THIS TIME FRAME SHALL BE COVERED WITH AN EROSION CONTROL BLANKET TO STABILIZE THE SOIL UNTIL GROWTH CAN BE ESTABLISHED. SEEDING MIXTURES SHALL BE SELECTED IN ACCORDANCE WITH FIGURES 6-2 OR 6-3 OF THE "GUIDELINES" OR AS RECOMMENDED BY THE SOIL CONSERVATION SERVICE. HYDROSEEDING SHALL BE USED WHERE INDICATED ON THE PLANS AND IN CRITICAL AREAS. MULCH SHALL BE APPLIED AND ANCHORED AS RECOMMENDED UNDER "EROSION AND SEDIMENT CONTROL DEVICES" ABOVE.

EMERGENCY SPILL PLAN

A SPILL IS DEFINED IN THE CONNECTICUT GENERAL STATUTE 22A- 452C, FOR PRACTICAL PURPOSES, ANY OIL OR PETROLEUM PRODUCTS, CHEMICAL OR WASTE THAT IS RELEASED IN ANY MANNER CONSTITUTES A SPILL. IN THE EVENT OF AN EMERGENCY SPILL, THE FOLLOWING STEPS SHALL BE TAKEN:

1. CONTACT THE STATE OF CONNECTICUT DEPARTMENT OF ENVIRONMENTAL PROTECTION OIL & CHEMICAL SPILL RESPONSE DIVISION AT (860) 424- 3338 IMMEDIATELY.

2. THE SPILL SHALL BE CONTAINED IMMEDIATELY.

EARTHWORK QUANTITY ESTIMATES FOR TOTAL SITE

TOTAL AREA OF ACTIVITY ON SITE FOR SOIL REMEDIATION:
FOR SOIL REMEDIATION AREAS = 121,700 SF
FOR SOIL CONSOLIDATION AREA = 39,000 SF
TOTAL AREA OF ONSITE CONSTRUCTION (EXCAVATION AND DEPOSITION) = 160,700 SF = 3.68 ACRES

EARTHWORK QUANTITY ESTIMATE IN WETLANDS REGULATED AREAS

FOR SOIL REMEDIATION AREA #1:
Total Activity in Wetlands* 3,100 SF = 0.07 AC.
FILL : 115 CY (HYDRIC SOILS BEING REPLACED WITH TOPSOIL)
CUT : 440 CY
Total Activity in 100' Regulated Area 10,450 SF = 0.24 AC.
FILL : 410 CY
CUT : 410 CY

FOR SOIL REMEDIATION AREA #2:
Total Activity in Wetlands 0 SF = 0 AC.
FILL : 0 CY
CUT : 0 CY
Total Activity in 100' Regulated Area 5,540 SF = 0.13 AC.
FILL : 210 CY
CUT : 210 CY

FOR SOIL REMEDIATION AREA #3:
Total Activity in Wetlands 0 SF = 0 AC.
FILL : 0 CY
CUT : 0 CY
Total Activity in 100' Regulated Area 0 SF = 0 AC.
FILL : 0 CY
CUT : 0 CY

FOR SOIL REMEDIATION AREA #4:
Total Activity in Wetlands 0 SF = 0 AC.
FILL : 0 CY
CUT : 0 CY
Total Activity in 100' Regulated Area 5,690 SF = 0.13 AC.
FILL : 250 CY
CUT : 250 CY

FOR SOIL REMEDIATION AREA #5:
Total Activity in Wetlands 0 SF = 0 AC.
FILL : 0 CY
CUT : 0 CY
Total Activity in 100' Regulated Area 735 SF = 0.02 AC.
FILL : 30 CY
CUT : 30 CY

FOR SOIL REMEDIATION AREA #6:
Total Activity in Wetlands 0 SF = 0 AC.
FILL : 0 CY
CUT : 0 CY
Total Activity in 100' Regulated Area 0 SF = 0 AC.
FILL : 0 CY
CUT : 0 CY

FOR SOIL REMEDIATION AREA #7:
Total Activity in Wetlands 0 SF = 0 AC.
FILL : 0 CY
CUT : 0 CY
Total Activity in 100' Regulated Area 2,575 SF = 0.06 AC.
FILL : 115 CY
CUT : 115 CY

FOR SOIL REMEDIATION AREA #8:
Total Activity in Wetlands 8,400 SF = 0.19 AC.
FILL : 310 CY (HYDRIC SOILS BEING REPLACED WITH TOPSOIL)
CUT : 310 CY
Total Activity in 100' Regulated Area 19,700 SF = 0.45 AC.
FILL : 700 CY
CUT : 700 CY

FOR SOIL REMEDIATION AREA #9:
Total Activity in Wetlands 0 SF = 0 AC.
FILL : 0 CY
CUT : 0 CY
Total Activity in 100' Regulated Area 7,275 SF = 0.17 AC.
FILL : 300 CY
CUT : 300 CY

Total area of Wetlands on site = 114,618 square feet = 2.63 acres
Total Wetlands disturbed = 11,500 square feet = 0.26 acres
Total Fill: 425 CY
Total Cut: 710 CY
90.0% of wetlands on property will remain undisturbed.

Total area of 100' Wetlands Regulated Area on site = 205,771 sf = 4.72 acres
Total disturbance in 100' Wetlands Regulated Area = 51,965 SF = 1.19 acres
Total Fill: 2,015 CY
Total Cut: 2,015 CY
74.8% of the 100' Wetlands Regulated Area will remain undisturbed.

Material to be excavated is existing topsoil and subsoil that has PCB contamination.

Material to be deposited in the wetlands areas is clean topsoil to replace the removed contaminated soils and to allow for New England Erosion Control & Restoration Mix for Moist Sites to be planted in order to revegetate the wetlands areas.

Material to be deposited in the 100' wetlands regulated areas will be clean on-site soil to allow for New England Erosion Control & Restoration Mix for Dry Sites to be planted to revegetate & stabilize the wetlands regulated areas.

*NOTE: 1,100 SF OF ADDITIONAL SOIL REMEDIATION ACTIVITY IN AREA #1 IS BEING PROPOSED IN SOUTHTONINGTON AND WILL BE SUBJECT TO A SEPARATE INLAND WETLANDS PERMITTING PROCESS THROUGH THE TOWN OF SOUTHTONINGTON.

CITY OF BRISTOL
BRISTOL, CT

EROSION CONTROL
NARRATIVE & EARTHWORK
QUANTITY ESTIMATES

894 MIDDLE STREET
(LOT 17, 17-3, 17-4-1)

CIVIL C1

CORNERSTONE PROFESSIONAL PARK, SUITE D-101
43 SHERMAN HILL ROAD
WOODBURY CONNECTICUT
(203) 266 - 0778

DRAWN: BS	APPROVED: KC
SCALE: AS NOTED	
DATE: 6 JUN 2017	
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DRAWING NO.: C - 3.0	

APPENDIX 5
ITEMIZED COST ESTIMATES FOR REMEDIAL OPTIONS

TABLE 1
ESTIMATED AREAS OF PCB IMPACT BY CONCENTRATION RANGE
FORMER LAVEIRO METALS
894 MIDDLE STREET
BRISTOL, CT

Range of PCB Concentration In Soil	Estimated Affected Area (acres)	Estimated Affected Area (sq ft)	Average Estimated Affected Depth (ft)	Estimated Volume (cu ft)	Estimated Volume (cu yd)	Contingency Added To Estimated Volume (cu yd)	Estimated Volume with Contingency (cu yd)	Estimated Mass (tons) (Mass = 1.5 tons/cu yd)
<1 ppm*	3	130,680	1.0	130,680	4,840	1,210	6,050	9,075
>1 ppm but <10 ppm	1.95	87,129	1.0	87,129	3,227	807	4,034	6,051
>10 ppm but <30 ppm	0.35	15,246	1.25	19,058	706	176	882	1,323
Hotspot Soils > 30 ppm	0.31	13,504	0.75	10,128	375	94	469	703

*remainder of Proposed Remediation Area

Notes:

The areas of impact were derived by interpolation from widely spaced sample points. See the sample results figures and summary tables to understand the level of sampling completed which is the basis for these estimates.

