SOIL CHARACTERIZATION INVESTIGATION REPORT

Merchant's Row Redevelopment Project
Barre, Vermont 05641

Prepared for:

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VHB Project No. 58341.00

August 2019

Prepared by:

This project was funding in part by a Municipal Planning Grant, administered by the Department of Housing and Community Development.

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CERTIFICATION

This Soil Characterization Investigation Report was prepared under my direction and describes investigation activities performed in support of the Merchant's Row Redevelopment Project, located in Barre, Vermont.

The investigation was conducted in accordance with VHB's *Work Plan for Soil Characterization Assessment* dated April 17, 2019 (the Work Plan). The Work Plan was reviewed by the Vermont Department of Environmental Conservation (VTDEC) prior to the investigation.

I certify under penalty of perjury that I am an environmental professional and that all content contained within this deliverable is to the best of my knowledge true and correct.

By: _____ Date: __08/23/2019_____
Kurt Muller, Vermont P.E. #74407
Senior Environmental Engineer
VHB

EXECUTIVE SUMMARY

VHB (formerly The Johnson Company or "JCO") was retained by The City of Barre (The City) of Barre, Vermont (BPRW) to perform a supplemental soil characterization investigation at the location of the Merchant's Row Redevelopment Project (the Project area) in Barre, Vermont. The Project area is approximately 2.5acres comprised of portions of multiple parcels and is currently used as a parking lot and associated driveways. The Project area is bound to the east and northeast by buildings along North Main Street, to the northwest by Depot Square, to the south by Prospect Street, and to the southwest by a railroad corridor. The latitude/longitude of the center of the Project area is [44.197648°, -72.502903°]. Historical use of Merchant's Row and adjacent properties include many commercial and industrial enterprises such as, granite manufacturers, automotive service stations, dry cleaners, and a manufactured gas plant. The current property owner (The City) is interested in redeveloping the existing parking area and associated driveways.

The specific objectives of this soil investigation were to provide the City with data regarding the presence, or lack thereof, of soil impacts at the Project area in order to identify any potential exposure risk to construction workers and the populace of Barre and to ascertain appropriate strategies for the management of soil generated during construction. This investigation focused on evaluating soils that were not previously characterized in areas that are most likely to be disturbed in the Project area. Furthermore, this investigation was not intended to determine the full nature and extent of potential impacts to soil or other media, nor was it intended to entirely satisfy the pre-approval requirements for all soil that may be proposed for offsite disposal at a certified landfill.

The investigation was performed in accordance with VHB's *Work Plan for Soil Characterization Assessment* dated April 17, 2019 (the Work Plan). This investigation included the advancement of 10 soil borings for soil screening, sampling, and analysis. Two (2) of the 10 soil borings were advanced at the north end of the Project area to evaluate polycyclic aromatic hydrocarbons (PAH) concentrations in the material below the "black ash material" identified during a Targeted Brownfields Assessment Phase II Investigation conducted in 2012 by Nobis Engineering, Inc. (Nobis). Two (2) of the 10 soil borings were advanced at the center of the Project area to evaluate PAH and lead concentrations in the 0 to 3 feet below ground surface (fbgs) depth interval and the remaining 6 of the 10 soil borings were advanced at the south end of the Project area to collect soil samples from the 3 to 4.5 fbgs depth interval. Two, 3-part composite samples were created with the soil samples collected from the south end of the Project area and were analyzed for volatile organic compounds (VOCs), semi-VOCs (SVOCs), RCRA8 metals, polychlorinated biphenyls (PCBs), and herbicides. Following review of the preliminary analytical results, the subsamples of one of the composite samples were analyzed for tetrachloroethene (PCE) and PAHs. Two samples collected from the Project area were also analyzed for pesticides. Finally, the two samples with the most elevated benzo(a)pyrene (BaP) concentrations were also analyzed for BaP via the Synthetic Precipitation Leaching Procedure (SPLP).

Based on field observations and analytical data collected during this investigation and review of available historical documentation including the 2012 Nobis investigation, VHB provides the following conclusions and recommendations:

- No visual, olfactory, or photoionization detector (PID) screening evidence of petroleum or other VOC impacts to soil were detected in any of the 10 soil borings advanced at the Project area on May 21, 2019. Visual observations of non-petroleum impacts included trace to some amounts of coal, concrete, metal and brick fragments, and trace amounts of ash. Darker colored strata were observed at select locations and were associated with higher concentrations of coal fragments and coal dust.
- Analytical results from both the 2012 Nobis and this 2019 VHB investigation reported no detections of non-PAH SVOCs, metals, PCBs, pesticides, or herbicides at concentrations exceeding their respective regulatory standards.
- Based on the laboratory analytical results for this study and the analytical results from the 2012 Nobis investigation, PAHs are the primary contaminant of concern. PAHs were detected at concentrations greater than the Vermont Urban Background Soil Concentration in 5 out of 9 soil samples collected from the Project area during this investigation and in 7 out of 24 discrete soil samples collected from the Project area during the 2012 Nobis investigation. PAH impacts generally do not appear to be associated with a particular depth or location and appear to be associated with fill that was placed at the Project area based on the anthropogenic debris that was inconsistently observed at various depths and locations. PAH impacts at the north end of the Project area appear to be associated with the "black ash material" that was identified in shallow soil at various depths and thicknesses.
- SPLP analytical results for BaP indicated that elevated BaP concentrations in Project area soil may pose a risk to groundwater. BaP concentrations in groundwater at the Project area are unknown.
- PCE was detected in only one discrete sample during this investigation at a concentration exceeding the residential Vermont Soil Standard (VSS), but less than the non-residential VSS. No other VOC exceedances of residential or non-residential VSSs or EPA Regional Screening Levels (RSLs) were identified during this 2019 VHB investigation. Analytical results for VOC analysis of the soil samples collected during the 2012 Nobis investigation reported no VOC exceedances of residential or non-residential/industrial soil screening values (SSVs).

RECOMMENDATIONS

Soil impacts consist of PAHs at select locations throughout the Project area and PCE at one location near the southeast end of the Project area. The impacted soil is currently isolated under an impervious surface and, therefore, poses no direct contact risk to the public. The elevated BaP concentrations in soil are unlikely to impact groundwater because the impacted soil is located beneath impervious pavement, and, therefore, precipitation infiltrate is unlikely to contact or mobilize the soil-bound BaP. Additionally, the impacted soil is located in the shallow unsaturated

zone which does not directly contact groundwater. Confirmatory groundwater sampling for BaP near the location where the SPLP soil samples were collected is recommended to confirm no BaP groundwater impacts exist.

This Soil Characterization Investigation was performed to supplement the 2012 Nobis investigation and to obtain analytical results for soil that is likely to be disturbed during potential redevelopment activities associate with the Project. Supplemental soil sampling is recommended at depths and locations of excavations for the reconstruction or installation of specific features that are proposed as part of the Project (e.g.: utility trenches, catch basins, or significant roadway cuts) to better evaluate the PAH or PCE concentrations in soil that will be disturbed and to determine the potential reuse options for soil that will be disturbed during the Project. If offsite disposal of impacted soil is required due to proposed grade changes or because material is structurally unsuitable for reuse, full characterization of material representative of what may need to be sent to a certified landfill would be required at an interval of one sample for every 200 tons in Vermont or one sample per 500 tons in New York.

Through careful planning it is possible that the material that does not exceed the Vermont Urban Background Concentration for PAHs could be disposed of at a low cost within an "urban background area" as defined by the VT ANR Natural Resources Atlas tool. This approach could generate capacity for material that exceeded the Vermont Urban Background Soil Concentration for PAHs and, therefore, allow it to remain onsite and ultimately be isolated under a VTDEC approved barrier, should it be shown that the elevated BaP concentrations will not impact groundwater.

1.0 INTRODUCTION AND BACKGROUND

1.1 Introduction

VHB was retained by The City to perform a supplemental soil characterization investigation at the location of the Project area in Barre, Vermont. The soil characterization investigation was designed to assess the gaps in existing soil data in areas that will potentially be disturbed during the redevelopment, and was performed in accordance with the Work Plan.

1.2 Project Area Description

The Project area is approximately 2.5-acres comprised of portions of multiple parcels (latitude 44.197648°, longitude -72.502903° at Project area center), and is currently owned by the City, whose contact information is summarized in the table below. The Project area is bound to the east and northeast by North Main Street, to the northwest by Depot Square, to the south by Prospect Street, and to the southwest by a railroad corridor. The Project area is currently used as a parking lot and associated driveways. The location of the Project area relative to its surroundings is shown on **Figure 1**.

Historical use of Merchant's Row and adjacent properties, as identified in an area wide assessment (AWA) for the Project area prepared by Stone Environmental, Inc. in September 2011, include many commercial and industrial enterprises such as, granite manufacturers, automotive service stations, dry cleaners, and a manufactured gas plant (see Section 1.3). With such an industrious past there was also historic railroad traffic likely used to transport materials to and from these enterprises. The Stevens Branch of the Winooski River previously passed through the Project area (Stone, 2011). After the course of the river changed, the former river channel was filled with soil of unknown quality or origin. The former and current locations of Stevens Branch are shown on **Figure 2.**

Multiple investigations have been conducted adjacent to and within the Project area and are described in Section 1.3. VHB understands that the objective of this soil characterization was to provide the City with soil data to address gaps in the existing soil data within the Project area boundaries regarding the presence, or lack thereof, of soil impacts at the Project area. These soil data will be used to establish options for management of soil generated during proposed reconstruction of the parking lot.

Information for Current Property Owner

Role	Name	Address	Email	Phone
Property Owner and Operator	City of Barre (Janet E. Shatney)	City Hall 6 North Main Street Suite 7 Barre, Vermont 05641	PPADirector@barrecity.org	(802) 476-0245

1.3 Previous Investigations

Numerous environmental investigations have been performed at sites adjacent to the Project area and one of these investigations extended onto the Project area. In 2012, Nobis Engineering, Inc. (Nobis) conducted a Targeted Brownfields Assessment Phase II Investigation which included characterization of a large portion of soil in the Project area. Spatially representative soil samples were collected in a grid pattern and analyzed for almost all the environmental contaminants that are typically identified in urban soils.

A summary of the existing soil data from the 2012 Nobis investigation is described below and is presented in **Figure 2**. As shown, Nobis collected soil samples from the north end of the Project area to a depth of 2 fbgs and in the middle and south end of the Project area to a depth of 3 fbgs and analyzed for VOCs, SVOCs, PCBs, herbicides and metals. Results are listed below:

- No PCB detections.
- No herbicides detected above Vermont's applicable screening criterion.
- No metals detected above Vermont's applicable screening criterion.
- VOC soil results were below screening criterion except for one sample that reported PCE at a concentration of 1.5 mg/kg, exceeding the applicable residential SSV of 1.46 mg/kg at the time, at the south end of the Project area near the Bonacorsi & Sons Property. This elevated PCE detection was expected considering the known extents of soil, soil vapor, and groundwater PCE contamination associated with the former dry-cleaning operation at the Bonacorsi & Sons Property. As of July 6, 2019, VTDEC has revised the residential SSV for PCE to 2.4 mg/kg; therefore, this PCE exceedance previously reported by the 2012 Nobis investigation is no longer considered an exceedance.
- SVOC soil results were below screening criteria with the exception of PAHs, a sub-set of SVOCs, which exceeded the Vermont Department of Environmental Conservation (VTDEC) Urban Background Soil Concentration in approximately one-third of the samples analyzed. Because this Project area is located in an "Urban Area" as mapped by the Vermont Agency of Natural Resources (VTANR) Natural Resources Atlas map, the resulting BaP toxic equivalent quotient (TEQ) value is compared to the VTDEC Urban Background Soil Concentration and not the residential VSL. PAHs and BaP-TEQ, a subset of PAHs, are a by-product of the combustion of hydro-carbons and are therefore contaminants commonly associated with urban areas, historical fill, and railroad operations, all of which are present at the Project area. **Figure 2** also shows the former location of the Stevens Branch riverbed, an area which was filled with soil of unknown quality or origin, after the course of the river changed.

Considering these data are relatively recent and reportedly incorporate appropriate sampling and quality control protocol, they were considered representative of existing soil conditions and were therefore used to identify data gaps and supplement the data that was generated during this soil characterization assessment.

An AWA that encompassed the Project area and adjacent properties was prepared by Stone Environmental, Inc. in September 2011. The objective of the AWA was to identify potentially impacted areas in the vicinity of the Merchants Row Redevelopment Area. VHB prepared an Area

Wide Assessment Addendum (AWA Addendum, dated March 26, 2019), which includes additional information obtained since the initial AWA was issued. The AWA Addendum was submitted to VTDEC on April 30, 2019.

VHB used the representative soil data from prior investigation and information obtained from the preparation of the AWA Addendum to determine where data may be missing and prescribe the sample locations and necessary analyses that were proposed in the Work Plan.

1.4 Soil Characterization Investigation Objective

The specific objectives of this investigation were to provide the City with soil data regarding the presence, or lack thereof, of soil impacts at the Project area in order to identify any potential exposure risk to construction workers and the populace of Barre and to ascertain appropriate strategies for the management of soil generated during construction.

This investigation focused on evaluating soils that were not previously characterized in areas that are most likely to be disturbed in the Project area. This investigation, however, was not intended to determine the full nature and extent of potential impacts to soil or other media, nor was it intended to entirely satisfy the pre-approval requirements for all soil that may be proposed for offsite disposal at a certified landfill.

2.0 INVESTIGATION METHODOLOGY AND RESULTS

To better assess the extent of and risks posed by potential soil impacts related to the former use of the Project area and adjacent properties (see Section 1.3) and to meet the objectives presented in Section 1.4, VHB evaluated soil that is representative of material that may be disturbed during construction. Prior to the start of intrusive activities at the Project area, VHB conducted a pre-mark for DigSafe and obtained a DigSafe ticket as required by Vermont law. In addition, VHB met with a City employee to discuss the proposed boring locations in relation to subsurface utilities and parking spaces. The locations of a few proposed soil borings were slightly adjusted to avoid utility corridors and the City placed cones in parking spots to reserve access to the proposed soil boring locations.

2.1 Applicable Screening Levels

Current reuse plans for the Project area are in the development phase; however, it is anticipated that the property will be rehabilitated to include parking, driveways, and green space for the City, classifying the Project area as "industrial/non-residential". Considering the proposed reuse scenario, industrial/non-residential soil screening values (SSV) are appropriate; however, if the zoning for the Project area is considered to be of mixed-use and include some residential use, the residential SSVs, may selectively be applied. As such, soil data were compared to the May 2019 EPA RSLs for both residential and industrial soil and residential and non-residential VSSs presented in VTDEC's July 6, 2019 *Investigation and Remediation of Contaminated Properties Rule* (IRule).

In addition, the PAH soil concentrations were used to calculate the BaP -toxicity equivalence (TEQ). The BaP-TEQ was calculated by summing the product of the detected concentrations for each of the PAHs with the corresponding BaP toxicity equivalence factor (TEF). For the purposes of this calculation, non-detect results were assumed to be one-half of the detection limit. The BaP-TEQ values were compared to the VTDEC Urban Background Soil Concentration value of 0.58 mg/kg because the Project area is located with an "urban area" as defined by the Vermont Agency of Natural Resources (VT ANR) Natural Resource Atlas.

SPLP analysis simulates the potential for contaminants in soil to mobilize when exposed to precipitation infiltrate and generates the resulting aqueous concentration of the analyzed contaminants. The SPLP analysis is a low-cost alternative to installing and sampling groundwater monitoring wells to evaluate the potential for soil contamination to impact groundwater and is a required analysis in order for VTDEC to approve the relocation of PAH impacted soils that exceed the applicable standard to be relocated and reused onsite. Analytical results for the SPLP analysis, performed only for BaP, were compared against the Vermont Groundwater Enforcement Standard (VGES) for BaP to evaluate if the elevated concentrations of BaP identified in Project area soil posed a risk to groundwater. BaP is the only PAH-analyte with a VGES. Analytical results are discussed in Section 2.2.2.

Landfills require Toxicity Characteristic Leaching Procedure (TCLP) analysis to confirm their liquid leachate generated by these soils will not exceed hazardous levels. Therefore, analytical results for analytes that have a TCLP Regulatory Level were divided by 20 per the "Rule of 20" and compared against the TCLP Regulatory Level to determine if the TCLP analysis was required, should the sampled soil require offsite disposal. No samples required TCLP analysis as discussed in Section 2.2.2.

2.2 Soil Screening and Sampling

In order to evaluate for potential soil impacts, soil borings were advanced to screen and sample soil at locations that were anticipated to be disturbed during construction and that were not previously sampled during prior investigations (see Section 1.3).

2.2.1 Methodology – soil screening and sampling

On May 21, 2019, Eastern Analytical, Inc. (EAI) of Concord, NH, with VHB oversight, advanced 10 soil borings at three different areas of the Project area (north end, center, south end). Four (4) of the 10 soil borings were advanced to termination depths of 3 fbgs, 2 of these 4 soil borings were located at the north end of the Project area, and 2 soil borings were located at the center of the Project area. The remaining 6 of the 10 soil borings were advanced to termination depths of 5 fbgs at the south end of the Project area. The locations and termination depths of these soil borings were pre-determined to collect additional environmental soil data where samples were not collected or particular analytes were not analyzed during prior investigations. The rationale for the soil boring locations and termination depths are provided in the Work Plan. Soil boring locations are shown on **Figure 2**.

A direct push, track-mounted Geoprobe drill rig equipped with dual tube sampling equipment was used to advance the borings and soil cores were extracted using dedicated butyrate liners. The soils were screened for the presence of VOCs with a field calibrated PID. To PID field screen the soil, a decontaminated stainless-steel tool was used to make a small space in the soil core and the PID probe was immediately inserted into the void. A VHB field geologist recorded geologic characteristics, visual/olfactory observations, PID readings, and tactile features on dedicated soil boring logs (see **Appendix A**). Decontamination of metal tools, used during the PID screening process, was accomplished by wiping off gross amounts of soil, washing with Alconox soap, and rinsing with deionized water. Dedicated butyrate liners and nitrile gloves were used to handle the extracted soil cores.

Immediately after PID screening, the appropriate sample containers were filled with soil samples that were collected from the extracted soil cores, starting with the container for VOCs. A multi-part aliquot system with methanol preserved vials was utilized to minimize the loss of VOCs for the composite samples. This approach is described in greater detail below.

All analytical samples were placed in an ice-filled cooler and transported to Eastern Analytical, Inc. of Concord, New Hampshire (EAI) for laboratory analysis. Once soil screening and sample collection were complete, the remaining soil was returned to the respective borehole and bagged sand was used to fill the remainder of the borehole to the base of the surrounding pavement or ground surface. An asphalt cold patch surface completion was installed at each soil boring that was advanced through the paved parking lot to match the surrounding grade of the pavement. VHBs GPS was used to record the locations of the soil borings.

Soil samples were collected from the soil borings at pre-determined depths at various locations within the Project area. The soil sample depth intervals and analyte lists are described by location below.

North End of Project Area

At the north end of the Project area, the Work Plan stated that two discrete soil samples would be collected from the depth interval below the "black ash material" identified in the soil core and above 1.5 fbgs. However, observations made in the field identified "black ash material" in soil boring SB-1 extending to a depth of 2.2 fbgs. The purpose of soil sampling in this area was to generate analytical data for the material immediately underlying the "black ash material"; therefore, the soil sample at this location (SB-1 (2.2-3)) was collected from 2.2 to 3 fbgs. A soil sample collected from the 0.5 to 1.5 fbgs depth interval (SB-1 (0.5-1.5)), representing the "black ash material" was also analyzed to correlate analytical results representative of the "black ash material". The "black ash material" extended to a depth of 1 fbgs in soil boring SB-2; therefore, the sample of the material underlying the "black ash material" was collected from the 1 to 1.5 fbgs depth interval (SB-2 (1-1.5)). The samples collected from the north end of the Project area were analyzed for PAH analysis, per the Work Plan.

Center of Project Area

Per the approved Work Plan, 2 discrete soil samples (SB-3 (0-3) and SB-4 (0-3)) were collected within the 0 to 3 fbgs depth interval at the center of the Project area and analyzed for PAHs and lead.

South End of Project Area

Two, 3-part composite samples were created from soil collected within the 3 to 4.5 fbgs depth interval from the 6 soil borings at the south end of the Project area. One composite sample was created with material collected from three soil borings advanced along the west portion of the south end of the Project area (Comp 5,6,7 (3-4.5)) and one composite sample was created with material collected from three soil borings advanced along the east portion of the south end of the Project area (Comp 8,9,10 (3-4.5)). To create the composite samples, approximately equal volumes of sub-sample material (with the exception of sample material for volatiles analyses) were placed in a zip-lock bag, homogenized, and a composite sample (three-part) was created representing the desired sample depth interval. Samples for VOC analysis were composited by placing approximately equal volumes of soil collected directly from the soil core at each sub-sample location into the methanol preserved vial, as opposed to introducing it to a zip-lock bag where volatiles could be lost.

Both composite samples were analyzed for VOCs via EPA Method 8260C, SVOCs via EPA Method 8270D, RCRA 8 metals via EPA Method 6020, PCBs via EPA Method 8082A, and herbicides via EPA Method 8151A. Per the Work Plan, if elevated levels of contaminants were identified in a composite sample, its sub-samples would be analyzed for those contaminants. Subsamples SB-8 (3-4.5), SB-9 (3-4.5), and SB-10 (3-4.5) from composite sample Comp 8,9,10 (3-4.5) were analyzed for PCE via EPA Method 8260C and PAHs via EPA Method 8270D. Analytical results are discussed in Section 2.2.2. The Work Plan also stated that if soil in a particular location was not homogenous and PID, visual, and/or olfactory evidence of impacts were observed, a discrete sample representing this anomalous condition would be collected and analyzed separately from the composite sample. No anomalous conditions were identified in any of the six sub-sample soil borings; therefore, no discrete samples of anomalous conditions were collected.

Contingency TCLP and SPLP Analyses

Additional sample material from each of the two composite samples and all of the discrete samples were collected and placed "on-hold" at the laboratory for contingency TCLP and SPLP analysis pending receipt of the composite analytical results.

No analytes exceeded their TCLP Regulatory Level by 20 times; therefore, no samples were analyzed via TCLP analysis. As previously mentioned in Section 1.3, the soil PAH results from the 2012 Nobis investigation reported BaP at concentrations exceeding the VTDEC Urban Background Soil Concentration of 0.58 mg/kg; therefore, the Work Plan stated that the two samples with the highest BaP concentrations would be analyzed for BaP via SPLP. The two samples with the highest BaP concentrations, samples SB-3 (0-3) and SB-4 (0-3), were analyzed for BaP via SPLP. Analytical results are further discussed in Section 2.2.2.

Per the Work Plan, one of the two composite samples (Comp 5,6,7 (3-4.5)) and one of the four discrete samples (SB-2 (1-1.5)) were also analyzed for pesticides via EPA Method 8081B.

2.2.2 Results – soil screening and sampling

The soils immediately underlying the pavement or from ground surface at locations without "hardscape" were comprised of brown sand and gravel with trace to some coal, concrete, metal and brick fragments, and trace amounts of ash. This material extended to depths ranging from 1 fbgs in select borings to a maximum observed depth of 5 fbgs, the termination depths of the deeper soil borings advanced at the south end of the Project area. Soil borings that extended deeper through this shallow layer encountered a brown, coarse to fine sand with varying amounts of gravel and silt. Groundwater was not encountered in any of the soil borings advanced during this investigation; soil borings did not extend deeper than 5 fbgs, per the Work Plan.

The PID field screening results for the soil encountered in the 10 soil borings were all 0.0 parts per million by volume (ppmv) above a background value of 0.1 ppmv.

North End of Project Area

Analytical results for samples collected from the north end of the Project area reported PAHs (as expressed by the BaP-TEQ) at concentrations less than the VTDEC Urban Background Soil Concentration of 0.58 mg/kg in the material underlying the "black ash material". Specifically, analytical results for sample SB-1 (2.2-3) reported PAHs at a concentration of 0.33 mg/kg and PAHs (as expressed by the BaP-TEQ) were not detected in sample SB-2 (1-1.5) at concentrations exceeding laboratory reporting limits. Analytical results for the sample collected from the "black ash material" (SB-1 (0.5-1.5)) reported PAHs (as expressed by the BaP-TEQ) at a concentration of 2.13 mg/kg, exceeding the VTDEC Urban Background Soil Concentration of 0.58 mg/kg.

No pesticides were reported at concentrations exceeding laboratory reporting limits in sample SB-2 (1-1.5).

Center of Project Area

Analytical results for samples SB-3 (0-3) and SB-4 (0-3), collected from the center of the Project area, reported PAHs (as expressed by the BaP-TEQ) at concentrations of 4.90 mg/kg and 5.72 mg/kg, respectively, exceeding the VTDEC Urban Background Soil Concentration of 0.58 mg/kg. Lead was not detected at concentrations greater than the residential RSL or the TCLP Regulatory Level for lead multiplied by 20 (100 mg/kg).

South End of Project Area

Results of the SVOC analysis reported that non-PAH SVOCs were not detected at concentrations exceeding the residential or non-residential/industrial SSVs in either of the two composite samples collected from the South End of the Project area (Comp 5,6,7 (3-4.5) and Comp 8,9,10 (3-4.5)). PAHs (as expressed by the BaP-TEQ) were identified at a concentration of 0.26 mg/kg in sample Comp 5,6,7 (3-4.5), less than the VTDEC Urban Background Soil Concentration of 0.58

mg/kg. PAHs (as expressed by the BaP-TEQ) were detected at concentrations exceeding the VTDEC Urban Background Soil Concentration of 0.58 mg/kg in sample Comp 8,9,10 (3-4.5). Due to the elevated PAH concentration reported in sample Comp 8,9,10 (3-4.5), sub-samples SB-8 (3-4.5), SB-9 (3-4.5), and SB-10 (3-4.5) were taken "off-hold" at the laboratory and analyzed for PAHs. Analytical results for sub-samples SB-8 (3-4.5) and SB-9 (3-4.5) reported PAH concentrations (as expressed by the BaP-TEQ) of 1.63 mg/kg and 20.67 mg/kg, respectively, both exceeding the VTDEC Urban Background Soil Concentration of 0.58 mg/kg. The PAH concentration (as expressed by the BaP-TEQ) in subsample SB-10 (3-4.5) was 0.04 mg/kg, less than the VTDEC Urban Background Soil Concentration of 0.58 mg/kg.

Results of the VOC analysis reported no VOC analytes at concentrations exceeding the respective laboratory reporting limits with the exception of PCE in sample Comp 8,9,10 (3-4.5), which was detected at a concentration of 0.34 mg/kg, less than the residential VSS of 2.4 mg/kg. Due to the known PCE impacts identified at the south end of the Project area (see Section 1.3), VHB with authorization from the City of Barre, instructed the laboratory to take sub-samples SB-8 (3-4.5), SB-9 (3-4.5), and SB-10 (3-4.5) "off-hold" for analysis of PCE, to determine if one or more of the subsamples might contain PCE at a concentration exceeding the residential VSS of 2.4 mg/kg. PCE was not detected at a concentration exceeding the laboratory reporting limit in sub-sample SB-8 (3-4.5) and was detected at a concentration of 0.099 mg/kg in sub-sample SB-10 (3-4.5), less than the residential VSS of 2.4 mg/kg. PCE was detected at a concentration of 2.5 mg/kg in sub-sample SB-9 (3-4.5), slightly exceeding the residential VSS of 2.4 mg/kg.

No metals were detected in either composite sample at concentrations exceeding their applicable soil standards and lead was not detected at concentrations greater than the TCLP Regulatory Level for lead multiplied by 20 (100 mg/kg). No PCBs or herbicides were detected in either composite sample at concentrations exceeding laboratory reporting limits.

No pesticides were reported at concentrations exceeding laboratory reporting limits in sample Comp 5,6,7 (3-4.5).

Contingency TCLP and SPLP Analyses

The Work Plan stated that the two samples with the highest lead concentrations at or above 100 mg/kg, equivalent to the TCLP Regulatory Level for lead multiplied by 20, would be analyzed for lead via TCLP. No lead concentrations in any sample analyzed during this investigation were equivalent to or exceeded 100 mg/kg; therefore, no samples were analyzed for lead via TCLP.

The Work Plan also stated that the two samples with the highest BaP concentrations would be analyzed for BaP via SPLP. In order to meet the laboratory's hold time requirements, the two samples with the highest BaP concentrations were selected from the initial round of analyzed samples. The two samples with the highest BaP concentrations were SB-3 (0-3) and SB-4 (0-3) with respective BaP concentrations of 3.5 mg/kg and 4.1 mg/kg. BaP SPLP results for samples SB-3 (0-3) and SB-4 (0-3) were 4.4 ug/L and 4.2 ug/L, respectively, both exceeding the VGES of 0.2 ug/L.

The analytical results discussed in this section are summarized in **Table 1** through **Table 6**, laboratory analytical reports are presented in **Appendix B**, and soil analytical results are summarized in **Figure 2**.

2.3 Investigation Derived Waste

No investigation derived waste (IDW) was generated during the investigation; therefore, no IDW required management during the soil investigation.

3.0 CONCEPTUAL SITE MODEL

Historical use of Merchant's Row and surrounding properties include many commercial and industrial enterprises such as, granite manufacturers, automotive service stations, dry cleaners, and a manufactured gas plant. It is likely that the railroad corridor adjacent to the west side of the Project area was frequently used to transport materials to and from these enterprises. The Stevens Branch of the Winooski River previously passed through the Project area. After the course of the river changed, the former river channel was filled with soil of unknown quality or origin. The Project area is bound to the east and northeast by North Main Street, to the northwest by Depot Square, to the south by Prospect Street, and to the southwest by a railroad corridor. The Project area is currently used as a parking lot and associated driveways.

Project area soils were typically comprised of brown sand and gravel with trace to some coal, concrete, metal and brick fragments, and trace amounts of ash ranging from 1 fbgs to a maximum observed depth of 5 fbgs. Deeper soil borings encountered a brown, coarse to fine sand with varying amounts of gravel and silt. Depth to groundwater measurements recorded at the property abutting the Project area to the north ranged from approximately 7 to 8 fbgs with a reported groundwater flow direction to the west-southwest toward Stevens Branch (Nobis, 2012).

Information obtained during this investigation and the Nobis 2012 investigation indicate that PAHs are the primary contaminant of concern at the Project area, and are present at select locations (12 out of 33 sample locations) at concentrations exceeding the Vermont Urban Background Concentration (0.58 mg/kg). Based on the results of two BaP SPLP analyses, elevated BaP concentrations in Project area soil could potentially impact groundwater should the soil-bound BaP concentrations mobilize as a result of precipitation infiltration. This is unlikely as the impacted soils are located beneath an impervious pavement surface and at depths shallower than the groundwater table.

The PAH data did not confine the most elevated impacts to a particular depth or location within the Project area with the exception of the "black ash material" located in shallow soil at the north end of the Project area. The presence of PAHs in Project area soils is likely the result of mixed industrial activities that previously occurred in and around the Project area and/or associated with the importation of potentially impacted fill from unknown sources to backfill the former river channel.

PCE was also detected at one sample location near the south end of the Project area at a concentration exceeding the residential VSS, but less than the non-residential VSS. This PCE

detection was not surprising given the proximity of the south end of the Project area to the Bonacorsi & Sons Site (SMS# 20023048).

The primary exposure pathway of these isolated soil impacts to site workers and site users is inhalation, ingestion, or dermal contact; therefore, recommended actions include removal or isolation of the soil impacted with PAHs at concentrations exceeding the Vermont Urban Soil Background Concentration. PCE impacts in soil can off-gas causing a potential vapor intrusion in buildings. However, considering the one low-level detection identified in the southern end of the Project area is likely associated with the known chlorinated solvent plume that is actively being remediated, the risk of vapor intrusion occurring to the extent that indoor air quality would be compromised is low.

Based on analytical results, field readings and observations from all 10 soil borings advanced during this investigation and the 20 soil borings advanced during the 2012 Nobis investigation, there is no evidence of petroleum impacts in soil at the Project area. Furthermore, VOCs (with the exception of one PCE exceedance of the residential VSS, mentioned above) RCRA8 metals, PCBs, pesticides, or herbicides were not detected at concentrations exceeding their respective regulatory standards during this investigation or the 2012 Nobis investigation. Therefore, the primary contaminant concern appears to be limited to PAHs, only.

4.0 QUALITY ASSURANCE / QUALITY CONTROL MEASURES

Field screening, sample collection and laboratory analysis activities were conducted in accordance with the approved Scope of Services. Quality assurance (QA) and quality control (QC) measures appear to have been satisfactory during the course of the project. All samples adhered to laboratory sample acceptance policies; and, laboratory analytical QA/QC criteria are included with the attached laboratory reports. No data were rejected due to improper collection techniques, sample delivery issues, hold times or laboratory analytical procedures.

4.1 Duplicate Samples

Due to the heterogeneity of soils and because this soil investigation was for construction pre-characterization purposes only, no duplicate samples were collected.

4.2 Trip Blank / Equipment Blanks

A total of one Trip Blank was transported to EAI for analysis of VOCs by EPA method 8260C along with the soil samples. No VOC's were detected at concentrations above laboratory reporting limits in the trip blank.

4.3 Elevated Reporting Limits

Laboratory reporting limits for all analytes were below the respective SSVs for all samples analyzed during this investigation.

4.4 QA/QC Conclusions

Laboratory reporting limits were below the applicable SSVs and all samples adhered to laboratory sample acceptance policies; therefore, the analytical data for the project are deemed useable, accurate and complete for the purposes of this report.

4.5 Data Gaps

The Scope of Services was followed and completed by JCO (currently VHB) with assistance from subcontractor EAI. No data gaps associated with field screening, sample collection, and/or laboratory analysis activities have been identified as of the date of this report.

5.0 CONCLUSIONS AND RECOMMENDATIONS

Based on the field observations and analytical results of this soil characterization investigation and the analytical results of the 2012 Nobis investigation , VHB concludes the following:

- No visual, olfactory, or PID screening evidence of petroleum or other VOC impacts to soil were detected in any of the 10 soil borings advanced at the Project area on May 21, 2019. Visual observations of non-petroleum impacts included trace to some amounts of coal, concrete, metal and brick fragments, and trace amounts of ash. Darker colored strata were observed at select locations and were associated with higher concentrations of coal fragments and coal dust.
- Analytical results from both the 2012 Nobis and this 2019 VHB investigation reported no detections of non-PAH SVOCs, metals, PCBs, pesticides, or herbicides at concentrations exceeding their respective regulatory standards.
- Based on the laboratory analytical results for this study and the analytical results from the 2012 Nobis investigation, PAHs are the primary contaminant of concern. PAHs were detected at concentrations greater than the Vermont Urban Background Soil Concentration in 5 out of 9 soil samples collected from the Project area during this investigation and in 7 out of 24 discrete soil samples collected from the Project area during the 2012 Nobis investigation. PAH impacts generally do not appear to be associated with a particular depth or location and appear to be associated with fill that was placed at the Project area based on the anthropogenic debris that was inconsistently observed at various depths and locations. PAH impacts at the north end of the Project area appear to be associated with the "black ash material" that was identified in shallow soil at various depths and thicknesses.
- SPLP analytical results for BaP indicated that elevated BaP concentrations in Project area soil may pose a risk to groundwater. BaP concentrations in groundwater at the Project area are unknown.
- PCE was detected in only one discrete sample during this investigation at a concentration exceeding the residential VSS, but less than the non-residential VSS. No other VOC exceedances of residential or non-residential VSSs or EPA RSLs were identified during this 2019 VHB investigation. Analytical results for VOC analysis of the soil samples collected

during the 2012 Nobis investigation reported no VOC exceedances of residential or non-residential/industrial SSVs.

RECOMMENDATIONS

Soil impacts consist of PAHs at select locations throughout the Project area and PCE at one location near the southeast end of the Project area. The impacted soil is currently isolated under an impervious surface and, therefore, poses no direct contact risk to the public. The elevated BaP concentrations in soil are unlikely to impact groundwater because the impacted soil is located beneath impervious pavement, and, therefore, precipitation infiltrate is unlikely to contact or mobilize the soil-bound BaP. Additionally, the impacted soil is located in the shallow unsaturated zone which does not directly contact groundwater. Confirmatory groundwater sampling for BaP near the location where the SPLP soil samples were collected is recommended to confirm no BaP groundwater impacts exist.

This Soil Characterization Investigation was performed to supplement the 2012 Nobis investigation and to obtain analytical results for soil that is likely to be disturbed during potential redevelopment activities associate with the Project. Supplemental soil sampling is recommended at depths and locations of excavations for the reconstruction or installation of specific features that are proposed as part of the Project (e.g.: utility trenches, catch basins, or significant roadway cuts) to better evaluate the PAH or PCE concentrations in soil that will be disturbed and to determine the potential reuse options for soil that will be disturbed during the Project. If offsite disposal of impacted soil is required due to proposed grade changes or because material is structurally unsuitable for reuse, full characterization of material representative of what may need to be sent to a certified landfill would be required at an interval of one sample for every 200 tons in Vermont or one sample per 500 tons in New York.

Through careful planning it is possible that the material that does not exceed the Vermont Urban Background Concentration for PAHs could be disposed of at a low cost within an "urban background area" as defined by the VT ANR Natural Resources Atlas tool. This approach could generate capacity for material that exceeded the Vermont Urban Background Soil Concentration for PAHs and, therefore, allow it to remain onsite and ultimately be isolated under a VTDEC approved barrier, should it be shown that the elevated BaP concentrations will not impact groundwater.

6.0 LIMITATIONS

This information is intended for the use of the City for the specific purpose of documenting Site contamination at the site of the Merchants Row Redevelopment Project, in Barre, Vermont. No other uses, expressed or implied, are warranted. The design of the investigation was based on sound scientific techniques and experience with similar investigations. However, the conclusions of this assessment are based on limited information. Should additional information become available pertaining to environmental concerns, VHB reserves the right to re-evaluate conclusions made herein.

The conclusions of this report were derived from information provided to VHB from the following sources: The City; EAI; Nobis; and Stone Environmental, Inc. Independent verification of the work performed by others was not always possible; therefore, its accuracy and reliability cannot be warranted.

This Report was prepared pursuant to Agreements between VHB and the City. All uses of this Report are subject to the conditions and restrictions contained in the Agreements. The observations and investigations described in this Report are based solely on the Scope of Services provided pursuant to the Agreement. VHB shall not be liable for the existence of any condition the discovery of which would have required the performance of services not authorized under the Agreement. This work has been undertaken in accordance with generally accepted consulting practices. No other warranty, expressed or implied, is made.

This Report reflects Site conditions observed during the last Site visit and described by records available to VHB as of the date of the field investigation. The passage of time may result in significant changes in Site conditions, technology, or economic conditions, which could alter the findings and/or recommendations of the Report. Accordingly, the Client (The City of Barre) and any other party to whom the Report is provided recognize and agree that VHB shall bear no liability for deviations due to observed conditions after the last Site visit or records available after the time of Report preparation.

7.0 REFERENCES

Nobis, 2012. Nobis Engineering, Inc. Targeted Brownfields Assessment Phase II Investigation, Merchants Row, dated December 2012.

Stone, 2011. Stone Environmental, Inc. Area Wide Assessment, Merchants Row Redevelopment Project, dated September 30, 2011.

TABLES

Notes Sheet
Merchant's Row Redevelopment Project, Barre, Vermont

The following acronyms are applicable to the text and/or tables

Acronyms

---	=	Value Not Available or Not Calculated
BaP	=	Benzo(a)pyrene
DRO	=	Diesel Range Organics
DUP	=	Duplicate
EAI	=	Eastern Analytical of Manchester, New Hampshire
GRO	=	Gasoline Range Organics
Ind	=	Industrial Screening Standard
IRULE	=	VTDEC Investigation and Remediation of Contaminated Properties Rule, July 6, 2019
MW	=	Monitoring Well
PCB	=	Polychlorinated Biphenyl
PAH	=	Polycyclic Aromatic Hydrocarbon
PID	=	Photoionization Detector
Res	=	Residential Screening Standard
RPD	=	Relative Percent Difference (not calculated where one or both results are non-detect)
RSL	=	USEPA Regional Screening Level, May 2019
SB	=	Soil Boring
SIM	=	Selective Ion Monitoring
SSV	=	Soil Screening Value
VSS	=	Vermont Soil Standard from the IRULE. If available, VSS trumps residential RSL
SU	=	Standard Unit
SVOC	=	Semi-Volatile Organic Compound
TCLP	=	Toxicity Characteristic Leaching Procedure
TEF	=	Toxicity Equivalence Factors, World Health Organization, 2005
TEQ	=	Toxicity Equivalency (calculated from toxicity equivalence factors)
TPH	=	Total Petroleum Hydrocarbon
USEPA	=	United States Environmental Protection Agency
VDH	=	Vermont Department of Health
VGES	=	Vermont Groundwater Enforcement Standard
VOC	=	Volatile Organic Compound
Comp	=	Composite Sample
NA	=	Not Analyzed
Urb	=	Urban

Cell & Text Shading

Regulatory Standards

Black w/ White Text	=	Analytical Value exceeds: a) Non-Residential VSS, or b) Industrial RSL c) VTDEC Background Soil Concentration, or d) VGES
Gray w/ Black Text	=	Analytical Value exceeds: a) Residential VSS, or b) RSL (when applicable)
Regular Text	=	Analytical Value is less than: a) Residential VSS, or b) RSL (when applicable)
Grey Text	=	Analytical Result: value is non-detect

Regulatory Standards (applies to BaP TEQ only)

Orange w/ White Text	=	Analytical Value Exceeds VTDEC Urban Background Soil Concentration (0.58 mg/kg).
Yellow w/ Black Text	=	Analytical Value Exceeds Residential VSS (0.07 mg/kg), but is Less than the VTDEC Urban Background Soil Concentration (0.58 mg/kg).
Green w/ Black Text	=	Analytical Value is less than Residential VSS (0.07 mg/kg).

Data Results and Qualifiers

<	=	not detected, value given is the laboratory reporting limit

Units

fbgs	=	feet below ground surface
ft	=	feet
mg/kg	=	milligrams per kilogram
µg/L	=	micrograms per liter
mg/L	=	milligrams per liter
µg/100 cm^2	=	micrograms per 100 square centimeters

Table 1 - Soil VOC Analytical Results
Merchants Row Redevelopment Project, Barre, Vermont

Location within Project Area:				South End					QA/QC
Sample ID:				Comp 5,6,7	Comp 8,9,10	SB-8	SB-9	SB-10	Trip Blank
Sample Depth (ft):				3-4.5	3-4.5	3-4.5	3-4.5	3-4.5	
Sample Date:				05/21/19	05/21/19	05/21/19	05/21/19	05/21/19	05/21/19
Analyte	Screening Level		Units						
	Non-Res.	Res.							
1,2,4-Trimethylbenzene	--	--	mg/kg	< 0.05	< 0.05				< 0.05
1,3,5-Trimethylbenzene	--	--	mg/kg	< 0.05	< 0.05				< 0.05
Total Trimethylbenzene	177	144	mg/kg	---	---				---
1,2-Dibromoethane(EDB)	0.14	0.02	mg/kg	< 0.05	< 0.05				< 0.05
2-Butanone(MEK)	26991	16952	mg/kg	< 0.5	< 0.5				< 0.5
2-Hexanone	1300*	200*	mg/kg	< 0.1	< 0.1				< 0.1
4-Methyl-2-pentanone(MIBK)	140000*	33000*	mg/kg	< 0.5	< 0.5				< 0.5
Acetone	100028	40609	mg/kg	< 2	< 2				< 2
Benzene	4.2	0.7	mg/kg	< 0.05	< 0.05				< 0.05
Bromobenzene	1800*	290*	mg/kg	< 0.05	< 0.05				< 0.05
Bromoform	86*	19*	mg/kg	< 0.05	< 0.05				< 0.05
Bromomethane	30*	6.8*	mg/kg	< 0.2	< 0.2				< 0.2
Carbon disulfide	662	608	mg/kg	< 0.1	< 0.1				< 0.1
Dibromomethane	99*	24*	mg/kg	< 0.05	< 0.05				< 0.05
Diethyl Ether	230000*	16000*	mg/kg	< 0.05	< 0.05				< 0.05
Ethylbenzene	22	3.7	mg/kg	< 0.05	< 0.05				< 0.05
IsoPropylbenzene	264	256	mg/kg	< 0.05	< 0.05				< 0.05
Methyl-t-butyl ether(MTBE)	4464	649	mg/kg	< 0.1	< 0.1				< 0.1
mp-Xylene	257	252	mg/kg	< 0.05	< 0.05				< 0.05
Naphthalene	16	2.7	mg/kg	< 0.1	< 0.1	Not Analyzed			< 0.1
n-Butylbenzene	51100	3504	mg/kg	< 0.05	< 0.05				< 0.05
n-Propylbenzene	261	253	mg/kg	< 0.05	< 0.05				< 0.05
o-Xylene	2800*	650*	mg/kg	< 0.05	< 0.05				< 0.05
p-Isopropyltoluene	--	--	mg/kg	< 0.05	< 0.05				< 0.05
sec-Butylbenzene	102200	7009	mg/kg	< 0.05	< 0.05				< 0.05
Styrene	35000*	6000*	mg/kg	< 0.05	< 0.05				< 0.05
tert-Butylbenzene	120000*	7800*	mg/kg	< 0.05	< 0.05				< 0.05
Tetrahydrofuran(THF)	94000*	18000*	mg/kg	< 0.5	< 0.5				< 0.5
Toluene	798	706	mg/kg	< 0.05	< 0.05				< 0.05
1,1,1,2-Tetrachloroethane	8	1.3	mg/kg	< 0.05	< 0.05				< 0.05
1,1,1-Trichloroethane	36000*	8100*	mg/kg	< 0.05	< 0.05				< 0.05
1,1,2,2-Tetrachloroethane	2.7*	0.6*	mg/kg	< 0.05	< 0.05				< 0.05
1,1,2-Trichloroethane	5*	1.1*	mg/kg	< 0.05	< 0.05				< 0.05
1,1-Dichloroethane	13	2.1	mg/kg	< 0.05	< 0.05				< 0.05
1,1-Dichloroethene	1000*	230*	mg/kg	< 0.05	< 0.05				< 0.05
1,1-Dichloropropene	--	--	mg/kg	< 0.05	< 0.05				< 0.05
1,2,3-Trichlorobenzene	930*	63*	mg/kg	< 0.05	< 0.05				< 0.05
1,2,3-Trichloropropane	0.07	0.00311	mg/kg	< 0.05	< 0.05				< 0.05
1,2,4-Trichlorobenzene	110*	24*	mg/kg	< 0.05	< 0.05				< 0.05

See Notes Sheet for Acronym, Units, and Shading Definitions, etc

Table 1 - Soil VOC Analytical Results
Merchants Row Redevelopment Project, Barre, Vermont

				Sample ID:	Comp 5,6,7	Comp 8,9,10	SB-8	SB-9	SB-10	Trip Blank
				Sample Depth (ft):	3-4.5	3-4.5	3-4.5	3-4.5	3-4.5	
				Sample Date:	05/21/19	05/21/19	05/21/19	05/21/19	05/21/19	05/21/19
Analyte	Screening Level		Units							
	Non-Res.	Res.								
1,2-Dibromo-3-chloropropane	0.064*	0.0053*	mg/kg		< 0.05	< 0.05				< 0.05
1,2-Dichlorobenzene	9300*	1800*	mg/kg		< 0.05	< 0.05				< 0.05
1,2-Dichloroethane	1.7	0.29	mg/kg		< 0.05	< 0.05				< 0.05
1,2-Dichloropropane	9.1	1.5	mg/kg		< 0.05	< 0.05				< 0.05
1,3-Dichlorobenzene	--	--	mg/kg		< 0.05	< 0.05				< 0.05
1,3-Dichloropropane	23000*	1600*	mg/kg		< 0.05	< 0.05				< 0.05
1,4-Dichlorobenzene	11*	2.6*	mg/kg		< 0.05	< 0.05				< 0.05
2,2-Dichloropropane	--	--	mg/kg		< 0.05	< 0.05				< 0.05
2-Chlorotoluene	23000*	1600*	mg/kg		< 0.05	< 0.05				< 0.05
4-Chlorotoluene	23000*	1600*	mg/kg		< 0.05	< 0.05				< 0.05
Bromochloromethane	597	193	mg/kg		< 0.05	< 0.05				< 0.05
Bromodichloromethane	1.3*	0.29*	mg/kg		< 0.05	< 0.05		Not Analyzed		< 0.05
Carbon tetrachloride	2.2	0.37	mg/kg		< 0.05	< 0.05				< 0.05
Chlorobenzene	726	414	mg/kg		< 0.05	< 0.05				< 0.05
Chloroethane	57000*	14000*	mg/kg		< 0.1	< 0.1				< 0.1
Chloroform	1.4*	0.32*	mg/kg		< 0.05	< 0.05				< 0.05
Chloromethane	460*	110*	mg/kg		< 0.1	< 0.1				< 0.1
cis-1,2-Dichloroethene	1814	140	mg/kg		< 0.05	< 0.05				< 0.05
cis-1,3-Dichloropropene	--	--	mg/kg		< 0.05	< 0.05				< 0.05
Dibromochloromethane	39*	8.3*	mg/kg		< 0.05	< 0.05				< 0.05
Dichlorodifluoromethane	370*	87*	mg/kg		< 0.1	< 0.1				< 0.1
Hexachlorobutadiene	5.3*	1.2*	mg/kg		< 0.05	< 0.05				< 0.05
Methylene chloride	1000*	57*	mg/kg		< 0.1	< 0.1				< 0.1
Tetrachloroethene	14	2.4	mg/kg		< 0.05	0.34	<0.05	**2.5**	0.099	< 0.05
trans-1,2-Dichloroethene	18137	1402	mg/kg		< 0.05	< 0.05				< 0.05
trans-1,3-Dichloropropene	--	--	mg/kg		< 0.05	< 0.05				< 0.05
Trichloroethene	6*	0.94*	mg/kg		< 0.05	< 0.05		Not Analyzed		< 0.05
Trichlorofluoromethane	350000*	23000*	mg/kg		< 0.1	< 0.1				< 0.1
Vinyl chloride	1.7*	0.059*	mg/kg		< 0.1	< 0.1				< 0.1

* Indicates no VSS is listed in IRule, applicable industrial or residential RSL is used

Table 2 - Soil SVOC Analytical Results
Merchants Row Redevelopment Project, Barre, Vermont

Location within Project Area:					North End			Center		South End				
Sample ID:					SB-1	SB-1	SB-2	SB-3	SB-4	Comp 5,6,7	Comp 8,9,10	SB-8	SB-9	SB-10
Sample Depth (ft):					0.5-1.5	2.2-3	1-1.5	0-3	0-3	3-4.5	3-4.5	3-4.5	3-4.5	3-4.5
Sample Date:					05/21/19	05/21/19	05/21/19	05/21/19	05/21/19	05/21/19	05/21/19	05/21/19	05/21/19	05/21/19
Analyte	Screening Level Non-Res.	Screening Level Res.	BaP TEF	Units										
1,2,4-Trichlorobenzene	110*	24*	--	mg/kg						< 0.08	< 0.08			
1,2-Dichlorobenzene	9300*	1800*	--	mg/kg						< 0.08	< 0.08			
1,3-Dichlorobenzene	--	--	--	mg/kg						< 0.08	< 0.08			
1,4-Dichlorobenzene	11*	2.6*	--	mg/kg						< 0.08	< 0.08			
2,3-Dichloroaniline	--	--	--	mg/kg						< 0.08	< 0.08			
2,4,5-Trichlorophenol	82000*	6300*	--	mg/kg						< 0.08	< 0.08			
2,4,6-Trichlorophenol	210*	49*	--	mg/kg						< 0.08	< 0.08			
2,4-Dichlorophenol	2500*	190*	--	mg/kg						< 0.08	< 0.08			
2,4-Dimethylphenol	16000*	1300*	--	mg/kg						< 0.4	< 0.4			
2,4-Dinitrophenol	1600*	130*	--	mg/kg						< 0.7	< 0.7			
2,4-Dinitrotoluene	7.4*	1.7*	--	mg/kg						< 0.4	< 0.4			
2,6-Dinitrotoluene	1.5*	0.36*	--	mg/kg						< 0.4	< 0.4			
2-Chloronaphthalene	60000*	4800*	--	mg/kg						< 0.08	< 0.08			
2-Chlorophenol	5800*	390*	--	mg/kg						< 0.08	< 0.08			
2-Methylphenol	41000*	3200*	--	mg/kg						< 0.08	< 0.08			
2-Nitroaniline	8000*	630*	--	mg/kg						< 0.4	< 0.4			
2-Nitrophenol	--	--	--	mg/kg						< 0.4	< 0.4			
3,3'-Dichlorobenzidine	5.1*	1.2*	--	mg/kg						< 0.08	< 0.08			
3/4-Methylphenol	--	--	--	mg/kg						< 0.08	< 0.08			
3-Nitroaniline	--	--	--	mg/kg						< 0.4	< 0.4			
4,6-Dinitro-2-methylphenol	66*	5.1*	--	mg/kg						< 0.4	< 0.4			
4-Bromophenyl-phenylether	--	--	--	mg/kg						< 0.08	< 0.08			
4-Chloro-3-methylphenol	82000*	6300*	--	mg/kg						< 0.08	< 0.08			
4-Chloroaniline	11*	2.7*	--	mg/kg						< 0.08	< 0.08			
4-Chlorophenyl-phenylether	--	--	--	mg/kg						< 0.08	< 0.08			
4-Nitroaniline	110*	27*	--	mg/kg						< 0.4	< 0.4			
4-Nitrophenol	--	--	--	mg/kg						< 0.4	< 0.4			
Acetophenone	120000*	7800*	--	mg/kg						< 0.7	< 0.7			
alpha-Terpineol	--	--	--	mg/kg						< 0.4	< 0.4			
Aniline	400*	95*	--	mg/kg						< 0.08	< 0.08			
Azobenzene	26*	5.6*	--	mg/kg						< 0.08	< 0.08			
Benzidine (estimated)	0.01*	0.00053*	--	mg/kg						< 0.4	< 0.4			
Benzoic Acid	3300000*	250000*	--	mg/kg						< 4	< 4			
Benzyl alcohol	82000*	6300*	--	mg/kg						< 0.7	< 0.7			
bis(2-Chloroethoxy)methane	2500*	190*	--	mg/kg						< 0.08	< 0.08			
bis(2-Chloroethyl)ether	1*	0.23*	--	mg/kg						< 0.08	< 0.08			
bis(2-chloroisopropyl)ether	36274	2804	--	mg/kg						< 0.08	< 0.08			
bis(2-Ethylhexyl)phthalate	120	20	--	mg/kg						< 0.4	< 0.4			
Butylbenzylphthalate	1200*	290*	--	mg/kg						< 0.4	< 0.4			
Carbazole	--	--	--	mg/kg						< 0.08	0.29			
Dibenzofuran	1000*	73*	--	mg/kg						< 0.08	0.092			
Diethylphthalate	660000*	51000*	--	mg/kg						< 0.4	< 0.4			
Dimethylphthalate	--	--	--	mg/kg						< 0.08	< 0.08			
Di-n-butylphthalate	82000*	6300*	--	mg/kg						< 0.4	< 0.4			
Di-n-octylphthalate	8200*	630*	--	mg/kg						< 0.4	< 0.4			
Hexachlorobenzene	0.69	0.13	--	mg/kg						< 0.08	< 0.08			
Hexachlorobutadiene	5.3*	1.2*	--	mg/kg						< 0.08	< 0.08			
Hexachlorocyclopentadiene	7.5*	1.8*	--	mg/kg						< 0.4	< 0.4			

Not Analyzed

Not Analyzed

See Notes Sheet for Acronym, Units, and Shading Definitions, etc

Table 2 - Soil SVOC Analytical Results
Merchants Row Redevelopment Project, Barre, Vermont

Analyte	Screening Level Non-Res.	Screening Level Res.	BaP TEF	Units	Sample ID: SB-1 / Sample Depth (ft): 0.5-1.5 / Sample Date: 05/21/19	SB-1 2.2-3 05/21/19	SB-2 1-1.5 05/21/19	SB-3 0-3 05/21/19	SB-4 0-3 05/21/19	Comp 5,6,7 3-4.5 05/21/19	Comp 8,9,10 3-4.5 05/21/19	SB-8 3-4.5 05/21/19	SB-9 3-4.5 05/21/19	SB-10 3-4.5 05/21/19
Hexachloroethane	8*	1.8*	--	mg/kg	Not Analyzed					< 0.08	< 0.08	Not Analyzed		
Isophorone	2400*	570*	--	mg/kg						< 0.08	< 0.08			
n-Decane	--	--	--	mg/kg						< 0.4	< 0.4			
Nitrobenzene	22*	5.1*	--	mg/kg						< 0.08	< 0.08			
N-Nitrosodimethylamine	0.034*	0.002*	--	mg/kg						< 0.08	< 0.08			
n-Nitroso-di-n-propylamine	0.33*	0.078*	--	mg/kg						< 0.08	< 0.08			
n-Nitrosodiphenylamine	470*	110*	--	mg/kg						< 0.08	< 0.08			
n-Octadecane	--	--	--	mg/kg						< 0.4	< 0.4			
Pentachlorophenol	2.9	0.48	--	mg/kg						< 0.4	< 0.4			
Phenol	250000*	19000*	--	mg/kg						< 0.08	< 0.08			
Pyridine	1200*	78*	--	mg/kg						< 0.4	< 0.4			
Polycyclic Aromatic Hydrocarbons (PAHs)														
1-Methylnaphthalene	73*	18*	--	mg/kg	0.097	< 0.008	< 0.008	0.042	0.086	< 0.007	0.075	0.069	0.3	< 0.007
2-Methylnaphthalene	3000*	240*	--	mg/kg	0.085	< 0.008	< 0.008	0.083	0.13	< 0.007	0.067	0.072	0.25	< 0.007
Acenaphthene	45000*	3600*	--	mg/kg	0.083	< 0.008	< 0.008	< 0.04	0.048	0.0078	0.072	0.036	0.43	< 0.007
Acenaphthylene	--	--	--	mg/kg	0.32	0.031	< 0.008	1.8	2	0.051	0.5	0.53	1.7	0.024
Anthracene	230000*	18000*	--	mg/kg	0.33	0.032	< 0.008	0.61	0.86	0.038	0.56	0.28	3.6	0.0074
Benzo[g,h,i]perylene	--	--	--	mg/kg	0.9	0.18	< 0.008	1.5	1.4	0.12	0.53	0.66	10	0.01
Fluoranthene	26371	2301	--	mg/kg	2.4	0.49	< 0.008	4.2	6	0.28	4.1	1.9	33	0.048
Fluorene	26371	2301	--	mg/kg	0.099	0.018	< 0.008	0.17	0.18	0.011	0.21	0.19	1.1	< 0.007
Naphthalene	16	2.7	--	mg/kg	0.09	0.024	< 0.008	0.11	0.17	< 0.007	0.11	0.072	0.53	< 0.007
Phenanthrene	--	--	--	mg/kg	1.3	0.32	< 0.008	0.91	1.2	0.11	2.6	1	20	0.028
Pyrene	23000*	1800*	--	mg/kg	2.4	0.47	< 0.008	4.7	5.9	0.32	4	1.9	33	0.049
PAH-Benzo(a)pyrene Toxicity Equivalency (BaP-TEQ)														
Benzo[a]anthracene	21*	1.1*	0.1	mg/kg	**1.4**	0.2	< 0.008	**3.1**	**4**	0.17	**2.2**	**1.1**	**15**	0.039
Benzo[a]pyrene	1.54	0.07	1	mg/kg	**1.4**	**0.22**	< 0.008	**3.5**	**4.1**	**0.18**	**2.2**	**1.1**	**14**	0.029
Benzo[b]fluoranthene	21*	1.1*	0.1	mg/kg	**1.9**	0.28	< 0.008	**4.7**	**6.1**	0.21	**3**	**1.4**	**17**	0.039
Benzo[k]fluoranthene	210*	11*	0.01	mg/kg	0.64	0.11	< 0.008	1.4	2.2	0.076	1.1	0.47	5.6	0.013
Chrysene	2100*	110*	0.001	mg/kg	1.8	0.26	< 0.008	3.5	4.3	0.19	2.6	1.2	18	0.042
Dibenz[a,h]anthracene	2.1*	0.11*	1	mg/kg	**0.28**	0.037	< 0.008	**0.43**	**0.42**	0.029	**0.17**	**0.2**	**2.3**	< 0.007
Indeno[1,2,3-cd]pyrene	21*	1.1*	0.1	mg/kg	**1.1**	0.19	< 0.008	**1.7**	**1.6**	0.13	0.73	0.75	**11**	0.013

* Indicates no VSS is listed in IRule, applicable industrial or residential RSL is used

Analyte	Screening Level Non-Res.	Screening Level Res.	Screening Level Urb. Bkrnd	Units										
BaP TEQ	1.54	0.07	0.58	mg/kg	**2.13**	**0.33**	**0.01**	**4.90**	**5.72**	**0.26**	**2.98**	**1.63**	**20.7**	**0.04**

Synthetic Precipitation Leaching Procedure (SPLP)

Analyte	Screening Level VGES	Units								
Benzo[a]pyrene (SPLP)	0.2	ug/L	Not Analyzed		**4.4**	**4.2**	Not Analyzed			

Table 3 - Soil Metals Analytical Results
Merchants Row Redevelopment Project, Barre, Vermont

Location within Project Area:				Center		South End	
Sample ID:				SB-3	SB-4	Comp 5,6,7	Comp 8,9,10
Sample Depth (ft):				0-3	0-3	3-4.5	3-4.5
Sample Date:				05/21/19	05/21/19	05/21/19	05/21/19
Analyte	Screening Level		Units				
	Non-Res.	Res.					
Arsenic	16	16	mg/kg	Not Analyzed		6.1	5.6
Barium	127382	11247	mg/kg			17	29
Cadmium	87	6.9	mg/kg			< 0.5	< 0.5
Chromium	--	--	mg/kg			16	17
Lead	800	400	mg/kg	8.2	26	9.4	16
Mercury	3.1	3.1	mg/kg	Not Analyzed		< 0.1	< 0.1
Selenium	4900	366	mg/kg			< 0.5	< 0.5
Silver	2483	237	mg/kg			< 0.5	< 0.5

Table 4 - Soil PCB Analytical Results
Merchants Row Redevelopment Project, Barre, Vermont

			Location within Project Area:	South End	
			Sample ID:	Comp 5,6,7	Comp 8,9,10
			Sample Depth (ft):	3-4.5	3-4.5
			Sample Date:	05/21/19	05/21/19
	Screening Level				
Analyte	Ind	Res	Units		
PCB-1016	--	--	mg/kg	< 0.02	< 0.02
PCB-1221	--	--	mg/kg	< 0.02	< 0.02
PCB-1232	--	--	mg/kg	< 0.02	< 0.02
PCB-1242	--	--	mg/kg	< 0.02	< 0.02
PCB-1248	--	--	mg/kg	< 0.02	< 0.02
PCB-1254	--	--	mg/kg	< 0.02	< 0.02
PCB-1260	--	--	mg/kg	< 0.02	< 0.02
PCB-1262	--	--	mg/kg	< 0.02	< 0.02
PCB-1268	--	--	mg/kg	< 0.02	< 0.02
Total PCBs	0.68	0.114	mg/kg	---	---

Table 5 - Soil Pesticides Analytical Results
Merchants Row Redevelopment Project, Barre, Vermont

Location within Project Area:				North End	South End
Sample ID:				SB-2	Comp 5,6,7
Sample Depth (ft):				1-1.5	3-4.5
Sample Date:				05/21/19	05/21/19
Analyte	Screening Level		Units		
	Non-Res.	Res.			
4,4'-DDD	9.6*	1.9*	mg/kg	< 0.006	< 0.005
4,4'-DDE	9.3*	2*	mg/kg	< 0.006	< 0.005
4,4'-DDT	8.5*	1.9*	mg/kg	< 0.006	< 0.005
aldrin	0.1	0.02	mg/kg	< 0.006	< 0.005
alpha bhc	0.36*	0.086*	mg/kg	< 0.006	< 0.005
beta bhc	1.3*	0.3*	mg/kg	< 0.006	< 0.005
delta bhc	--	--	mg/kg	< 0.006	< 0.005
gamma bhc	2.5*	0.57*	mg/kg	< 0.006	< 0.005
chlordane	--	--	mg/kg	< 0.02	< 0.02
dieldrin	0.14*	0.034*	mg/kg	< 0.006	< 0.005
endosulfan i	--	--	mg/kg	< 0.006	< 0.005
endosulfan ii	--	--	mg/kg	< 0.006	< 0.005
endosulfan sulfate	4900*	380*	mg/kg	< 0.006	< 0.005
endrin	250*	19*	mg/kg	< 0.006	< 0.005
endrin aldehyde	--	--	mg/kg	< 0.006	< 0.005
endrin ketone	--	--	mg/kg	< 0.006	< 0.005
heptachlor	0.63*	0.13*	mg/kg	< 0.006	< 0.005
heptachlor epoxide	0.33*	0.07*	mg/kg	< 0.006	< 0.005
methoxychlor	4100*	320*	mg/kg	< 0.006	< 0.005
toxaphene	2.1*	0.49*	mg/kg	< 0.06	< 0.05

* Indicates no VSS is listed in IRule, applicable industrial or residential RSL is used

Table 6 - Soil Herbicides Analytical Results
Merchants Row Redevelopment Project, Barre, Vermont

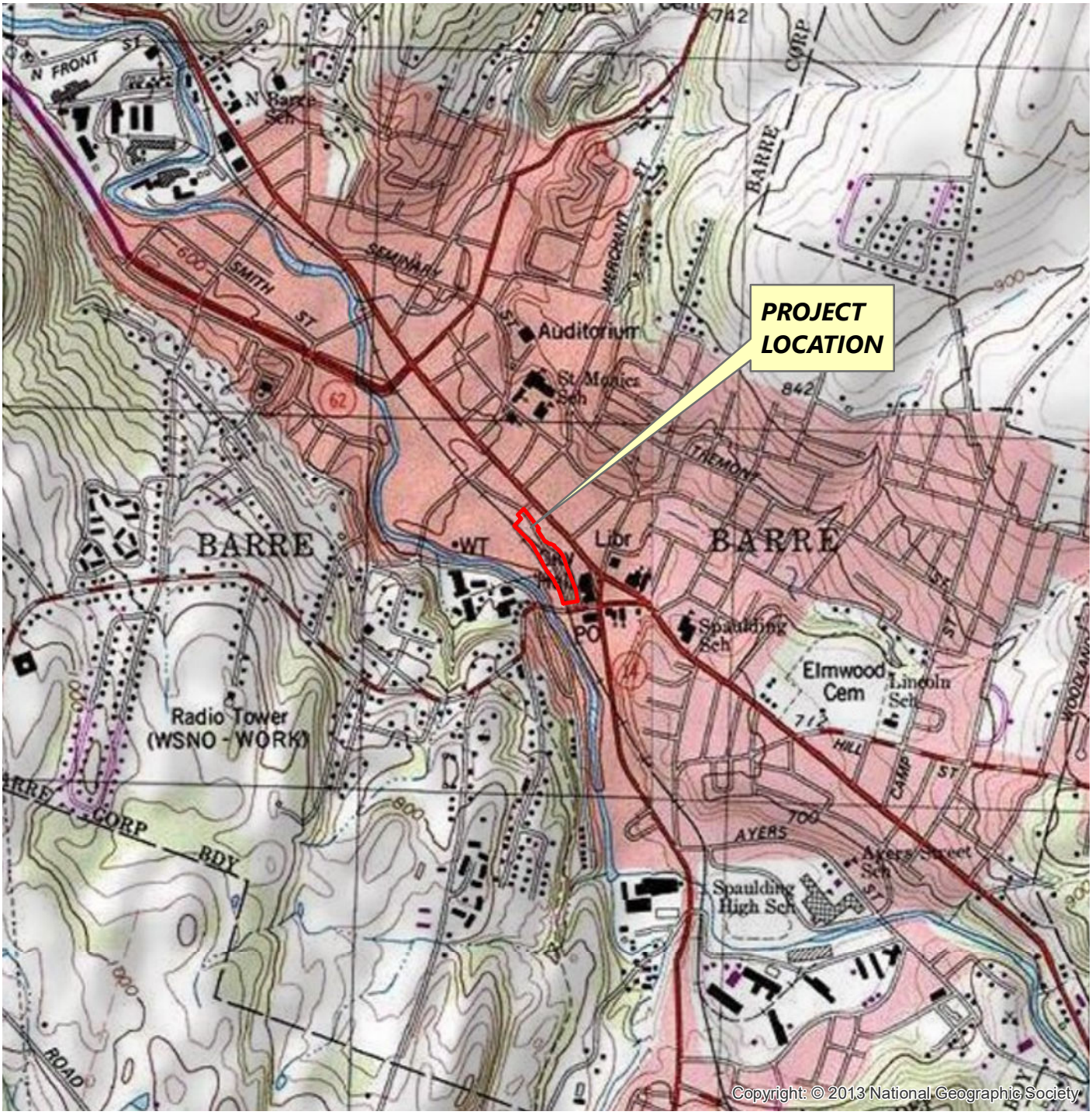
Location within Project Area:				South End	
Sample ID:				Comp 5,6,7	Comp 8,9,10
Sample Depth (ft):				3-4.5	3-4.5
Sample Date:				05/21/19	05/21/19
	Screening Level				
Analyte	Ind	Res	Units		
2,4,5-T	8200*	630*	mg/kg	< 0.089	< 0.094
2,4,5-TP (silvex)	6600*	510*	mg/kg	< 0.089	< 0.094
2,4-D	9600*	700*	mg/kg	< 0.18	< 0.19
2,4-DB	25000*	1900*	mg/kg	< 0.89	< 0.94
dalapon	25000*	1900*	mg/kg	< 0.089	< 0.094
dicamba	25000*	1900*	mg/kg	< 0.089	< 0.094
dichloroprop	--	--	mg/kg	< 0.13	< 0.14
dinoseb	820*	63*	mg/kg	< 0.089	< 0.094
MCPA	410*	32*	mg/kg	< 27	< 28
MCPP	820*	63*	mg/kg	< 27	< 28

* Indicates no VSS is listed in IRule, applicable industrial or residential RSL is used