TABLE 2
Estimated Remediation Costs To Completion: Removal of PCB Contaminated Soil Greater Than 30 ppm
And Capping of Remaining Soils Under An Engineered Control
Former Laviero Metals Site
894 Middle Street
Bristol, CT

Prepared by: Timothy Carr, LEP
Prepared for: Bristol Development Authority
Date Prepared: April 25, 2016 (rev. May 2017)

Objective and Primary Assumptions/Limitations

- Excavate and dispose off-site soils containing greater than 30 ppm of PCBs under a Risk-Based Clean-up approval from EPA.
- An Engineered Control Variance (ECV) will be required from the CTDEEP to allow capping of soils up to 30 ppm on-site.
- Estimate for wetlands mitigation is based on current knowledge (Task 1c). Additional remediation may be required to meet ecological risk standards.
- An ELUR would be required to specify industrial/commercial use of the Site in perpetuity.
- Includes construction of a 1 acre cap area using 40 mil geomembrane

Task or Activity		Engineering/ Consulting	Contractors	Laboratory	Subtotal						
1) Project Preparation											
a.	Bid specifications & pre-earthwork land survey	\$ 10,000	\$ 15,000	\$ -	\$ 25,000						
b.	Remedial Action Plan, Public Notice, Permitting	\$ 20,000	\$ -	\$ -	\$ 20,000						
c.	Engineered Control Variance Application - Parts 1 and 2	\$ 25,000	\$ -	\$ -	\$ 25,000						
2) Remedial Earthwork											
a.	Clearing & grubbing, staging, and earthwork*	\$ 50,000	\$ 350,000	\$ 5,000	\$ 405,000						
	* Assumes additional \$350,000 contribution from proposed developer.										
b.	Excavation and Off-Site Disposal of PCB Contaminated Soil										
	<table><tr><td>Type</td><td>Mass (tons)</td><td>Trans & Disposal Unit Cost (\$)</td></tr><tr><td>PCBs >30 ppm **</td><td>703</td><td>\$ 350 = \$ 246,159</td></tr></table>	Type	Mass (tons)	Trans & Disposal Unit Cost (\$)	PCBs >30 ppm **	703	\$ 350 = \$ 246,159	\$ -	\$ 246,159	\$ -	\$ 246,159
Type	Mass (tons)	Trans & Disposal Unit Cost (\$)									
PCBs >30 ppm **	703	\$ 350 = \$ 246,159									
	** Transportation and disposal at \$350/ton as TSCA remediation waste										
c.	Wetlands Area Excavation and Mitigation	\$ 5,000	\$ 120,000	\$ 4,000	\$ 129,000						
d.	Construction of Engineered Controls and Consolidation of Contaminated Soils (Assume 1-acre geomembrane cap and layer of drainage composite) - 40 mil geomembrane cap (Delivered and Placed)										
	43,560 sf \$ 2.10 sf = 91,476	\$ 5,000	\$ 172,062	\$ -	\$ 177,062						
	43,560 sf \$ 1.85 sf = 80,586										
	\$ 172,062										
e.	Remedial Verification Sampling and Reporting	\$ 25,000	\$ -	\$ 50,000	\$ 75,000						
3) Post Remediation Groundwater Monitoring											
a.	Installation of Groundwater Monitoring Wells	\$ 5,000	\$ 25,000	\$ -	\$ 30,000						
b.	Groundwater Sampling	\$ 20,000	\$ -	\$ 16,320	\$ 36,320						
	12 Wells, Quarterly for 2 Years (96 samples) x \$300/well	\$ 7,500	\$ -	\$ 13,200	\$ 20,700						
c.	Groundwater Annual Reporting (Two reports @ \$5,000/report)	\$ 10,000	\$ -	\$ -	\$ 10,000						
4) Compliance Documents											
a.	Remedial Action Report	\$ 12,000	\$ -	\$ -	\$ 12,000						
b.	A-2 Survey	\$ 3,000	\$ 10,000	\$ -	\$ 13,000						
c.	Record Land Use Restriction (ELUR) - Engineering & Legal	\$ 3,000	\$ 15,000	\$ -	\$ 18,000						
d.	Financial Assurance for Engineered Control Variance	\$ 120,000	\$ -	\$ 30,000	\$ 150,000						
	Annual Maintenance and Monitoring Estimate (Averaged over 30 period required by the ECV)										
	Groundwater Monitoring and Sampling \$ 2,000 annual average over 30 year period										
	Laboratory Analytical Testing \$ 1,000 annual average over 30 year period										
	Annual Inspection and Reporting to DEEP \$ 2,000 annual average over 30 year period										
	Estimated M&M Cost \$ 5,000 total per year avg. for 30 years										
Projected Totals		\$ 320,500	\$ 953,221	\$ 118,520	\$ 1,392,241						
5) Remedial Contingencies (+10%)											
		\$ 32,050	\$ 95,322	\$ 11,852	\$ 139,224						
Projected Totals With 10% Contingency		\$ 352,550	\$ 1,048,544	\$ 130,372	\$ 1,531,466						

Notes:

- Areas used to derive estimated soil volumes are shown on the figures. These areas are based on widely spaced environmental samples and limited PCB analyses. spaced environmental samples and a limited number of PCB analyses completed as part of a Phase II/III Environmental Site Assessment. Additional sampling would better determine the actual areas and depths of impacts from PCBs (non-point source) and other hazardous constituents.
- The unit cost for off-site disposal of contaminated soil includes loading, transportation, and disposal. A conversion factor of 1.5 tons per cubic yard was used. Transportation and disposal unit cost estimated are not based on competitive bidding.
- This is an estimate of possible remedial costs. Actual costs will vary, potentially significantly. This Consultant's opinion of probable remediation costs is made on the basis of professional judgment and experience. Significant data gaps may exist between known and actual conditions which can significantly affect cost. Therefore, no warranty has been expressed or should be implied.

TABLE 3
Estimated Remediation Costs To Completion: Removal of PCB Contaminated Soil Greater Than 10 ppm
Former Laviero Metals Site
894 Middle Street
Bristol, CT

Prepared by: Timothy Carr, LEP
Prepared for: Bristol Development Authority
Date Prepared: April 25, 2016 (rev. May 2017)

Objective and Primary Assumptions/Limitations

- Excavate and dispose off-site soils containing greater than 10 ppm of PCBs under a Risk-Based Clean-up approval from EPA.
- Estimate for wetlands mitigation is based on current knowledge (Task 2c). Additional remediation may be required to meet ecological risk standards.
- An ELUR would be required to specify industrial/commercial use for a large portion or the entire Site in perpetuity.