FIGURES

FIGURE 1 SITE LOCATION MAP

FIGURE 2 SUMMARY OF 2012 NOBIS AND 2019 VHB SOIL ANALYTICAL RESULTS



N

0.5 0.25 0 0.5

MILES

1,000 0 1,000 2,000 3,000

FEET

CONTOUR INTERVAL: 20 FEET

VT

MAP LOCATION

BASE MAP: USGS Seamless iTopo 1:24,000, December 12, 2009

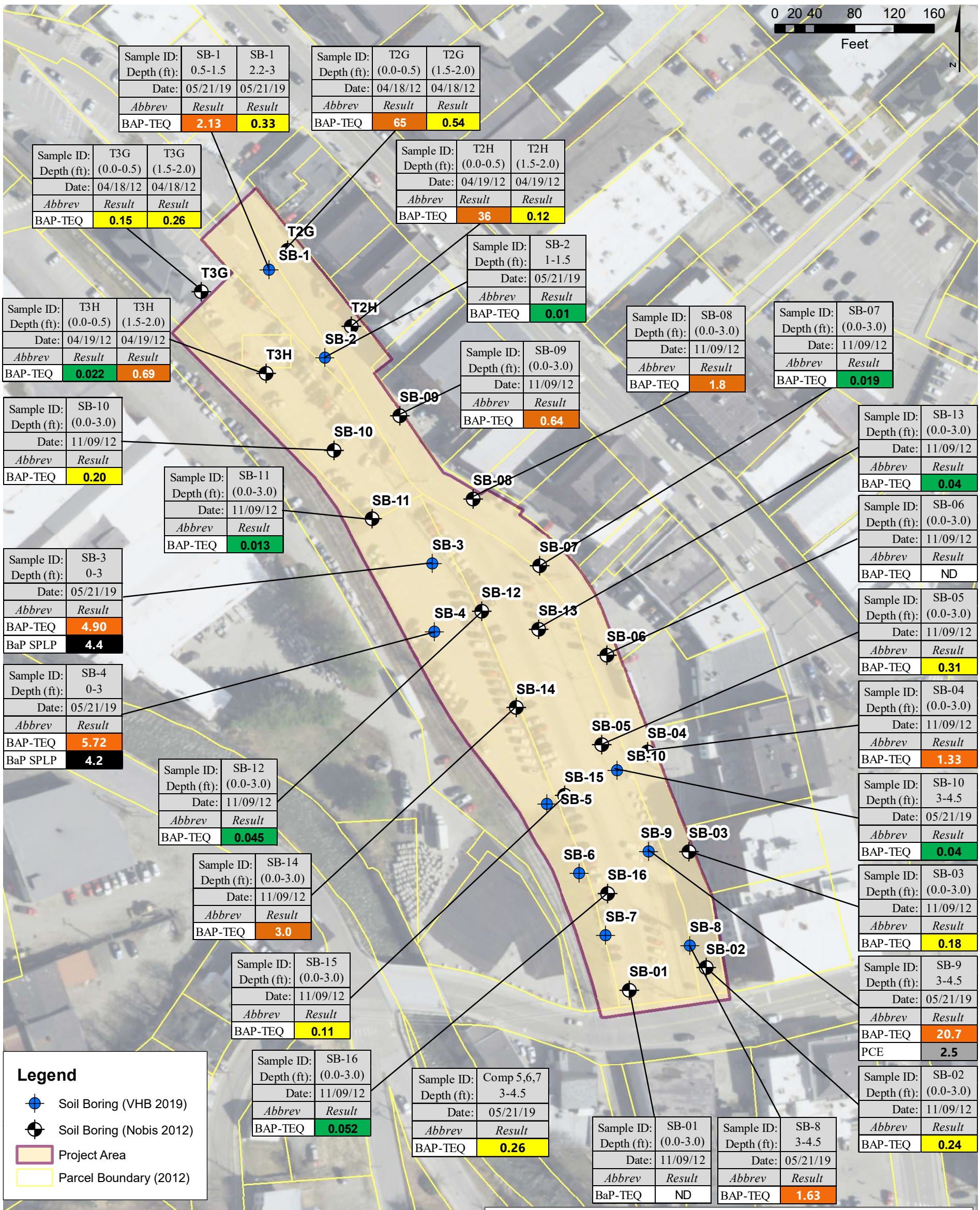
FIGURE 1: PROJECT LOCATION MAP
MERCHANT'S ROW REHABILITATION PROJECT
BARRE, VERMONT

vhb

40 IDX Drive, Building 100, Suite 200
South Burlington, VT 05403

Drawn by: SGH	Date: 3/28/19
Chk'd by: JKM	Date: 3/28/19
App'd by: JKM	Date: 3/28/19
Scale: As Shown	Project: 58341.00

C:\Users\shilfiker\OneDrive - VHB\Desktop\Merchants Rowgis\MXDs\2019 Report\Figure 2 - Summary of project area soil results_new.mxd



Sample ID:	SB-1	SB-1
Depth (ft):	0.5-1.5	2.2-3
Date:	05/21/19	05/21/19
Abbrev	*Result*	*Result*
BAP-TEQ	2.13	0.33

Sample ID:	T2G	T2G
Depth (ft):	(0.0-0.5)	(1.5-2.0)
Date:	04/18/12	04/18/12
Abbrev	*Result*	*Result*
BAP-TEQ	65	0.54

Sample ID:	T3G	T3G
Depth (ft):	(0.0-0.5)	(1.5-2.0)
Date:	04/18/12	04/18/12
Abbrev	*Result*	*Result*
BAP-TEQ	0.15	0.26

Sample ID:	T2H	T2H
Depth (ft):	(0.0-0.5)	(1.5-2.0)
Date:	04/19/12	04/19/12
Abbrev	*Result*	*Result*
BAP-TEQ	36	0.12

Sample ID:	SB-2
Depth (ft):	1-1.5
Date:	05/21/19
Abbrev	*Result*
BAP-TEQ	0.01

Sample ID:	T3H	T3H
Depth (ft):	(0.0-0.5)	(1.5-2.0)
Date:	04/19/12	04/19/12
Abbrev	*Result*	*Result*
BAP-TEQ	0.022	0.69

Sample ID:	SB-08
Depth (ft):	(0.0-3.0)
Date:	11/09/12
Abbrev	*Result*
BAP-TEQ	1.8

Sample ID:	SB-07
Depth (ft):	(0.0-3.0)
Date:	11/09/12
Abbrev	*Result*
BAP-TEQ	0.019

Sample ID:	SB-09
Depth (ft):	(0.0-3.0)
Date:	11/09/12
Abbrev	*Result*
BAP-TEQ	0.64

Sample ID:	SB-10
Depth (ft):	(0.0-3.0)
Date:	11/09/12
Abbrev	*Result*
BAP-TEQ	0.20

Sample ID:	SB-11
Depth (ft):	(0.0-3.0)
Date:	11/09/12
Abbrev	*Result*
BAP-TEQ	0.013

Sample ID:	SB-13
Depth (ft):	(0.0-3.0)
Date:	11/09/12
Abbrev	*Result*
BAP-TEQ	0.04

Sample ID:	SB-3
Depth (ft):	0-3
Date:	05/21/19
Abbrev	*Result*
BAP-TEQ	4.90
BaP SPLP	4.4

Sample ID:	SB-06
Depth (ft):	(0.0-3.0)
Date:	11/09/12
Abbrev	*Result*
BAP-TEQ	ND

Sample ID:	SB-05
Depth (ft):	(0.0-3.0)
Date:	11/09/12
Abbrev	*Result*
BAP-TEQ	0.31

Sample ID:	SB-4
Depth (ft):	0-3
Date:	05/21/19
Abbrev	*Result*
BAP-TEQ	5.72
BaP SPLP	4.2

Sample ID:	SB-04
Depth (ft):	(0.0-3.0)
Date:	11/09/12
Abbrev	*Result*
BAP-TEQ	1.33

Sample ID:	SB-12
Depth (ft):	(0.0-3.0)
Date:	11/09/12
Abbrev	*Result*
BAP-TEQ	0.045

Sample ID:	SB-10
Depth (ft):	3-4.5
Date:	05/21/19
Abbrev	*Result*
BAP-TEQ	0.04

Sample ID:	SB-14
Depth (ft):	(0.0-3.0)
Date:	11/09/12
Abbrev	*Result*
BAP-TEQ	3.0

Sample ID:	SB-03
Depth (ft):	(0.0-3.0)
Date:	11/09/12
Abbrev	*Result*
BAP-TEQ	0.18

Sample ID:	SB-15
Depth (ft):	(0.0-3.0)
Date:	11/09/12
Abbrev	*Result*
BAP-TEQ	0.11

Sample ID:	SB-9
Depth (ft):	3-4.5
Date:	05/21/19
Abbrev	*Result*
BAP-TEQ	20.7
PCE	2.5

Sample ID:	SB-16
Depth (ft):	(0.0-3.0)
Date:	11/09/12
Abbrev	*Result*
BAP-TEQ	0.052

Sample ID:	SB-02
Depth (ft):	(0.0-3.0)
Date:	11/09/12
Abbrev	*Result*
BAP-TEQ	0.24

Sample ID:	Comp 5,6,7
Depth (ft):	3-4.5
Date:	05/21/19
Abbrev	*Result*
BAP-TEQ	0.26

Sample ID:	SB-01
Depth (ft):	(0.0-3.0)
Date:	11/09/12
Abbrev	*Result*
BaP-TEQ	ND

Sample ID:	SB-8
Depth (ft):	3-4.5
Date:	05/21/19
Abbrev	*Result*
BAP-TEQ	1.63

Legend

- Soil Boring (VHB 2019)
- Soil Boring (Nobis 2012)
- Project Area
- Parcel Boundary (2012)

Screening Level Key

Analyte	Abbrev	Screening Level: Non-Res. VSS	Screening Level: Res. VSS	Screening Level: Urb Bkgd	Units
BaP TEQ	BAP-TEQ	1.54	0.076	0.58	mg/kg
Tetrachlorothene	PCE	14	2.4	--	mg/kg
BaP SPLP	BaP SPLP	VGES = 0.2			ug/L

Cell & Text Shading

- **Black w/ White Text** = Analytical Value exceeds VGES.
- **Gray w/ Black Text** = Analytical Value exceedes Residential VSS, but is Less than Non-Residential VSS.

Applies to BaP TEQ only

- **Orange w/ White Text** = Analytical Value Exceeds VTDEC Urban Background Soil Concentration (0.58 mg/kg).
- **Yellow w/ Black Text** = Analytical Value Exceeds Residential VSS (0.076 mg/kg), but is Less than the VTDEC Urban Background Soil Concentration (0.58 mg/kg).
- **Green w/ Black Text** = Analytical Value is less than Residential VSs (0.076 mg/kg).

For all 2012 Nobis soil borings shown, soil samples analyzed for VOCs, SVOCs, PCBs, Herbicides, and Metals. Only exceedances are shown on this figure.
Soil samples SB-01 through SB-16 collected at 0-3 ft depth bgs. Soil samples T#G though T#H collected at 0-0.5 ft depth bgs and 1.5-2.0 ft depth bgs.

For 2019 VHB soil borings: only exceedances are shown. Soil samples Comp 5,6,7 (3-4.5) and Comp 8,9,10 (3-4.5) are 3-part composits created with sub-samples from soil borings SB-5, SB-6, SB-7 and SB-8, SB-9, SB-10, respectively. Comp 5,6,7 (3-4.5) and Comp 8,9,10 (3-4.5) were analyzed for VOCs, SVOCs, PCBs, Herbicides, and Metals. Samples Comp 5,6,7 (3-4.5) and SB-2 (1-1.5) were also analyzed for Pesticides. Samples SB-8 (3-4.5), SB-9 (3-4.5), and SB-10 (3-4.5) were analyzed for PCE and samples SB-3 (0-3) and SB-4 (0-3) were analyzed for lead.

Notes:
Res. = residential
SPLP = Synthetic Precipitation Leaching Procedure
VGES = Vermont Groundwater Enforcement Standard
VSS: Vermont Soil Standard (IRULE, July 2019)
Urb. Bkgd: VTDEC Urban Background Soil Concentration (IRULE, 2019)
BaP-TEQ: benzo(a)pyrene - toxicity equivalence
Sources: Nobis (2012); VCGI (2012); Aerial Imagery from NAIP (2016).

FIGURE 2: SUMMARY OF 2012 NOBIS AND 2019 VHB SOIL ANALYTICAL RESULTS
MERCHANT'S ROW REDEVELOPMENT PROJECT
BARRE, VERMONT

vhb
40 IDX Drive, Building 100, Suite 200
South Burlington, VT 05403

Drawn by: SGH Date: 07/25/19
Reviewed by: JKM Date: 07/25/19
Scale: 1 in = 100 ft Project: 58341.00

APPENDICES

APPENDIX A FIELD NOTES AND SOIL BORING LOGS

Location Merchants Row, Barre Date 5/21/19

Project / Client City of Barre

0750 - VHB onsite

PID: MR#2 (SN: 592-908866) MiniRae3000
- Calib. w/ 100ppm isobutylene + ambient air
Results [100.2/0.1] ppmv

0815: GAI onsite

1215: GAI offsite (half-day rate)

- VHB collected GPS coord. + returned cones.

- 1345 - VHB offsite

522-6029 c Janet 477-1465 O

Location Date

Project / Client

\\VTMODATA\proj_gis$\58341.00 City of Barre Merchants Row\gis\MXDs\WorkPlan\Figure 3 - Proposed Soil Boring Locations.mxd

N

2 Discrete Samples Analyzed for:
-PAHs

Main St

Project Wide
Additional sample material from each soil boring will be placed on-hold for contingency analyses:
-Up to 2 lead TCLP analyses
-Up to 2 BaP SPLP analyses

2 soil samples will also be analyzed for:
-pesticides

Merchants Row

Metro Way

2 Discrete Samples Analyzed for:
-PAHs
-lead

Stevens Branch

2 Composite Samples (3-part) Analyzed for:
-VOCs
-SVOCs
-RCRA8 metals
-PCB's
-herbicides
(sub-samples will be analyzed for analytes associated with reported exceedance(s) in respective composite sample)

SB-1
SB-2
SB-3
SB-4
SB-5
SB-6
SB-7
SB-8
SB-9

Legend

- Proposed Sample Location
- Soil Sample (2012)
- Project Limits
- Parcel Boundary (2012)

Area Recommended for Additional Soil Quality Assessment

- Shallow (0-3 fbgs)
- Shallow (0.5-1.5 fbgs)
- Deep (3-4.5 fbgs)

0 12.525 50 75 100
Feet

Sources: Nobis (2012); VCGI (2012).
Aerial Imagery from NAIP (2016).

FIGURE 3: PROPOSED SOIL BORING LOCATIONS
MERCHANT'S ROW REDEVELOPMENT PROJECT
BARRE, VERMONT

vhb
40 IDX Drive, Building 100, Suite 200
South Burlington, VT 05403

Drawn by: SGH Date: 4/1/19
Reviewed by: JKM Date: 4/1/19
Scale:1 in = 60 ft Project: 583414.00

Site Name: Merchant's Row
Site Location: Barre, Vermont
Installation Date: 5/21/2019

Boring ID/Well ID:	SB-1				
Boring Depth	3.0 ~~5~~ SGH 5/21/19	Depth to Water (ft BGS)	—	VHB Staff	SGH
Well Depth (ft BTC)	N/A			Drilling Company	Eastern Analytical, Inc. (EAI)
Screen Diameter (ft)	N/A	Depth Range (ft)	N/A	Sample Method	Dual tube w/ butyrate liner
Screen Type/Size	N/A			Reference Point (location)	
Riser Diameter (ft)	N/A	Depth Range (ft)	N/A		
Riser Type/Size (ft)	N/A				
Notes	N/A				

Depth (ft bgs)	Sample Depth (ft bgs)	Recovery (ft)	Sample Description and Notes (Moisture, Color, Texture, Redox, Inclusions, Staining, Olfactory/ Visual Evidence of Contamination)	PID (PPM)	Stratum Change	Well Profile
0	~~0-2~~ 0-1.5	1.2/1.5	Asphalt			
0-0.5			Brown sand & gravel.	0.1/0.1		
0.5-1.5			Black sand, coal fragments, ash.	0.1		
1.5	—	—	~~Bottom of Hole~~ SGH 5/21/19	—		
1.5-2.2		1.1/1.5	SAA	0.1		
2.2-3			Brown sand, tr. gravel, tr silt	0.1		
3.0	—	—	Bottom of Hole	—	Refusal @ 3'	

VHB Project # 58341.00

Site Name: Merchant's Row
Site Location: Barre, Vermont
Installation Date: 5/21/2019

Boring ID/Well ID:	SB-2				
Boring Depth	3'	Depth to Water (ft BGS)	—	VHB Staff	SGH
Well Depth (ft BTC)	N/A			Drilling Company	Eastern Analytical, Inc. (EAI)
Screen Diameter (ft)	N/A	Depth Range (ft)	N/A	Sample Method	Dual tube w/ butyrate liner
Screen Type/Size	N/A			Reference Point (location)	
Riser Diameter (ft)	N/A	Depth Range (ft)	N/A		
Riser Type/Size (ft)	N/A				
Notes	N/A				

Depth (ft bgs)	Sample Depth (ft bgs)	Recovery (ft)	Sample Description and Notes (Moisture, Color, Texture, Redox, Inclusions, Staining, Olfactory/ Visual Evidence of Contamination)	PID (PPM)	Stratum Change	Well Profile
0		1.4/3.0	Asphalt	0.1		
0-1	1-1.5		Brown fine sand, tr. gravel, tr.			
			to some brick frags., coal,			
			frags., metal frags.			
1-3			Brown m-f sand, tr. gravel, tr. silt	0.1		
3.0	—	—	Bottom of Hole	—		

VHB Project # 58341.00

Site Name: Merchant's Row
Site Location: Barre, Vermont
Installation Date: 5/21/2019

Boring ID/Well ID:	SB-3				
Boring Depth	3.0	Depth to Water (ft BGS)	—	VHB Staff	SGH
Well Depth (ft BTC)	N/A			Drilling Company	Eastern Analytical, Inc. (EAI)
Screen Diameter (ft)	N/A	Depth Range (ft)	N/A	Sample Method	Dual tube w/ butyrate liner
Screen Type/Size	N/A			Reference Point (location)	
Riser Diameter (ft)	N/A	Depth Range (ft)	N/A		
Riser Type/Size (ft)	N/A				
Notes	N/A				

Depth (ft bgs)	Sample Depth (ft bgs)	Recovery (ft)	Sample Description and Notes (Moisture, Color, Texture, Redox, Inclusions, Staining, Olfactory/ Visual Evidence of Contamination)	PID (PPM)	Stratum Change	Well Profile
0	0-3	1.7/3.0	Asphalt	0.1		
0-1			Black f. sand w/gravel, asphalt			
			fragments.			
1-3			Brown sand, tr. gravel. 1" seam	0.1		
			of drk. brn. sand w/ coal frag./asphalt	2.7		
3.0	—	—	Bottom of Hole	—		

VHB Project # 58341.00

Site Name: Merchant's Row
Site Location: Barre, Vermont
Installation Date: 5/21/2019

Boring ID/Well ID:	SB-4				
Boring Depth	3.0	Depth to Water (ft BGS)	—	VHB Staff	SGH
Well Depth (ft BTC)	N/A			Drilling Company	Eastern Analytical, Inc. (EAI)
Screen Diameter (ft)	N/A	Depth Range (ft)	N/A	Sample Method	Dual tube w/ butyrate liner
Screen Type/Size	N/A			Reference Point (location)	
Riser Diameter (ft)	N/A	Depth Range (ft)	N/A		
Riser Type/Size (ft)	N/A				
Notes	N/A				

Depth (ft bgs)	Sample Depth (ft bgs)	Recovery (ft)	Sample Description and Notes (Moisture, Color, Texture, Redox, Inclusions, Staining, Olfactory/ Visual Evidence of Contamination)	PID (PPM)	Stratum Change	Well Profile
0	0-3	1.7/3.0	Asphalt			
0-1.5			Dark brown sand w/gravel.	0.1		
			tr. black coal dust/fragments.			
1.5-3			Brown to grey fine sand w/some	0.1		
			silt, tr. gravel.			
3.0	—	—	Bottom of Hole	-		

VHB Project # 58341.00

Site Name: Merchant's Row
Site Location: Barre, Vermont
Installation Date: 5/21/2019

Boring ID/Well ID:	SB-5				
Boring Depth	5'	Depth to Water (ft BGS)	—	VHB Staff	SGH
Well Depth (ft BTC)	N/A			Drilling Company	Eastern Analytical, Inc. (EAI)
Screen Diameter (ft)	N/A	Depth Range (ft)	N/A	Sample Method	Dual tube w/ butyrate liner
Screen Type/Size	N/A			Reference Point (location)	
Riser Diameter (ft)	N/A	Depth Range (ft)	N/A		
Riser Type/Size (ft)	N/A				
Notes	N/A				

Depth (ft bgs)	Sample Depth (ft bgs)	Recovery (ft)	Sample Description and Notes (Moisture, Color, Texture, Redox, Inclusions, Staining, Olfactory/ Visual Evidence of Contamination)	PID (PPM)	Stratum Change	Well Profile
0		12/3.0	Grass	0.1		
0-3			Brown sand w/ gravel. Coal frag.			
			& tr. brick frags.		—	
3-5	3-4.5	10/2.0	Brown m-f sand, silt, tr. gravel.	0.1		
5.0	—	—	Bottom of Hole	—		

VHB Project # 58341.00

Site Name: Merchant's Row
Site Location: Barre, Vermont
Installation Date: 5/21/2019

Boring ID/Well ID:	SB-6				
Boring Depth	5'	Depth to Water (ft BGS)	—	VHB Staff	SGH
Well Depth (ft BTC)	N/A			Drilling Company	Eastern Analytical, Inc. (EAI)
Screen Diameter (ft)	N/A	Depth Range (ft)	N/A	Sample Method	Dual tube w/ butyrate liner
Screen Type/Size	N/A			Reference Point (location)	
Riser Diameter (ft)	N/A	Depth Range (ft)	N/A		
Riser Type/Size (ft)	N/A				
Notes	N/A				

Depth (ft bgs)	Sample Depth (ft bgs)	Recovery (ft)	Sample Description and Notes (Moisture, Color, Texture, Redox, Inclusions, Staining, Olfactory/ Visual Evidence of Contamination)	PID (PPM)	Stratum Change	Well Profile
0		1.5/3.0	Grass	0.1		
0-3			Brown sand, some gravel, tr. silt,			
			Tr. coal fragments, tr. concrete.			
3-5	3-4.5	1.0/2.0	Brown coarse sand, tr. gravel. (rounded)	0.1		
5	—	—	Bottom of Hole	—		

VHB Project # 58341.00

Site Name: Merchant's Row
Site Location: Barre, Vermont
Installation Date: 5/21/2019

Boring ID/Well ID:	SB-7				
Boring Depth	5'	Depth to Water (ft BGS)	—	VHB Staff	SGH
Well Depth (ft BTC)	N/A			Drilling Company	Eastern Analytical, Inc. (EAI)
Screen Diameter (ft)	N/A	Depth Range (ft)	N/A	Sample Method	Dual tube w/ butyrate liner
Screen Type/Size	N/A			Reference Point (location)	
Riser Diameter (ft)	N/A	Depth Range (ft)	N/A		
Riser Type/Size (ft)	N/A				
Notes	N/A				

Depth (ft bgs)	Sample Depth (ft bgs)	Recovery (ft)	Sample Description and Notes (Moisture, Color, Texture, Redox, Inclusions, Staining, Olfactory/ Visual Evidence of Contamination)	PID (PPM)	Stratum Change	Well Profile
0		13/30	Asphalt	0.1		
0-3			Brown sand, fr. gravel, tr. coal fragments.			
3-5	3-4.5	1.4/2.0	Brown f. sand, tr. silt, tr. coal frag.	0.1		
5	—	—	Bottom of Hole	—		

VHB Project # 58341.00

Site Name: Merchant's Row
Site Location: Barre, Vermont
Installation Date: 5/21/2019

Boring ID/Well ID:	SB-8				
Boring Depth	5'	Depth to Water (ft BGS)	—	VHB Staff	SGH
Well Depth (ft BTC)	N/A			Drilling Company	Eastern Analytical, Inc. (EAI)
Screen Diameter (ft)	N/A	Depth Range (ft)	N/A	Sample Method	Dual tube w/ butyrate liner
Screen Type/Size	N/A			Reference Point (location)	
Riser Diameter (ft)	N/A	Depth Range (ft)	N/A		
Riser Type/Size (ft)	N/A				
Notes	N/A				

Depth (ft bgs)	Sample Depth (ft bgs)	Recovery (ft)	Sample Description and Notes (Moisture, Color, Texture, Redox, Inclusions, Staining, Olfactory/ Visual Evidence of Contamination)	PID (PPM)	Stratum Change	Well Profile
0		2.6/3.0	Asphalt	0.1		
0-1			Brown m-f. Sand, tr. gravel, tr.		—	
			coal fragments.			
3-5	3-4.5	1.5/2.0	(1-5'): Brown m-f. sand, tr. gravel; wet	0.1		
			Damp @ 4.8'			
5.0	—	—	Bottom of Hole		—	

VHB Project # 58341.00

Site Name: Merchant's Row
Site Location: Barre, Vermont
Installation Date: 5/21/2019

Boring ID/Well ID:	SB-9				
Boring Depth	5'	Depth to Water (ft BGS)	—	VHB Staff	SGH
Well Depth (ft BTC)	N/A			Drilling Company	Eastern Analytical, Inc. (EAI)
Screen Diameter (ft)	N/A	Depth Range (ft)	N/A	Sample Method	Dual tube w/ butyrate liner
Screen Type/Size	N/A			Reference Point (location)	
Riser Diameter (ft)	N/A	Depth Range (ft)	N/A		
Riser Type/Size (ft)	N/A				
Notes	N/A				

Depth (ft bgs)	Sample Depth (ft bgs)	Recovery (ft)	Sample Description and Notes (Moisture, Color, Texture, Redox, Inclusions, Staining, Olfactory/ Visual Evidence of Contamination)	PID (PPM)	Stratum Change	Well Profile
0		1.7/3.0	Asphalt			
0-3			Brown m. sand, tr. gravel.	0.1		
			Tr. brick frag., Some coal fragments.			
3	3-4.5	1.5/2.0	Brown to black coal frags, brick frags			
			Metal frags	0.1		
5	—	—	Bottom of Hole			

VHB Project # 58341.00

Site Name: Merchant's Row
Site Location: Barre, Vermont
Installation Date: 5/21/2019

Boring ID/Well ID:	SB-10				
Boring Depth	5'	Depth to Water (ft BGS)	—	VHB Staff	SGH
Well Depth (ft BTC)	N/A			Drilling Company	Eastern Analytical, Inc. (EAI)
Screen Diameter (ft)	N/A	Depth Range (ft)	N/A	Sample Method	Dual tube w/ butyrate liner
Screen Type/Size	N/A			Reference Point (location)	
Riser Diameter (ft)	N/A	Depth Range (ft)	N/A		
Riser Type/Size (ft)	N/A				
Notes	N/A				

Depth (ft bgs)	Sample Depth (ft bgs)	Recovery (ft)	Sample Description and Notes (Moisture, Color, Texture, Redox, Inclusions, Staining, Olfactory/ Visual Evidence of Contamination)	PID (PPM)	Stratum Change	Well Profile
0		1.8/3.0	Asphalt	0.1		
0-1			Brown sand, some gravel,			
			some coal fragments, tr. metal			
			fragments.			
1-3			Brown m. sand, tr. gravel,	0.1		
			tr. silt.			
3	3-4.5	1.5/2.0				
			SAA	0.1		
5	—	—	Bottom of Hole	—		

Page 1 of 1

Chain-of-Custody Record

Bold Fields Required. Please Circle Requested Analysis.

For Lab Use Only

Sample I.D.	Sampling Date/Time *If Composite, Indicate Both Start & Finish Date/Time	Matrix (see below)	Grab/*Composite	VOC: 524.2 BTEX 524.2 MTBE only; 8260 624 VTICs; 1,4 Dioxane; 8021 BTEX HALOS; 8015 GRO MAVPH	SVOC: 8270 625 SVTICs EDB DBCP ABN A BN PAH; TPH8100 LI L2; 8015 DRO MAEPH; PEST 608 PCB 608 PEST 8081 PCB 8082; Oil & Grease 1664 TPH 1664	TCLP: TCLP 1311 ABN Metals VOC Pest Herb	Metals: Dissolved Metals (List Below); Total Metals (List Below)	Inorganics: TS TSS TDS Spec. Con.; Br Cl F SO_4 NO_2 NO_3 NO_3NO_2; BOD CBOD T. Alk.; TKN NH_3 T. Phos. O. Phos.; pH T. Res. Chlorine; COD Phenols TOC DOC; Total Cyanide Total Sulfide; Reactive Cyanide Reactive Sulfide Flashpoint Ignitability	Micro: Total Coliform E. Coli Fecal Coliform; Enterococci Heterotrophic Plate Count	Other	# of Containers	Notes MeOH Vial #
SB-1 (0.5-1.5)	5/21/19 0854	S	G								X	1	OV-HOLD
SB-6 (3-4.5)	1015	S	G	X							X	2	47845
SB-5 (3-4.5)	1030	S	G	X							X	2	47846
SB-7 (3-4.5)	1050	S	G	X							X	2	47841
SB-8 (3-4.5)	1115	S	G	X							X	2	47844
SB-9 (3-4.5)	1135	S	G	X							X	2	47830
SB-10 (3-4.5)	1150	S	G	X							X	2	47843
Z	Z												

Matrix: A-Air; S-Soil; GW-Ground Water; SW-Surface Water; DW-Drinking Water; WW-Waste water

Preservative: H-HCL; N-HNO_3; S-H_2SO_4; Na-NaOH; M-MEOH

Project Manager: Kurt Muller

Company: VHB

Address: 40 IDX Dr., Bld. 100, Ste. 200

City: South Burlington **State:** VT **Zip:** 05403

Phone: 802-778-1278 **Ext.:**

Fax: 862-495-5130

E-Mail: kmuller@vhb.com / shilfiker@vhb.com

Site Name: Merchant's Row

Project #: 58341.00

State: NH MA ME VT **Other:**

Regulatory Program: NPDES: RGP POTW Stormwater or GWP, Oil Fund, Brownfield or Other:

Quote #: 101607S **PO #:**

Date Needed: Standard TAT

QA/QC Reporting Level A B C OR MA MCP

Reporting Options Prelims: Yes or No

Excel

Electronic Options E-Mail PDF Equis Excel

Temp. °C

ICE? Yes No

Sampler(s): Steve Hilfiker			
	5/21/19	1200	
Relinquished By:	**Date:**	**Time:**	**Received By:**
Relinquished By:	**Date:**	**Time:**	**Received By:**
Relinquished By:	**Date:**	**Time:**	**Received By:**

Metals: 8 RCRA 13 PP Fe, Mn Pb, Cu

Other Metals:

Samples Field Filtered? ☐ Yes ☑ No

Notes: (ie: Special Detection Limits, Billing Info, If Different)

All samples on Hold.

Site History:

Suspected Contamination:

Field Readings:

Eastern Analytical, Inc.
professional laboratory and drilling services
25 Chenell Drive | Concord, NH 03301 | Tel: 603.228.0525 | 1.800.287.0525 | E-Mail: CustomerService@EasternAnalytical.com | www.EasternAnalytical.com

(WHITE: Original GREEN: Project Manager)

Page 1 of 1

Chain-of-Custody Record

Bold Fields Required. Please Circle Requested Analysis.

For Lab Use Only

Sample I.D.	Sampling Date / Time *If Composite, Indicate Both Start & Finish Date / Time	Matrix (see below)	Grab/*Composite	VOC: 524.2 / 524.2 BTEX / 524.2 MTBE only; 8260 / 624 / VTICs / 1, 4 Dioxane; 8021 BTEX HALOS; 8015 GRO MAVPH	SVOC: 8270 / 625 / SVTICs EDB DBCP; ABN / A / BN / PAH; TPH8100 LI L2; 8015 DRO MAEPH; PEST 608 PCB 608; PEST 8081 PCB 8082; Oil & Grease 1664 TPH 1664	TCLP: TCLP 1311 ABN Metals; VOC Pest Herb	Metals: Dissolved Metals (List Below); Total Metals (List Below)	Inorganics: TS TSS TDS Spec. Con.; Br Cl F SO_4 NO_2 NO_3 NO_2NO_3; BOD CBOD T. Alk.; TKN NH_3 T. Phos. O. Phos.; pH T. Res. Chlorine; COD Phenols TOC DOC; Total Cyanide Total Sulfide; Reactive Cyanide Reactive Sulfide Flashpoint Ignitability	Micro: Total Coliform E. Coli Fecal Coliform; Enterococci Heterotrophic Plate Count	Other: OV-HOLD (containers); Herbicides	# of Containers	Notes MeOH Vial #
SB-1 (2-3)	5/21/19 0854	S	G		X		X		X		2	5 61) 5/21/19
SB-2 (1-1.5)	0905	S	G		X SPAH only	X Pest. only			X		2	
SB-3 (0-3)	0930	S	G		X		X	Pb only	X		2	
SB-4 (0-3)	0940	S	G		X		X	Pb only	X		2	
Comp 5,6,7 (3-4.5)	1015-1050	S	C	X	X Full SVOC	X Pest + PCB	X	RCRA 8 only		X	3	47911
Comp 8,9,10 (3-4.5)	5/21/19 1115-1150	S	C	X	X	X PCB only	X			X	3	47912
Trip Blank				X							1	47831

Matrix: A-Air; S-Soil; GW-Ground Water; SW-Surface Water; DW-Drinking Water; WW-Waste water

Preservative: H-HCl; N-HNO_3; S-H_2SO_4; Na-NaOH; M-MEOH

Project Manager: Kurt Muller

Company: VHB

Address: 40 Id x Dr., Bld. 100, Ste. 200

City: South Burlington **State:** VT **Zip:** 05403

Phone: 802-778-1278 **Ext.:**

Fax: 802-495-5130

E-Mail: Kmuller@vhb.com / shilfiker@vhb.com

Site Name: Merchant's Row

Project #: 58341.00

State: NH MA ME (VT) **Other:**

Regulatory Program: NPDES: RGP POTW Stormwater or GWP, Oil Fund, Brownfield or Other:

Quote #: 101675 **PO #:**

Date Needed: Standard TAT

QA/QC Reporting Level

A B C

OR

MA MCP

Reporting Options

Prelims: Yes or No

Excel

Electronic Options

E-Mail PDF Equis Excel

Temp. °C

Ice? Yes No

Sampler(s): Steve Hilfiker

Relinquished By:	Date:	Time:	Received By:
	5/21/19	1200	
Relinquished By:	Date:	Time:	Received By:
Relinquished By:	Date:	Time:	Received By:

Metals: 8 RCRA 13 PP Fe, Mn Pb, Cu

Other Metals: 8RCRA / Pb

Samples Field Filtered? ☐ Yes ☒ No

Notes: (ie: Special Detection Limits, Billing Info, If Different)

Site History:

Suspected Contamination:

Field Readings:

Eastern Analytical, Inc.
professional laboratory and drilling services
25 Chenell Drive | Concord, NH 03301 | Tel: 603.228.0525 | 1.800.287.0525 | E-Mail: CustomerService@EasternAnalytical.com | www.EasternAnalytical.com

(WHITE: Original GREEN: Project Manager)

APPENDIX B LABORATORY ANALYTICAL REPORTS

Eastern Analytical, Inc.
professional laboratory and drilling services

J. Kurt Muller
Vanasse Hangen Brustlin, Inc. (VHB)
40 IDX Drive Building 100
South Burlington , VT 05403

Subject: Laboratory Report

Eastern Analytical, Inc. ID:	195702
Client Identification:	Merchant's Row | 58341.00
Date Received:	5/21/2019

Dear Mr. Muller :

Enclosed please find the laboratory report for the above identified project. All analyses were performed in accordance with our QA/QC Program. Unless otherwise stated, holding times, preservation techniques, container types, and sample conditions adhered to EPA Protocol. Samples which were collected by Eastern Analytical, Inc. (EAI) were collected in accordance with approved EPA procedures. Eastern Analytical, Inc. certifies that the enclosed test results meet all requirements of NELAP and other applicable state certifications. Please refer to our website at www.easternanalytical.com for a copy of our NELAP certificate and accredited parameters.

The following standard abbreviations and conventions apply to all EAI reports:

Solid samples are reported on a dry weight basis, unless otherwise noted
< : "less than" followed by the reporting limit
> : "greater than" followed by the reporting limit
%R : % Recovery

Eastern Analytical Inc. maintains certification in the following states: Connecticut (PH-0492), Maine (NH005), Massachusetts (M-NH005), New Hampshire/NELAP (1012), Rhode Island (269), Vermont (VT1012) and New York (12072).

The following information is contained within this report: Sample Conditions summary, Analytical Results/Data, Quality Control data (if requested) and copies of the Chain of Custody. This report may not be reproduced except in full, without the the written approval of the laboratory.

If you have any questions regarding the results contained within, please feel free to directly contact me or the chemist(s) who performed the testing in question. Unless otherwise requested, we will dispose of the sample (s) 30 days from the sample receipt date.

We appreciate this opportunity to be of service and look forward to your continued patronage.

Sincerely,

Lorraine Olashaw, Lab Director | 6.14.19 Date | 35 # of pages (excluding cover letter)

SAMPLE CONDITIONS PAGE

EAI ID#: **195702**

Client: **Vanasse Hangen Brustlin, Inc. (VHB)**

Client Designation: **Merchant's Row | 58341.00**

Temperature upon receipt (°C): 1.3 **Received on ice or cold packs (Yes/No): Y**

Acceptable temperature range (°C): 0-6

Lab ID	Sample ID	Date Received	Date Sampled	Sample Matrix	% Dry Weight	Exceptions/Comments (other than thermal preservation)
195702.01	SB-1 (2.2-3)	5/21/19	5/21/19	soil	89.6	Adheres to Sample Acceptance Policy
195702.02	SB-2 (1-1.5)	5/21/19	5/21/19	soil	88.9	Adheres to Sample Acceptance Policy
195702.03	SB-3 (0-3)	5/21/19	5/21/19	soil	94.0	Adheres to Sample Acceptance Policy
195702.04	SB-4 (0-3)	5/21/19	5/21/19	soil	90.5	Adheres to Sample Acceptance Policy
195702.05	Comp 5,6,7 (3-4.5)	5/21/19	5/21/19	soil	92.2	Adheres to Sample Acceptance Policy
195702.06	Comp 8,9,10 (3-4.5)	5/21/19	5/21/19	soil	88.7	Adheres to Sample Acceptance Policy
195702.07	Trip Blank	5/21/19	5/21/19	soil	100.0	Adheres to Sample Acceptance Policy

Samples were properly preserved and the pH measured when applicable unless otherwise noted. Analysis of solids for pH, Flashpoint, Ignitability, Paint Filter, Corrosivity, Conductivity and Specific Gravity are reported on an "as received" basis.
Immediate analyses, pH, Total Residual Chlorine, Dissolved Oxygen and Sulfite, performed at the laboratory were run outside of the recommended 15 minute hold time.