Task or Activity				Engineering/ Consulting	Contractors	Laboratory	Subtotal
1) Project Preparation							
a.	Bid specifications & pre-earthwork land survey			\$ 20,000	\$ 15,000	\$ -	\$ 35,000
b.	Risk-Based Cleanup Application, Remedial Action Plan, Public Notice, Permitting			\$ 25,000	\$ -	\$ -	\$ 25,000
c.	Engineered Control Variance Application - Parts 1 and 2			\$ -	\$ -	\$ -	\$ -
2) Remedial Earthwork							
a.	Clearing & grubbing, staging, earthwork*			\$ 50,000	\$ 350,000	\$ 5,000	\$ 405,000
* Assumes additional \$350,000 contribution from proposed developer.							
b.	Excavation and Off-Site Disposal of PCB Contaminated Soil						
	Type	Mass (tons)	Trans & Disposal Unit Cost (\$)	Subtotal			
	PCBs >30 ppm**	703	\$ 350 =	\$ 246,159			
	PCB 10 to 30 ppm	1,323	\$ 115 =	\$ 152,195			
				\$ 398,355			
** Transportation and disposal at \$350/ton as TSCA remediation waste							
c.	Wetlands Area Excavation and Mitigation			\$ 5,000	\$ 120,000	\$ 4,000	\$ 129,000
d.	Excavation and Off-Site Disposal of Petroleum & Metals Contaminated Soil (not co-mingled with PCB contaminated soils)						
	REC	Area (sf)	Depth (ft.)	Vol. (cy)			
	REC-1	2500	3	278			
	REC-2	2000	3	222			
	REC-3	750	7	194			
			694 cy =	972 tons (see Note 2)	\$ -	\$ 92,361	\$ -
Transportation and disposal at \$85/ton as Non-hazardous regulated waste (CRO5)							
e.	Remedial Verification Sampling and Reporting			\$ 25,000	\$ -	\$ 50,000	\$ 75,000
3) Post Remediation Groundwater Monitoring							
a.	Installation of Groundwater Monitoring Wells			\$ 5,000	\$ 25,000	\$ -	\$ 30,000
b.	Groundwater Sampling			\$ 20,000	\$ -	\$ 16,320	\$ 36,320
	12 Wells, Quarterly for 2 Years (96 samples) x \$300/well			\$ 7,500	\$ -	\$ 13,200	\$ 20,700
c.	Groundwater Annual Reporting (Two reports @ \$5,000/report)			\$ 10,000	\$ -	\$ -	\$ 10,000
4) Compliance Documents							
a.	Remedial Action Report			\$ 12,000	\$ -	\$ -	\$ 12,000
b.	A-2 Survey			\$ 3,000	\$ 10,000	\$ -	\$ 13,000
c.	Record Land Use Restriction (ELUR) - Engineering & Legal			\$ 3,000	\$ 15,000	\$ -	\$ 18,000
d.	Financial Assurance for Engineered Control Variance			\$ -	\$ -	\$ -	\$ -
Projected Totals				\$ 185,500	\$ 1,025,716	\$ 88,520	\$ 1,299,736
5) Remedial Contingencies (+10%)							
				\$ 18,550	\$ 102,572	\$ 8,852	\$ 129,974
Projected Totals With 10% Contingency				\$ 204,050	\$ 1,128,287	\$ 97,372	\$ 1,429,709

Notes:

- 1 Areas used to derive estimated soil volumes are shown on the figures. These areas are based on widely spaced environmental samples and limited PCB analyses. spaced environmental samples and a limited number of PCB analyses completed as part of a Phase II/III Environmental Site Assessment. Additional sampling would better determine the actual areas and depths of impacts from PCBs (non-point source) and other hazardous constituents.
- 2 The unit cost for off-site disposal of contaminated soil includes loading, transportation, and disposal. A conversion factor of 1.5 tons per cubic yard was used. Transportation and disposal unit cost estimated are not based on competitive bidding.
- 3 This is an estimate of possible remedial costs. Actual costs will vary, potentially significantly. This Consultant's opinion of probable remediation costs is made on the basis of professional judgment and experience. Significant data gaps may exist between known and actual conditions which can significantly affect cost. Therefore, no warranty has been expressed or should be implied.

TABLE 4A
Estimated Remediation Costs To Completion: Removal/Consolidation of PCB Contaminated Soil Greater Than 1 ppm
Former Laviero Metals Site
894 Middle Street
Bristol, CT

Prepared by: Timothy Carr, LEP
Prepared for: Bristol Development Authority
Date Prepared: April 25, 2016 (rev. May 2017)

Objective and Primary Assumptions/Limitations

- Excavate and dispose off-site soils containing greater than 10 ppm of PCBs under a Risk-Based Clean-up approval from EPA.
- Consolidate soils containing greater than 1 ppm and less than 10 ppm of PCBs on-site within a Soils Consolidation Area.
- Estimate for wetlands mitigation is based on current knowledge (Task 2d). Additional remediation may be required to meet ecological risk standards.
- An ELUR would be required to specify industrial/commercial use at a remote portion of the Site in perpetuity.

<u>Task or Activity</u>				Engineering/ Consulting	Contractors	Laboratory	Subtotal
1) Project Preparation							
a.	Bid specifications & pre-earthwork land survey			\$ 20,000	\$ 15,000	\$ -	\$ 35,000
b.	Remedial Action Plan, Public Notice, Permitting			\$ 25,000	\$ -	\$ -	\$ 25,000
c.	Engineered Control Variance Application - Parts 1 and 2			\$ -	\$ -	\$ -	\$ -
2) Remedial Earthwork							
a.	Clearing & grubbing, staging, and earthwork*			\$ 50,000	\$ 350,000	\$ 5,000	\$ 405,000
* Assumes additional \$350,000 contribution from proposed developer.							
b.	Excavation and Off-Site Disposal of PCB Contaminated Soil						
	Type	Mass (tons)	Trans & Disposal Unit Cost (\$)	Subtotal			
	PCBs >30 ppm **	703	\$ 350 =	\$ 246,159			
	PCB >10 ppm	1,323	\$ 115 =	\$ 152,195			
				\$ 398,355			
** Transportation and disposal at \$350/ton as TSCA remediation waste							
c.	Soils Consolidation Area Excavation and Replacement						
	Exc. 17,500 sf	\$ 20	cy =	350,000			
	Rep. 17,500 sf	\$ 10	cy =	175,000			
				\$ 525,000			
d.	Wetlands Area Excavation and Mitigation			\$ 5,000	\$ 120,000	\$ 4,000	\$ 129,000
e.	Excavation and Off-Site Disposal of Petroleum & Metals Contaminated Soil (not co-mingled with PCB contaminated soils)						
	REC	Area (sf)	Depth (ft.)	Vol. (cy)			
	REC-1	2500	3	278			
	REC-2	2000	3	222			
	REC-3	750	7	194			
			694 cy =	972 tons (see Note 2)	\$ -	\$ 92,361	\$ -
Transportation and disposal at \$85/ton as Non-hazardous regulated waste (CRO5)							
f.	Remedial Verification Sampling and Reporting			\$ 25,000	\$ -	\$ 50,000	\$ 75,000
3) Post Remediation Groundwater Monitoring							
a.	Installation of Groundwater Monitoring Wells			\$ 5,000	\$ 25,000	\$ -	\$ 30,000
b.	Groundwater Sampling			\$ 20,000	\$ -	\$ 16,320	\$ 36,320
	12 Wells, Quarterly for 2 Years (96 samples) x \$300/well			\$ 7,500	\$ -	\$ 13,200	\$ 20,700
c.	Groundwater Annual Reporting (Two reports @ \$5,000/report)			\$ 10,000	\$ -	\$ -	\$ 10,000
4) Compliance Documents							
a.	Remedial Action Report			\$ 12,000	\$ -	\$ -	\$ 12,000
b.	A-2 Survey			\$ 3,000	\$ 10,000	\$ -	\$ 13,000
c.	Record Land Use Restriction (ELUR) - Engineering & Legal			\$ 3,000	\$ 15,000	\$ -	\$ 18,000
d.	Financial Assurance for Engineered Control Variance			\$ -	\$ -	\$ -	\$ -
Projected Totals				\$ 195,500	\$ 1,550,716	\$ 96,020	\$ 1,842,236
5) Remedial Contingencies (+10%)				\$ 19,550	\$ 155,072	\$ 9,602	\$ 184,224
Projected Totals With 10% Contingency				\$ 215,050	\$ 1,705,787	\$ 105,622	\$ 2,026,459

Notes:

- 1 Areas used to derive estimated soil volumes are shown on the figures. These areas are based on widely spaced environmental samples and limited PCB analyses. spaced environmental samples and a limited number of PCB analyses completed as part of a Phase II/III Environmental Site Assessment. Additional sampling would better determine the actual areas and depths of impacts from PCBs (non-point source) and other hazardous constituents.
- 2 The unit cost for off-site disposal of contaminated soil includes loading, transportation, and disposal. A conversion factor of 1.5 tons per cubic yard was used. Transportation and disposal unit cost estimated are not based on competitive bidding.
- 3 This is an estimate of possible remedial costs. Actual costs will vary, potentially significantly. This Consultant's opinion of probable remediation costs is made on the basis of professional judgment and experience. Significant data gaps may exist between known and actual conditions which can significantly affect cost. Therefore, no warranty has been expressed or should be implied.