All results contained in this report relate only to the above listed samples.

References include:

1) EPA 600/4-79-020, 1983
2) Standard Methods for Examination of Water and Wastewater, 20th, 21st, 22nd & 23rd Edition or noted Revision year.
3) Test Methods for Evaluating Solid Waste SW 846 3rd Edition including updates IVA and IVB
4) Hach Water Analysis Handbook, 4th edition, 1992

LABORATORY REPORT

EAI ID#: **195702**

Client: **Vanasse Hangen Brustlin, Inc. (VHB)**

Client Designation: **Merchant's Row | 58341.00**

Sample ID:	Comp 5,6,7 (3-4.5)	Comp 8,9,10 (3-4.5)	Trip Blank
Lab Sample ID:	195702.05	195702.06	195702.07
Matrix:	soil	soil	soil
Date Sampled:	5/21/19	5/21/19	5/21/19
Date Received:	5/21/19	5/21/19	5/21/19
Units:	mg/kg	mg/kg	mg/kg
Date of Analysis:	5/23/19	5/23/19	5/23/19
Analyst:	VG	VG	VG
Method:	8260C	8260C	8260C
Dilution Factor:	1	1	1
Dichlorodifluoromethane	< 0.1	< 0.1	< 0.1
Chloromethane	< 0.1	< 0.1	< 0.1
Vinyl chloride	< 0.1	< 0.1	< 0.1
Bromomethane	< 0.2	< 0.2	< 0.2
Chloroethane	< 0.1	< 0.1	< 0.1
Trichlorofluoromethane	< 0.1	< 0.1	< 0.1
Diethyl Ether	< 0.05	< 0.05	< 0.05
Acetone	< 2	< 2	< 2
1,1-Dichloroethene	< 0.05	< 0.05	< 0.05
Methylene chloride	< 0.1	< 0.1	< 0.1
Carbon disulfide	< 0.1	< 0.1	< 0.1
Methyl-t-butyl ether(MTBE)	< 0.1	< 0.1	< 0.1
trans-1,2-Dichloroethene	< 0.05	< 0.05	< 0.05
1,1-Dichloroethane	< 0.05	< 0.05	< 0.05
2,2-Dichloropropane	< 0.05	< 0.05	< 0.05
cis-1,2-Dichloroethene	< 0.05	< 0.05	< 0.05
2-Butanone(MEK)	< 0.5	< 0.5	< 0.5
Bromochloromethane	< 0.05	< 0.05	< 0.05
Tetrahydrofuran(THF)	< 0.5	< 0.5	< 0.5
Chloroform	< 0.05	< 0.05	< 0.05
1,1,1-Trichloroethane	< 0.05	< 0.05	< 0.05
Carbon tetrachloride	< 0.05	< 0.05	< 0.05
1,1-Dichloropropene	< 0.05	< 0.05	< 0.05
Benzene	< 0.05	< 0.05	< 0.05
1,2-Dichloroethane	< 0.05	< 0.05	< 0.05
Trichloroethene	< 0.05	< 0.05	< 0.05
1,2-Dichloropropane	< 0.05	< 0.05	< 0.05
Dibromomethane	< 0.05	< 0.05	< 0.05
Bromodichloromethane	< 0.05	< 0.05	< 0.05
4-Methyl-2-pentanone(MIBK)	< 0.5	< 0.5	< 0.5
cis-1,3-Dichloropropene	< 0.05	< 0.05	< 0.05
Toluene	< 0.05	< 0.05	< 0.05
trans-1,3-Dichloropropene	< 0.05	< 0.05	< 0.05
1,1,2-Trichloroethane	< 0.05	< 0.05	< 0.05
2-Hexanone	< 0.1	< 0.1	< 0.1
Tetrachloroethene	< 0.05	**0.34**	< 0.05
1,3-Dichloropropane	< 0.05	< 0.05	< 0.05
Dibromochloromethane	< 0.05	< 0.05	< 0.05
1,2-Dibromoethane(EDB)	< 0.05	< 0.05	< 0.05
Chlorobenzene	< 0.05	< 0.05	< 0.05
1,1,1,2-Tetrachloroethane	< 0.05	< 0.05	< 0.05
Ethylbenzene	< 0.05	< 0.05	< 0.05
mp-Xylene	< 0.05	< 0.05	< 0.05
o-Xylene	< 0.05	< 0.05	< 0.05
Styrene	< 0.05	< 0.05	< 0.05
Bromoform	< 0.05	< 0.05	< 0.05
IsoPropylbenzene	< 0.05	< 0.05	< 0.05

LABORATORY REPORT

EAI ID#: **195702**

Client: **Vanasse Hangen Brustlin, Inc. (VHB)**

Client Designation: **Merchant's Row | 58341.00**

Sample ID:	Comp 5,6,7 (3-4.5)	Comp 8,9,10 (3-4.5)	Trip Blank
Lab Sample ID:	195702.05	195702.06	195702.07
Matrix:	soil	soil	soil
Date Sampled:	5/21/19	5/21/19	5/21/19
Date Received:	5/21/19	5/21/19	5/21/19
Units:	mg/kg	mg/kg	mg/kg
Date of Analysis:	5/23/19	5/23/19	5/23/19
Analyst:	VG	VG	VG
Method:	8260C	8260C	8260C
Dilution Factor:	1	1	1
Bromobenzene	< 0.05	< 0.05	< 0.05
1,1,2,2-Tetrachloroethane	< 0.05	< 0.05	< 0.05
1,2,3-Trichloropropane	< 0.05	< 0.05	< 0.05
n-Propylbenzene	< 0.05	< 0.05	< 0.05
2-Chlorotoluene	< 0.05	< 0.05	< 0.05
4-Chlorotoluene	< 0.05	< 0.05	< 0.05
1,3,5-Trimethylbenzene	< 0.05	< 0.05	< 0.05
tert-Butylbenzene	< 0.05	< 0.05	< 0.05
1,2,4-Trimethylbenzene	< 0.05	< 0.05	< 0.05
sec-Butylbenzene	< 0.05	< 0.05	< 0.05
1,3-Dichlorobenzene	< 0.05	< 0.05	< 0.05
p-Isopropyltoluene	< 0.05	< 0.05	< 0.05
1,4-Dichlorobenzene	< 0.05	< 0.05	< 0.05
1,2-Dichlorobenzene	< 0.05	< 0.05	< 0.05
n-Butylbenzene	< 0.05	< 0.05	< 0.05
1,2-Dibromo-3-chloropropane	< 0.05	< 0.05	< 0.05
1,2,4-Trichlorobenzene	< 0.05	< 0.05	< 0.05
Hexachlorobutadiene	< 0.05	< 0.05	< 0.05
Naphthalene	< 0.1	< 0.1	< 0.1
1,2,3-Trichlorobenzene	< 0.05	< 0.05	< 0.05
4-Bromofluorobenzene (surr)	**97 %R**	**95 %R**	**97 %R**
1,2-Dichlorobenzene-d4 (surr)	**99 %R**	**96 %R**	**97 %R**
Toluene-d8 (surr)	**94 %R**	**96 %R**	**96 %R**
1,2-Dichloroethane-d4 (surr)	**85 %R**	**85 %R**	**85 %R**

QC REPORT

EAI ID#: **195702**

Client: **Vanasse Hangen Brustlin, Inc. (VHB)**

Client Designation: **Merchant's Row | 58341.00**

Parameter Name	Blank	LCS	LCSD	Analysis Date	Units	Limits	RPD	Method
Dichlorodifluoromethane	< 0.1			5/23/2019	mg/kg			8260C
Chloromethane	< 0.1			5/23/2019	mg/kg			8260C
Vinyl chloride	< 0.1			5/23/2019	mg/kg			8260C
Bromomethane	< 0.2			5/23/2019	mg/kg			8260C
Chloroethane	< 0.1			5/23/2019	mg/kg			8260C
Trichlorofluoromethane	< 0.1			5/23/2019	mg/kg			8260C
Diethyl Ether	< 0.05			5/23/2019	mg/kg			8260C
Acetone	< 2			5/23/2019	mg/kg			8260C
1,1-Dichloroethene	< 0.05	1.3 (129 %R)	1.3 (126 %R) (2 RPD)	5/23/2019	mg/kg	59 - 172	20	8260C
tert-Butyl Alcohol (TBA)	< 2			5/23/2019	mg/kg			8260C
Methylene chloride	< 0.1			5/23/2019	mg/kg			8260C
Carbon disulfide	< 0.1			5/23/2019	mg/kg			8260C
Methyl-t-butyl ether(MTBE)	< 0.1			5/23/2019	mg/kg			8260C
Ethyl-t-butyl ether(ETBE)	< 0.1			5/23/2019	mg/kg			8260C
Isopropyl ether(DIPE)	< 0.1			5/23/2019	mg/kg			8260C
tert-amyl methyl ether(TAME)	< 0.1			5/23/2019	mg/kg			8260C
trans-1,2-Dichloroethene	< 0.05			5/23/2019	mg/kg			8260C
1,1-Dichloroethane	< 0.05			5/23/2019	mg/kg			8260C
2,2-Dichloropropane	< 0.05			5/23/2019	mg/kg			8260C
cis-1,2-Dichloroethene	< 0.05			5/23/2019	mg/kg			8260C
2-Butanone(MEK)	< 0.5			5/23/2019	mg/kg			8260C
Bromochloromethane	< 0.05			5/23/2019	mg/kg			8260C
Tetrahydrofuran(THF)	< 0.5			5/23/2019	mg/kg			8260C
Chloroform	< 0.05			5/23/2019	mg/kg			8260C
1,1,1-Trichloroethane	< 0.05			5/23/2019	mg/kg			8260C
Carbon tetrachloride	< 0.05			5/23/2019	mg/kg			8260C
1,1-Dichloropropene	< 0.05			5/23/2019	mg/kg			8260C
Benzene	< 0.05	1.1 (112 %R)	1.1 (114 %R) (2 RPD)	5/23/2019	mg/kg	66 - 142	20	8260C
1,2-Dichloroethane	< 0.05			5/23/2019	mg/kg			8260C
Trichloroethene	< 0.05	1.2 (117 %R)	1.2 (117 %R) (0 RPD)	5/23/2019	mg/kg	62 - 137	20	8260C
1,2-Dichloropropane	< 0.05			5/23/2019	mg/kg			8260C
Dibromomethane	< 0.05			5/23/2019	mg/kg			8260C
Bromodichloromethane	< 0.05			5/23/2019	mg/kg			8260C
1,4-Dioxane	< 3			5/23/2019	mg/kg			8260C
4-Methyl-2-pentanone(MIBK)	< 0.5			5/23/2019	mg/kg			8260C
cis-1,3-Dichloropropene	< 0.05			5/23/2019	mg/kg			8260C
Toluene	< 0.05	1.1 (111 %R)	1.1 (110 %R) (1 RPD)	5/23/2019	mg/kg	59 - 139	20	8260C
trans-1,3-Dichloropropene	< 0.05			5/23/2019	mg/kg			8260C
1,1,2-Trichloroethane	< 0.05			5/23/2019	mg/kg			8260C
2-Hexanone	< 0.1			5/23/2019	mg/kg			8260C
Tetrachloroethene	< 0.05			5/23/2019	mg/kg			8260C
1,3-Dichloropropane	< 0.05			5/23/2019	mg/kg			8260C
Dibromochloromethane	< 0.05			5/23/2019	mg/kg			8260C
1,2-Dibromoethane(EDB)	< 0.05			5/23/2019	mg/kg			8260C
Chlorobenzene	< 0.05	1.1 (111 %R)	1.1 (111 %R) (0 RPD)	5/23/2019	mg/kg	60 - 133	20	8260C
1,1,1,2-Tetrachloroethane	< 0.05			5/23/2019	mg/kg			8260C

QC REPORT

EAI ID#: **195702**

Client: **Vanasse Hangen Brustlin, Inc. (VHB)**

Client Designation: **Merchant's Row | 58341.00**

Parameter Name	Blank	LCS	LCSD	Analysis Date	Units	Limits	RPD	Method
Ethylbenzene	< 0.05			5/23/2019	mg/kg			8260C
mp-Xylene	< 0.05			5/23/2019	mg/kg			8260C
o-Xylene	< 0.05			5/23/2019	mg/kg			8260C
Styrene	< 0.05			5/23/2019	mg/kg			8260C
Bromoform	< 0.05			5/23/2019	mg/kg			8260C
IsoPropylbenzene	< 0.05			5/23/2019	mg/kg			8260C
Bromobenzene	< 0.05			5/23/2019	mg/kg			8260C
1,1,2,2-Tetrachloroethane	< 0.05			5/23/2019	mg/kg			8260C
1,2,3-Trichloropropane	< 0.05			5/23/2019	mg/kg			8260C
n-Propylbenzene	< 0.05			5/23/2019	mg/kg			8260C
2-Chlorotoluene	< 0.05			5/23/2019	mg/kg			8260C
4-Chlorotoluene	< 0.05			5/23/2019	mg/kg			8260C
1,3,5-Trimethylbenzene	< 0.05			5/23/2019	mg/kg			8260C
tert-Butylbenzene	< 0.05			5/23/2019	mg/kg			8260C
1,2,4-Trimethylbenzene	< 0.05			5/23/2019	mg/kg			8260C
sec-Butylbenzene	< 0.05			5/23/2019	mg/kg			8260C
1,3-Dichlorobenzene	< 0.05			5/23/2019	mg/kg			8260C
p-Isopropyltoluene	< 0.05			5/23/2019	mg/kg			8260C
1,4-Dichlorobenzene	< 0.05			5/23/2019	mg/kg			8260C
1,2-Dichlorobenzene	< 0.05			5/23/2019	mg/kg			8260C
n-Butylbenzene	< 0.05			5/23/2019	mg/kg			8260C
1,2-Dibromo-3-chloropropane	< 0.05			5/23/2019	mg/kg			8260C
1,3,5-Trichlorobenzene	< 0.05			5/23/2019	mg/kg			8260C
1,2,4-Trichlorobenzene	< 0.05			5/23/2019	mg/kg			8260C
Hexachlorobutadiene	< 0.05			5/23/2019	mg/kg			8260C
Naphthalene	< 0.1			5/23/2019	mg/kg			8260C
1,2,3-Trichlorobenzene	< 0.05			5/23/2019	mg/kg			8260C
4-Bromofluorobenzene (surr)	99 %R	97 %R	97 %R	5/23/2019	% Rec	70 - 130	20	8260C
1,2-Dichlorobenzene-d4 (surr)	97 %R	96 %R	98 %R	5/23/2019	% Rec	70 - 130	20	8260C
Toluene-d8 (surr)	96 %R	96 %R	94 %R	5/23/2019	% Rec	70 - 130	20	8260C
1,2-Dichloroethane-d4 (surr)	85 %R	88 %R	89 %R	5/23/2019	% Rec	70 - 130	20	8260C

Samples were extracted and analyzed within holding time limits.
Instrumentation was calibrated in accordance with the method requirements.
The method blanks were free of contamination at the reporting limits.
Sample surrogate recoveries met the above stated criteria.
The associated matrix spikes and/or Laboratory Control Samples met acceptance criteria.
There were no exceptions in the analyses, unless noted.
*/! Flagged analyte recoveries deviated from the QA/QC limits. Unless noted below, flagged analytes that exceed acceptance limits in the Quality Control sample were not detected in the field samples.
Analytes that exceed limits high but are not detected in the field samples do not impact the data. For analytes that show low recovery and are not detected in the field samples, a low point calibration standard has been analyzed to support the reporting limit.

LABORATORY REPORT

EAI ID#: **195702**

Client: **Vanasse Hangen Brustlin, Inc. (VHB)**

Client Designation: **Merchant's Row | 58341.00**

Client Sample ID:	Comp 5,6,7 (3-4.5)		**Date Prepared:**		5/22/19
Lab Sample ID:	195702.05		**Units:**		mg/kg
Matrix:	soil		**Method:**		8270D
Date Sampled:	5/21/19		**Analyst:**		JMR
Date Received:	5/21/19	**Dilution Factor**	**Date Analyzed**	**TEF**	**TEQ**
alpha-Terpineol	< 0.4	1	5/23/19		
Phenol	< 0.08	1	5/23/19		
2-Chlorophenol	< 0.08	1	5/23/19		
2,4-Dichlorophenol	< 0.08	1	5/23/19		
2,4,5-Trichlorophenol	< 0.08	1	5/23/19		
2,4,6-Trichlorophenol	< 0.08	1	5/23/19		
Pentachlorophenol	< 0.4	1	5/23/19		
2-Nitrophenol	< 0.4	1	5/23/19		
4-Nitrophenol	< 0.4	1	5/23/19		
2,4-Dinitrophenol	< 0.7	1	5/23/19		
2-Methylphenol	< 0.08	1	5/23/19		
3/4-Methylphenol	< 0.08	1	5/23/19		
2,4-Dimethylphenol	< 0.4	1	5/23/19		
4-Chloro-3-methylphenol	< 0.08	1	5/23/19		
4,6-Dinitro-2-methylphenol	< 0.4	1	5/23/19		
Benzoic Acid	< 4	1	5/23/19		
N-Nitrosodimethylamine	< 0.08	1	5/23/19		
n-Nitroso-di-n-propylamine	< 0.08	1	5/23/19		
n-Nitrosodiphenylamine	< 0.08	1	5/23/19		
bis(2-Chloroethyl)ether	< 0.08	1	5/23/19		
bis(2-chloroisopropyl)ether	< 0.08	1	5/23/19		
bis(2-Chloroethoxy)methane	< 0.08	1	5/23/19		
1,3-Dichlorobenzene	< 0.08	1	5/23/19		
Acetophenone	< 0.7	1	5/23/19		
1,4-Dichlorobenzene	< 0.08	1	5/23/19		
1,2-Dichlorobenzene	< 0.08	1	5/23/19		
1,2,4-Trichlorobenzene	< 0.08	1	5/23/19		
2-Chloronaphthalene	< 0.08	1	5/23/19		
4-Chlorophenyl-phenylether	< 0.08	1	5/23/19		
4-Bromophenyl-phenylether	< 0.08	1	5/23/19		
Hexachloroethane	< 0.08	1	5/23/19		
Hexachlorobutadiene	< 0.08	1	5/23/19		
Hexachlorocyclopentadiene	< 0.4	1	5/23/19		
Hexachlorobenzene	< 0.08	1	5/23/19		
4-Chloroaniline	< 0.08	1	5/23/19		
2,3-Dichloroaniline	< 0.08	1	5/23/19		
2-Nitroaniline	< 0.4	1	5/23/19		
3-Nitroaniline	< 0.4	1	5/23/19		
4-Nitroaniline	< 0.4	1	5/23/19		
Aniline	< 0.08	1	5/23/19		
Benzyl alcohol	< 0.7	1	5/23/19		
Nitrobenzene	< 0.08	1	5/23/19		
Isophorone	< 0.08	1	5/23/19		
2,4-Dinitrotoluene	< 0.4	1	5/23/19		
2,6-Dinitrotoluene	< 0.4	1	5/23/19		
Benzidine (estimated)	< 0.4	1	5/23/19		

LABORATORY REPORT

EAI ID#: **195702**

Client: **Vanasse Hangen Brustlin, Inc. (VHB)**

Client Designation: **Merchant's Row | 58341.00**

Client Sample ID:	Comp 5,6,7 (3-4.5)		**Date Prepared:**		5/22/19
Lab Sample ID:	195702.05		**Units:**		mg/kg
Matrix:	soil		**Method:**		8270D
Date Sampled:	5/21/19		**Analyst:**		JMR
Date Received:	5/21/19	**Dilution Factor**	**Date Analyzed**	**TEF**	**TEQ**
3,3'-Dichlorobenzidine	< 0.08	1	5/23/19		
Pyridine	< 0.4	1	5/23/19		
Azobenzene	< 0.08	1	5/23/19		
Carbazole	< 0.08	1	5/23/19		
Dimethylphthalate	< 0.08	1	5/23/19		
Diethylphthalate	< 0.4	1	5/23/19		
Di-n-butylphthalate	< 0.4	1	5/23/19		
Butylbenzylphthalate	< 0.4	1	5/23/19		
bis(2-Ethylhexyl)phthalate	< 0.4	1	5/23/19		
Di-n-octylphthalate	< 0.4	1	5/23/19		
Dibenzofuran	< 0.08	1	5/23/19		
Naphthalene	< 0.007	1	5/23/19		
2-Methylnaphthalene	< 0.007	1	5/23/19		
1-Methylnaphthalene	< 0.007	1	5/23/19		
Acenaphthylene	**0.051**	1	5/23/19		
Acenaphthene	**0.0078**	1	5/23/19		
Fluorene	**0.011**	1	5/23/19		
Phenanthrene	**0.11**	1	5/23/19		
Anthracene	**0.038**	1	5/23/19		
Fluoranthene	**0.28**	1	5/23/19		
Pyrene	**0.32**	1	5/23/19		
Benzo[a]anthracene	**0.17**	1	5/23/19	0.1	.017
Chrysene	**0.19**	1	5/23/19	0.001	.00019
Benzo[b]fluoranthene	**0.21**	1	5/23/19	0.1	.021
Benzo[k]fluoranthene	**0.076**	1	5/23/19	0.01	.00076
Benzo[a]pyrene	**0.18**	1	5/23/19	1	.18
Indeno[1,2,3-cd]pyrene	**0.13**	1	5/23/19	0.1	.013
Dibenz[a,h]anthracene	**0.029**	1	5/23/19	1	.029
Benzo[g,h,i]perylene	**0.12**	1	5/23/19		
n-Decane	< 0.4	1	5/23/19		
n-Octadecane	< 0.4	1	5/23/19		
2-Fluorophenol (surr)	**56 %R**		5/23/19		
Phenol-d6 (surr)	**62 %R**		5/23/19		
2,4,6-Tribromophenol (surr)	**75 %R**		5/23/19		
Nitrobenzene-D5 (surr)	**61 %R**		5/23/19		
2-Fluorobiphenyl (surr)	**66 %R**		5/23/19		
p-Terphenyl-D14 (surr)	**85 %R**		5/23/19		

TEF: Toxicity Equivalent Factor TEQ: Toxicity Equivalence to Benzo[a]pyrene

The TEF factors set forth in this report are taken from the following EPA document: "Mid- Atlantic Risk Assessment User's Guide: Novembe 2013". This guidance document sets forth a recommended, but not mandatory approach based upon currently available information with respect to risk assessment for response actions at CERCLA sites. This document does not establish binding rules. This document contains the most current TEF values per VT IROCP.

LABORATORY REPORT

EAI ID#: **195702**

Client: **Vanasse Hangen Brustlin, Inc. (VHB)**

Client Designation: **Merchant's Row | 58341.00**

Client Sample ID:	Comp 8,9,10 (3-4.5)		**Date Prepared:**		5/22/19
Lab Sample ID:	195702.06		**Units:**		mg/kg
Matrix:	soil		**Method:**		8270D
Date Sampled:	5/21/19		**Analyst:**		JMR
Date Received:	5/21/19	**Dilution Factor**	**Date Analyzed**	**TEF**	**TEQ**
alpha-Terpineol	< 0.4	1	5/23/19		
Phenol	< 0.08	1	5/23/19		
2-Chlorophenol	< 0.08	1	5/23/19		
2,4-Dichlorophenol	< 0.08	1	5/23/19		
2,4,5-Trichlorophenol	< 0.08	1	5/23/19		
2,4,6-Trichlorophenol	< 0.08	1	5/23/19		
Pentachlorophenol	< 0.4	1	5/23/19		
2-Nitrophenol	< 0.4	1	5/23/19		
4-Nitrophenol	< 0.4	1	5/23/19		
2,4-Dinitrophenol	< 0.7	1	5/23/19		
2-Methylphenol	< 0.08	1	5/23/19		
3/4-Methylphenol	< 0.08	1	5/23/19		
2,4-Dimethylphenol	< 0.4	1	5/23/19		
4-Chloro-3-methylphenol	< 0.08	1	5/23/19		
4,6-Dinitro-2-methylphenol	< 0.4	1	5/23/19		
Benzoic Acid	< 4	1	5/23/19		
N-Nitrosodimethylamine	< 0.08	1	5/23/19		
n-Nitroso-di-n-propylamine	< 0.08	1	5/23/19		
n-Nitrosodiphenylamine	< 0.08	1	5/23/19		
bis(2-Chloroethyl)ether	< 0.08	1	5/23/19		
bis(2-chloroisopropyl)ether	< 0.08	1	5/23/19		
bis(2-Chloroethoxy)methane	< 0.08	1	5/23/19		
1,3-Dichlorobenzene	< 0.08	1	5/23/19		
Acetophenone	< 0.7	1	5/23/19		
1,4-Dichlorobenzene	< 0.08	1	5/23/19		
1,2-Dichlorobenzene	< 0.08	1	5/23/19		
1,2,4-Trichlorobenzene	< 0.08	1	5/23/19		
2-Chloronaphthalene	< 0.08	1	5/23/19		
4-Chlorophenyl-phenylether	< 0.08	1	5/23/19		
4-Bromophenyl-phenylether	< 0.08	1	5/23/19		
Hexachloroethane	< 0.08	1	5/23/19		
Hexachlorobutadiene	< 0.08	1	5/23/19		
Hexachlorocyclopentadiene	< 0.4	1	5/23/19		
Hexachlorobenzene	< 0.08	1	5/23/19		
4-Chloroaniline	< 0.08	1	5/23/19		
2,3-Dichloroaniline	< 0.08	1	5/23/19		
2-Nitroaniline	< 0.4	1	5/23/19		
3-Nitroaniline	< 0.4	1	5/23/19		
4-Nitroaniline	< 0.4	1	5/23/19		
Aniline	< 0.08	1	5/23/19		
Benzyl alcohol	< 0.7	1	5/23/19		
Nitrobenzene	< 0.08	1	5/23/19		
Isophorone	< 0.08	1	5/23/19		
2,4-Dinitrotoluene	< 0.4	1	5/23/19		
2,6-Dinitrotoluene	< 0.4	1	5/23/19		
Benzidine (estimated)	< 0.4	1	5/23/19		

LABORATORY REPORT

EAI ID#: **195702**

Client: **Vanasse Hangen Brustlin, Inc. (VHB)**

Client Designation: **Merchant's Row | 58341.00**

Client Sample ID:	Comp 8,9,10 (3-4.5)		**Date Prepared:**		5/22/19
Lab Sample ID:	195702.06		**Units:**		mg/kg
Matrix:	soil		**Method:**		8270D
Date Sampled:	5/21/19		**Analyst:**		JMR
Date Received:	5/21/19	**Dilution Factor**	**Date Analyzed**	**TEF**	**TEQ**
3,3'-Dichlorobenzidine	< 0.08	1	5/23/19		
Pyridine	< 0.4	1	5/23/19		
Azobenzene	< 0.08	1	5/23/19		
Carbazole	**0.29**	1	5/23/19		
Dimethylphthalate	< 0.08	1	5/23/19		
Diethylphthalate	< 0.4	1	5/23/19		
Di-n-butylphthalate	< 0.4	1	5/23/19		
Butylbenzylphthalate	< 0.4	1	5/23/19		
bis(2-Ethylhexyl)phthalate	< 0.4	1	5/23/19		
Di-n-octylphthalate	< 0.4	1	5/23/19		
Dibenzofuran	**0.092**	1	5/23/19		
Naphthalene	**0.11**	1	5/23/19		
2-Methylnaphthalene	**0.067**	1	5/23/19		
1-Methylnaphthalene	**0.075**	1	5/23/19		
Acenaphthylene	**0.50**	1	5/23/19		
Acenaphthene	**0.072**	1	5/23/19		
Fluorene	**0.21**	1	5/23/19		
Phenanthrene	**2.6**	1	5/23/19		
Anthracene	**0.56**	1	5/23/19		
Fluoranthene	**4.1**	1	5/23/19		
Pyrene	**4.0**	1	5/23/19		
Benzo[a]anthracene	**2.2**	1	5/23/19	0.1	.22
Chrysene	**2.6**	1	5/23/19	0.001	.0026
Benzo[b]fluoranthene	**3.0**	1	5/23/19	0.1	.3
Benzo[k]fluoranthene	**1.1**	1	5/23/19	0.01	.011
Benzo[a]pyrene	**2.2**	1	5/23/19	1	2.2
Indeno[1,2,3-cd]pyrene	**0.73**	1	5/23/19	0.1	.073
Dibenz[a,h]anthracene	**0.17**	1	5/23/19	1	.17
Benzo[g,h,i]perylene	**0.53**	1	5/23/19		
n-Decane	< 0.4	1	5/23/19		
n-Octadecane	< 0.4	1	5/23/19		
2-Fluorophenol (surr)	**63 %R**		5/23/19		
Phenol-d6 (surr)	**70 %R**		5/23/19		
2,4,6-Tribromophenol (surr)	**80 %R**		5/23/19		
Nitrobenzene-D5 (surr)	**68 %R**		5/23/19		
2-Fluorobiphenyl (surr)	**73 %R**		5/23/19		
p-Terphenyl-D14 (surr)	**85 %R**		5/23/19		

TEF: Toxicity Equivalent Factor TEQ: Toxicity Equivalence to Benzo[a]pyrene

The TEF factors set forth in this report are taken from the following EPA document: "Mid- Atlantic Risk Assessment User's Guide: Novembe 2013". This guidance document sets forth a recommended, but not mandatory approach based upon currently available information with respect to risk assessment for response actions at CERCLA sites. This document does not establish binding rules. This document contains the most current TEF values per VT IROCP.

QC REPORT

EAI ID#: **195702**

Client: **Vanasse Hangen Brustlin, Inc. (VHB)**

Batch ID: 636940-24397/S052119ABN1

Client Designation: **Merchant's Row | 58341.00**

Parameter Name	Blank	LCS	LCSD	Analysis Date	Units	Limits	RPD	Method
alpha-Terpineol	< 0.34	1.4 (82 %R)	1.1 (67 %R) (20 RPD)	5/22/2019	mg/kg	40 - 140	30	8270D
Phenol	< 0.07	2.3 (70 %R)	1.9 (58 %R) (17 RPD)	5/22/2019	mg/kg	15 - 130	30	8270D
2-Chlorophenol	< 0.07	2.3 (69 %R)	1.9 (57 %R) (18 RPD)	5/22/2019	mg/kg	30 - 130	30	8270D
2,4-Dichlorophenol	< 0.07	2.5 (75 %R)	2.1 (63 %R) (17 RPD)	5/22/2019	mg/kg	30 - 130	30	8270D
2,4,5-Trichlorophenol	< 0.07	2.7 (80 %R)	2.3 (70 %R) (13 RPD)	5/22/2019	mg/kg	30 - 130	30	8270D
2,4,6-Trichlorophenol	< 0.07	2.8 (84 %R)	2.3 (69 %R) (19 RPD)	5/22/2019	mg/kg	30 - 130	30	8270D
Pentachlorophenol	< 0.34	2.7 (82 %R)	2.5 (74 %R) (11 RPD)	5/22/2019	mg/kg	30 - 130	30	8270D
2-Nitrophenol	< 0.34	2.4 (71 %R)	2.0 (60 %R) (16 RPD)	5/22/2019	mg/kg	30 - 130	30	8270D
4-Nitrophenol	< 0.34	2.8 (83 %R)	2.5 (74 %R) (11 RPD)	5/22/2019	mg/kg	15 - 130	30	8270D
2,4-Dinitrophenol	< 0.7	2.5 (75 %R)	2.3 (68 %R) (11 RPD)	5/22/2019	mg/kg	15 - 130	30	8270D
2-Methylphenol	< 0.07	2.5 (74 %R)	2.0 (61 %R) (19 RPD)	5/22/2019	mg/kg	30 - 130	30	8270D
3/4-Methylphenol	< 0.07	2.7 (82 %R)	2.2 (67 %R) (20 RPD)	5/22/2019	mg/kg	30 - 130	30	8270D
2,4-Dimethylphenol	< 0.34	2.3 (70 %R)	1.9 (58 %R) (18 RPD)	5/22/2019	mg/kg	30 - 130	30	8270D
4-Chloro-3-methylphenol	< 0.07	2.8 (83 %R)	2.4 (71 %R) (15 RPD)	5/22/2019	mg/kg	30 - 130	30	8270D
4,6-Dinitro-2-methylphenol	< 0.34	2.6 (77 %R)	2.4 (71 %R) (7 RPD)	5/22/2019	mg/kg	30 - 130	30	8270D
Benzoic Acid	< 3.4	< 3.4 (73 %R)	< 3.4 (65 %R) (11 RPD)	5/22/2019	mg/kg	15 - 130	30	8270D
N-Nitrosodimethylamine	< 0.07	1.1 (67 %R)	0.91 (55 %R) (19 RPD)	5/22/2019	mg/kg	15 - 140	30	8270D
n-Nitroso-di-n-propylamine	< 0.07	1.3 (76 %R)	1.0 (62 %R) (20 RPD)	5/22/2019	mg/kg	40 - 140	30	8270D
n-Nitrosodiphenylamine	< 0.07	1.4 (83 %R)	1.3 (76 %R) (9 RPD)	5/22/2019	mg/kg	40 - 140	30	8270D
bis(2-Chloroethyl)ether	< 0.07	1.2 (70 %R)	0.96 (58 %R) (19 RPD)	5/22/2019	mg/kg	40 - 140	30	8270D
bis(2-chloroisopropyl)ether	< 0.07	1.3 (78 %R)	1.1 (64 %R) (19 RPD)	5/22/2019	mg/kg	40 - 140	30	8270D
bis(2-Chloroethoxy)methane	< 0.07	1.2 (75 %R)	1.0 (61 %R) (20 RPD)	5/22/2019	mg/kg	40 - 140	30	8270D
1,3-Dichlorobenzene	< 0.07	1.0 (60 %R)	0.83 (50 %R) (19 RPD)	5/22/2019	mg/kg	40 - 140	30	8270D
Acetophenone	< 0.7	1.1 (65 %R)	0.89 (53 %R) (20 RPD)	5/22/2019	mg/kg	40 - 140	30	8270D
1,4-Dichlorobenzene	< 0.07	1.0 (61 %R)	0.83 (50 %R) (19 RPD)	5/22/2019	mg/kg	40 - 140	30	8270D
1,2-Dichlorobenzene	< 0.07	1.0 (62 %R)	0.85 (51 %R) (19 RPD)	5/22/2019	mg/kg	40 - 140	30	8270D
1,2,4-Trichlorobenzene	< 0.07	1.1 (66 %R)	0.93 (56 %R) (17 RPD)	5/22/2019	mg/kg	40 - 140	30	8270D
2-Chloronaphthalene	< 0.07	1.2 (74 %R)	1.0 (62 %R) (18 RPD)	5/22/2019	mg/kg	40 - 140	30	8270D
4-Chlorophenyl-phenylether	< 0.07	1.3 (79 %R)	1.1 (67 %R) (16 RPD)	5/22/2019	mg/kg	40 - 140	30	8270D
4-Bromophenyl-phenylether	< 0.07	1.4 (82 %R)	1.2 (71 %R) (13 RPD)	5/22/2019	mg/kg	40 - 140	30	8270D
Hexachloroethane	< 0.07	0.99 (59 %R)	0.80 (48 %R) (21 RPD)	5/22/2019	mg/kg	40 - 140	30	8270D
Hexachlorobutadiene	< 0.07	1.1 (64 %R)	0.88 (53 %R) (18 RPD)	5/22/2019	mg/kg	40 - 140	30	8270D
Hexachlorocyclopentadiene	< 0.34	0.64 (38 %R)	0.57 (34 %R) (12 RPD)	5/22/2019	mg/kg	15 - 140	30	8270D
Hexachlorobenzene	< 0.07	1.4 (84 %R)	1.3 (75 %R) (11 RPD)	5/22/2019	mg/kg	40 - 140	30	8270D
4-Chloroaniline	< 0.07	1.3 (75 %R)	1.0 (61 %R) (21 RPD)	5/22/2019	mg/kg	15 - 140	30	8270D
2,3-Dichloroaniline	< 0.07	1.3 (76 %R)	1.1 (64 %R) (18 RPD)	5/22/2019	mg/kg	40 - 140	30	8270D
2-Nitroaniline	< 0.34	1.4 (85 %R)	1.2 (73 %R) (15 RPD)	5/22/2019	mg/kg	40 - 140	30	8270D
3-Nitroaniline	< 0.34	1.4 (83 %R)	1.2 (73 %R) (13 RPD)	5/22/2019	mg/kg	40 - 140	30	8270D
4-Nitroaniline	< 0.34	1.4 (82 %R)	1.2 (72 %R) (12 RPD)	5/22/2019	mg/kg	40 - 140	30	8270D
Aniline	< 0.07	1.1 (68 %R)	0.92 (55 %R) (20 RPD)	5/22/2019	mg/kg	40 - 140	30	8270D
Benzyl alcohol	< 0.7	1.3 (75 %R)	1.1 (63 %R) (17 RPD)	5/22/2019	mg/kg	40 - 140	30	8270D
Nitrobenzene	< 0.07	1.2 (70 %R)	0.98 (59 %R) (18 RPD)	5/22/2019	mg/kg	40 - 140	30	8270D
Isophorone	< 0.07	1.3 (76 %R)	1.0 (63 %R) (19 RPD)	5/22/2019	mg/kg	40 - 140	30	8270D
2,4-Dinitrotoluene	< 0.34	1.4 (84 %R)	1.2 (75 %R) (11 RPD)	5/22/2019	mg/kg	40 - 140	30	8270D
2,6-Dinitrotoluene	< 0.34	1.4 (81 %R)	1.2 (72 %R) (12 RPD)	5/22/2019	mg/kg	40 - 140	30	8270D
Benzidine (estimated)	< 0.34	0.74 (44 %R)	0.54 (33 %R) (30 RPD)	5/22/2019	mg/kg	1 - 200	50	8270D