TABLE 4B
Estimated Remediation Costs To Completion: Removal of PCB Contaminated Soil Greater Than 1 ppm
Former Laviero Metals Site
894 Middle Street
Bristol, CT

Prepared by: Timothy Carr, LEP
Prepared for: Bristol Development Authority
Date Prepared: April 25, 2016 (rev. May 2017)

Objective and Primary Assumptions/Limitations

- Excavate and dispose off-site soils containing greater than 1 ppm of PCBs under a Risk-Based Clean-up approval from EPA.
- Estimate for wetlands mitigation is based on current knowledge (Task 2d). Additional remediation may be required to meet ecological risk standards.
- No ELUR or special permissions are required.

<u>Task or Activity</u>		Engineering/ Consulting	Contractors	Laboratory	Subtotal
1) Project Preparation					
a.	Bid specifications & pre-earthwork land survey	\$ 10,000	\$ 15,000	\$ -	\$ 25,000
b.	Remedial Action Plan, Public Notice, Permitting	\$ 20,000	\$ -	\$ -	\$ 20,000
c.	Engineered Control Variance Application - Parts 1 and 2	\$ -	\$ -	\$ -	\$ -
2) Remedial Earthwork					
a.	Clearing & grubbing, staging, and earthwork*	\$ 50,000	\$ 350,000	\$ 5,000	\$ 405,000
	* Assumes additional \$350,000 contribution from proposed developer.				
b.	Excavation and Off-Site Disposal of PCB Contaminated Soil				
	Trans & Disposal				
	Type Mass (tons) Unit Cost (\$)				
	PCBs >30 ppm ** 703 \$ 350 = \$ 246,159				
	PCB >1 ppm 15,126 \$ 115 = \$ 1,739,447				
					\$ 1,985,606
	** Transportation and disposal at \$350/ton as TSCA remediation waste				
c.	Wetlands Area Excavation and Mitigation	\$ 5,000	\$ 120,000	\$ 4,000	\$ 129,000
d.	Excavation and Off-Site Disposal of Petroleum & Metals Contaminated Soil (not co-mingled with PCB contaminated soils)				
	REC Area (sf) Depth (ft.) Vol. (cy)				
	REC-1 2500 3 278				
	REC-2 2000 3 222				
	REC-3 750 7 194				
			694 cy =	972 tons (see Note 2)	\$ -
	Transportation and disposal at \$85/ton as Non-hazardous regulated waste (CRO5)				
		\$ -	\$ 92,361	\$ -	\$ 92,361
e.	Remedial Verification Sampling and Reporting	\$ 25,000	\$ -	\$ 50,000	\$ 75,000
3) Post Remediation Groundwater Monitoring					
a.	Installation of Groundwater Monitoring Wells	\$ 5,000	\$ 25,000	\$ -	\$ 30,000
b.	Groundwater Sampling	\$ 20,000	\$ -	\$ 16,320	\$ 36,320
	12 Wells, Quarterly for 2 Years (96 samples) x \$300/well	\$ 7,500	\$ -	\$ 13,200	\$ 20,700
c.	Groundwater Annual Reporting (Two reports @ \$5,000/report)	\$ 10,000	\$ -	\$ -	\$ 10,000
4) Compliance Documents					
a.	Remedial Action Report	\$ 12,000	\$ -	\$ -	\$ 12,000
b.	A-2 Survey	\$ -	\$ -	\$ -	\$ -
c.	Record Land Use Restriction (ELUR) - Engineering & Legal	\$ -	\$ -	\$ -	\$ -
d.	Financial Assurance for Engineered Control Variance	\$ -	\$ -	\$ -	\$ -
Projected Totals		\$ 164,500	\$ 2,587,967	\$ 88,520	\$ 2,840,987
5) Remedial Contingencies (+10%)		\$ 16,450	\$ 258,797	\$ 8,852	\$ 284,099
Projected Totals With 10% Contingency		\$ 180,950	\$ 2,846,764	\$ 97,372	\$ 3,125,086

Notes:

- 1 Areas used to derive estimated soil volumes are shown on the figures. These areas are based on widely spaced environmental samples and limited PCB analyses. spaced environmental samples and a limited number of PCB analyses completed as part of a Phase II/III Environmental Site Assessment. Additional sampling would better determine the actual areas and depths of impacts from PCBs (non-point source) and other hazardous constituents.
- 2 The unit cost for off-site disposal of contaminated soil includes loading, transportation, and disposal. A conversion factor of 1.5 tons per cubic yard was used. Transportation and disposal unit cost estimated are not based on competitive bidding.
- 3 This is an estimate of possible remedial costs. Actual costs will vary, potentially significantly. This Consultant's opinion of probable remediation costs is made on the basis of professional judgment and experience. Significant data gaps may exist between known and actual conditions which can significantly affect cost. Therefore, no warranty has been expressed or should be implied.

APPENDIX 6
DECONTAMINATION & VERIFICATION SAMPLING
STANDARD OPERATING PROCEDURES

STANDARD OPERATING PROCEDURE

DECONTAMINATION OF PCB SURFACES

OBJECTIVE

To describe the procedures to be followed when decontaminating materials and equipment generated during routine PCB sampling, remediation and/or handling activities. This Standard Operating Procedure (SOP) was developed to ensure that decontamination is conducted in compliance with applicable Toxic Substances Control Act (TSCA) requirements. Additionally, if decontamination is performed properly, materials and equipment can, in some instances, be re-used. This SOP provides procedures for the decontamination of the following re-usable items that could be generated during PCB remediation activities: (1) sampling or remediation equipment or tools; (2) personal protective equipment (PPE); (3) vehicles and heavy equipment used for the loading and removal of PCB remediation waste; and (4) containers used to transport PCB remediation waste on-site. This SOP also specifies decontamination methods, cleanup levels, and disposal methods for materials generated during decontamination activities.

DECONTAMINATE OR DISPOSE

- Cleanup materials generated during PCB remediation waste activities must either be decontaminated in accordance with TSCA and this SOP, or shipped to a TSCA-approved facility for proper disposal.
- TSCA defines two types of decontamination: measurement-based decontamination and self-implementing decontamination. The type of decontamination chosen depends on the material to be decontaminated. The following sections describe the requirements for each.

DECONTAMINATION METHODS

Measurement-based decontamination involves decontaminating materials and then sampling or measuring the decontaminated materials to ensure that remaining PCB levels comply with levels specified in the regulations. Self-implementing decontamination (as opposed to measurement based decontamination) means using specific decontamination procedures specified in the regulations. The following decontamination methods can be used to decontaminate liquids, concrete, or non-porous surfaces:

- Chopping (including wire chopping);
- Distilling;
- Filtering;
- Oil/Water Separation;
- Spraying;
- Soaking;
- Wiping;
- Stripping of insulation;
- Scraping;
- Scarification; and
- Use of abrasives or solvents.

Table 1 describes the decontamination standards for measurement-based and self-implementing decontamination methods, organized by type of material to be decontaminated.

TABLE 1. DECONTAMINATION METHODS

TYPE OF MATERIAL	SPECIFIC MATERIAL TO BE DECONTAMINATED	DECONTAMINATION METHOD	TSCA DECONTAMINATION LEVEL
Water and Liquids	Water for non-contact use in a closed system where there are no releases.	One of the methods described in Section 5.1	<200 micrograms per liter (µg/L or ppb) PCBs (see 40 CFR §761.79(b)(1))
	Water discharged to treatment works or to navigable waters	One of the methods described in Section 5.1	< 3 ppb PCBs, or a PCB discharge limit specified in a NPDES permit (see 40 CFR §761.79(b)(1))
	Water for unrestricted use	One of the methods described in Section 5.1	< 0.5 ppb (µg/L) PCBs (see 40 CFR §761.79(b)(2))
	Organic liquids and non-aqueous liquids containing PCBs	One of the methods described in Section 5.1	< 2 milligrams per liter (mg/L or ppm) PCBs (see 40 CFR §761.79(b)(2))
Non-Porous Surfaces	Non-porous surfaces previously in contact with liquid PCBs at any concentration where no free-flowing liquids are currently present	One of the methods described in Section 5.1	≤ 10 micrograms per 100 square centimeters (µg/100 cm ²) PCBs (see 40 CFR §761.79(b)(3)(i)(A)) Must be sampled and measured in accordance with specific TSCA requirements
	Non-porous surfaces in contact with non-liquid PCBs (including non-porous surfaces covered with a porous surface, such as paint or coating on metal)	One of the methods described in Section 5.1	Cleaning to the National Association of Corrosion Engineers' (NACE) Visual Standard No. 2, Near-White Blast Cleaned Surface Finish. Compliance with standard No. 2 must be verified by visually inspecting all cleaned areas. (see 40 CFR §761.79(b)(3)(i)(B))
Porous Surfaces	Concrete if decontamination is commenced within 72 hours of the initial spill of PCBs to the concrete	One of the methods described in Section 5.1	≤ 10 µg/100 cm ² as measured by a standard wipe test (see 40 CFR §761.123)
	Porous surface other than concrete where decontamination is commenced within 72 hours of the spill; and non-porous surfaces covered with a porous surface	Obtain an alternative decontamination approval (see 40 CFR §761.79 (h))	

TYPE OF MATERIAL	SPECIFIC MATERIAL TO BE DECONTAMINATED	DECONTAMINATION METHOD	TSCA DECONTAMINATION LEVEL
PCB Container	PCB Container	Flush the internal surface of the container three times with a solvent containing <500 ppm PCBs. Each rinse must use a volume of the flushing solvent equal to approximately 10% of the capacity of the PCB container. In other words, if you are rinsing out a 55-gallon drum, you must rinse three times and use at least 5.5 gallons of solvent during each rinse	Self-implementing (see 40 CFR §761.79(c)(1))
Equipment, Tools, Etc.	Movable equipment, tools, and sampling equipment that is contaminated with PCBs	Use one of the following methods: 1. Swabbing surfaces that have contacted PCBs with a solvent; 2. Double wash/rinse per 40 CFR §761 Subpart S; or 3. Another applicable decontamination procedure specified in the regulations (e.g. NACE Visual Standard No. 2, Near-White Blast Cleaned Surface Finish).	Self-implementing (see 40 CFR §761.79(c)(2))

SUMMARY OF 40 CFR SUBPART S – DOUBLE WASH/RINSE METHOD FOR DECONTAMINATING NON-POROUS SURFACES

- This procedure is for effectively removing PCBs from **Non-Porous Surfaces**
- This procedure includes two washing steps and two rinsing steps. The type of step used depends on whether the contaminated surface was relatively clean prior to the release or whether the surface was coated or covered with dust, dirt, grime, grease, or another absorbent material.
- Cleanup equipment used must consist of scrubbers and absorbent pads that meet the following criteria:
 - they are not dissolved by the solvents or cleaners used;
 - they do not shred, crumble, or leave visible fragments on the surface;
 - scrubbers and absorbent pads used to wash contaminated surfaces must not be reused;
 - if they are used for rinsing, they must not contain ≥ 2 ppm PCBs;
 - if they are used in the second rinse of contaminated surfaces, they may be reused to wash contaminated surfaces.

Table 2 describes the double-wash/rinse procedure for surfaces that do not appear dusty or grimy before a spill, such as glass, automobile surfaces, newly-poured concrete, and desk tops.

TABLE 2. DOUBLE WASH/RINSE PROCEDURE FOR “CLEAN” SURFACES

STEP	PROCEDURE	NOTES
Pre-Cleaning the Surface	Thoroughly wipe or mop the entire surface with absorbent paper or cloth until no liquid is visible on the surface.	Pre-cleaning is only necessary if PCB-containing liquid is visible on the surface to be cleaned.
First Wash	1. Cover the entire surface with organic solvent (in which PCBs are soluble to at least 5% by weight). 2. Scrub rough surfaces with a scrub brush or disposable scrubbing pad and solvent such that each 900 cm² (1 square foot) of the surface is always very wet for 1 minute. 3. Wipe smooth surfaces with a solvent-soaked, disposable absorbent pad such that each 900 cm² (1 ft²) is wiped for 1 minute. Any surface < 1 ft² must also be wiped for 1 minute. 4. Wipe, mop, and/or sorb the solvent onto absorbent material until no visible traces of the solvent remain.	Ensure that any runoff solvent is collected for proper disposal.
First Rinse	1. Wet the surface with clean rinse solvent such that the entire surface is very wet for 1 minute. 2. Wipe the residual solvent off the drained surface using a clean, disposable absorbent pad until no liquid is visible on the surface.	Ensure that solvent from the surface is drained and contained.
Second Wash	Repeat the wash (described above).	The rinse solvent from the first rinse (above) may be used.
Second Rinse	Repeat the rinse (described above).	

Table 3 describes the double-wash/rinse procedure for surfaces coated or covered with dust, dirt, grime, grease, or another absorbent material.

TABLE 3. DOUBLE WASH/RINSE PROCEDURE FOR “DIRTY” SURFACES

Step	Procedure	Notes
Pre-Cleaning the Surface	Thoroughly wipe or mop the entire surface with absorbent paper or cloth until no liquid is visible on the surface.	Pre-cleaning is only necessary if PCB-containing liquid is visible on the surface to be cleaned.
First Wash	1. Cover the entire surface with concentrated or industrial strength detergent or non-ionic surfactant solution. 2. Scrub rough surfaces with a scrub brush or scrubbing pad, adding cleaning solution such that the surface is always very wet (each 900 cm ² (1 ft ²) is washed for 1 minute. 3. Wipe smooth surfaces with a cleaning solution-soaked dis-posable absorbent pad such that each 900 cm ² (1 ft ²) is wiped for 1 minute. Wash any surface < 1 ft ² for 1 minute. 4. Mop up or absorb the residual cleaner solution and suds with a clean, disposable absorbent pad until the surface appears dry. This cleaning should remove any residual dirt, dust, grime, or other absorbent materials left on the surface during the first wash.	Ensure that all cleaning solutions are contained and collected for proper disposal.
First Rinse	1. Rinse off the wash solution with 1 gallon of clean water per square foot and capture the rinse water. 2. Mop up the wet surface with a clean, disposable, absorbent pad until the surface appears dry.	
Second Wash	Follow the procedure for the First Wash described in Table 2, above.	
Second Rinse	Follow the procedure for the First Rinse described in Table 2, above.	

- All solvents and cleaners must be captured for reuse, decontamination, or proper disposal. Clean organic solvents contain < 2 ppm PCBs, and clean water contains < 3 ppb PCBs. A solvent may be reused provided its PCB concentration is < 50 ppm. Solvents for reuse must be stored in accordance with 40 CFR § 761.35.
- Equipment used in the double wash/rinse procedures can be reused or decontaminated. Decontamination should follow TSCA procedures (as described in this SOP). Equipment for reuse must be stored in accordance with 40 CFR § 761.35.
- Equipment, solvents, cleaners, and absorbent materials stored for disposal must be stored in accordance with 40 C.F.R § 761.65.

USING SOLVENTS FOR DECONTAMINATION

The solubility of PCBs in any solvent used for decontamination must be 5% or more by weight. Solvents can be re-used for PCB decontamination provided the concentration of PCBs in the solvent is < 50 ppm.