QC REPORT

EAI ID#: **195702**

Client: **Vanasse Hangen Brustlin, Inc. (VHB)**

Batch ID: 636940-24397/S052119ABN1

Client Designation: **Merchant's Row | 58341.00**

Parameter Name	Blank	LCS	LCSD	Analysis Date	Units	Limits	RPD	Method
3,3'-Dichlorobenzidine	< 0.07	1.5 (90 %R)	1.4 (82 %R) (9 RPD)	5/22/2019	mg/kg	40 - 140	30	8270D
Pyridine	< 0.34	1.0 (62 %R)	0.86 (52 %R) (19 RPD)	5/22/2019	mg/kg	15 - 140	30	8270D
Azobenzene	< 0.07	1.4 (86 %R)	1.3 (75 %R) (14 RPD)	5/22/2019	mg/kg	40 - 140	30	8270D
Carbazole	< 0.07	1.4 (86 %R)	1.3 (78 %R) (9 RPD)	5/22/2019	mg/kg	40 - 140	30	8270D
Dimethylphthalate	< 0.07	1.4 (83 %R)	1.2 (73 %R) (13 RPD)	5/22/2019	mg/kg	40 - 140	30	8270D
Diethylphthalate	< 0.34	1.4 (87 %R)	1.3 (77 %R) (12 RPD)	5/22/2019	mg/kg	40 - 140	30	8270D
Di-n-butylphthalate	< 0.34	1.5 (88 %R)	1.4 (83 %R) (6 RPD)	5/22/2019	mg/kg	40 - 140	30	8270D
Butylbenzylphthalate	< 0.34	1.8 (105 %R)	1.6 (97 %R) (8 RPD)	5/22/2019	mg/kg	40 - 140	30	8270D
bis(2-Ethylhexyl)phthalate	< 0.34	1.7 (105 %R)	1.6 (96 %R) (9 RPD)	5/22/2019	mg/kg	40 - 140	30	8270D
Di-n-octylphthalate	< 0.34	1.7 (100 %R)	1.5 (92 %R) (9 RPD)	5/22/2019	mg/kg	40 - 140	30	8270D
Dibenzofuran	< 0.07	1.3 (80 %R)	1.1 (67 %R) (18 RPD)	5/22/2019	mg/kg	40 - 140	30	8270D
Naphthalene	< 0.007	1.1 (68 %R)	0.94 (56 %R) (18 RPD)	5/22/2019	mg/kg	40 - 140	30	8270D
2-Methylnaphthalene	< 0.007	1.2 (73 %R)	1.0 (61 %R) (17 RPD)	5/22/2019	mg/kg	40 - 140	30	8270D
1-Methylnaphthalene	< 0.007	1.2 (73 %R)	1.0 (61 %R) (18 RPD)	5/22/2019	mg/kg	40 - 140	30	8270D
Acenaphthylene	< 0.007	1.3 (77 %R)	1.1 (63 %R) (19 RPD)	5/22/2019	mg/kg	40 - 140	30	8270D
Acenaphthene	< 0.007	1.4 (83 %R)	1.2 (70 %R) (17 RPD)	5/22/2019	mg/kg	40 - 140	30	8270D
Fluorene	< 0.007	1.3 (78 %R)	1.1 (67 %R) (15 RPD)	5/22/2019	mg/kg	40 - 140	30	8270D
Phenanthrene	< 0.007	1.4 (82 %R)	1.2 (74 %R) (11 RPD)	5/22/2019	mg/kg	40 - 140	30	8270D
Anthracene	< 0.007	1.4 (83 %R)	1.2 (74 %R) (11 RPD)	5/22/2019	mg/kg	40 - 140	30	8270D
Fluoranthene	< 0.007	1.4 (82 %R)	1.2 (75 %R) (10 RPD)	5/22/2019	mg/kg	40 - 140	30	8270D
Pyrene	< 0.007	1.6 (97 %R)	1.5 (89 %R) (9 RPD)	5/22/2019	mg/kg	40 - 140	30	8270D
Benzo[a]anthracene	< 0.007	1.4 (86 %R)	1.3 (80 %R) (8 RPD)	5/22/2019	mg/kg	40 - 140	30	8270D
Chrysene	< 0.007	1.5 (93 %R)	1.4 (85 %R) (9 RPD)	5/22/2019	mg/kg	40 - 140	30	8270D
Benzo[b]fluoranthene	< 0.007	1.5 (89 %R)	1.4 (84 %R) (7 RPD)	5/22/2019	mg/kg	40 - 140	30	8270D
Benzo[k]fluoranthene	< 0.007	1.5 (88 %R)	1.3 (79 %R) (11 RPD)	5/22/2019	mg/kg	40 - 140	30	8270D
Benzo[a]pyrene	< 0.007	1.4 (86 %R)	1.3 (78 %R) (10 RPD)	5/22/2019	mg/kg	40 - 140	30	8270D
Indeno[1,2,3-cd]pyrene	< 0.007	1.5 (88 %R)	1.3 (78 %R) (12 RPD)	5/22/2019	mg/kg	40 - 140	30	8270D
Dibenz[a,h]anthracene	< 0.007	1.4 (86 %R)	1.3 (78 %R) (10 RPD)	5/22/2019	mg/kg	40 - 140	30	8270D
Benzo[g,h,i]perylene	< 0.007	1.5 (93 %R)	1.4 (83 %R) (12 RPD)	5/22/2019	mg/kg	40 - 140	30	8270D
n-Decane	< 0.34	0.96 (58 %R)	0.77 (46 %R) (23 RPD)	5/22/2019	mg/kg	40 - 140	30	8270D
n-Octadecane	< 0.34	1.6 (97 %R)	1.5 (90 %R) (7 RPD)	5/22/2019	mg/kg	40 - 140	30	8270D
2-Fluorophenol (surr)	61 %R	63 %R	52 %R	5/22/2019	mg/kg	30 - 130	30	8270D
Phenol-d6 (surr)	67 %R	72 %R	59 %R	5/22/2019	mg/kg	30 - 130	30	8270D
2,4,6-Tribromophenol (surr)	73 %R	84 %R	75 %R	5/22/2019	mg/kg	30 - 130	30	8270D
Nitrobenzene-D5 (surr)	67 %R	69 %R	59 %R	5/22/2019	mg/kg	30 - 130	30	8270D
2-Fluorobiphenyl (surr)	75 %R	74 %R	61 %R	5/22/2019	mg/kg	30 - 130	30	8270D
p-Terphenyl-D14 (surr)	93 %R	98 %R	89 %R	5/22/2019	mg/kg	30 - 130	30	8270D

Samples were extracted and analyzed within holding time limits.Instrumentation was calibrated in accordance with the method requirements.The method blanks were free of contamination at the reporting limits.Sample surrogate recoveries met the above stated criteria.The associated matrix spikes and/or Laboratory Control Samples met acceptance criteria.There were no exceptions in the analyses, unless noted.*/!Flagged analyte recoveries deviated from the QA/QC limits. Unless noted below, flagged analytes that exceed acceptance limits in the Quality Control sample were not detected in the field samples.

LABORATORY REPORT

EAI ID#: **195702**

Client: **Vanasse Hangen Brustlin, Inc. (VHB)**

Client Designation: **Merchant's Row | 58341.00**

Client Sample ID:	SB-1 (2.2-3)
Lab Sample ID:	195702.01
Matrix:	soil
Date Sampled:	5/21/19
Date Received:	5/21/19
Date Prepared:	5/23/19
Units	mg/kg
Method	8270D
Analyst	JMR

	Results	Dilution Factor	Date Analyzed	TEF	TEQ
Naphthalene	**0.024**	1	5/23/19		
2-Methylnaphthalene	< 0.008	1	5/23/19		
1-Methylnaphthalene	< 0.008	1	5/23/19		
Acenaphthylene	**0.031**	1	5/23/19		
Acenaphthene	< 0.008	1	5/23/19		
Fluorene	**0.018**	1	5/23/19		
Phenanthrene	**0.32**	1	5/23/19		
Anthracene	**0.032**	1	5/23/19		
Fluoranthene	**0.49**	1	5/23/19		
Pyrene	**0.47**	1	5/23/19		
Benzo[a]anthracene	**0.20**	1	5/23/19	0.1	.02
Chrysene	**0.26**	1	5/23/19	0.001	.00026
Benzo[b]fluoranthene	**0.28**	1	5/23/19	0.1	.028
Benzo[k]fluoranthene	**0.11**	1	5/23/19	0.01	.0011
Benzo[a]pyrene	**0.22**	1	5/23/19	1	.22
Indeno[1,2,3-cd]pyrene	**0.19**	1	5/23/19	0.1	.019
Dibenz[a,h]anthracene	**0.037**	1	5/23/19	1	.037
Benzo[g,h,i]perylene	**0.18**	1	5/23/19		
p-Terphenyl-D14 (surr)	**80 %R**		5/23/19		

TEF: Toxicity Equivalent Factor

TEQ: Toxicity Equivalence to Benzo[a]pyrene

The TEF factors set forth in this report are taken from the following EPA document: "Mid- Atlantic Risk Assessment User's Guide: November 2013". This guidance document sets forth a recommended, but not mandatory approach based upon currently available information with respect to risk assessment for response actions at CERCLA sites. This document does not establish binding rules. This document contains the most current TEF values per VT IROCP.

LABORATORY REPORT

EAI ID#: **195702**

Client: **Vanasse Hangen Brustlin, Inc. (VHB)**

Client Designation: **Merchant's Row | 58341.00**

Client Sample ID:	SB-2 (1-1.5)
Lab Sample ID:	195702.02
Matrix:	soil
Date Sampled:	5/21/19
Date Received:	5/21/19
Date Prepared:	5/23/19
Units	mg/kg
Method	8270D
Analyst	JMR

	Results	Dilution Factor	Date Analyzed	TEF	TEQ
Naphthalene	< 0.008	1	5/23/19		
2-Methylnaphthalene	< 0.008	1	5/23/19		
1-Methylnaphthalene	< 0.008	1	5/23/19		
Acenaphthylene	< 0.008	1	5/23/19		
Acenaphthene	< 0.008	1	5/23/19		
Fluorene	< 0.008	1	5/23/19		
Phenanthrene	< 0.008	1	5/23/19		
Anthracene	< 0.008	1	5/23/19		
Fluoranthene	< 0.008	1	5/23/19		
Pyrene	< 0.008	1	5/23/19		
Benzo[a]anthracene	< 0.008	1	5/23/19	0.1	< .0008
Chrysene	< 0.008	1	5/23/19	0.001	< .00000
Benzo[b]fluoranthene	< 0.008	1	5/23/19	0.1	< .0008
Benzo[k]fluoranthene	< 0.008	1	5/23/19	0.01	< .00008
Benzo[a]pyrene	< 0.008	1	5/23/19	1	< .008
Indeno[1,2,3-cd]pyrene	< 0.008	1	5/23/19	0.1	< .0008
Dibenz[a,h]anthracene	< 0.008	1	5/23/19	1	< .008
Benzo[g,h,i]perylene	< 0.008	1	5/23/19		
p-Terphenyl-D14 (surr)	**81 %R**		5/23/19		

TEF: Toxicity Equivalent Factor

TEQ: Toxicity Equivalence to Benzo[a]pyrene

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LABORATORY REPORT

EAI ID#: **195702**

Client: **Vanasse Hangen Brustlin, Inc. (VHB)**

Client Designation: **Merchant's Row | 58341.00**

Client Sample ID:	SB-3 (0-3)
Lab Sample ID:	195702.03
Matrix:	soil
Date Sampled:	5/21/19
Date Received:	5/21/19
Date Prepared:	5/23/19
Units	mg/kg
Method	8270D
Analyst	JMR

	Results	Dilution Factor	Date Analyzed	TEF	TEQ
Naphthalene	**0.11**	5	5/23/19		
2-Methylnaphthalene	**0.083**	5	5/23/19		
1-Methylnaphthalene	**0.042**	5	5/23/19		
Acenaphthylene	**1.8**	5	5/23/19		
Acenaphthene	< 0.04	5	5/23/19		
Fluorene	**0.17**	5	5/23/19		
Phenanthrene	**0.91**	5	5/23/19		
Anthracene	**0.61**	5	5/23/19		
Fluoranthene	**4.2**	5	5/23/19		
Pyrene	**4.7**	5	5/23/19		
Benzo[a]anthracene	**3.1**	5	5/23/19	0.1	.31
Chrysene	**3.5**	5	5/23/19	0.001	.0035
Benzo[b]fluoranthene	**4.7**	5	5/23/19	0.1	.47
Benzo[k]fluoranthene	**1.4**	5	5/23/19	0.01	.014
Benzo[a]pyrene	**3.5**	5	5/23/19	1	3.5
Indeno[1,2,3-cd]pyrene	**1.7**	5	5/23/19	0.1	.17
Dibenz[a,h]anthracene	**0.43**	5	5/23/19	1	.43
Benzo[g,h,i]perylene	**1.5**	5	5/23/19		
p-Terphenyl-D14 (surr)	**89 %R**		5/23/19		

TEF: Toxicity Equivalent Factor

TEQ: Toxicity Equivalence to Benzo[a]pyrene

The TEF factors set forth in this report are taken from the following EPA document: "Mid- Atlantic Risk Assessment User's Guide: November 2013". This guidance document sets forth a recommended, but not mandatory approach based upon currently available information with respect to risk assessment for response actions at CERCLA sites. This document does not establish binding rules. This document contains the most current TEF values per VT IROCP.

Detection limits elevated due to higher than normal final extract volume.

LABORATORY REPORT

EAI ID#: **195702**

Client: **Vanasse Hangen Brustlin, Inc. (VHB)**

Client Designation: **Merchant's Row | 58341.00**

Client Sample ID:	SB-4 (0-3)
Lab Sample ID:	195702.04
Matrix:	soil
Date Sampled:	5/21/19
Date Received:	5/21/19
Date Prepared:	5/23/19
Units	mg/kg
Method	8270D
Analyst	JMR

	Results	Dilution Factor	Date Analyzed	TEF	TEQ
Naphthalene	**0.17**	6	5/23/19		
2-Methylnaphthalene	**0.13**	6	5/23/19		
1-Methylnaphthalene	**0.086**	6	5/23/19		
Acenaphthylene	**2.0**	6	5/23/19		
Acenaphthene	**0.048**	6	5/23/19		
Fluorene	**0.18**	6	5/23/19		
Phenanthrene	**1.2**	6	5/23/19		
Anthracene	**0.86**	6	5/23/19		
Fluoranthene	**6.0**	6	5/23/19		
Pyrene	**5.9**	6	5/23/19		
Benzo[a]anthracene	**4.0**	6	5/23/19	0.1	.4
Chrysene	**4.3**	6	5/23/19	0.001	.0043
Benzo[b]fluoranthene	**6.1**	6	5/23/19	0.1	.61
Benzo[k]fluoranthene	**2.2**	6	5/23/19	0.01	.022
Benzo[a]pyrene	**4.1**	6	5/23/19	1	4.1
Indeno[1,2,3-cd]pyrene	**1.6**	6	5/23/19	0.1	.16
Dibenz[a,h]anthracene	**0.42**	6	5/23/19	1	.42
Benzo[g,h,i]perylene	**1.4**	6	5/23/19		
p-Terphenyl-D14 (surr)	**80 %R**		5/23/19		

TEF: Toxicity Equivalent Factor

TEQ: Toxicity Equivalence to Benzo[a]pyrene

The TEF factors set forth in this report are taken from the following EPA document: "Mid- Atlantic Risk Assessment User's Guide: November 2013". This guidance document sets forth a recommended, but not mandatory approach based upon currently available information with respect to risk assessment for response actions at CERCLA sites. This document does not establish binding rules. This document contains the most current TEF values per VT IROCP.

QC REPORT

EAI ID#: **195702**

Client: **Vanasse Hangen Brustlin, Inc. (VHB)**

Batch ID: 636941-98748/S052319PAH1

Client Designation: **Merchant's Row | 58341.00**

Parameter Name	Blank	LCS	LCSD	Analysis Date	Units	Limits	RPD	Method
Naphthalene	< 0.007	1.1 (69 %R)	1.1 (68 %R) (2 RPD)	5/23/2019	mg/kg	40 - 140	30	8270D
2-Methylnaphthalene	< 0.007	1.3 (79 %R)	1.3 (76 %R) (4 RPD)	5/23/2019	mg/kg	40 - 140	30	8270D
1-Methylnaphthalene	< 0.007	1.3 (78 %R)	1.2 (74 %R) (5 RPD)	5/23/2019	mg/kg	40 - 140	30	8270D
Acenaphthylene	< 0.007	1.1 (69 %R)	1.1 (68 %R) (2 RPD)	5/23/2019	mg/kg	40 - 140	30	8270D
Acenaphthene	< 0.007	1.1 (63 %R)	1.0 (62 %R) (3 RPD)	5/23/2019	mg/kg	40 - 140	30	8270D
Fluorene	< 0.007	1.2 (70 %R)	1.2 (70 %R) (1 RPD)	5/23/2019	mg/kg	40 - 140	30	8270D
Phenanthrene	< 0.007	1.2 (74 %R)	1.2 (73 %R) (1 RPD)	5/23/2019	mg/kg	40 - 140	30	8270D
Anthracene	< 0.007	1.3 (75 %R)	1.2 (75 %R) (1 RPD)	5/23/2019	mg/kg	40 - 140	30	8270D
Fluoranthene	< 0.007	1.3 (76 %R)	1.3 (76 %R) (0 RPD)	5/23/2019	mg/kg	40 - 140	30	8270D
Pyrene	< 0.007	1.5 (87 %R)	1.4 (83 %R) (5 RPD)	5/23/2019	mg/kg	40 - 140	30	8270D
Benzo[a]anthracene	< 0.007	1.4 (83 %R)	1.3 (81 %R) (3 RPD)	5/23/2019	mg/kg	40 - 140	30	8270D
Chrysene	< 0.007	1.4 (86 %R)	1.4 (84 %R) (2 RPD)	5/23/2019	mg/kg	40 - 140	30	8270D
Benzo[b]fluoranthene	< 0.007	1.4 (82 %R)	1.3 (79 %R) (3 RPD)	5/23/2019	mg/kg	40 - 140	30	8270D
Benzo[k]fluoranthene	< 0.007	1.4 (83 %R)	1.3 (80 %R) (4 RPD)	5/23/2019	mg/kg	40 - 140	30	8270D
Benzo[a]pyrene	< 0.007	1.3 (81 %R)	1.3 (78 %R) (3 RPD)	5/23/2019	mg/kg	40 - 140	30	8270D
Indeno[1,2,3-cd]pyrene	< 0.007	1.4 (83 %R)	1.3 (78 %R) (6 RPD)	5/23/2019	mg/kg	40 - 140	30	8270D
Dibenz[a,h]anthracene	< 0.007	1.4 (83 %R)	1.3 (81 %R) (3 RPD)	5/23/2019	mg/kg	40 - 140	30	8270D
Benzo[g,h,i]perylene	< 0.007	1.4 (81 %R)	1.3 (78 %R) (3 RPD)	5/23/2019	mg/kg	40 - 140	30	8270D
p-Terphenyl-D14 (surr)	71 %R	84 %R	82 %R	5/23/2019	mg/kg	30 - 130		8270D

Samples were extracted and analyzed within holding time limits.
Instrumentation was calibrated in accordance with the method requirements.
The method blanks were free of contamination at the reporting limits.
Sample surrogate recoveries met the above stated criteria.
The associated matrix spikes and/or Laboratory Control Samples met acceptance criteria.
There were no exceptions in the analyses, unless noted.
*/! Flagged analyte recoveries deviated from the QA/QC limits. Unless noted below, flagged analytes that exceed acceptance limits in the Quality Control sample were not detected in the field samples.

LABORATORY REPORT

EAI ID#: **195702**

Client: **Vanasse Hangen Brustlin, Inc. (VHB)**

Client Designation: **Merchant's Row | 58341.00**

Sample ID:	SB-3 (0-3)	SB-4 (0-3)
Lab Sample ID:	195702.03	195702.04
Matrix:	soil	soil
Date Sampled:	5/21/19	5/21/19
Date Received:	5/21/19	5/21/19
Units:	ug/L	ug/L
Date of Extraction/Prep:	6/5/19	6/5/19
Date of Analysis:	6/5/19	6/5/19
Analyst:	JMR	JMR
Method:	8270D	8270D
Dilution Factor:	1	1
Benzo[a]pyrene	**4.4**	**4.2**
p-Terphenyl-D14 (surr)	**73 %R**	**85 %R**

Samples prepared by SPLP prior to extraction.

QC REPORT

EAI ID#: **195702**

Client: **Vanasse Hangen Brustlin, Inc. (VHB)**

Batch ID: 636953-14142/A060419PAH1

Client Designation: **Merchant's Row | 58341.00**

Parameter Name	Blank	LCS	LCSD	Analysis Date	Units	Limits	RPD	Method
Naphthalene	< 0.1	16 (64 %R)	16 (65 %R) (1 RPD)	6/4/2019	ug/L	40 - 140	20	8270D
2-Methylnaphthalene	< 0.1	17 (67 %R)	18 (70 %R) (4 RPD)	6/4/2019	ug/L	40 - 140	20	8270D
1-Methylnaphthalene	< 0.1	17 (68 %R)	18 (71 %R) (4 RPD)	6/4/2019	ug/L	40 - 140	20	8270D
Acenaphthylene	< 0.1	17 (68 %R)	18 (71 %R) (5 RPD)	6/4/2019	ug/L	40 - 140	20	8270D
Acenaphthene	< 0.1	17 (69 %R)	18 (72 %R) (5 RPD)	6/4/2019	ug/L	40 - 140	20	8270D
Fluorene	< 0.1	18 (71 %R)	19 (74 %R) (4 RPD)	6/4/2019	ug/L	40 - 140	20	8270D
Phenanthrene	< 0.1	18 (72 %R)	18 (74 %R) (2 RPD)	6/4/2019	ug/L	40 - 140	20	8270D
Anthracene	< 0.1	18 (74 %R)	19 (75 %R) (1 RPD)	6/4/2019	ug/L	40 - 140	20	8270D
Fluoranthene	< 0.1	19 (76 %R)	19 (77 %R) (1 RPD)	6/4/2019	ug/L	40 - 140	20	8270D
Pyrene	< 0.1	20 (81 %R)	20 (79 %R) (2 RPD)	6/4/2019	ug/L	40 - 140	20	8270D
Benzo[a]anthracene	< 0.1	20 (79 %R)	20 (79 %R) (0 RPD)	6/4/2019	ug/L	40 - 140	20	8270D
Chrysene	< 0.1	22 (86 %R)	21 (86 %R) (0 RPD)	6/4/2019	ug/L	40 - 140	20	8270D
Benzo[b]fluoranthene	< 0.1	20 (79 %R)	20 (80 %R) (0 RPD)	6/4/2019	ug/L	40 - 140	20	8270D
Benzo[k]fluoranthene	< 0.1	20 (81 %R)	20 (82 %R) (0 RPD)	6/4/2019	ug/L	40 - 140	20	8270D
Benzo[a]pyrene	< 0.1	20 (79 %R)	20 (79 %R) (0 RPD)	6/4/2019	ug/L	40 - 140	20	8270D
Indeno[1,2,3-cd]pyrene	< 0.1	19 (75 %R)	19 (75 %R) (1 RPD)	6/4/2019	ug/L	40 - 140	20	8270D
Dibenz[a,h]anthracene	< 0.1	20 (79 %R)	20 (79 %R) (1 RPD)	6/4/2019	ug/L	40 - 140	20	8270D
Benzo[g,h,i]perylene	< 0.1	19 (74 %R)	19 (75 %R) (0 RPD)	6/4/2019	ug/L	40 - 140	20	8270D
p-Terphenyl-D14 (surr)	92 %R	87 %R	85 %R	6/4/2019	% Rec	30 - 130		8270D

Samples were extracted and analyzed within holding time limits.
Instrumentation was calibrated in accordance with the method requirements.
The method blanks were free of contamination at the reporting limits.
Sample surrogate recoveries met the above stated criteria.
The associated matrix spikes and/or Laboratory Control Samples met acceptance criteria.
There were no exceptions in the analyses, unless noted.
*/! Flagged analyte recoveries deviated from the QA/QC limits. Unless noted below, flagged analytes that exceed acceptance limits in the Quality Control sample were not detected in the field samples.

LABORATORY REPORT

EAI ID#: **195702**

Client: **Vanasse Hangen Brustlin, Inc. (VHB)**

Client Designation: **Merchant's Row | 58341.00**

Sample ID:	SB-2 (1-1.5)	Comp 5,6,7 (3-4.5)
Lab Sample ID:	195702.02	195702.05
Matrix:	soil	soil
Date Sampled:	5/21/19	5/21/19
Date Received:	5/21/19	5/21/19
Units:	mg/kg	mg/kg
Date of Extraction/Prep:	5/22/19	5/22/19
Date of Analysis:	5/24/19	5/24/19
Analyst:	SG	SG
Method:	8081B	8081B
Dilution Factor:	1	1
Aldrin	< 0.006	< 0.005
alpha-BHC	< 0.006	< 0.005
beta-BHC	< 0.006	< 0.005
Lindane(gamma-BHC)	< 0.006	< 0.005
delta-BHC	< 0.006	< 0.005
Chlordane	< 0.02	< 0.02
4,4'-DDT	< 0.006	< 0.005
4,4'-DDE	< 0.006	< 0.005
4,4'-DDD	< 0.006	< 0.005
Dieldrin	< 0.006	< 0.005
Endosulfan I	< 0.006	< 0.005
Endosulfan II	< 0.006	< 0.005
Endosulfan Sulfate	< 0.006	< 0.005
Endrin	< 0.006	< 0.005
Endrin Aldehyde	< 0.006	< 0.005
Endrin Ketone	< 0.006	< 0.005
Heptachlor	< 0.006	< 0.005
Heptachlor Epoxide	< 0.006	< 0.005
Methoxychlor	< 0.006	< 0.005
Toxaphene	< 0.06	< 0.05
TMX (surr)	**62 %R**	**60 %R**
DCB (surr)	**60 %R**	**45 %R**

Florisil clean-up was performed on the sample and associated batch QC.

QC REPORT

EAI ID#: **195702**

Client: **Vanasse Hangen Brustlin, Inc. (VHB)**

Batch ID: 636941-09400/S052219Pest1

Client Designation: **Merchant's Row | 58341.00**

Parameter Name	Blank	LCS	LCSD	Analysis Date	Units	Limits	RPD	Method
Aldrin	< 0.005	0.022 (67 %R)	0.021 (64 %R) (5 RPD)	5/24/2019	mg/kg	40 - 140	30	8081B
alpha-BHC	< 0.005	0.023 (69 %R)	0.022 (66 %R) (4 RPD)	5/24/2019	mg/kg	40 - 140	30	8081B
beta-BHC	< 0.005	0.023 (70 %R)	0.025 (74 %R) (6 RPD)	5/24/2019	mg/kg	40 - 140	30	8081B
Lindane(gamma-BHC)	< 0.005	0.024 (71 %R)	0.023 (70 %R) (1 RPD)	5/24/2019	mg/kg	40 - 140	30	8081B
delta-BHC	< 0.005	0.021 (62 %R)	0.022 (66 %R) (6 RPD)	5/24/2019	mg/kg	40 - 140	30	8081B
Chlordane	< 0.02	< 0.02 (%R N/A)	< 0.02 (%R N/A) (RPD N/A)	5/24/2019	mg/kg		30	8081B
4,4'-DDT	< 0.005	0.027 (80 %R)	0.026 (79 %R) (1 RPD)	5/24/2019	mg/kg	40 - 140	30	8081B
4,4'-DDE	< 0.005	0.024 (73 %R)	0.024 (71 %R) (3 RPD)	5/24/2019	mg/kg	40 - 140	30	8081B
4,4'-DDD	< 0.005	0.025 (75 %R)	0.024 (73 %R) (3 RPD)	5/24/2019	mg/kg	40 - 140	30	8081B
Dieldrin	< 0.005	0.024 (71 %R)	0.023 (70 %R) (1 RPD)	5/24/2019	mg/kg	40 - 140	30	8081B
Endosulfan I	< 0.005	0.025 (75 %R)	0.025 (75 %R) (0 RPD)	5/24/2019	mg/kg	40 - 140	30	8081B
Endosulfan II	< 0.005	0.024 (73 %R)	0.026 (77 %R) (5 RPD)	5/24/2019	mg/kg	40 - 140	30	8081B
Endosulfan Sulfate	< 0.005	0.021 (62 %R)	0.024 (71 %R) (14 RPD)	5/24/2019	mg/kg	40 - 140	30	8081B
Endrin	< 0.005	0.026 (78 %R)	0.026 (78 %R) (0 RPD)	5/24/2019	mg/kg	40 - 140	30	8081B
Endrin Aldehyde	< 0.005	0.016 (49 %R)	0.019 (58 %R) (17 RPD)	5/24/2019	mg/kg	40 - 140	30	8081B
Endrin Ketone	< 0.005	0.023 (68 %R)	0.024 (73 %R) (7 RPD)	5/24/2019	mg/kg	40 - 140	30	8081B
Heptachlor	< 0.005	0.024 (71 %R)	0.023 (69 %R) (3 RPD)	5/24/2019	mg/kg	40 - 140	30	8081B
Heptachlor Epoxide	< 0.005	0.024 (71 %R)	0.023 (70 %R) (1 RPD)	5/24/2019	mg/kg	40 - 140	30	8081B
Methoxychlor	< 0.005	0.026 (79 %R)	0.026 (79 %R) (0 RPD)	5/24/2019	mg/kg	40 - 140	30	8081B
Toxaphene	< 0.05	< 0.05 (%R N/A)	< 0.05 (%R N/A) (RPD N/A)	5/24/2019	mg/kg			8081B
TMX (surr)	62 %R	64 %R	62 %R	5/24/2019	mg/kg	30 - 150	30	8081B
DCB (surr)	65 %R	65 %R	64 %R	5/24/2019	mg/kg	30 - 150	30	8081B

Samples were extracted and analyzed within holding time limits.
Instrumentation was calibrated in accordance with the method requirements.
The method blanks were free of contamination at the reporting limits.
Sample surrogate recoveries met the above stated criteria.
The associated matrix spikes and/or Laboratory Control Samples met acceptance criteria.
There were no exceptions in the analyses, unless noted.
*/! Flagged analyte recoveries deviated from the QA/QC limits. Unless noted below, flagged analytes that exceed acceptance limits in the Quality Control sample were not detected in the field samples.

LABORATORY REPORT

EAI ID#: **195702**

Client: **Vanasse Hangen Brustlin, Inc. (VHB)**

Client Designation: **Merchant's Row | 58341.00**

Sample ID:	Comp 5,6,7 (3-4.5)	Comp 8,9,10 (3-4.5)
Lab Sample ID:	195702.05	195702.06
Matrix:	soil	soil
Date Sampled:	5/21/19	5/21/19
Date Received:	5/21/19	5/21/19
% Solid:	92.2	88.7
Units:	mg/kg	mg/kg
Date of Extraction/Prep:	5/22/19	5/22/19
Date of Analysis:	5/23/19	5/23/19
Analyst:	SG	SG
Extraction Method:	3540C	3540C
Analysis Method:	8082A	8082A
Dilution Factor:	1	1
PCB-1016	< 0.02	< 0.02
PCB-1221	< 0.02	< 0.02
PCB-1232	< 0.02	< 0.02
PCB-1242	< 0.02	< 0.02
PCB-1248	< 0.02	< 0.02
PCB-1254	< 0.02	< 0.02
PCB-1260	< 0.02	< 0.02
PCB-1262	< 0.02	< 0.02
PCB-1268	< 0.02	< 0.02
TMX (surr)	**92 %R**	**77 %R**
DCB (surr)	**63 %R**	**58 %R**

Acid clean-up was performed on the samples and associated batch QC.

QC REPORT

EAI ID#: **195702**

Client: **Vanasse Hangen Brustlin, Inc. (VHB)**

Batch ID: 636941-09444/S052219PCB1

Client Designation: **Merchant's Row | 58341.00**

Parameter Name	Blank	LCS	LCSD	Analysis Date	Units	Limits	RPD	Method
PCB-1016	< 0.02	0.14 (102 %R)	0.14 (105 %R) (2 RPD)	5/23/2019	mg/kg	40 - 140	30	8082A
PCB-1221	< 0.02	< 0.02 (%R N/A)	< 0.02 (%R N/A) (RPD N/A)	5/23/2019	mg/kg			8082A
PCB-1232	< 0.02	< 0.02 (%R N/A)	< 0.02 (%R N/A) (RPD N/A)	5/23/2019	mg/kg			8082A
PCB-1242	< 0.02	< 0.02 (%R N/A)	< 0.02 (%R N/A) (RPD N/A)	5/23/2019	mg/kg			8082A
PCB-1248	< 0.02	< 0.02 (%R N/A)	< 0.02 (%R N/A) (RPD N/A)	5/23/2019	mg/kg			8082A
PCB-1254	< 0.02	< 0.02 (%R N/A)	< 0.02 (%R N/A) (RPD N/A)	5/23/2019	mg/kg			8082A
PCB-1260	< 0.02	0.13 (96 %R)	0.13 (97 %R) (2 RPD)	5/23/2019	mg/kg	40 - 140	30	8082A
PCB-1262	< 0.02	< 0.02 (%R N/A)	< 0.02 (%R N/A) (RPD N/A)	5/23/2019	mg/kg			8082A
PCB-1268	< 0.02	< 0.02 (%R N/A)	< 0.02 (%R N/A) (RPD N/A)	5/23/2019	mg/kg			8082A
TMX (surr)	97 %R	94 %R	93 %R	5/23/2019	% Rec	30 - 150	30	8082A
DCB (surr)	98 %R	95 %R	95 %R	5/23/2019	% Rec	30 - 150	30	8082A

Samples were extracted and analyzed within holding time limits.
Instrumentation was calibrated in accordance with the method requirements.
The method blanks were free of contamination at the reporting limits.
Sample surrogate recoveries met the above stated criteria.
The associated matrix spikes and/or Laboratory Control Samples met acceptance criteria.
There were no exceptions in the analyses, unless noted.
*/! Flagged analyte recoveries deviated from the QA/QC limits. Unless noted below, flagged analytes that exceed acceptance limits in the Quality Control sample were not detected in the field samples.