ALTERNATIVE DECONTAMINATION METHODS

If other decontamination methods are used, prior approval must be obtained from EPA Region 1. A written application must describe the material to be decontaminated and the proposed

decontamination method, and must demonstrate that the proposed method is capable of decontaminating the material to TSCA levels. Interactions and communications with personnel at EPA Region 1 should only be done by the EHS Manager.

EPA may request additional information necessary to evaluate the alternative decontamination method. EPA will then issue a written decision indicating if the proposed method is acceptable.

MANAGEMENT OF DECONTAMINATION WASTES AND RESIDUES

Wastes and residues generated during PCB decontamination activities must be managed in accordance with specific requirements. Table 4 summarizes the management and disposal requirements for decontamination wastes. As specified in SOP E-1, Waste Characterization and Disposal, the EHS Manager is responsible for approving all waste profiles and for properly characterizing all waste streams in accordance with applicable federal, state, and local requirements.

TABLE 4. DISPOSAL OF DECONTAMINATION WASTES AND RESIDUES

DECONTAMINATION WASTE/RESIDUE	MANAGEMENT/DISPOSAL
All decontamination wastes and residues.	Disposal method depends on the existing PCB concentration of the waste.
Distillation bottoms or residues and filter media.	Regulated for disposal as PCB Remediation Waste.
PCBs physically separated from regulated waste during chopping, shredding, scraping, abrading, or oil/water separation, as opposed to solvent rinsing and soaking.	Regulated for disposal at their original concentration.
Hydrocarbon solvent used or reused for decontamination that contains <50 ppm PCBs.	Must be burned and marketed in accordance with the requirements for used oil per 40 CFR § 761.20(e), disposed in accordance with 40 CFR § 761.60(a) or (e), or decontaminated.
Chlorinated solvent at any PCB concentration used for decontamination.	Must be disposed of in an incinerator operating in compliance with 40 CFR §761.70 or decontaminated.
Other solvents ≥ 50 ppm PCBs.	Must be disposed of in accordance with 40 CFR § 761.60(a) or de-contaminated.
Non-liquid cleaning materials and PPE at any PCB concentration, including non-porous sur-faces and other non-liquid materials such as rags, gloves, booties, other disposable PPE, and similar materials resulting from decontamination.	Must be decontaminated or disposed of at: 1. A facility permitted, licensed, or registered by a State to manage municipal solid waste subject to 40 CFR Part 258. 2. A facility permitted, licensed, or registered by a State to manage non-municipal non-hazardous waste subject to 40 CFR § 257.5 through 257.30. 3. A permitted hazardous waste landfill. 4. An approved PCB disposal facility.

EXPOSURE AND RELEASES

Persons conducting PCB decontamination activities must: (1) take the necessary actions to prevent releases to the environment from the decontamination area; and (2) wear or use protective clothing or equipment to protect against dermal contact or inhalation of PCBs or materials containing PCBs.

SELECTED REGULATIONS

The following is a list of portions of 40 CFR Part 761 (Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions) that pertain to PCB decontamination requirements:

- § 761.3 Definitions
- § 761.61 PCB remediation waste
- § 761.79 Decontamination standards and procedures
- Subpart P—Sampling Non-Porous Surfaces for Measurement-Based Use, Reuse, and On-Site or Off-Site Disposal Under §761.61(a)(6) and Decontamination Under §761.79(b)(3)
- Subpart Q—Self-Implementing Alternative Extraction and Chemical Analysis Procedures for Non-liquid
PCB Remediation Waste Samples
- Subpart R—Sampling Non-Liquid, Non-Metal PCB Bulk Product Waste for Purposes of Characterization for PCB Disposal in Accordance With §761.62, and Sampling PCB Remediation Waste Destined for Off-Site Disposal, in Accordance With §761.61
- Subpart S—Double Wash/Rinse Method for Decontaminating Non-Porous Surfaces

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Region 1

5 Post Office Square, Suite 100

Boston, MA 02109-3912



**STANDARD OPERATING PROCEDURE FOR SAMPLING POROUS
SURFACES FOR POLYCHLORINATED BIPHENYLS (PCBs)**

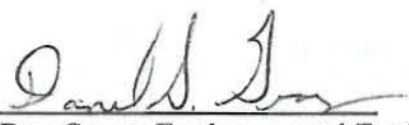
May 2011



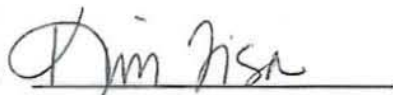
SDMS DocID 484692

**STANDARD OPERATING PROCEDURE
FOR SAMPLING POROUS SURFACES
FOR POLYCHLORINATED BIPHENYLS (PCBs)**

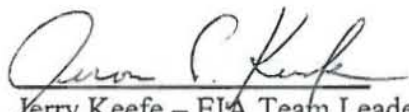
**The Office of Environmental Measurement and Evaluation
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5/23/11
Date

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Attachments:

Example of Custody Seal and Sample Label

Example of Chain of Custody Form

1.0 Scope and Application

- 1.1 This Standard Operating Procedure (SOP) is suitable for collection of a porous matrix sample for analysis of Polychlorinated Biphenyls (PCBs).
- 1.2 This SOP describes sampling techniques for both hard and soft porous surfaces.
 - 1.2.1 Hard surfaces, and most soft surfaces, can be sampled using an impact hammer drill to generate a uniform, finely ground, powder to be extracted and analyzed for PCBs. This procedure is primarily geared at providing enough sample quantity for two analyses. Hard porous surfaces include concrete, brick, asphalt, cement, sandstone, limestone, unglazed ceramics, and other possible PCB suspected material. This procedure may also be used on other softer porous surfaces, such as wood.
 - 1.2.2 Soft surfaces can be sampled using a chisel or sharp knife to generate a representative sample to be extracted and analyzed for PCBs. Soft porous surfaces include wood, wall plasterboard, low density plastics, rubber, caulking, and other PCB suspected material.
- 1.3 This SOP provides for collection of surface samples (0 – 0.5 inches) and delineation of PCB contamination throughout the core of the porous surface. The procedure can be used to sample the porous surface at distinctly different depth zones.

2.0 Method Summary

A one-inch or other sized diameter carbide drill bit is used in a rotary impact hammer drill to generate a fine powder, or other representative sample, suitable for extraction and analysis of PCBs from porous surfaces. This method also allows the use of chisels or knives for the collection of samples from soft porous surfaces for PCB analysis.

3.0 Definitions

- 3.1 Field/Bottle Blank: A sample container of the same lot as the containers used for the environmental samples. This evaluates PCB contamination introduced from the sample container(s) from a common lot.
- 3.2 Equipment/Rinse/Rinsate Blanks: A sample that is collected by pouring hexane over the sample collection equipment after decontamination and before sample collection. The sample is collected in the appropriate sample container identical to the sample containers. This represents background contamination resulting from the field equipment, sampling procedure, sample container, and shipment.

- 3.3 Field Replicates/Duplicates: Two or more samples collected at the same sampling location. Field replicates should be samples collected side by side. Field replicates represent the precision of the whole method, site heterogeneity, field sampling, and the laboratory analysis.
- 3.4 Field Split Samples: Two or more representative subsamples taken from one environmental sample in the field. Prior to splitting, the environmental sample is homogenized to correct for sample heterogeneity that would adversely impact data comparability. Field split samples are usually analyzed by different laboratories (interlaboratory comparison) or by the same laboratory (intralaboratory comparison). Field splits are used to assess sample handling procedures from field to laboratory and laboratory comparability.
- 3.5 Laboratory Quality Samples: Additional samples that will be collected for the laboratory's quality control program: matrix spike, matrix spike duplicate, laboratory duplicates, etc.
- 3.6 Proficiency Testing (PT)/Performance Evaluation (PE) Sample: A sample, the composition of which is unknown to the laboratory or analyst, provided to the analyst or laboratory to assess the capability to produce results within acceptable criteria. This is optional depending on the data quality objectives. If possible, it is recommended that the PE sample be of similar matrix as the porous surface(s) being sampled.
- 3.7 Porous Surface: Any surface that allows PCBs to penetrate or pass into itself including, but not limited to, paint or coating on metal; corroded metal; fibrous glass or glass wool; unglazed ceramics; ceramics with porous glaze; porous building stone such as sandstone, travertine, limestone, or coral rock; low density plastics such as Styrofoam and low density polyethylene; coated (varnished or painted) or uncoated wood; painted or unpainted concrete or cement; plaster; plasterboard; wallboard; rubber; caulking; fiberboard; chipboard; asphalt; or tar paper.
- 3.8 Shipping Container Temperature Blank: A water sample that is transported to the laboratory to measure the temperature of the samples in the cooler.
- 4.0 Health and Safety**
- 4.1 Eye, respiratory, and hearing protection are required at all times during sample drilling. A properly fitted respirator is required for hard porous surface sampling. A respirator is recommended whenever there is a risk of inhalation of either particulate or volatilized PCBs during sampling.
- 4.2 All proper personal protection clothing and equipment must be worn.

4.3 When working with potentially hazardous materials or situations, follow EPA, OSHA, and specific health or safety procedures.

4.4 Care must be exercised when using an electrical drill and sharp cutting objects.

5.0 Interferences and Potential Problems

5.1 This sampling technique produces a finely ground uniform powder, which minimizes the physical matrix effects from variations in the sample consistency (i.e., particle size, uniformity, homogeneity, and surface condition). Matrix spike analysis of a sample is highly recommended to monitor for any matrix related interferences.

5.2 Nitrile gloves are recommended. Latex gloves must not be used due to possible phthalate contamination.

5.3 Interferences may result from using contaminated equipment, solvents, reagents, sample containers, or sampling in a disturbed area. The drill bit must be decontaminated between samples. (see Section 11.0.)

5.4 Cross contamination problems can be eliminated or minimized through the use of dedicated sampling equipment.

6.0 Personnel Qualifications

6.1 All field samplers working at hazardous materials/waste sites are required to take a 40 hour health and safety training course prior to engaging in any field activities. Subsequently, an 8 hour refresher health and safety course is required annually.

6.2 The field sampler should be trained by an experienced sampler before initiating this procedure.

6.3 All personnel shall be responsible for complying with all quality assurance/quality control requirements that pertain to their organizational/technical function.

7.0 Equipment and Supplies

7.1 This list varies with the matrix and if depth profiling is required

- Rotary impact hammer variable speed drill
- 1-inch or other suitable (1/2, 3/4, etc.) diameter carbide tip drill bits
- Steel chisel or sharp cutting knife, and hammer
- Brush and cloths to clean area
- Stainless steel scoopulas

Aluminum foil to collect the powder sample
1 quart Cubitainer with the top cut out to collect the powder sample
Aluminum weighing pans to collect the powder sample
Cleaned glass container (2 oz or 40 mL) with Teflon lined cap
Decontamination supplies: hexane, two small buckets, a scrub brush, detergent, deionized water, hexane squirt bottle, and paper towels
Dedicated vacuum cleaner with a disposable filter or a vacuum pump with a dust filter
Polyethylene tubing and Pasteur pipettes
Sample tags/labels, custody seals, and Chain-of-Custody form

8.0 Sampling Design

8.1 A sufficient number of samples must be collected to meet the data quality objectives of the project. If the source of the PCB contamination is regulated under the federal TSCA PCB Regulations at 40 CFR Part 761, the sampler should insure that the sampling design is sufficient to meet any investigation or verification sampling requirements. At a minimum, the following is recommended:

8.1.1 Suspected stained area (s) should be sampled.

8.1.2 At each separate location, collect at least 3 samples of each type of porous surface, regardless of the amount of each type of porous surface present.

8.1.3 In areas where PCB equipment was used or where PCBs were stored, samples should be collected at a frequency of 1 sample/100 square feet (ft²).

9.0 Sample Collection

9.1 Hard Porous Surfaces

9.1.1 Lock a 1-inch or another size diameter carbide drill bit into the impact hammer drill and plug the drill into an appropriate power source. For easy identification, sample locations may be pre-marked using a marker or paint. (Note: the actual drilling point must not be marked.) Remove any debris with a clean brush or cloth prior to drilling. All sampling decisions of this nature should be noted in the sampling logbook.

9.1.2 Use a Cubitainer with the top cut off or aluminum foil to contain the powdered sample. Begin drilling in the designated location. Apply steady even pressure and let the drill do the work. Applying too much pressure will generate excessive heat and dull the drill bit prematurely. The drill will provide a finely ground powder that can be easily collected.

- 9.1.3 Samples should be collected at 1/2-inch depth intervals. Thus, the initial surface sample should be collected from 0 – 0.5 inches. A 1/2-inch deep hole generates about 10 grams (20 mL) of powder. Multiple holes located closely adjacent to each other, may be needed to generate sufficient sample volumes for a PCB determination. It is strongly recommended that the analytical laboratory be consulted on the minimum sample size needed for PCB extraction and analysis.
- 9.1.4 Wall and Ceiling Sampling: A team of two samplers will be required for wall and ceiling sampling. The second person will hold a clean catch surface (e.g. an aluminum pan) below the drill to collect the falling powder. Alternatively, use the chuck-end of the drill bit and punch a hole through the center of the collection pan. The drill bit is then mounted through the pan and into the drill. For ceilings, the drill may be held at an angle to collect the powder. Thus the driller can be drilling at an angle while the assistant steadies the pan to catch the falling powder. As a precaution, it may be advantageous to tape a piece of plastic around the drill, just below the chuck, to avoid dust contaminating the body of the drill and entering the drill's cooling vents. Caution must be taken to prevent obstruction of the drill's cooling vents.

9.2 Soft Porous Surfaces

- 9.2.1 The procedure for the hard porous surface may be used for certain soft porous surfaces, such as wood.
- 9.2.2 Samples should be collected at no more than 1/2-inch depth intervals using a metal chisel or sharp cutting knife. Thus, the initial surface sample should be collected from 0 – 0.5 inches. It is important to collect at least 10 grams for analysis.
- 9.2.3 For soft porous surfaces, such as caulking and rubber, a representative sample can be collected using a metal chisel or sharp cutting knife.

9.3 Multiple Depth Sampling

- 9.3.1 Multiple Depth Sampling may not be applicable to certain porous surfaces, such as caulking.
- 9.3.2 Collect the surface sample as outlined in Section 9.1 or 9.2.
- 9.3.3 Use the vacuum pump or cleaner to clean out the hole.
- 9.3.4 To collect multiple depths there are two options.