LABORATORY REPORT

EAI ID#: **195702**

Client: **Vanasse Hangen Brustlin, Inc. (VHB)**

Client Designation: **Merchant's Row | 58341.00**

Sample ID:	SB-3 (0-3)	SB-4 (0-3)
Lab Sample ID:	195702.03	195702.04
Matrix:	soil	soil
Date Sampled:	5/21/19	5/21/19
Date Received:	5/21/19	5/21/19
Lead	**8.2**	**26**

Analytical Matrix	Units	Date of Analysis	Method	Analyst
SolTotDry	mg/kg	5/22/19	6020	DS

Sample ID:	Comp 5,6,7 (3-4.5)	Comp 8,9,10 (3-4.5)
Lab Sample ID:	195702.05	195702.06
Matrix:	soil	soil
Date Sampled:	5/21/19	5/21/19
Date Received:	5/21/19	5/21/19
Arsenic	**6.1**	**5.6**
Barium	**17**	**29**
Cadmium	< 0.5	< 0.5
Chromium	**16**	**17**
Lead	**9.4**	**16**
Mercury	< 0.1	< 0.1
Selenium	< 0.5	< 0.5
Silver	< 0.5	< 0.5

Analytical Matrix	Units	Date of Analysis	Method	Analyst
SolTotDry	mg/kg	5/22/19	6020	DS
SolTotDry	mg/kg	5/22/19	6020	DS
SolTotDry	mg/kg	5/22/19	6020	DS
SolTotDry	mg/kg	5/22/19	6020	DS
SolTotDry	mg/kg	5/22/19	6020	DS
SolTotDry	mg/kg	5/22/19	6020	DS
SolTotDry	mg/kg	5/22/19	6020	DS
SolTotDry	mg/kg	5/22/19	6020	DS

QC REPORT

EAI ID#: **195702**

Client: **Vanasse Hangen Brustlin, Inc. (VHB)**

Client Designation: **Merchant's Row | 58341.00**

Parameter Name	Blank	LCS	LCSD		Units	Date of Analysis	Limits	RPD	Method
Arsenic	< 0.5	39 (98 %R)		NA	mg/kg	5/22/19	80 - 120	20	6020
Barium	< 0.5	38 (95 %R)		NA	mg/kg	5/22/19	80 - 120	20	6020
Cadmium	< 0.5	39 (98 %R)		NA	mg/kg	5/22/19	80 - 120	20	6020
Chromium	< 0.5	38 (96 %R)		NA	mg/kg	5/22/19	80 - 120	20	6020
Lead	< 0.5	37 (93 %R)		NA	mg/kg	5/22/19	80 - 120	20	6020
Mercury	< 0.1	0.37 (93 %R)		NA	mg/kg	5/22/19	80 - 120	20	6020
Selenium	< 0.5	41 (102 %R)		NA	mg/kg	5/22/19	80 - 120	20	6020
Silver	< 0.5	39 (97 %R)		NA	mg/kg	5/22/19	80 - 120	20	6020

Samples were analyzed within holding times unless noted on the sample results page.
Instrumentation was calibrated in accordance with the method requirements.
The method blanks were free of contamination at the reporting limits.
The associated matrix spikes and/or Laboratory Control Samples met the above stated criteria.
Exceptions to the above statements are flagged or noted above or on the QC Narrative page.
*/! Flagged analyte recoveries deviated from the QA/QC limits.

PHOENIX
Environmental Laboratories, Inc.

Thursday, May 30, 2019

Attn: Front Office
Eastern Analytical
25 Chenell Drive
Concord, NH 03301

Project ID: 195702
SDG ID: GCD20731
Sample ID#s: CD20731 - CD20732

This laboratory is in compliance with the NELAC requirements of procedures used except where indicated.

This report contains results for the parameters tested, under the sampling conditions described on the Chain Of Custody, as received by the laboratory. This report is incomplete unless all pages indicated in the pagination at the bottom of the page are included.

All soils, solids and sludges are reported on a dry weight basis unless otherwise noted in the sample comments.

A scanned version of the COC form accompanies the analytical report and is an exact duplicate of the original.

If you are the client above and have any questions concerning this testing, please do not hesitate to contact Phoenix Client Services at ext.200. The contents of this report cannot be discussed with anyone other than the client listed above without their written consent.

Sincerely yours,

Phyllis Shiller

Phyllis Shiller
Laboratory Director

NELAC - #NY11301
CT Lab Registration #PH-0618
MA Lab Registration #M-CT007
ME Lab Registration #CT-007
NH Lab Registration #213693-A,B
NJ Lab Registration #CT-003
NY Lab Registration #11301
PA Lab Registration #68-03530
RI Lab Registration #63
UT Lab Registration #CT00007
VT Lab Registration #VT11301

PHOENIX

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

Sample Id Cross Reference

May 30, 2019

SDG I.D.: GCD20731

Project ID: 195702

Client Id	Lab Id	Matrix
COMP 5,6,7 (3-4.5)	CD20731	SOIL
COMP 8,9,10 (3-4.5)	CD20732	SOIL

PHOENIX

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report

May 30, 2019

FOR: Attn: Front Office
Eastern Analytical
25 Chenell Drive
Concord, NH 03301

Sample Information		Custody Information		Date	Time
Matrix:	SOIL	Collected by:		05/21/19	10:50
Location Code:	EASTANAL	Received by:	CP	05/23/19	16:42
Rush Request:	Standard	Analyzed by:	see "By" below		
P.O.#:	50115				

Laboratory Data

SDG ID: GCD20731
Phoenix ID: CD20731

Project ID: 195702
Client ID: COMP 5,6,7 (3-4.5)

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Percent Solid	93		%		05/23/19	ML	SW846-%Solid
Soil Extraction for Herbicide	Completed				05/24/19	C/D	SW8151A
Chlorinated Herbicides							
2,4,5-T	ND	89	ug/Kg	10	05/29/19	CW	SW8151A
2,4,5-TP (Silvex)	ND	89	ug/Kg	10	05/29/19	CW	SW8151A
2,4-D	ND	180	ug/Kg	10	05/29/19	CW	SW8151A
2,4-DB	ND	890	ug/Kg	10	05/29/19	CW	SW8151A
Dalapon	ND	89	ug/Kg	10	05/29/19	CW	SW8151A
Dicamba	ND	89	ug/Kg	10	05/29/19	CW	SW8151A
Dichloroprop	ND	130	ug/Kg	10	05/29/19	CW	SW8151A
Dinoseb	ND	89	ug/Kg	10	05/29/19	CW	SW8151A
MCPA	ND	27000	ug/Kg	10	05/29/19	CW	SW8151A
MCPP	ND	27000	ug/Kg	10	05/29/19	CW	SW8151A
QA/QC Surrogates							
% DCAA	69		%	10	05/29/19	CW	30 - 150 %
% DCAA (Confirmation)	72		%	10	05/29/19	CW	30 - 150 %

Project ID: 195702 Phoenix I.D.: CD20731

Client ID: COMP 5,6,7 (3-4.5)

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference

RL/PQL=Reporting/Practical Quantitation Level ND=Not Detected BRL=Below Reporting Level
QA/QC Surrogates: Surrogates are compounds (preceeded with a %) added by the lab to determine analysis efficiency. Surrogate results(%) listed in the report are not "detected" compounds.

Comments:

All soils, solids and sludges are reported on a dry weight basis unless otherwise noted in the sample comments.

If you are the client above and have any questions concerning this testing, please do not hesitate to contact Phoenix Client Services at ext.200.
The contents of this report cannot be discussed with anyone other than the client listed above without their written consent.

Phyllis Shiller, Laboratory Director

May 30, 2019

Reviewed and Released by: Bobbi Aloisa, Vice President

PHOENIX

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report

May 30, 2019

FOR: Attn: Front Office
Eastern Analytical
25 Chenell Drive
Concord, NH 03301

Sample Information		Custody Information		Date	Time
Matrix:	SOIL	Collected by:		05/21/19	11:50
Location Code:	EASTANAL	Received by:	CP	05/23/19	16:42
Rush Request:	Standard	Analyzed by:	see "By" below		
P.O.#:	50115				

Laboratory Data

SDG ID: GCD20731
Phoenix ID: CD20732

Project ID: 195702
Client ID: COMP 8,9,10 (3-4.5)

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Percent Solid	87		%		05/23/19	ML	SW846-%Solid
Soil Extraction for Herbicide	Completed				05/24/19	C/D	SW8151A
Chlorinated Herbicides							
2,4,5-T	ND	94	ug/Kg	10	05/29/19	CW	SW8151A
2,4,5-TP (Silvex)	ND	94	ug/Kg	10	05/29/19	CW	SW8151A
2,4-D	ND	190	ug/Kg	10	05/29/19	CW	SW8151A
2,4-DB	ND	940	ug/Kg	10	05/29/19	CW	SW8151A
Dalapon	ND	94	ug/Kg	10	05/29/19	CW	SW8151A
Dicamba	ND	94	ug/Kg	10	05/29/19	CW	SW8151A
Dichloroprop	ND	140	ug/Kg	10	05/29/19	CW	SW8151A
Dinoseb	ND	94	ug/Kg	10	05/29/19	CW	SW8151A
MCPA	ND	28000	ug/Kg	10	05/29/19	CW	SW8151A
MCPP	ND	28000	ug/Kg	10	05/29/19	CW	SW8151A
QA/QC Surrogates							
% DCAA	65		%	10	05/29/19	CW	30 - 150 %
% DCAA (Confirmation)	70		%	10	05/29/19	CW	30 - 150 %

Project ID: 195702
Client ID: COMP 8,9,10 (3-4.5)

Phoenix I.D.: CD20732

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference

RL/PQL=Reporting/Practical Quantitation Level ND=Not Detected BRL=Below Reporting Level
QA/QC Surrogates: Surrogates are compounds (preceeded with a %) added by the lab to determine analysis efficiency. Surrogate results(%) listed in the report are not "detected" compounds.

Comments:

All soils, solids and sludges are reported on a dry weight basis unless otherwise noted in the sample comments.

If you are the client above and have any questions concerning this testing, please do not hesitate to contact Phoenix Client Services at ext.200.
The contents of this report cannot be discussed with anyone other than the client listed above without their written consent.

Phyllis Shiller, Laboratory Director
May 30, 2019
Reviewed and Released by: Bobbi Aloisa, Vice President

PHOENIX

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

QA/QC Report

May 30, 2019

QA/QC Data

SDG I.D.: GCD20731

Parameter	Blank	Blk RL	LCS %	LCSD %	LCS RPD	MS %	MSD %	MS RPD	% Rec Limits	% RPD Limits
QA/QC Batch 480387 (ug/Kg), QC Sample No: CD21069 10X (CD20731, CD20732)										
Chlorinated Herbicides - Soil										
2,4,5-T	ND	83	77	71	8.1	81	77	5.1	40 - 140	30
2,4,5-TP (Silvex)	ND	83	84	76	10.0	87	83	4.7	40 - 140	30
2,4-D	ND	170	67	60	11.0	68	86	23.4	40 - 140	30
2,4-DB	ND	1700	83	79	4.9	89	111	22.0	40 - 140	30
Dalapon	ND	83	63	67	6.2	75	66	12.8	40 - 140	30
Dicamba	ND	83	98	92	6.3	104	94	10.1	40 - 140	30
Dichloroprop	ND	83	86	88	2.3	108	108	0.0	40 - 140	30
Dinoseb	ND	83	114	106	7.3	85	88	3.5	40 - 140	30
MCPA	ND	25000	70	59	17.1	74	63	16.1	40 - 140	30
MCPP	ND	25000	114	118	3.4	86	87	1.2	40 - 140	30
% DCAA (Surrogate Rec)	61	%	71	65	8.8	71	67	5.8	30 - 150	30
% DCAA (Surrogate Rec) (Confirm	66	%	76	74	2.7	84	79	6.1	30 - 150	30

If there are any questions regarding this data, please call Phoenix Client Services at extension 200.

RPD - Relative Percent Difference
LCS - Laboratory Control Sample
LCSD - Laboratory Control Sample Duplicate
MS - Matrix Spike
MS Dup - Matrix Spike Duplicate
NC - No Criteria
Intf - Interference

Phyllis Shiller, Laboratory Director
May 30, 2019

Thursday, May 30, 2019

Criteria: None

State: VT

Sample Criteria Exceedances Report

GCD20731 - EASTANAL

SampNo	Acode	Phoenix Analyte	Criteria	Result	RL	Criteria	RL Criteria	Analysis Units

*** No Data to Display ***

Phoenix Laboratories does not assume responsibility for the data contained in this exceedance report. It is provided as an additional tool to identify requested criteria exceedences. All efforts are made to ensure the accuracy of the data (obtained from appropriate agencies). A lack of exceedence information does not necessarily suggest conformance to the criteria. It is ultimately the site professional's responsibility to determine appropriate compliance.

PHOENIX

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

ACCREDITED IN ACCORDANCE WITH nelac NY # 11301

Analysis Comments

May 30, 2019 SDG I.D.: GCD20731

The following analysis comments are made regarding exceptions to criteria not already noted in the Analysis Report or QA/QC Report:

Herbicide Narration

AU-ECD2 05/28/19-1: CD20731, CD20732

The following Continuing Calibration compounds did not meet % deviation criteria:
Samples: CD20731, CD20732
Preceding CC 528A064 - None.
Succeeding CC 528A075 - MCPA (6) 16%L (15%)

CHAIN-OF-CUSTODY RECORD

WCIP 1.2

Eastern Analytical, Inc.
professional laboratory and drilling services

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EAI ID# 195702 Page 1

Sample ID	Date Sampled	Matrix	aParameters	Sample Notes
Comp 5,6,7 (3-4.5)	5/21/2019 10:50	soil	Subcontract - Herbicides 8151	20731
Comp 8,9,10 (3-4.5)	5/21/2019 11:50	soil	Subcontract - Herbicides 8151	20732

EAI ID# 195702 **Project State: VT**

Project ID: 0

Company Phoenix Environmental Labs
Address 587 East Middle Turnpike
Address Manchester , CT 06040
Account #
Phone # (860) 645-1102

Results Needed: **Preferred Date: Standard**

RUSH Due Date: _____

QC Deliverables

☐ A ☐ A+ ☒ B ☐ B+ ☐ C ☐ MA MCP

Notes about project:

Email login confirmation, pdf of results and invoice to customerservice@easternanalytical.com.

PO #: 50115 **EAI ID# 195702**

Data Deliverable (circle)

Excel NH EMD EQuIS ME EGAD

Call prior to analyzing, if RUSH charges will be applied

Samples Collected by: 5-23-19 @1100

Relinquished by	Date/Time	Received by
	5-23-19 13:05	
Relinquished by	Date/Time	Received by
		1642

Eastern Analytical, Inc. 25 Chenell Dr. Concord, NH 03301 Phone: (603) 228-0525 1-800-287-0525 customerservice@easternanalytical.com

Page 1 of 1

CHAIN-OF-CUSTODY RECORD

195702

BOLD FIELDS REQUIRED. PLEASE CIRCLE REQUESTED ANALYSIS.

SAMPLE I.D.	SAMPLING DATE / TIME *IF COMPOSITE, INDICATE BOTH START & FINISH DATE / TIME	MATRIX (SEE BELOW)	GRAB/*COMPOSITE	VOC: 524.2 BTEX; 524.2 MTBE ONLY; 524.2 VTICs; 8260 624 1,4 DIOXANE; 8021 BTEX HALOS; 8015 GRO MAVPH	SVOC: 8270 625 ABN A; SVTICs EDB PAH BN; TPH8100 LI L2; 8015 DRO MAEPH; PEST 608 PCB 608 PEST 8081 PCB 8082; OIL & GREASE 1664 TPH 1664	TCLP: TCLP 1311 ABN METALS VOC PEST HERB	METALS: DISSOLVED METALS (LIST BELOW); TOTAL METALS (LIST BELOW)	INORGANICS: TS TSS TDS SPEC. CON.; Br Cl F SO_4 NO_2 NO_3 NO_2NO_3; BOD CBOD T. ALK.; TKN NH_3 T. PHOS. O. PHOS.; pH T. RES. CHLORINE; COD PHENOLS TOC DOC; TOTAL CYANIDE TOTAL SULFIDE; REACTIVE CYANIDE REACTIVE SULFIDE FLASHPOINT IGNITABILITY	MICRO: TOTAL COLIFORM E. COLI; FECAL COLIFORM; ENTEROCOCCI HETEROTROPHIC PLATE COUNT	OTHER: Oil-Mod Combo; Herbicides	# OF CONTAINERS	NOTES MEOH VIAL #
SB-1 (2-3)	5/21/19 0854	S	G		X					X	2	5/21/19
SB-2 (1-1.5)	0905	S	G		X SPAH only	X Pest only				X	2	
SB-3 (0-3)	0930	S	G		X		X	Pb only		X	2	
SB-4 (0-3)	0940	S	G		X		X	Pb only		X	2	
Comp 5,6,7 (3-4.5)	1015-1050	S	C	X	X Full SVOC	X Pest + PCB	X	RCRA 8 only		X	3	47911
Comp 8,9,10 (3-4.5)	5/21/19 1115-1150	S	C	X	X	X PCB only	X			X	3	47912
Trip Blank				X							1	47831

MATRIX: A-AIR; S-SOIL; GW-GROUND WATER; SW-SURFACE WATER; DW-DRINKING WATER; WW-WASTE WATER

PRESERVATIVE: H-HCL; N-HNO_3; S-H_2SO_4; Na-NaOH; M-MEOH

PROJECT MANAGER: Kurt Muller

COMPANY: VHB

ADDRESS: 40 Dorn, Bld. 100, Ste. 200

CITY: South Burlington STATE: VT ZIP: 05403

PHONE: 802-778-1278 EXT.:

FAX: 802-495-5130

E-MAIL: Kmuller@vhb.com / shilfiker@vhb.com

SITE NAME: Merchant's Row

PROJECT #: 58341.00

STATE: NH MA ME (VT) OTHER:

REGULATORY PROGRAM: NPDES: RGP POTW STORMWATER OR GWP, OIL FUND, BROWNFIELD OR OTHER:

QUOTE #: 101675 PO #:

DATE NEEDED: Standard TAT

QA/QC REPORTING LEVEL: A B C OR MA MCP

REPORTING OPTIONS: PRELIMS: YES OR NO

ELECTRONIC OPTIONS: E-MAIL PDF EQUIS EXCEL

TEMP. 1.3 °C ICE? (YES) NO

SAMPLER(S): Steve Hilfiker

RELINQUISHED BY:	DATE:	TIME:	RECEIVED BY:
	5/21/19	1200	
	5/21/19	1430	

METALS: 8 RCRA 13 PP FE, MN PB, CU

OTHER METALS: 8RCRA / Pb

SAMPLES FIELD FILTERED? ☐ YES ☒ NO

NOTES: (IE: SPECIAL DETECTION LIMITS, BILLING INFO, IF DIFFERENT)

SITE HISTORY:

SUSPECTED CONTAMINATION:

FIELD READINGS:

Eastern Analytical, Inc.
professional laboratory and drilling services
25 CHENELL DRIVE | CONCORD, NH 03301 | TEL: 603.228.0525 | 1.800.287.0525 | E-MAIL: CUSTOMERSERVICE@EASTERNANALYTICAL.COM | WWW.EASTERNANALYTICAL.COM

(WHITE: ORIGINAL GREEN: PROJECT MANAGER)

Eastern Analytical, Inc.
professional laboratory and drilling services

J. Kurt Muller
Vanasse Hangen Brustlin, Inc. (VHB)
40 IDX Drive Building 100
South Burlington , VT 05403

Subject: Laboratory Report

Eastern Analytical, Inc. ID:	195703
Client Identification:	Merchant's Row | 58341.00
Date Received:	5/21/2019

Dear Mr. Muller :

Enclosed please find the laboratory report for the above identified project. All analyses were performed in accordance with our QA/QC Program. Unless otherwise stated, holding times, preservation techniques, container types, and sample conditions adhered to EPA Protocol. Samples which were collected by Eastern Analytical, Inc. (EAI) were collected in accordance with approved EPA procedures. Eastern Analytical, Inc. certifies that the enclosed test results meet all requirements of NELAP and other applicable state certifications. Please refer to our website at www.easternanalytical.com for a copy of our NELAP certificate and accredited parameters.

The following standard abbreviations and conventions apply to all EAI reports:

Solid samples are reported on a dry weight basis, unless otherwise noted
< : "less than" followed by the reporting limit
> : "greater than" followed by the reporting limit
%R : % Recovery

Eastern Analytical Inc. maintains certification in the following states: Connecticut (PH-0492), Maine (NH005), Massachusetts (M-NH005), New Hampshire/NELAP (1012), Rhode Island (269), Vermont (VT1012) and New York (12072).

The following information is contained within this report: Sample Conditions summary, Analytical Results/Data, Quality Control data (if requested) and copies of the Chain of Custody. This report may not be reproduced except in full, without the the written approval of the laboratory.

If you have any questions regarding the results contained within, please feel free to directly contact me or the chemist(s) who performed the testing in question. Unless otherwise requested, we will dispose of the sample (s) 30 days from the sample receipt date.

We appreciate this opportunity to be of service and look forward to your continued patronage.

Sincerely,

Lorraine Olashaw, Lab Director | 6.14.19 Date | 11 # of pages (excluding cover letter)

SAMPLE CONDITIONS PAGE

EAI ID#: **195703**

Client: **Vanasse Hangen Brustlin, Inc. (VHB)**

Client Designation: **Merchant's Row | 58341.00**

Temperature upon receipt (°C): 1.3 **Received on ice or cold packs (Yes/No): Y**

Acceptable temperature range (°C): 0-6

Lab ID	Sample ID	Date Received	Date Sampled	Sample Matrix	% Dry Weight	Exceptions/Comments (other than thermal preservation)
195703.01	SB-1 (0.5-1.5)	5/21/19	5/21/19	soil	84.8	Adheres to Sample Acceptance Policy
195703.02	SB-6 (3-4.5)	5/21/19	5/21/19	soil		Placed on hold, then cancelled pending results of other samples.
195703.03	SB-5 (3-4.5)	5/21/19	5/21/19	soil		Placed on hold, then cancelled pending results of other samples.
195703.04	SB-7 (3-4.5)	5/21/19	5/21/19	soil		Placed on hold, then cancelled pending results of other samples.
195703.05	SB-8 (3-4.5)	5/21/19	5/21/19	soil	83.1	Adheres to Sample Acceptance Policy
195703.06	SB-9 (3-4.5)	5/21/19	5/21/19	soil	88.9	Adheres to Sample Acceptance Policy
195703.07	SB-10 (3-4.5)	5/21/19	5/21/19	soil	92.8	Adheres to Sample Acceptance Policy

Samples were properly preserved and the pH measured when applicable unless otherwise noted. Analysis of solids for pH, Flashpoint, Ignitability, Paint Filter, Corrosivity, Conductivity and Specific Gravity are reported on an "as received" basis.
Immediate analyses, pH, Total Residual Chlorine, Dissolved Oxygen and Sulfite, performed at the laboratory were run outside of the recommended 15 minute hold time.
All results contained in this report relate only to the above listed samples.
References include:
1) EPA 600/4-79-020, 1983
2) Standard Methods for Examination of Water and Wastewater, 20th, 21st, 22nd & 23rd Edition or noted Revision year.
3) Test Methods for Evaluating Solid Waste SW 846 3rd Edition including updates IVA and IVB
4) Hach Water Analysis Handbook, 4th edition, 1992

LABORATORY REPORT

EAI ID#: **195703**

Client: **Vanasse Hangen Brustlin, Inc. (VHB)**

Client Designation: **Merchant's Row | 58341.00**

Sample ID:	SB-8 (3-4.5)	SB-9 (3-4.5)	SB-10 (3 -4.5)
Lab Sample ID:	195703.05	195703.06	195703.07
Matrix:	soil	soil	soil
Date Sampled:	5/21/19	5/21/19	5/21/19
Date Received:	5/21/19	5/21/19	5/21/19
Units:	mg/kg	mg/kg	mg/kg
Date of Analysis:	5/31/19	5/31/19	5/31/19
Analyst:	VG	VG	VG
Method:	8260C	8260C	8260C
Dilution Factor:	1	1	1
Tetrachloroethene	< 0.05	**2.5**	**0.099**
4-Bromofluorobenzene (surr)	**98 %R**	**97 %R**	**97 %R**
1,2-Dichlorobenzene-d4 (surr)	**98 %R**	**96 %R**	**99 %R**
Toluene-d8 (surr)	**96 %R**	**97 %R**	**95 %R**
1,2-Dichloroethane-d4 (surr)	**86 %R**	**86 %R**	**85 %R**

QC REPORT

EAI ID#: **195703**

Client: **Vanasse Hangen Brustlin, Inc. (VHB)**

Client Designation: **Merchant's Row | 58341.00**

Parameter Name	Blank	LCS	LCSD	Analysis Date	Units	Limits	RPD	Method
Dichlorodifluoromethane	< 0.1			5/30/2019	mg/kg			8260C
Chloromethane	< 0.1			5/30/2019	mg/kg			8260C
Vinyl chloride	< 0.1			5/30/2019	mg/kg			8260C
Bromomethane	< 0.2			5/30/2019	mg/kg			8260C
Chloroethane	< 0.1			5/30/2019	mg/kg			8260C
Trichlorofluoromethane	< 0.1			5/30/2019	mg/kg			8260C
Diethyl Ether	< 0.05			5/30/2019	mg/kg			8260C
Acetone	< 2			5/30/2019	mg/kg			8260C
1,1-Dichloroethene	< 0.05	1.1 (113 %R)	1.3 (128 %R) (13 RPD)	5/30/2019	mg/kg	59 - 172	20	8260C
tert-Butyl Alcohol (TBA)	< 2			5/30/2019	mg/kg			8260C
Methylene chloride	< 0.1			5/30/2019	mg/kg			8260C
Carbon disulfide	< 0.1			5/30/2019	mg/kg			8260C
Methyl-t-butyl ether(MTBE)	< 0.1			5/30/2019	mg/kg			8260C
Ethyl-t-butyl ether(ETBE)	< 0.1			5/30/2019	mg/kg			8260C
Isopropyl ether(DIPE)	< 0.1			5/30/2019	mg/kg			8260C
tert-amyl methyl ether(TAME)	< 0.1			5/30/2019	mg/kg			8260C
trans-1,2-Dichloroethene	< 0.05			5/30/2019	mg/kg			8260C
1,1-Dichloroethane	< 0.05			5/30/2019	mg/kg			8260C
2,2-Dichloropropane	< 0.05			5/30/2019	mg/kg			8260C
cis-1,2-Dichloroethene	< 0.05			5/30/2019	mg/kg			8260C
2-Butanone(MEK)	< 0.5			5/30/2019	mg/kg			8260C
Bromochloromethane	< 0.05			5/30/2019	mg/kg			8260C
Tetrahydrofuran(THF)	< 0.5			5/30/2019	mg/kg			8260C
Chloroform	< 0.05			5/30/2019	mg/kg			8260C
1,1,1-Trichloroethane	< 0.05			5/30/2019	mg/kg			8260C
Carbon tetrachloride	< 0.05			5/30/2019	mg/kg			8260C
1,1-Dichloropropene	< 0.05			5/30/2019	mg/kg			8260C
Benzene	< 0.05	1.0 (102 %R)	1.1 (115 %R) (12 RPD)	5/30/2019	mg/kg	66 - 142	20	8260C
1,2-Dichloroethane	< 0.05			5/30/2019	mg/kg			8260C
Trichloroethene	< 0.05	1.0 (104 %R)	1.2 (118 %R) (13 RPD)	5/30/2019	mg/kg	62 - 137	20	8260C
1,2-Dichloropropane	< 0.05			5/30/2019	mg/kg			8260C
Dibromomethane	< 0.05			5/30/2019	mg/kg			8260C
Bromodichloromethane	< 0.05			5/30/2019	mg/kg			8260C
1,4-Dioxane	< 3			5/30/2019	mg/kg			8260C
4-Methyl-2-pentanone(MIBK)	< 0.5			5/30/2019	mg/kg			8260C
cis-1,3-Dichloropropene	< 0.05			5/30/2019	mg/kg			8260C
Toluene	< 0.05	1.0 (101 %R)	1.1 (115 %R) (13 RPD)	5/30/2019	mg/kg	59 - 139	20	8260C
trans-1,3-Dichloropropene	< 0.05			5/30/2019	mg/kg			8260C
1,1,2-Trichloroethane	< 0.05			5/30/2019	mg/kg			8260C
2-Hexanone	< 0.1			5/30/2019	mg/kg			8260C
Tetrachloroethene	< 0.05			5/30/2019	mg/kg			8260C
1,3-Dichloropropane	< 0.05			5/30/2019	mg/kg			8260C
Dibromochloromethane	< 0.05			5/30/2019	mg/kg			8260C
1,2-Dibromoethane(EDB)	< 0.05			5/30/2019	mg/kg			8260C
Chlorobenzene	< 0.05	1.0 (101 %R)	1.1 (114 %R) (13 RPD)	5/30/2019	mg/kg	60 - 133	20	8260C
1,1,1,2-Tetrachloroethane	< 0.05			5/30/2019	mg/kg			8260C

QC REPORT

EAI ID#: **195703**

Client: **Vanasse Hangen Brustlin, Inc. (VHB)**

Client Designation: **Merchant's Row | 58341.00**

Parameter Name	Blank	LCS	LCSD	Analysis Date	Units	Limits	RPD	Method
Ethylbenzene	< 0.05			5/30/2019	mg/kg			8260C
mp-Xylene	< 0.05			5/30/2019	mg/kg			8260C
o-Xylene	< 0.05			5/30/2019	mg/kg			8260C
Styrene	< 0.05			5/30/2019	mg/kg			8260C
Bromoform	< 0.05			5/30/2019	mg/kg			8260C
IsoPropylbenzene	< 0.05			5/30/2019	mg/kg			8260C
Bromobenzene	< 0.05			5/30/2019	mg/kg			8260C
1,1,2,2-Tetrachloroethane	< 0.05			5/30/2019	mg/kg			8260C
1,2,3-Trichloropropane	< 0.05			5/30/2019	mg/kg			8260C
n-Propylbenzene	< 0.05			5/30/2019	mg/kg			8260C
2-Chlorotoluene	< 0.05			5/30/2019	mg/kg			8260C
4-Chlorotoluene	< 0.05			5/30/2019	mg/kg			8260C
1,3,5-Trimethylbenzene	< 0.05			5/30/2019	mg/kg			8260C
tert-Butylbenzene	< 0.05			5/30/2019	mg/kg			8260C
1,2,4-Trimethylbenzene	< 0.05			5/30/2019	mg/kg			8260C
sec-Butylbenzene	< 0.05			5/30/2019	mg/kg			8260C
1,3-Dichlorobenzene	< 0.05			5/30/2019	mg/kg			8260C
p-Isopropyltoluene	< 0.05			5/30/2019	mg/kg			8260C
1,4-Dichlorobenzene	< 0.05			5/30/2019	mg/kg			8260C
1,2-Dichlorobenzene	< 0.05			5/30/2019	mg/kg			8260C
n-Butylbenzene	< 0.05			5/30/2019	mg/kg			8260C
1,2-Dibromo-3-chloropropane	< 0.05			5/30/2019	mg/kg			8260C
1,3,5-Trichlorobenzene	< 0.05			5/30/2019	mg/kg			8260C
1,2,4-Trichlorobenzene	< 0.05			5/30/2019	mg/kg			8260C
Hexachlorobutadiene	< 0.05			5/30/2019	mg/kg			8260C
Naphthalene	< 0.1			5/30/2019	mg/kg			8260C
1,2,3-Trichlorobenzene	< 0.05			5/30/2019	mg/kg			8260C
4-Bromofluorobenzene (surr)	98 %R	96 %R	98 %R	5/30/2019	% Rec	70 - 130	20	8260C
1,2-Dichlorobenzene-d4 (surr)	97 %R	95 %R	96 %R	5/30/2019	% Rec	70 - 130	20	8260C
Toluene-d8 (surr)	97 %R	95 %R	97 %R	5/30/2019	% Rec	70 - 130	20	8260C
1,2-Dichloroethane-d4 (surr)	86 %R	87 %R	88 %R	5/30/2019	% Rec	70 - 130	20	8260C

Samples were extracted and analyzed within holding time limits.
Instrumentation was calibrated in accordance with the method requirements.
The method blanks were free of contamination at the reporting limits.
Sample surrogate recoveries met the above stated criteria.
The associated matrix spikes and/or Laboratory Control Samples met acceptance criteria.
There were no exceptions in the analyses, unless noted.
*/! Flagged analyte recoveries deviated from the QA/QC limits. Unless noted below, flagged analytes that exceed acceptance limits in the Quality Control sample were not detected in the field samples.
Analytes that exceed limits high but are not detected in the field samples do not impact the data. For analytes that show low recovery and are not detected in the field samples, a low point calibration standard has been analyzed to support the reporting limit.

LABORATORY REPORT

EAI ID#: **195703**

Client: **Vanasse Hangen Brustlin, Inc. (VHB)**

Client Designation: **Merchant's Row | 58341.00**

Client Sample ID:	SB-1 (0.5-1.5)
Lab Sample ID:	195703.01
Matrix:	soil
Date Sampled:	5/21/19
Date Received:	5/21/19
Date Prepared:	5/23/19
Units	mg/kg
Method	8270D
Analyst	JMR

	Results	Dilution Factor	Date Analyzed	TEF	TEQ
Naphthalene	**0.090**	1	5/23/19		
2-Methylnaphthalene	**0.085**	1	5/23/19		
1-Methylnaphthalene	**0.097**	1	5/23/19		
Acenaphthylene	**0.32**	1	5/23/19		
Acenaphthene	**0.083**	1	5/23/19		
Fluorene	**0.099**	1	5/23/19		
Phenanthrene	**1.3**	1	5/23/19		
Anthracene	**0.33**	1	5/23/19		
Fluoranthene	**2.4**	1	5/23/19		
Pyrene	**2.4**	1	5/23/19		
Benzo[a]anthracene	**1.4**	1	5/23/19	0.1	.14
Chrysene	**1.8**	1	5/23/19	0.001	.0018
Benzo[b]fluoranthene	**1.9**	1	5/23/19	0.1	.19
Benzo[k]fluoranthene	**0.64**	1	5/23/19	0.01	.0064
Benzo[a]pyrene	**1.4**	1	5/23/19	1	1.4
Indeno[1,2,3-cd]pyrene	**1.1**	1	5/23/19	0.1	.11
Dibenz[a,h]anthracene	**0.28**	1	5/23/19	1	.28
Benzo[g,h,i]perylene	**0.90**	1	5/23/19		
p-Terphenyl-D14 (surr)	**68 %R**		5/23/19		

TEF: Toxicity Equivalent Factor

TEQ: Toxicity Equivalence to Benzo[a]pyrene

The TEF factors set forth in this report are taken from the following EPA document: "Mid- Atlantic Risk Assessment User's Guide: November 2013". This guidance document sets forth a recommended, but not mandatory approach based upon currently available information with respect to risk assessment for response actions at CERCLA sites. This document does not establish binding rules. This document contains the most current TEF values per VT IROCP.

LABORATORY REPORT

EAI ID#: **195703**

Client: **Vanasse Hangen Brustlin, Inc. (VHB)**

Client Designation: **Merchant's Row | 58341.00**

Client Sample ID:	SB-8 (3-4.5)
Lab Sample ID:	195703.05
Matrix:	soil
Date Sampled:	5/21/19
Date Received:	5/21/19
Date Prepared:	5/31/19
Units	mg/kg
Method	8270D
Analyst	JMR

	Results	Dilution Factor	Date Analyzed	TEF	TEQ
Naphthalene	**0.072**	1	5/31/19		
2-Methylnaphthalene	**0.072**	1	5/31/19		
1-Methylnaphthalene	**0.069**	1	5/31/19		
Acenaphthylene	**0.53**	1	5/31/19		
Acenaphthene	**0.036**	1	5/31/19		
Fluorene	**0.19**	1	5/31/19		
Phenanthrene	**1.0**	1	5/31/19		
Anthracene	**0.28**	1	5/31/19		
Fluoranthene	**1.9**	1	5/31/19		
Pyrene	**1.9**	1	5/31/19		
Benzo[a]anthracene	**1.1**	1	5/31/19	0.1	.11
Chrysene	**1.2**	1	5/31/19	0.001	.0012
Benzo[b]fluoranthene	**1.4**	1	5/31/19	0.1	.14
Benzo[k]fluoranthene	**0.47**	1	5/31/19	0.01	.0047
Benzo[a]pyrene	**1.1**	1	5/31/19	1	1.1
Indeno[1,2,3-cd]pyrene	**0.75**	1	5/31/19	0.1	.075
Dibenz[a,h]anthracene	**0.20**	1	5/31/19	1	.2
Benzo[g,h,i]perylene	**0.66**	1	5/31/19		
p-Terphenyl-D14 (surr)	**63 %R**		5/31/19		

TEF: Toxicity Equivalent Factor

TEQ: Toxicity Equivalence to Benzo[a]pyrene

The TEF factors set forth in this report are taken from the following EPA document: "Mid- Atlantic Risk Assessment User's Guide: November 2013". This guidance document sets forth a recommended, but not mandatory approach based upon currently available information with respect to risk assessment for response actions at CERCLA sites. This document does not establish binding rules. This document contains the most current TEF values per VT IROCP.