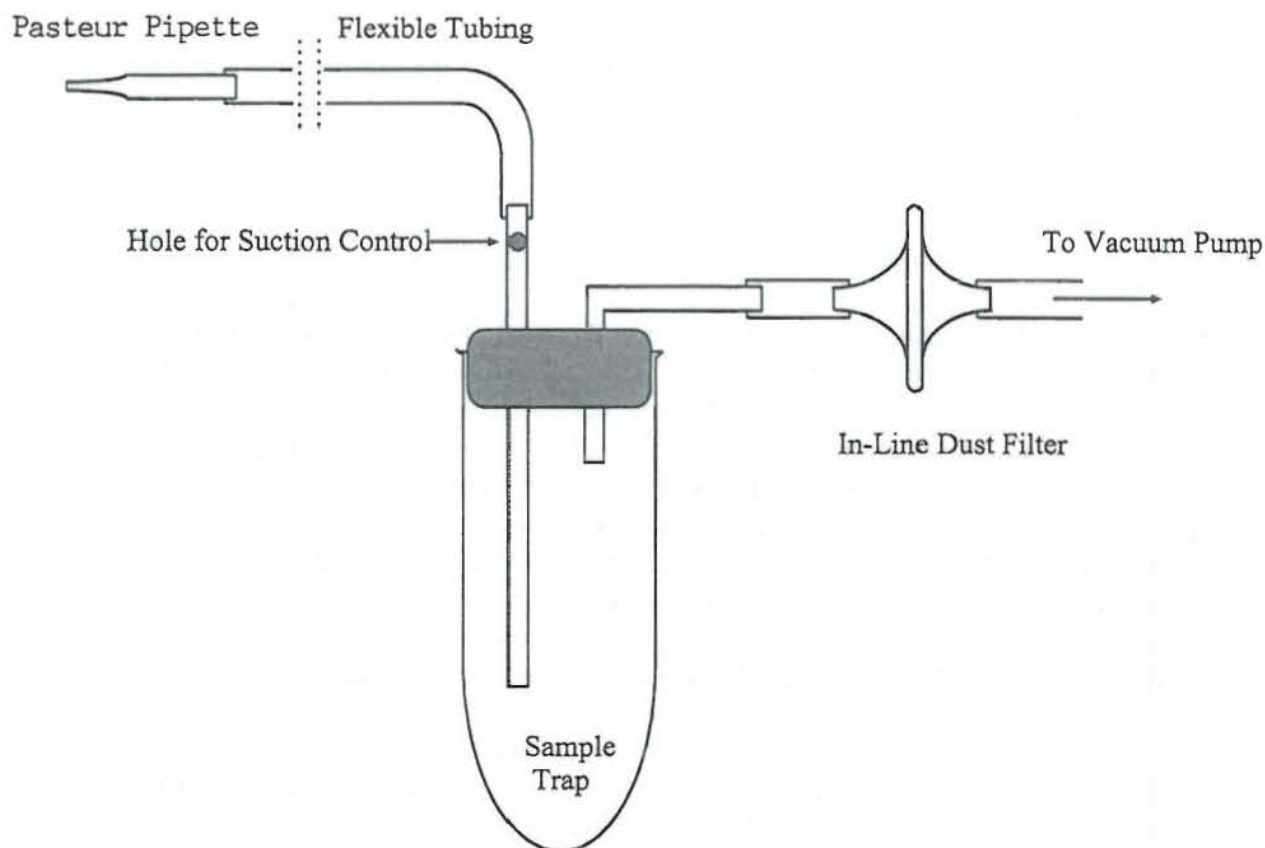
9.3.4.1 Option one: drill sequentially ½-inch increments with the 1 inch drill.

9.3.4.2 Option two: drill with the 1 inch bit and either make the hole larger or use a smaller bit to take the next ½- inch sample.

9.3.5 A stainless steel scoopula will make it easier to collect the sample from the bottom of the hole.

9.4 Vacuum Trap Design and Clean-out

The trap presented in Figure 1 is a convenient and thorough way for collecting and removing concrete powder from drilled holes. The trap system is designed to allow for control of the suction from the vacuum pump and easy trap clean-out between samples. Note, by placing a hole in the inlet tube (see Figure 1), a finger on the hand holding the trap can be used to control the suction at the sampling tip. Thus, when this hole is left completely open, there will be no suction, and the sampler can have complete control over where and what to sample. To change-out between samples the following steps should be taken: 1) the Pasteur pipette and piece of polyethylene tubing at the sample inlet should be replaced with new materials, 2) the portion of the rubber stopper and glass tubing that was in the trap should be wiped down with a clean damp paper towel (wetted with deionized water) and then dried with a fresh paper towel, 3) a clean pipe cleaner should be drawn through the glass inlet tube to remove any concrete dust present, and 4) the glass tube or flask used to collect the sample should be swapped out with a clean decontaminated sample trap. Having several clean tubes or flasks on hand will facilitate change-out between samples.

Figure 1

Note: the holes should be vacuumed thoroughly to minimize any cross-contamination between sample depths and the bits should be decontaminated between samples. (See Section 11.0)

10.0 Sample Handling, Preservation, and Storage

- 10.1 Samples must be collected in glass containers for PCB analyses. In general, a 2-ounce sample container with a Teflon-lined cap (wide-mouth jars are preferred) will hold sufficient mass for most analyses. A 2-ounce jar can hold roughly 90 grams of sample.
- 10.2 Samples are to be shipped refrigerated and maintained at $\leq 6^{\circ}\text{C}$ until the time of extraction and analysis.
- 10.3 The suggested holding time for PCB samples is 14 days to extraction.

11.0 Decontamination

- 11.1 Assemble two decontamination buckets. The first bucket contains a detergent and potable water solution, and the second bucket is for rinsate. Place all used drill bits, hose for the vacuum cleaner, and utensils in the detergent and water bucket. Scrub each piece thoroughly using the scrub brush. Note, the powder does cling to the metal surfaces, so care should be taken during this step, especially with the twists and curves of the drill bits. Next, rinse each piece with water and hexane. Place the rinsed pieces on clean paper towels and individually dry and inspect each piece. Note: all pieces should be dry prior to reuse.
- 11.2 Lightly contaminated drill bits and utensils may be wiped with a hexane soaked cloth and hexane rinsed for decontamination.

12.0 Data and Record Management

- 12.1 All data and information collection should follow a Field Data Management SOP or Quality Assurance Project Plan (QAPP).
- 12.2 Follow the chain of custody procedures to release the samples to the laboratory. A copy is kept with the sampling records.
- 12.3 The field data is stored for at least 3 years.

13.0 Quality Control and Quality Assurance

- 13.1 Representative samples are required. The sampler will evaluate the site specific conditions to assure the sample will be representative.
- 13.2 All sampling equipment must be decontaminated prior to use and between each discrete sample.
- 13.3 All field Quality Control (QC) sample requirements in a Sample and Analysis Plan (SAP) or QAPP must be followed. The SAP or QAPP may involve field blanks, equipment blanks, field duplicates and/or the collection of extra samples for the laboratory's quality control program.
- 13.4 Field duplicates should be collected at a minimum frequency of 1 per 20 samples or 1 per non-related porous matrix, whichever is greater.

14.0 Waste Management and Pollution Prevention

- 14.1 During field sampling events there may be PCB and/or hazardous waste produced from the sample collection. The waste must be handled and disposed of in accordance with federal, state, and local regulations. The dust filter, and tubing if a vacuum pump is used, is disposed after each site investigation. This waste will be treated as PCB waste if the samples are positive for PCBs. It may be possible to manage or dispose of the waste produced at the site where the work was performed. If the site does not meet regulatory requirements for these types of activities, the waste must be transported to a facility permitted to manage and/or dispose of the waste.

15.0 References

1. Guidance for the Preparation of Standard Operating Procedures for Quality-Related Operations, QA/G-6, EPA/600/R-96/027, November 1995.
2. 40 CFR Part 761 – Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution In Commerce, and Use Prohibitions
3. Sample Container and Holding Time: RCRA SW 846, Chapter 4, Table 4.1, Revision 4, February, 2007.

Example of Sample Label and Custody Seal

U.S. ENVIRONMENTAL PROTECTION AGENCY – REGION I BOSTON, MASS.	
LABEL	NAME OF UNIT AND ADDRESS ENVIRONMENTAL SERVICES DIVISION 60 WESTVIEW STREET LEXINGTON, MASSACHUSETTS 02173
	DATE: YR/MO/DAY
SAMPLE	TIME
	STATION NO.
	SAMPLE NO.
	SUB NO.
	PRESERVATIVE
	AMOUNT
SOURCE OF SAMPLE	
ANALYSIS	
SAMPLING CREW (FIRST, INITIAL, LAST NAME)	

 UNITED STATES ENVIRONMENTAL PROTECTION AGENCY OFFICIAL SAMPLE SEAL	SAMPLE NO.	DATE
	SIGNATURE	
	PRINT NAME AND TITLE (Inspector, Analyst or Technician)	
SEAL BROKEN BY		DATE

EPA FORM 7500-2 (R7-75)



REGION 1
ENVIRONMENTAL PROTECTION AGENCY

CHAIN OF CUSTODY RECORD

[illegible]

Distribution: Original Accompanies Shipment; Copy to Coordinator Field Files

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