LABORATORY REPORT

EAI ID#: **195703**

Client: **Vanasse Hangen Brustlin, Inc. (VHB)**

Client Designation: **Merchant's Row | 58341.00**

Client Sample ID:	SB-9 (3-4.5)
Lab Sample ID:	195703.06
Matrix:	soil
Date Sampled:	5/21/19
Date Received:	5/21/19
Date Prepared:	5/31/19
Units	mg/kg
Method	8270D
Analyst	JMR

	Results	Dilution Factor	Date Analyzed	TEF	TEQ
Naphthalene	**0.53**	11	6/3/19		
2-Methylnaphthalene	**0.25**	11	6/3/19		
1-Methylnaphthalene	**0.30**	11	6/3/19		
Acenaphthylene	**1.7**	11	6/3/19		
Acenaphthene	**0.43**	11	6/3/19		
Fluorene	**1.1**	11	6/3/19		
Phenanthrene	**20**	11	6/3/19		
Anthracene	**3.6**	11	6/3/19		
Fluoranthene	**33**	11	6/3/19		
Pyrene	**33**	11	6/3/19		
Benzo[a]anthracene	**15**	11	6/3/19	0.1	1.5
Chrysene	**18**	11	6/3/19	0.001	.018
Benzo[b]fluoranthene	**17**	11	6/3/19	0.1	1.7
Benzo[k]fluoranthene	**5.6**	11	6/3/19	0.01	.056
Benzo[a]pyrene	**14**	11	6/3/19	1	14
Indeno[1,2,3-cd]pyrene	**11**	11	6/3/19	0.1	1.1
Dibenz[a,h]anthracene	**2.3**	11	6/3/19	1	2.3
Benzo[g,h,i]perylene	**10**	11	6/3/19		
p-Terphenyl-D14 (surr)	**70 %R**		6/3/19		

TEF: Toxicity Equivalent Factor

TEQ: Toxicity Equivalence to Benzo[a]pyrene

The TEF factors set forth in this report are taken from the following EPA document: "Mid- Atlantic Risk Assessment User's Guide: November 2013". This guidance document sets forth a recommended, but not mandatory approach based upon currently available information with respect to risk assessment for response actions at CERCLA sites. This document does not establish binding rules. This document contains the most current TEF values per VT IROCP.

LABORATORY REPORT

EAI ID#: **195703**

Client: **Vanasse Hangen Brustlin, Inc. (VHB)**

Client Designation: **Merchant's Row | 58341.00**

Client Sample ID:	SB-10 (3-4.5)
Lab Sample ID:	195703.07
Matrix:	soil
Date Sampled:	5/21/19
Date Received:	5/21/19
Date Prepared:	5/31/19
Units	mg/kg
Method	8270D
Analyst	JMR

	Results	Dilution Factor	Date Analyzed	TEF	TEQ
Naphthalene	< 0.007	1	5/31/19		
2-Methylnaphthalene	< 0.007	1	5/31/19		
1-Methylnaphthalene	< 0.007	1	5/31/19		
Acenaphthylene	**0.024**	1	5/31/19		
Acenaphthene	< 0.007	1	5/31/19		
Fluorene	< 0.007	1	5/31/19		
Phenanthrene	**0.028**	1	5/31/19		
Anthracene	**0.0074**	1	5/31/19		
Fluoranthene	**0.048**	1	5/31/19		
Pyrene	**0.049**	1	5/31/19		
Benzo[a]anthracene	**0.039**	1	5/31/19	0.1	.0039
Chrysene	**0.042**	1	5/31/19	0.001	.000042
Benzo[b]fluoranthene	**0.039**	1	5/31/19	0.1	.0039
Benzo[k]fluoranthene	**0.013**	1	5/31/19	0.01	.00013
Benzo[a]pyrene	**0.029**	1	5/31/19	1	.029
Indeno[1,2,3-cd]pyrene	**0.013**	1	5/31/19	0.1	.0013
Dibenz[a,h]anthracene	< 0.007	1	5/31/19	1	< .007
Benzo[g,h,i]perylene	**0.010**	1	5/31/19		
p-Terphenyl-D14 (surr)	**63 %R**		5/31/19		

TEF: Toxicity Equivalent Factor

TEQ: Toxicity Equivalence to Benzo[a]pyrene

The TEF factors set forth in this report are taken from the following EPA document: "Mid- Atlantic Risk Assessment User's Guide: November 2013". This guidance document sets forth a recommended, but not mandatory approach based upon currently available information with respect to risk assessment for response actions at CERCLA sites. This document does not establish binding rules. This document contains the most current TEF values per VT IROCP.

QC REPORT

EAI ID#: **195703**

Client: **Vanasse Hangen Brustlin, Inc. (VHB)**

Batch ID: 636941-98748/S052319PAH1

Client Designation: **Merchant's Row | 58341.00**

Parameter Name	Blank	LCS	LCSD	Analysis Date	Units	Limits	RPD	Method
Naphthalene	< 0.007	1.1 (69 %R)	1.1 (68 %R) (2 RPD)	5/23/2019	mg/kg	40 - 140	30	8270D
2-Methylnaphthalene	< 0.007	1.3 (79 %R)	1.3 (76 %R) (4 RPD)	5/23/2019	mg/kg	40 - 140	30	8270D
1-Methylnaphthalene	< 0.007	1.3 (78 %R)	1.2 (74 %R) (5 RPD)	5/23/2019	mg/kg	40 - 140	30	8270D
Acenaphthylene	< 0.007	1.1 (69 %R)	1.1 (68 %R) (2 RPD)	5/23/2019	mg/kg	40 - 140	30	8270D
Acenaphthene	< 0.007	1.1 (63 %R)	1.0 (62 %R) (3 RPD)	5/23/2019	mg/kg	40 - 140	30	8270D
Fluorene	< 0.007	1.2 (70 %R)	1.2 (70 %R) (1 RPD)	5/23/2019	mg/kg	40 - 140	30	8270D
Phenanthrene	< 0.007	1.2 (74 %R)	1.2 (73 %R) (1 RPD)	5/23/2019	mg/kg	40 - 140	30	8270D
Anthracene	< 0.007	1.3 (75 %R)	1.2 (75 %R) (1 RPD)	5/23/2019	mg/kg	40 - 140	30	8270D
Fluoranthene	< 0.007	1.3 (76 %R)	1.3 (76 %R) (0 RPD)	5/23/2019	mg/kg	40 - 140	30	8270D
Pyrene	< 0.007	1.5 (87 %R)	1.4 (83 %R) (5 RPD)	5/23/2019	mg/kg	40 - 140	30	8270D
Benzo[a]anthracene	< 0.007	1.4 (83 %R)	1.3 (81 %R) (3 RPD)	5/23/2019	mg/kg	40 - 140	30	8270D
Chrysene	< 0.007	1.4 (86 %R)	1.4 (84 %R) (2 RPD)	5/23/2019	mg/kg	40 - 140	30	8270D
Benzo[b]fluoranthene	< 0.007	1.4 (82 %R)	1.3 (79 %R) (3 RPD)	5/23/2019	mg/kg	40 - 140	30	8270D
Benzo[k]fluoranthene	< 0.007	1.4 (83 %R)	1.3 (80 %R) (4 RPD)	5/23/2019	mg/kg	40 - 140	30	8270D
Benzo[a]pyrene	< 0.007	1.3 (81 %R)	1.3 (78 %R) (3 RPD)	5/23/2019	mg/kg	40 - 140	30	8270D
Indeno[1,2,3-cd]pyrene	< 0.007	1.4 (83 %R)	1.3 (78 %R) (6 RPD)	5/23/2019	mg/kg	40 - 140	30	8270D
Dibenz[a,h]anthracene	< 0.007	1.4 (83 %R)	1.3 (81 %R) (3 RPD)	5/23/2019	mg/kg	40 - 140	30	8270D
Benzo[g,h,i]perylene	< 0.007	1.4 (81 %R)	1.3 (78 %R) (3 RPD)	5/23/2019	mg/kg	40 - 140	30	8270D
p-Terphenyl-D14 (surr)	71 %R	84 %R	82 %R	5/23/2019	mg/kg	30 - 130		8270D

Samples were extracted and analyzed within holding time limits.
Instrumentation was calibrated in accordance with the method requirements.
The method blanks were free of contamination at the reporting limits.
Sample surrogate recoveries met the above stated criteria.
The associated matrix spikes and/or Laboratory Control Samples met acceptance criteria.
There were no exceptions in the analyses, unless noted.
*/! Flagged analyte recoveries deviated from the QA/QC limits. Unless noted below, flagged analytes that exceed acceptance limits in the Quality Control sample were not detected in the field samples.

QC REPORT

EAI ID#: **195703**

Client: **Vanasse Hangen Brustlin, Inc. (VHB)**

Batch ID: 636948-85821/S053119PAH1

Client Designation: **Merchant's Row | 58341.00**

Parameter Name	Blank	LCS	LCSD	Analysis Date	Units	Limits	RPD	Method
Naphthalene	< 0.007	1.3 (81 %R)	1.4 (82 %R) (2 RPD)	5/31/2019	mg/kg	40 - 140	30	8270D
2-Methylnaphthalene	< 0.007	1.5 (90 %R)	1.5 (91 %R) (1 RPD)	5/31/2019	mg/kg	40 - 140	30	8270D
1-Methylnaphthalene	< 0.007	1.5 (89 %R)	1.5 (89 %R) (0 RPD)	5/31/2019	mg/kg	40 - 140	30	8270D
Acenaphthylene	< 0.007	1.3 (79 %R)	1.3 (79 %R) (0 RPD)	5/31/2019	mg/kg	40 - 140	30	8270D
Acenaphthene	< 0.007	1.2 (72 %R)	1.2 (72 %R) (0 RPD)	5/31/2019	mg/kg	40 - 140	30	8270D
Fluorene	< 0.007	1.4 (81 %R)	1.3 (77 %R) (6 RPD)	5/31/2019	mg/kg	40 - 140	30	8270D
Phenanthrene	< 0.007	1.4 (86 %R)	1.4 (83 %R) (4 RPD)	5/31/2019	mg/kg	40 - 140	30	8270D
Anthracene	< 0.007	1.4 (86 %R)	1.4 (81 %R) (5 RPD)	5/31/2019	mg/kg	40 - 140	30	8270D
Fluoranthene	< 0.007	1.4 (86 %R)	1.3 (78 %R) (10 RPD)	5/31/2019	mg/kg	40 - 140	30	8270D
Pyrene	< 0.007	1.6 (96 %R)	1.6 (93 %R) (3 RPD)	5/31/2019	mg/kg	40 - 140	30	8270D
Benzo[a]anthracene	< 0.007	1.6 (95 %R)	1.5 (91 %R) (4 RPD)	5/31/2019	mg/kg	40 - 140	30	8270D
Chrysene	< 0.007	1.6 (98 %R)	1.5 (92 %R) (6 RPD)	5/31/2019	mg/kg	40 - 140	30	8270D
Benzo[b]fluoranthene	< 0.007	1.5 (93 %R)	1.5 (88 %R) (5 RPD)	5/31/2019	mg/kg	40 - 140	30	8270D
Benzo[k]fluoranthene	< 0.007	1.5 (93 %R)	1.4 (82 %R) (12 RPD)	5/31/2019	mg/kg	40 - 140	30	8270D
Benzo[a]pyrene	< 0.007	1.5 (92 %R)	1.4 (84 %R) (9 RPD)	5/31/2019	mg/kg	40 - 140	30	8270D
Indeno[1,2,3-cd]pyrene	< 0.007	1.4 (86 %R)	1.4 (86 %R) (0 RPD)	5/31/2019	mg/kg	40 - 140	30	8270D
Dibenz[a,h]anthracene	< 0.007	1.5 (88 %R)	1.4 (86 %R) (3 RPD)	5/31/2019	mg/kg	40 - 140	30	8270D
Benzo[g,h,i]perylene	< 0.007	1.5 (88 %R)	1.5 (89 %R) (1 RPD)	5/31/2019	mg/kg	40 - 140	30	8270D
p-Terphenyl-D14 (surr)	92 %R	100 %R	88 %R	5/31/2019	mg/kg	30 - 130		8270D

Samples were extracted and analyzed within holding time limits.
Instrumentation was calibrated in accordance with the method requirements.
The method blanks were free of contamination at the reporting limits.
Sample surrogate recoveries met the above stated criteria.
The associated matrix spikes and/or Laboratory Control Samples met acceptance criteria.
There were no exceptions in the analyses, unless noted.
*/! Flagged analyte recoveries deviated from the QA/QC limits. Unless noted below, flagged analytes that exceed acceptance limits in the Quality Control sample were not detected in the field samples.

Page 1 of 1

CHAIN-OF-CUSTODY RECORD

BOLD FIELDS REQUIRED. PLEASE CIRCLE REQUESTED ANALYSIS.

FOR LAB USE ONLY: 195703

SAMPLE I.D.	SAMPLING DATE/TIME *IF COMPOSITE, INDICATE BOTH START & FINISH DATE/TIME	MATRIX (SEE BELOW)	GRAB/*COMPOSITE	VOC: 524.2 BTEX / 524.2 MTBE ONLY / 8260 / VTICs / 624 / 1,4 DIOXANE	VOC: 8021 BTEX HALOS	VOC: 8015 GRO MAVPH	SVOC: 8270 SVTICs EDB DBCP / 625 ABN A BN PAH	SVOC: TPH8100 LI L2	SVOC: 8015 DRO MAEPH	SVOC: PEST 608 PCB 608 / PEST 8081 PCB 8082	SVOC: OIL & GREASE 1664 TPH 1664	TCLP: TCLP 1311 ABN METALS / VOC PEST HERB	METALS: DISSOLVED METALS (LIST BELOW)	METALS: TOTAL METALS (LIST BELOW)	INORGANICS: TS TSS TDS SPEC. CON.	INORGANICS: BR CL F SO4 / NO2 NO3 NO2NO2	INORGANICS: BOD CBOD T. ALK.	INORGANICS: TKN NH3 T. PHOS. O. PHOS.	INORGANICS: PH T. RES. CHLORINE	INORGANICS: COD PHENOLS TOC DOC	INORGANICS: TOTAL CYANIDE TOTAL SULFIDE	INORGANICS: REACTIVE CYANIDE REACTIVE SULFIDE / FLASHPOINT IGNITABILITY	MICRO: TOTAL COLIFORM E. COLI / FECAL COLIFORM	MICRO: ENTEROCOCCI / HETEROTROPHIC PLATE COUNT	OTHER: OU-Mold	OTHER	OTHER	# OF CONTAINERS	NOTES / MEOH VIAL #
SB-1 (0.5-1.5)	5/21/19 0854	S	G				X																			X			1	
SB-6 (3-4.5)	1015	S	G	X																						X			2	47845
SB-5 (3-4.5)	1030	S	G	X																						X			2	47846
SB-7 (3-4.5)	1050	S	G	X																						X			2	47841
SB-8 (3-4.5)	1115	S	G	X																						X			2	47844
SB-9 (3-4.5)	1135	S	G	X																						X			2	47830
SB-10 (3-4.5)	1150	S	G	X																						X			2	47843
7	7																													

MATRIX: A-AIR; S-SOIL; GW-GROUND WATER; SW-SURFACE WATER; DW-DRINKING WATER; WW-WASTE WATER

PRESERVATIVE: H-HCL; N-HNO_3; S-H_2SO_4; Na-NaOH; M-MEOH

PROJECT MANAGER: Kurt Muller

COMPANY: VHB

ADDRESS: 40 IDX Dr., Bld. 100, Ste 200

CITY: South Burlington STATE: VT ZIP: 05403

PHONE: 802-778-1278 EXT.:

FAX: 802-495-5130

E-MAIL: KMuller@vhb.com / SH; FIker@vhb.com

SITE NAME: Merchant's Row

PROJECT #: 58341.00

STATE: NH MA ME (VT) OTHER:

REGULATORY PROGRAM: NPDES: RGP POTW STORMWATER OR GWP, OIL FUND, BROWNFIELD OR OTHER:

QUOTE #: 101607S PO #:

DATE NEEDED: Standard TAT

QA/QC REPORTING LEVEL: A B C OR MA MCP

REPORTING OPTIONS: PRELIMS: (YES) OR NO

ELECTRONIC OPTIONS: E-MAIL (PDF) EQUIS (EXCEL)

TEMP. 1.3 °C

ICE? (YES) NO

SAMPLER(S): Steve H; Fiker

RELINQUISHED BY:	DATE:	TIME:	RECEIVED BY:
	5/21/19	1200	
	5/21/19	14:30	
RELINQUISHED BY:	DATE:	TIME:	RECEIVED BY:
RELINQUISHED BY:	DATE:	TIME:	RECEIVED BY:

METALS: 8 RCRA 13 PP FE, MN PB, CU

OTHER METALS:

SAMPLES FIELD FILTERED? ☐ YES ☒ NO

NOTES: (IE: SPECIAL DETECTION LIMITS, BILLING INFO, IF DIFFERENT)

All samples on Hold.

* Analyze at Customers Request

SITE HISTORY:

SUSPECTED CONTAMINATION:

FIELD READINGS: PA - 5/22/19

Eastern Analytical, Inc.
professional laboratory and drilling services
25 CHENELL DRIVE | CONCORD, NH 03301 | TEL: 603.228.0525 | 1.800.287.0525 | E-MAIL: CUSTOMERSERVICE@EASTERNANALYTICAL.COM | WWW.EASTERNANALYTICAL.COM

(WHITE: ORIGINAL GREEN: PROJECT MANAGER)

April 17, 2019

Ref: 58341.00

Janet E. Shatney
Director of Planning, Permitting & Assessing Services
City of Barre
City Hall
6 North Main Street, Suite 7
Barre, Vermont 05641

Re: Work Plan for Soil Characterization Assessment
Merchant's Row Redevelopment Project
City of Barre, Vermont

Dear Janet:

On behalf of The City of Barre (The City), VHB has prepared this Work Plan for Soil Characterization Assessment (the Work Plan) for the Merchant's Row Redevelopment Project (the Project) located in the City of Barre, Vermont. The Project area relative to its surroundings is shown on **Figure 1**. This proposed soil characterization assessment will be performed to address gaps in the existing soil data for areas that will potentially be disturbed during the Project. The purpose of this Work Plan is to describe the procedures for soil characterization that will be used to obtain the data necessary for making informed soil management decisions.

1.0 BACKGROUND

Numerous environmental investigations have been performed at Sites adjacent to the Project area and one of these investigations extending onto the Project area. In 2012, Nobis Engineering, Inc. (Nobis) conducted a Targeted Brownfields Assessment Phase II Investigation which included characterization of a large portion of soil in the Project area. Spatially representative soil samples were collected in a grid pattern and analyzed for almost all the environmental contaminants that are typically identified in urban soils. Considering these data are relatively recent and reportedly incorporate appropriate sampling and quality control protocol, they will be used to guide and supplement the data that will be generated during this proposed soil characterization assessment. Once the data generated during the 2012 Nobis investigation is combined with the additional soil data proposed in this Work Plan, the resulting data set can be used to plan potential soil management options and associated costs for general planning purposes. As discussed below, the supplemental field investigation being proposed will not determine the full nature and extent of potential impacts to soil, nor will it entirely satisfy the pre-approval requirements for all soil that may be proposed for offsite disposal at a certified landfill.

Engineers | Scientists | Planners | Designers

40 IDX Drive, Building 100
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A summary of the existing soil data from the 2012 Nobis investigation is described below and is presented in **Figure 2**. As shown, soil samples were collected from the north end of the Project area to a depth of 2 feet below ground surface (fbgs) and in the middle and south end of the Project area to a depth of 3 fbgs and analyzed for volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs), herbicides and metals. Results are listed below:

- No PCB detections.
- No herbicides detected above Vermont's applicable screening criterion.
- No metals detected above Vermont's applicable screening criterion.
- VOC soil results were below screening criterion except for one sample that reported tetrachloroethylene (PCE) at a concentration above the residential Vermont Screening Level (VSL) at the south end of the Project area near the Bonacorsi & Sons Property. This elevated PCE detection was expected considering the known extents of soil, soil vapor, and groundwater PCE contamination associated with the former dry-cleaning operation at the Bonacorsi & Sons Property.
- SVOC soil results were below screening criteria with the exception of polycyclic aromatic hydrocarbons (PAHs, a sub-set of SVOCs) which exceeded the Vermont Department of Environmental Conservation (VTDEC) Urban Background Soil Concentration in approximately one-third of the samples analyzed. Because this Project area is located in an "Urban Area" as mapped by the Vermont Agency of Natural Resources (VTANR) Natural Resources Atlas map, the resulting benzo[a]pyrene (BaP) toxic equivalent quotient (TEQ) value is compared to the VTDEC Urban Background Soil Concentration and not the residential VSL. PAHs and BaP TEQ, a subset of PAHs, are a by-product of the combustion of hydro-carbons and are therefore contaminants commonly associated with urban areas, historical fill, and railroad operations, all of which are present at the Project area. **Figure 2** also shows the former location of the Stevens Branch riverbed, an area which was filled with soil of unknown quality or origin, after the course of the river changed.

In addition to a review of the 2012 Nobis investigation results, VHB prepared an Area Wide Assessment Addendum (AWA Addendum, dated March 26, 2019) to Stone Environmental, Inc.'s Area Wide Assessment dated September 30, 2011 (AWA) for the Project. As of April 17, 2019,the AWA Addendum is currently under review by the City of Barre and has not yet been submitted to VTDEC. The purpose of the AWA Addendum was to review the environmental hazardous site investigation information related to State listed sites near the Project area and to evaluate how this new information could impact the data gaps, conclusions and recommendations in the 2011 AWA report. VHB used the information obtained from review of the 2011 AWA and preparation of the AWA Addendum to assist in the placement of sample locations and analyses that are proposed in this Work Plan.

1.1 Recommendations for Soil Characterization Assessment

VHB recommends employing a focused investigation approach that obtains additional soil data to supplement the existing 2012 Nobis data set, as well as take into consideration the information identified in VHB's 2019 AWA Addendum (currently under review), rather than reinvestigating the entire Project area. Based on the information from previous investigations, VHB recommends additional investigation locations within the Project area where prior data was limited as described below and shown on **Figure 3:**

- Shallow soil stratification (0.5 – 1.5 fbgs) in a specific area within the northern portion of the Project area;

- Shallow soil (0 – 3 fbgs) in a specific area within the central portion of the Project area;

- Deeper soil (3 – 4.5 fbgs) in an area within the southern portion of the Project area, the area located adjacent to the rail road and within 250 feet of Prospect Street; and,

- Project-wide shallow and deeper soil for specific parameters not previously analyzed.

Again, this supplemental soil assessment is designed to fill some of the data gaps in the 2012 Nobis soil assessment but will not determine the full nature and extent of potential impacts to soil. The data generated from this supplemental assessment coupled with the 2012 Nobis data can be used to determine potential soil management options and support preliminary budgets for project planning purposes.

Shallow soil stratification (north end)
At two (2) locations in the north end of the Project area, results from the 2012 soil investigation identified soil with elevated BaP-TEQ concentrations that exceeded the industrial VSLs in the surface soil at depths of 0 - 0.5 fbgs; however, the shallow soil at these locations at depths of 1.5 – 2 fbgs had BaP-TEQ levels below the VTDEC Urban Background Soil Concentration. Soil management costs associated with these two types of soil vary considerably; therefore, it is cost beneficial for the City to determine the depth of the PAH-contaminated soil in this area, rather than assuming the contaminated soil extends to 1.5 fbgs. It is likely that this PAH-contaminated soil in the top 6-inches is associated with a "black ash material" below the asphalt that was described in the soil boring logs. Vertical delineation of these PAH impacts within the 0-1.5 fbgs interval could potentially reduce soil management and disposal costs.

Shallow soil (center)
The shallow soil in the center of the Project area that was not included in the 2012 Nobis investigation should be analyzed for PAHs to close this data gap. Since the previous data indicates that other analytes (VOCs, non-PAH SVOCs, PCBs, metals and herbicides) across the Project area are not present at levels of concern, these analyses are not necessary.

Deeper soil (south end)
The deeper soil (3 – 4.5 fbgs interval) in the south end of the Project area was not previously investigated and therefore this stratum must be pre-characterized.

Project-wide
In addition to investigating the specific locations described above, VHB recommends investigating soils across the Project area for specific parameters which can have a significant impact on soil management strategies due to their cost implications, as follows:

- Based on the 2012 soil PAH results, BaP is present in some samples at concentrations exceeding the VTDEC Urban Background Soil Concentration and industrial VSL. To potentially relocate and reuse this soil onsite, which could avoid expensive soil disposal costs, VTDEC requires evidence that this soil will not impact groundwater. Based on our experience at other Vermont sites, a synthetic precipitation leaching procedure (SPLP) analysis can be performed and is a low-cost alternative to installing and sampling groundwater monitoring wells; this approach is also acceptable to VTDEC. The SPLP simulates the potential for contaminants in soil to mobilize when exposed to precipitation infiltrate and generates the resulting aqueous concentration of the analyzed contaminants. Results of the SPLP analysis can be compared to Vermont Groundwater Enforcement Standards (VGES).

- Based on the 2012 soil metals results, lead concentrations are below the residential VSL (400 mg/kg); however, lead concentrations at several locations exceeded the threshold that triggers toxicity characteristic leaching procedure (TCLP) analysis for certified landfills (100 mg/kg). Landfills require this analysis to confirm their liquid leachate generated by these soils will not exceed hazardous levels. An exceedance of the TCLP for lead could have a significant impact on soil disposal costs for material required to be transported and disposed offsite.

- Pesticides were not evaluated during the 2012 investigation and may potentially be present; this will be viewed as a data gap from a waste disposal perspective.

2.0 SCOPE OF WORK

This soil characterization assessment will establish a data set that when combined with the data generated during the 2012 Nobis investigation can be used to develop appropriate soil management strategies that may include disposal at Casella-owned landfills, relocation and reuse off-site, and/or on-site reuse of the soil. Additional analyses outside of this Scope of Work may be necessary for pre-disposal waste characterization of soil that is actually representative of the specific waste stream; however, it is VHB's experience that Casella-owned landfills may accept a reduced sample quantity for pre-approval when a robust data set such as this already exists.

VHB anticipates one (1) day of drilling will be required to advance soil borings and collect soil samples from the locations and depth intervals that are representative of soils that would likely be disturbed during the Project, and where prior data was limited.

2.1 Preparatory Tasks

After receiving authorization from the City, VHB will forward this Work Plan to the VTDEC for review and approval. Following approval of the Work Plan by the City and VTDEC, VHB will coordinate the work with the subcontracted driller and laboratory. Prior to drilling, VHB will contact Dig Safe and public works officials to obtain utility clearance.

2.2 Soil Borings

Ten (10) soil borings will be advanced to collect soil samples from within the Project area at locations and depths that were not previously characterized during the 2012 Nobis investigation and that would likely be disturbed during the Project (see Section1.1). Soil borings will be advanced at three (3) locations in the Project area: the north end of the Project area to characterize soil from0.5 - 1.5 fbgs; the central portion of the Project area to characterize soil from 0 – 3 fbgs; and the south end of the Project area to characterize soil from 3 – 4.5 fbgs. Proposed soil boring locations, and proposed sample depth intervals are shown on **Figure 3**.

Two (2) out of the ten (10) soil borings will be advanced at the north end of the Project area to termination depths of 1.5 fbgs and soil samples representing the previously uncharacterized soil located just below the "black ash material" identified below the asphalt and described in the 2012 Nobis soil boring logs will be collected. Two (2) out of the ten (10) soil borings will be advanced near the center of the Project area to termination depths of 3 fbgs and the remaining six (6) out of the ten (10) soil borings will be advanced at the south end of the Project area to termination depths of 4.5 fbgs.

Soil borings will be advanced using a Geoprobe direct-push drill rig and continuous soil cores will be collected in dedicated butyrate liners. The exterior diameter of the boring equipment will be 3 inches and the soil cores will be collected in 5-foot intervals or less, depending on the termination depth of the soil boring. A calibrated photoionization detector (PID) will be used to field screen the soils extracted during soil boring advancement and visual/olfactory/geologic observations will be recorded on dedicated soil boring logs. To PID field screen the soil, a decontaminated stainless-steel tool will be used to make a small space in the soil core and the PID probe will be immediately inserted into the void. Immediately after PID screening, the appropriate sample containers will be filled (see Section 2.3), starting with the container for VOCs. After sampling, any remaining soil will be returned to the bore hole and the remaining void will be backfilled with driller's sand. Surface completions of soil borings advanced through hardscape or softscape features (e.g.: concrete, asphalt, or soil) will be repaired using similar material (e.g.: concrete, asphalt cold-patch, or soil). All soil boring locations will be measured with VHB's Trimble GPS and presented on a sample location figure in the investigation report.

2.3 Soil Sampling

VHB understands that the objectives of this soil characterization assessment are to: 1) evaluate whether or not shallow soils present a risk of exposure to construction workers and the nearby populace of Barre; and, 2) establish options for management of soils generated during construction. This soil characterization assessment is not intended to establish formal pre-approval from a landfill for soil disposal but is instead intended to generate the necessary environmental soil data that will be used to develop planning budgets for the soil management associated with the Project.

Immediately after PID screening of the soil cores is completed, soil samples will be collected from the depth intervals and locations presented on **Figure 3**. Specifically, soil samples at the north end of the Project area will be collected from the 0.5 - 1.5 fbgs depth interval (the upper bound of this interval will be determined by the base of the "black ash material" identified in the soil core). Soil samples near the center of the Project area will be collected from the 0 – 3 fbgs depth interval and soil samples from the south end of the Project area will be collected from the 3 – 4.5 fbgs depth interval. Discrete samples will be collected from the soil borings advanced at the north end and center of the Project area for laboratory analysis. Discrete samples and composite samples will be collected from the soil borings advanced at the south end of the Project area.

At each of the six (6) sample locations at the south end of the Project area, equal volumes of sample material (with the exception of VOCs) will be placed in a zip-lock bag, homogenized, and two (2) composite samples (three-part) will be created representing the 3 – 4.5 fbgs depth interval. Samples for VOCs will also be composited by placing approximately equal volumes of soil from each sub-sample location into the methanol preserved vial, as opposed to introducing it to a zip-lock bag where volatiles could be lost. If soil in a particular location is not homogenous and PID, visual, and/or olfactory evidence of impacts are observed, a discrete sample representing this anomalous condition will be collected and analyzed separately from the composite sample. VHB is assuming that no more than two (2) discrete samples representing anomalous conditions will be collected. The City will be contacted prior to the analysis of these samples because these samples are not included in the existing Work Plan budget.

Following sample collection, all samples will be shipped in an ice-filled cooler under Chain of Custody protocol to Eastern Analytical, Inc. of Concord, New Hampshire (EAI) for laboratory analysis. The two (2) discrete samples collected from the north end of the Project area will be immediately analyzed for PAHs and the two (2) discrete soil samples collected from the center of the Project area will be analyzed for PAHs and lead. One (1) of the four (4) discrete samples collected from the north end and center of the Project area will also be

analyzed for pesticides. The two (2) composite samples will be immediately analyzed for VOCs, SVOCs, RCRA 8 metals, PCBs, and herbicides. One (1) of the two (2) composite samples will also be analyzed for pesticides. Additional material from each of the six (6) sub-samples that were used to create the two (2) composite samples will also be placed "on-hold" at the laboratory pending receipt of the composite analytical results. For any analyte that exceeds the applicable standard from the composite results, the three (3) sub-samples that comprised the composite will then also be analyzed for that particular analyte only, that exceeded the standard. The discrete samples representing anomalous conditions will be placed on-hold for analysis of VOC, SVOC, RCRA8 metals, and PCBs, and the City will be contacted for authorization to analyze these samples.

Additional sample material from each of the two (2) composite samples and all of the discrete samples will be collected and the laboratory will be instructed to place the material "on-hold" for contingency TCLP and SPLP analysis pending receipt of the composite analytical results. Details regarding contingency analysis of the "on-hold" samples for TCLP and SPLP are provided below:

Contingency analyses: Analytical results of the two (2) composite samples and the discrete samples will be reviewed to determine if TCLP and/or SPLP analysis are required.

- TCLP: If analytes exceed their TCLP Regulatory Level by 20 times, the additional sample material for the sample(s) associated with the exceedance(s) will be analyzed for the respective analyte(s). Based on both VHB's experience reviewing soil analytical results from urban areas in Vermont and VHB's review of the 2012 Nobis investigation results, it is anticipated that lead is the most likely analyte that may exceed its TCLP Regulatory Level by 10 times. Therefore, the two (2) samples with the highest lead concentrations at or above 100 mg/kg will be analyzed for lead via TCLP.

- SPLP: As previously mentioned in Section 1.1, the soil PAH results from the 2012 Nobis investigation reported BaP at concentrations exceeding the VTDEC Urban Background Soil Concentration and industrial VSL. Therefore, the two (2) samples with the highest BaP concentrations collected during this proposed soil characterization assessment will be analyzed for BaP via SPLP.

2.4 Quality Assurance/Quality Control

This soil sampling is for pre-characterization purposes. Considering the heterogeneity of soil, no duplicate sampling is proposed. Samples to be analyzed for VOCs will be accompanied by a laboratory-prepared trip blank. Additionally, all coolers containing samples will be packed with ice and equipped with a laboratory-prepared temperature blank. VHB's standard chain of custody protocol will also be employed.

2.5 Reporting

Following completion of all on-site investigation work and receipt of all analytical data, an investigation report will be prepared. Included in this report will be a description of methodology, summaries of sample collection activities, results of field screening, analytical data summary tables, soil boring logs, laboratory analytical reports, Site and area maps, sample collection forms, and field notes. The applicable 2012 Nobis data will also be included in this report. Both the Nobis data and the new VHB data will be compared to the applicable regulatory standards presented in the July 27, 2017 *Investigation and Remediation of Contaminated Properties Rule* (IRule), and presented in tabular, graphical and text forms. The figures will be user-friendly (typically color-coded) and prepared such that the general public can easily interpret what management options are available for soils throughout the Project area. The report will also contain conclusions regarding the nature

and extent of impacted soil that can be ascertained from the analytical data and field observations. Potential soil management strategies will be discussed and preliminary unit costs for soil management will also be provided. This report will be submitted to VTDEC for review.

3.0 WORK SCHEDULE SUMMARY

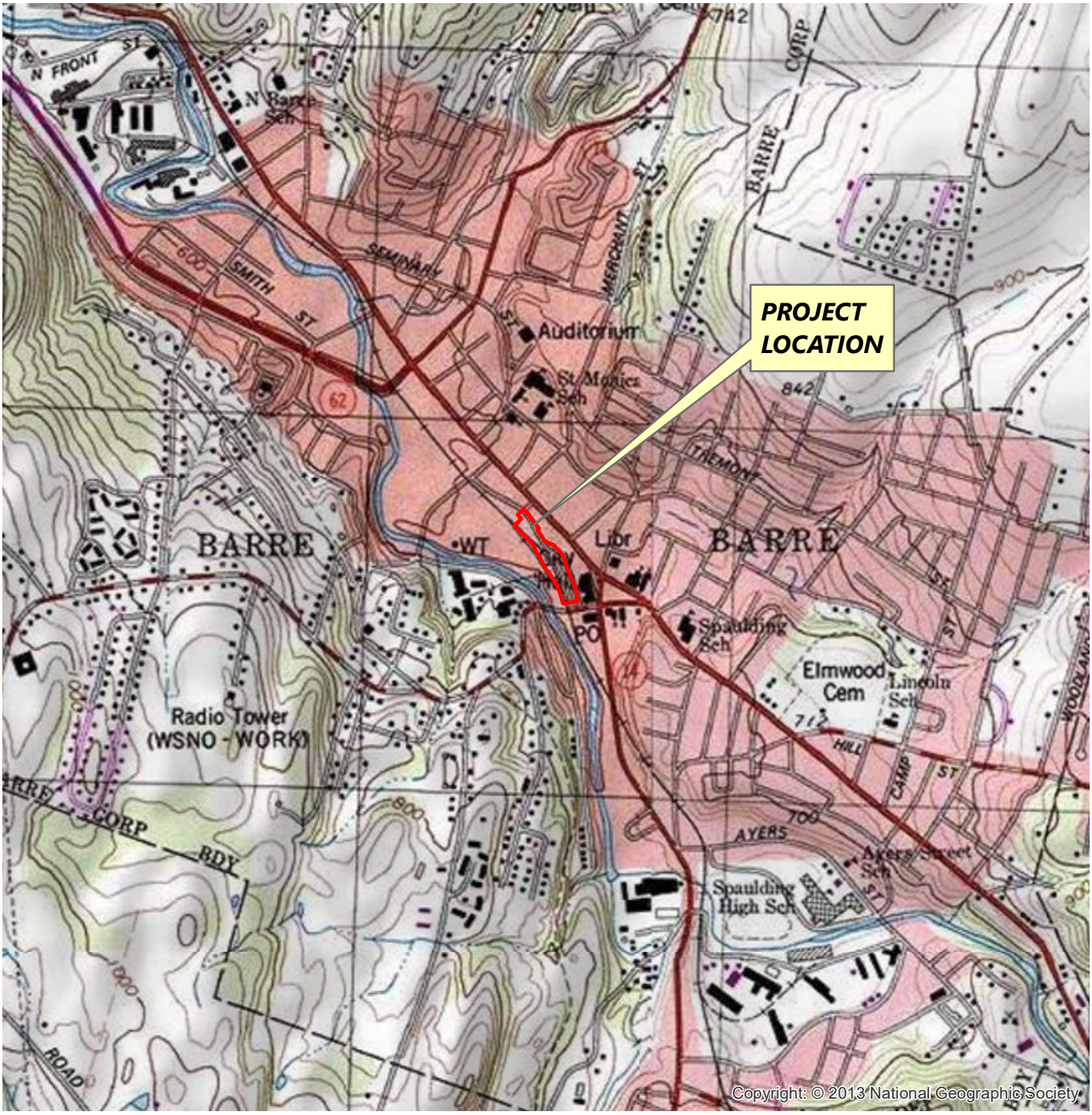
VHB proposes to perform the field effort described above within 5 weeks of receiving a formal notice to proceed by the City and will request that drilling and analytical invoices be dated prior to June 1, 2019. VHB will have a draft report available for the City to review within 3 weeks of the receipt of analytical results. VHB will strive to accelerate the work schedule to the best of our ability; however, VHB cannot be responsible for schedule delays caused by other entities (regulators, subcontractors, and/or the property owners).

We appreciate the opportunity to present this Work Plan to the City for soil sampling in support of the Merchant's Row Redevelopment Project. We look forward to working with you on this project. Should you have any questions pertaining to this proposal, please feel free to contact me at (802) 778-1278.

Sincerely,

Kurt Muller, P.E.
Senior Environmental Engineer

Attachments: Figure 1 – Project Location Map
Figure 2 – Soil Analytical Results from 2012 Nobis Investigation
Figure 3 - Proposed Soil Boring Locations



N

0.5 0.25 0 0.5

MILES

1,000 0 1,000 2,000 3,000

FEET

CONTOUR INTERVAL: 20 FEET

VT

MAP LOCATION

BASE MAP: USGS Seamless iTopo 1:24,000, December 12, 2009

FIGURE 1: PROJECT LOCATION MAP
MERCHANT'S ROW REHABILITATION PROJECT
BARRE, VERMONT

vhb

40 IDX Drive, Building 100, Suite 200
South Burlington, VT 05403

Drawn by: SGH	Date: 3/28/19
Chk'd by: JKM	Date: 3/28/19
App'd by: JKM	Date: 3/28/19
Scale: As Shown	Project: 58341.00

For all soil borings shown, soil samples analyzed for VOCs, SVOCs, PCBs, Herbicides, and Metals. Only exceedances are shown on this figure.
Soil samples SB-01 through SB-16 collected at 0-3 ft depth bgs. Soil samples T#G though T#H collected at 0-0.5 ft depth bgs and 1.5-2.0 ft depth bgs.

Sample ID:	T2G	T2G
Depth (ft):	(0.0-0.5)	(1.5-2.0)
Date:	04/18/12	04/18/12
Abbrev	*Result*	*Result*
BAP-TEQ	64.5	0.539

T2G

Sample ID:	T2H	T2H
Depth (ft):	(0.0-0.5)	(1.5-2.0)
Date:	04/19/12	04/19/12
Abbrev	*Result*	*Result*
BAP-TEQ	35.9	0.118

T2H

T3G

Sample ID:	T3G	T3G
Depth (ft):	(0.0-0.5)	(1.5-2.0)
Date:	04/18/12	04/18/12
Abbrev	*Result*	*Result*
BAP-TEQ	0.153	0.257

T3H

Sample ID:	T3H
Depth (ft):	(1.5-2.0)
Date:	04/19/12
Abbrev	*Result*
BAP-TEQ	0.692

Sample ID:	SB-09
Depth (ft):	(0.0-3.0)
Date:	11/09/12
Abbrev	*Result*
BAP-TEQ	0.643

SB-09

SB-10

Sample ID:	SB-10
Depth (ft):	(0.0-3.0)
Date:	11/09/12
Abbrev	*Result*
BAP-TEQ	0.196

SB-11

Sample ID:	SB-08
Depth (ft):	(0.0-3.0)
Date:	11/09/12
Abbrev	*Result*
BAP-TEQ	1.790

SB-08

SB-07

SB-12

SB-13

SB-06

Sample ID:	SB-14
Depth (ft):	(0.0-3.0)
Date:	11/09/12
Abbrev	*Result*
BAP-TEQ	3.030

SB-14

Sample ID:	SB-05
Depth (ft):	(0.0-3.0)
Date:	11/09/12
Abbrev	*Result*
BAP-TEQ	0.313

SB-05

Sample ID:	SB-04
Depth (ft):	(0.0-3.0)
Date:	11/09/12
Abbrev	*Result*
BAP-TEQ	1.33

SB-04

SB-15

Sample ID:	SB-15
Depth (ft):	(0.0-3.0)
Date:	11/09/12
Abbrev	*Result*
BAP-TEQ	0.113

Sample ID:	SB-03
Depth (ft):	(0.0-3.0)
Date:	11/09/12
Abbrev	*Result*
BAP-TEQ	0.179

SB-03

SB-16

Sample ID:	SB-02
Depth (ft):	(0.0-3.0)
Date:	11/09/12
Abbrev	*Result*
BAP-TEQ	0.240

SB-02

Sample ID:	SB-01
Depth (ft):	(0.0-3.0)
Date:	11/09/12
Abbrev	*Result*
PCE	1.5

SB-01

Main St

Merchants Row

Metro Way

Stevens Branch

Legend

- Soil Sample (2012)
- Approximate Former Riverbed
- Project Limits
- Parcel Boundary (2012)

Screening Level Key

Analyte	Abbrev	Screening Level: Ind. RSL/VSL	Screening Level: Res. VSL	Screening Level: Urb Bkgd	Units
BaP TEQ	BAP-TEQ	1.54	0.076	0.58	mg/kg
Tetrachlorothene	PCE	100	1.46	--	mg/kg

Cell & Text Shading

Regular Text = Analytical Value Exceeds Residential VSL

Applies to BaP TEQ only

Purple w/ White Text = Analytical Value Exceeds Industrial VSL (1.54 mg/kg)

Orange w/ White Text = Analytical Value Exceeds VTDEC Urban Background Soil Concentration (0.58 mg/kg) but Is less than Industrial VSL

Yellow w/ Black Text = Analytical Value Exceeds Residential VSL (0.076 mg/kg), but is Less than the VTDEC Urban Background Soil Concentration (0.58 mg/kg).

0 12.525 50 75 100
Feet

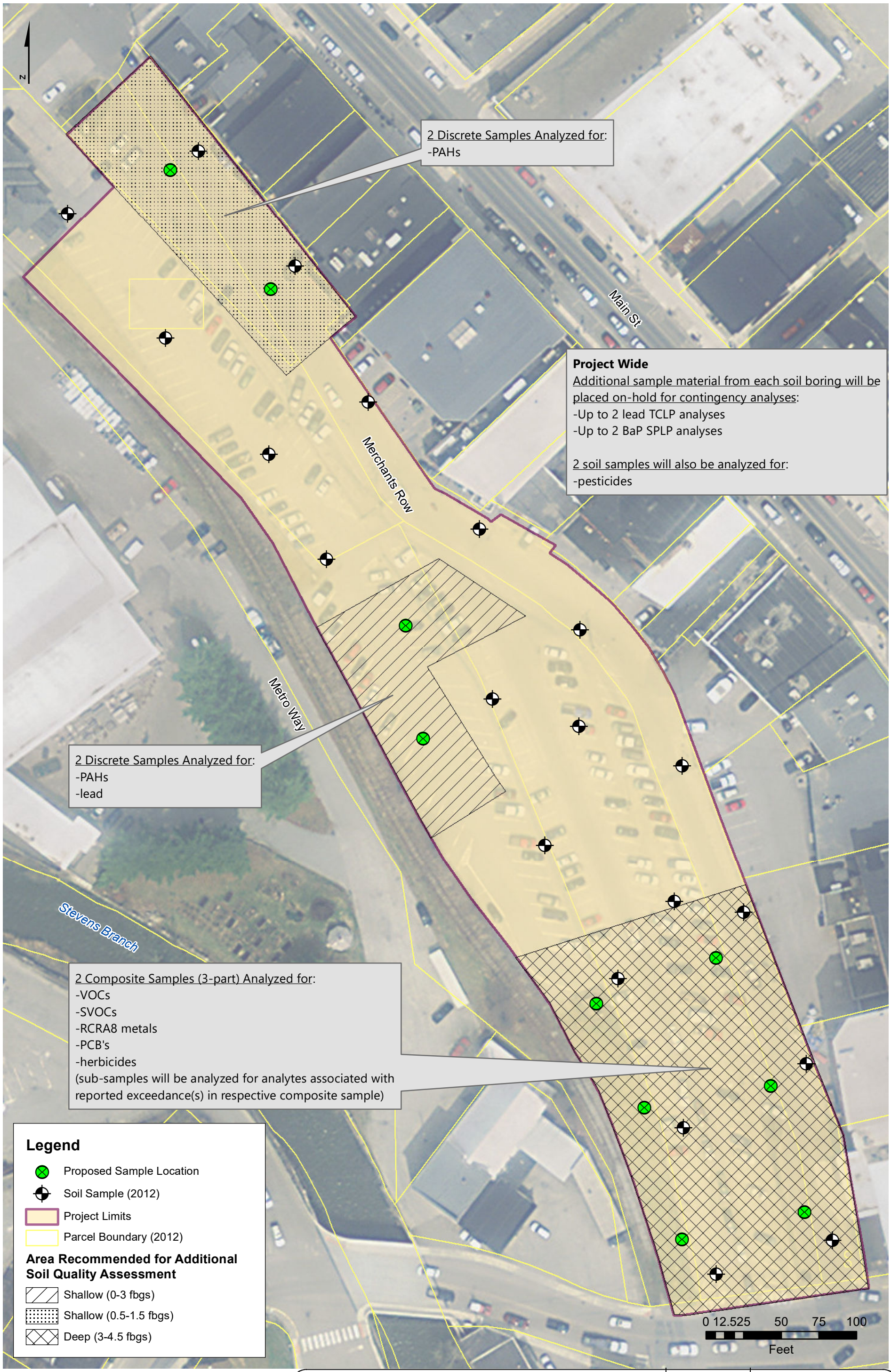
Notes:
Ind./Res. = industrial/residential
RSL: EPA Regional Screening Level
VSL: Vermont Screening Level (IRULE, July 2017)
Urb. Bkgd: VTDEC Urban Background Soil Concentration (IRULE, 2017)
BaP-TEQ: benzo(a)pyrene toxicity equivalence
Sources: Nobis (2012); VCGI (2012).
Aerial Imagery from NAIP (2016).

FIGURE 2: SOIL ANALYTICAL RESULTS FROM 2012 NOBIS INVESTIGATION
MERCHANT'S ROW REDEVELOPMENT PROJECT
BARRE, VERMONT

vhb
40 IDX Drive, Building 100, Suite 200
South Burlington, VT 05403

Drawn by: DEB Date: 12/10/18
Reviewed by: DVR Date: 12/10/18
Scale: 1 in = 60 ft Project: 583414.00

\\VTMODATA\proj_gis$\58341.00 City of Barre Merchants Row\gis\MXDs\WorkPlan\Figure 3 - Proposed Soil Boring Locations.mxd



Sources: Nobis (2012); VCGI (2012).
Aerial Imagery from NAIP (2016).

FIGURE 3: PROPOSED SOIL BORING LOCATIONS
MERCHANT'S ROW REDEVELOPMENT PROJECT
BARRE, VERMONT

vhb
40 IDX Drive, Building 100, Suite 200
South Burlington, VT 05403

Drawn by: SGH Date: 4/1/19
Reviewed by: JKM Date: 4/1/19
Scale:1 in = 60 ft Project: 583414.00

April 17, 2019

Ref: 58341.00

Janet E. Shatney
Director of Planning, Permitting & Assessing Services
City of Barre
City Hall
6 North Main Street, Suite 7
Barre, Vermont 05641

Re: Work Plan for Soil Characterization Assessment
Merchant's Row Redevelopment Project
City of Barre, Vermont

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In addition to a review of the 2012 Nobis investigation results, VHB prepared an Area Wide Assessment Addendum (AWA Addendum, dated March 26, 2019) to Stone Environmental, Inc.'s Area Wide Assessment dated September 30, 2011 (AWA) for the Project. As of April 17, 2019,the AWA Addendum is currently under review by the City of Barre and has not yet been submitted to VTDEC. The purpose of the AWA Addendum was to review the environmental hazardous site investigation information related to State listed sites near the Project area and to evaluate how this new information could impact the data gaps, conclusions and recommendations in the 2011 AWA report. VHB used the information obtained from review of the 2011 AWA and preparation of the AWA Addendum to assist in the placement of sample locations and analyses that are proposed in this Work Plan.

1.1 Recommendations for Soil Characterization Assessment

VHB recommends employing a focused investigation approach that obtains additional soil data to supplement the existing 2012 Nobis data set, as well as take into consideration the information identified in VHB's 2019 AWA Addendum (currently under review), rather than reinvestigating the entire Project area. Based on the information from previous investigations, VHB recommends additional investigation locations within the Project area where prior data was limited as described below and shown on **Figure 3:**

- Shallow soil stratification (0.5 – 1.5 fbgs) in a specific area within the northern portion of the Project area;

- Shallow soil (0 – 3 fbgs) in a specific area within the central portion of the Project area;

- Deeper soil (3 – 4.5 fbgs) in an area within the southern portion of the Project area, the area located adjacent to the rail road and within 250 feet of Prospect Street; and,

- Project-wide shallow and deeper soil for specific parameters not previously analyzed.

Again, this supplemental soil assessment is designed to fill some of the data gaps in the 2012 Nobis soil assessment but will not determine the full nature and extent of potential impacts to soil. The data generated from this supplemental assessment coupled with the 2012 Nobis data can be used to determine potential soil management options and support preliminary budgets for project planning purposes.

Shallow soil stratification (north end)
At two (2) locations in the north end of the Project area, results from the 2012 soil investigation identified soil with elevated BaP-TEQ concentrations that exceeded the industrial VSLs in the surface soil at depths of 0 - 0.5 fbgs; however, the shallow soil at these locations at depths of 1.5 – 2 fbgs had BaP-TEQ levels below the VTDEC Urban Background Soil Concentration. Soil management costs associated with these two types of soil vary considerably; therefore, it is cost beneficial for the City to determine the depth of the PAH-contaminated soil in this area, rather than assuming the contaminated soil extends to 1.5 fbgs. It is likely that this PAH-contaminated soil in the top 6-inches is associated with a "black ash material" below the asphalt that was described in the soil boring logs. Vertical delineation of these PAH impacts within the 0-1.5 fbgs interval could potentially reduce soil management and disposal costs.

Shallow soil (center)
The shallow soil in the center of the Project area that was not included in the 2012 Nobis investigation should be analyzed for PAHs to close this data gap. Since the previous data indicates that other analytes (VOCs, non-PAH SVOCs, PCBs, metals and herbicides) across the Project area are not present at levels of concern, these analyses are not necessary.

Deeper soil (south end)
The deeper soil (3 – 4.5 fbgs interval) in the south end of the Project area was not previously investigated and therefore this stratum must be pre-characterized.

Project-wide
In addition to investigating the specific locations described above, VHB recommends investigating soils across the Project area for specific parameters which can have a significant impact on soil management strategies due to their cost implications, as follows:

- Based on the 2012 soil PAH results, BaP is present in some samples at concentrations exceeding the VTDEC Urban Background Soil Concentration and industrial VSL. To potentially relocate and reuse this soil onsite, which could avoid expensive soil disposal costs, VTDEC requires evidence that this soil will not impact groundwater. Based on our experience at other Vermont sites, a synthetic precipitation leaching procedure (SPLP) analysis can be performed and is a low-cost alternative to installing and sampling groundwater monitoring wells; this approach is also acceptable to VTDEC. The SPLP simulates the potential for contaminants in soil to mobilize when exposed to precipitation infiltrate and generates the resulting aqueous concentration of the analyzed contaminants. Results of the SPLP analysis can be compared to Vermont Groundwater Enforcement Standards (VGES).

- Based on the 2012 soil metals results, lead concentrations are below the residential VSL (400 mg/kg); however, lead concentrations at several locations exceeded the threshold that triggers toxicity characteristic leaching procedure (TCLP) analysis for certified landfills (100 mg/kg). Landfills require this analysis to confirm their liquid leachate generated by these soils will not exceed hazardous levels. An exceedance of the TCLP for lead could have a significant impact on soil disposal costs for material required to be transported and disposed offsite.

- Pesticides were not evaluated during the 2012 investigation and may potentially be present; this will be viewed as a data gap from a waste disposal perspective.

2.0 SCOPE OF WORK

This soil characterization assessment will establish a data set that when combined with the data generated during the 2012 Nobis investigation can be used to develop appropriate soil management strategies that may include disposal at Casella-owned landfills, relocation and reuse off-site, and/or on-site reuse of the soil. Additional analyses outside of this Scope of Work may be necessary for pre-disposal waste characterization of soil that is actually representative of the specific waste stream; however, it is VHB's experience that Casella-owned landfills may accept a reduced sample quantity for pre-approval when a robust data set such as this already exists.

VHB anticipates one (1) day of drilling will be required to advance soil borings and collect soil samples from the locations and depth intervals that are representative of soils that would likely be disturbed during the Project, and where prior data was limited.

2.1 Preparatory Tasks

After receiving authorization from the City, VHB will forward this Work Plan to the VTDEC for review and approval. Following approval of the Work Plan by the City and VTDEC, VHB will coordinate the work with the subcontracted driller and laboratory. Prior to drilling, VHB will contact Dig Safe and public works officials to obtain utility clearance.

2.2 Soil Borings

Ten (10) soil borings will be advanced to collect soil samples from within the Project area at locations and depths that were not previously characterized during the 2012 Nobis investigation and that would likely be disturbed during the Project (see Section1.1). Soil borings will be advanced at three (3) locations in the Project area: the north end of the Project area to characterize soil from0.5 - 1.5 fbgs; the central portion of the Project area to characterize soil from 0 – 3 fbgs; and the south end of the Project area to characterize soil from 3 – 4.5 fbgs. Proposed soil boring locations, and proposed sample depth intervals are shown on **Figure 3**.

Two (2) out of the ten (10) soil borings will be advanced at the north end of the Project area to termination depths of 1.5 fbgs and soil samples representing the previously uncharacterized soil located just below the "black ash material" identified below the asphalt and described in the 2012 Nobis soil boring logs will be collected. Two (2) out of the ten (10) soil borings will be advanced near the center of the Project area to termination depths of 3 fbgs and the remaining six (6) out of the ten (10) soil borings will be advanced at the south end of the Project area to termination depths of 4.5 fbgs.

Soil borings will be advanced using a Geoprobe direct-push drill rig and continuous soil cores will be collected in dedicated butyrate liners. The exterior diameter of the boring equipment will be 3 inches and the soil cores will be collected in 5-foot intervals or less, depending on the termination depth of the soil boring. A calibrated photoionization detector (PID) will be used to field screen the soils extracted during soil boring advancement and visual/olfactory/geologic observations will be recorded on dedicated soil boring logs. To PID field screen the soil, a decontaminated stainless-steel tool will be used to make a small space in the soil core and the PID probe will be immediately inserted into the void. Immediately after PID screening, the appropriate sample containers will be filled (see Section 2.3), starting with the container for VOCs. After sampling, any remaining soil will be returned to the bore hole and the remaining void will be backfilled with driller's sand. Surface completions of soil borings advanced through hardscape or softscape features (e.g.: concrete, asphalt, or soil) will be repaired using similar material (e.g.: concrete, asphalt cold-patch, or soil). All soil boring locations will be measured with VHB's Trimble GPS and presented on a sample location figure in the investigation report.

2.3 Soil Sampling

VHB understands that the objectives of this soil characterization assessment are to: 1) evaluate whether or not shallow soils present a risk of exposure to construction workers and the nearby populace of Barre; and, 2) establish options for management of soils generated during construction. This soil characterization assessment is not intended to establish formal pre-approval from a landfill for soil disposal but is instead intended to generate the necessary environmental soil data that will be used to develop planning budgets for the soil management associated with the Project.

Immediately after PID screening of the soil cores is completed, soil samples will be collected from the depth intervals and locations presented on **Figure 3**. Specifically, soil samples at the north end of the Project area will be collected from the 0.5 - 1.5 fbgs depth interval (the upper bound of this interval will be determined by the base of the "black ash material" identified in the soil core). Soil samples near the center of the Project area will be collected from the 0 – 3 fbgs depth interval and soil samples from the south end of the Project area will be collected from the 3 – 4.5 fbgs depth interval. Discrete samples will be collected from the soil borings advanced at the north end and center of the Project area for laboratory analysis. Discrete samples and composite samples will be collected from the soil borings advanced at the south end of the Project area.

At each of the six (6) sample locations at the south end of the Project area, equal volumes of sample material (with the exception of VOCs) will be placed in a zip-lock bag, homogenized, and two (2) composite samples (three-part) will be created representing the 3 – 4.5 fbgs depth interval. Samples for VOCs will also be composited by placing approximately equal volumes of soil from each sub-sample location into the methanol preserved vial, as opposed to introducing it to a zip-lock bag where volatiles could be lost. If soil in a particular location is not homogenous and PID, visual, and/or olfactory evidence of impacts are observed, a discrete sample representing this anomalous condition will be collected and analyzed separately from the composite sample. VHB is assuming that no more than two (2) discrete samples representing anomalous conditions will be collected. The City will be contacted prior to the analysis of these samples because these samples are not included in the existing Work Plan budget.

Following sample collection, all samples will be shipped in an ice-filled cooler under Chain of Custody protocol to Eastern Analytical, Inc. of Concord, New Hampshire (EAI) for laboratory analysis. The two (2) discrete samples collected from the north end of the Project area will be immediately analyzed for PAHs and the two (2) discrete soil samples collected from the center of the Project area will be analyzed for PAHs and lead. One (1) of the four (4) discrete samples collected from the north end and center of the Project area will also be

analyzed for pesticides. The two (2) composite samples will be immediately analyzed for VOCs, SVOCs, RCRA 8 metals, PCBs, and herbicides. One (1) of the two (2) composite samples will also be analyzed for pesticides. Additional material from each of the six (6) sub-samples that were used to create the two (2) composite samples will also be placed "on-hold" at the laboratory pending receipt of the composite analytical results. For any analyte that exceeds the applicable standard from the composite results, the three (3) sub-samples that comprised the composite will then also be analyzed for that particular analyte only, that exceeded the standard. The discrete samples representing anomalous conditions will be placed on-hold for analysis of VOC, SVOC, RCRA8 metals, and PCBs, and the City will be contacted for authorization to analyze these samples.

Additional sample material from each of the two (2) composite samples and all of the discrete samples will be collected and the laboratory will be instructed to place the material "on-hold" for contingency TCLP and SPLP analysis pending receipt of the composite analytical results. Details regarding contingency analysis of the "on-hold" samples for TCLP and SPLP are provided below:

Contingency analyses: Analytical results of the two (2) composite samples and the discrete samples will be reviewed to determine if TCLP and/or SPLP analysis are required.

- TCLP: If analytes exceed their TCLP Regulatory Level by 20 times, the additional sample material for the sample(s) associated with the exceedance(s) will be analyzed for the respective analyte(s). Based on both VHB's experience reviewing soil analytical results from urban areas in Vermont and VHB's review of the 2012 Nobis investigation results, it is anticipated that lead is the most likely analyte that may exceed its TCLP Regulatory Level by 10 times. Therefore, the two (2) samples with the highest lead concentrations at or above 100 mg/kg will be analyzed for lead via TCLP.

- SPLP: As previously mentioned in Section 1.1, the soil PAH results from the 2012 Nobis investigation reported BaP at concentrations exceeding the VTDEC Urban Background Soil Concentration and industrial VSL. Therefore, the two (2) samples with the highest BaP concentrations collected during this proposed soil characterization assessment will be analyzed for BaP via SPLP.

2.4 Quality Assurance/Quality Control

This soil sampling is for pre-characterization purposes. Considering the heterogeneity of soil, no duplicate sampling is proposed. Samples to be analyzed for VOCs will be accompanied by a laboratory-prepared trip blank. Additionally, all coolers containing samples will be packed with ice and equipped with a laboratory-prepared temperature blank. VHB's standard chain of custody protocol will also be employed.

2.5 Reporting

Following completion of all on-site investigation work and receipt of all analytical data, an investigation report will be prepared. Included in this report will be a description of methodology, summaries of sample collection activities, results of field screening, analytical data summary tables, soil boring logs, laboratory analytical reports, Site and area maps, sample collection forms, and field notes. The applicable 2012 Nobis data will also be included in this report. Both the Nobis data and the new VHB data will be compared to the applicable regulatory standards presented in the July 27, 2017 *Investigation and Remediation of Contaminated Properties Rule* (IRule), and presented in tabular, graphical and text forms. The figures will be user-friendly (typically color-coded) and prepared such that the general public can easily interpret what management options are available for soils throughout the Project area. The report will also contain conclusions regarding the nature

and extent of impacted soil that can be ascertained from the analytical data and field observations. Potential soil management strategies will be discussed and preliminary unit costs for soil management will also be provided. This report will be submitted to VTDEC for review.

3.0 WORK SCHEDULE SUMMARY

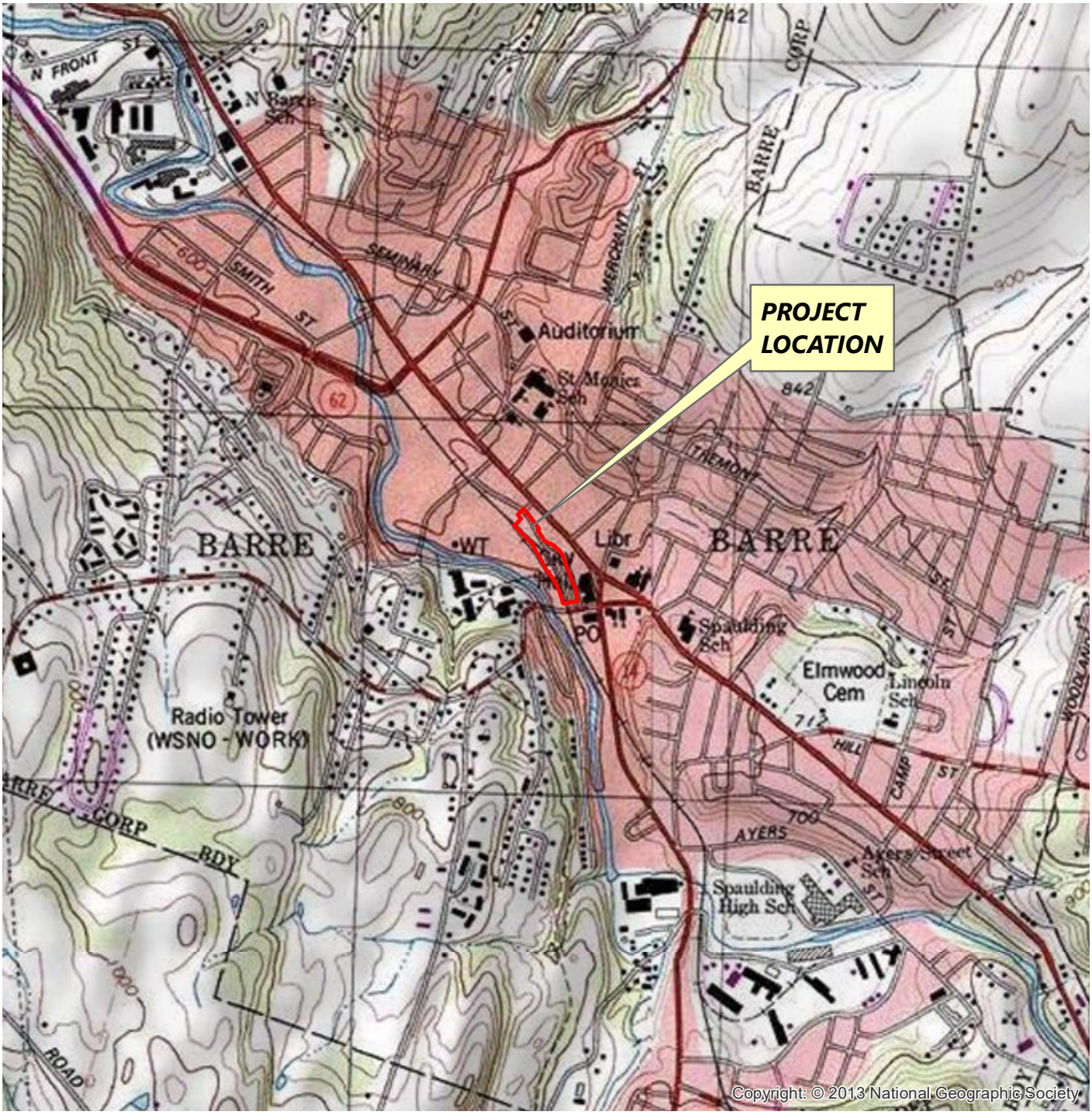
VHB proposes to perform the field effort described above within 5 weeks of receiving a formal notice to proceed by the City and will request that drilling and analytical invoices be dated prior to June 1, 2019. VHB will have a draft report available for the City to review within 3 weeks of the receipt of analytical results. VHB will strive to accelerate the work schedule to the best of our ability; however, VHB cannot be responsible for schedule delays caused by other entities (regulators, subcontractors, and/or the property owners).

We appreciate the opportunity to present this Work Plan to the City for soil sampling in support of the Merchant's Row Redevelopment Project. We look forward to working with you on this project. Should you have any questions pertaining to this proposal, please feel free to contact me at (802) 778-1278.

Sincerely,

Kurt Muller, P.E.
Senior Environmental Engineer

Attachments: Figure 1 – Project Location Map
Figure 2 – Soil Analytical Results from 2012 Nobis Investigation
Figure 3 - Proposed Soil Boring Locations



N

0.5 0.25 0 0.5

MILES

1,000 0 1,000 2,000 3,000

FEET

CONTOUR INTERVAL: 20 FEET

VT

MAP LOCATION

BASE MAP: USGS Seamless iTopo 1:24,000, December 12, 2009

FIGURE 1: PROJECT LOCATION MAP
MERCHANT'S ROW REHABILITATION PROJECT
BARRE, VERMONT

vhb

40 IDX Drive, Building 100, Suite 200
South Burlington, VT 05403

Drawn by: SGH	Date: 3/28/19
Chk'd by: JKM	Date: 3/28/19
App'd by: JKM	Date: 3/28/19
Scale: As Shown	Project: 58341.00

For all soil borings shown, soil samples analyzed for VOCs, SVOCs, PCBs, Herbicides, and Metals. Only exceedances are shown on this figure.
Soil samples SB-01 through SB-16 collected at 0-3 ft depth bgs. Soil samples T#G though T#H collected at 0-0.5 ft depth bgs and 1.5-2.0 ft depth bgs.

Sample ID:	T2G	T2G
Depth (ft):	(0.0-0.5)	(1.5-2.0)
Date:	04/18/12	04/18/12
Abbrev	*Result*	*Result*
BAP-TEQ	64.5	0.539

T2G

Sample ID:	T2H	T2H
Depth (ft):	(0.0-0.5)	(1.5-2.0)
Date:	04/19/12	04/19/12
Abbrev	*Result*	*Result*
BAP-TEQ	35.9	0.118

T2H

T3G

Sample ID:	T3G	T3G
Depth (ft):	(0.0-0.5)	(1.5-2.0)
Date:	04/18/12	04/18/12
Abbrev	*Result*	*Result*
BAP-TEQ	0.153	0.257

T3H

Sample ID:	T3H
Depth (ft):	(1.5-2.0)
Date:	04/19/12
Abbrev	*Result*
BAP-TEQ	0.692

Sample ID:	SB-09
Depth (ft):	(0.0-3.0)
Date:	11/09/12
Abbrev	*Result*
BAP-TEQ	0.643

SB-09

SB-10

Sample ID:	SB-10
Depth (ft):	(0.0-3.0)
Date:	11/09/12
Abbrev	*Result*
BAP-TEQ	0.196

SB-11

Sample ID:	SB-08
Depth (ft):	(0.0-3.0)
Date:	11/09/12
Abbrev	*Result*
BAP-TEQ	1.790

SB-08

SB-07

SB-12

SB-13

SB-06

Sample ID:	SB-14
Depth (ft):	(0.0-3.0)
Date:	11/09/12
Abbrev	*Result*
BAP-TEQ	3.030

SB-14

Sample ID:	SB-05
Depth (ft):	(0.0-3.0)
Date:	11/09/12
Abbrev	*Result*
BAP-TEQ	0.313

SB-05

Sample ID:	SB-04
Depth (ft):	(0.0-3.0)
Date:	11/09/12
Abbrev	*Result*
BAP-TEQ	1.33

SB-04

SB-15

Sample ID:	SB-15
Depth (ft):	(0.0-3.0)
Date:	11/09/12
Abbrev	*Result*
BAP-TEQ	0.113

Sample ID:	SB-03
Depth (ft):	(0.0-3.0)
Date:	11/09/12
Abbrev	*Result*
BAP-TEQ	0.179

SB-03

SB-16

Sample ID:	SB-02
Depth (ft):	(0.0-3.0)
Date:	11/09/12
Abbrev	*Result*
BAP-TEQ	0.240

SB-02

Sample ID:	SB-01
Depth (ft):	(0.0-3.0)
Date:	11/09/12
Abbrev	*Result*
PCE	1.5

SB-01

Main St

Merchants Row

Metro Way

Stevens Branch

Legend

- Soil Sample (2012)
- Approximate Former Riverbed
- Project Limits
- Parcel Boundary (2012)

Screening Level Key

Analyte	Abbrev	Screening Level: Ind. RSL/VSL	Screening Level: Res. VSL	Screening Level: Urb Bkgd	Units
BaP TEQ	BAP-TEQ	1.54	0.076	0.58	mg/kg
Tetrachlorothene	PCE	100	1.46	--	mg/kg

Cell & Text Shading

Regular Text = Analytical Value Exceeds Residential VSL

Applies to BaP TEQ only

Purple w/ White Text = Analytical Value Exceeds Industrial VSL (1.54 mg/kg)

Orange w/ White Text = Analytical Value Exceeds VTDEC Urban Background Soil Concentration (0.58 mg/kg) but Is less than Industrial VSL

Yellow w/ Black Text = Analytical Value Exceeds Residential VSL (0.076 mg/kg), but is Less than the VTDEC Urban Background Soil Concentration (0.58 mg/kg).

0 12.525 50 75 100
Feet

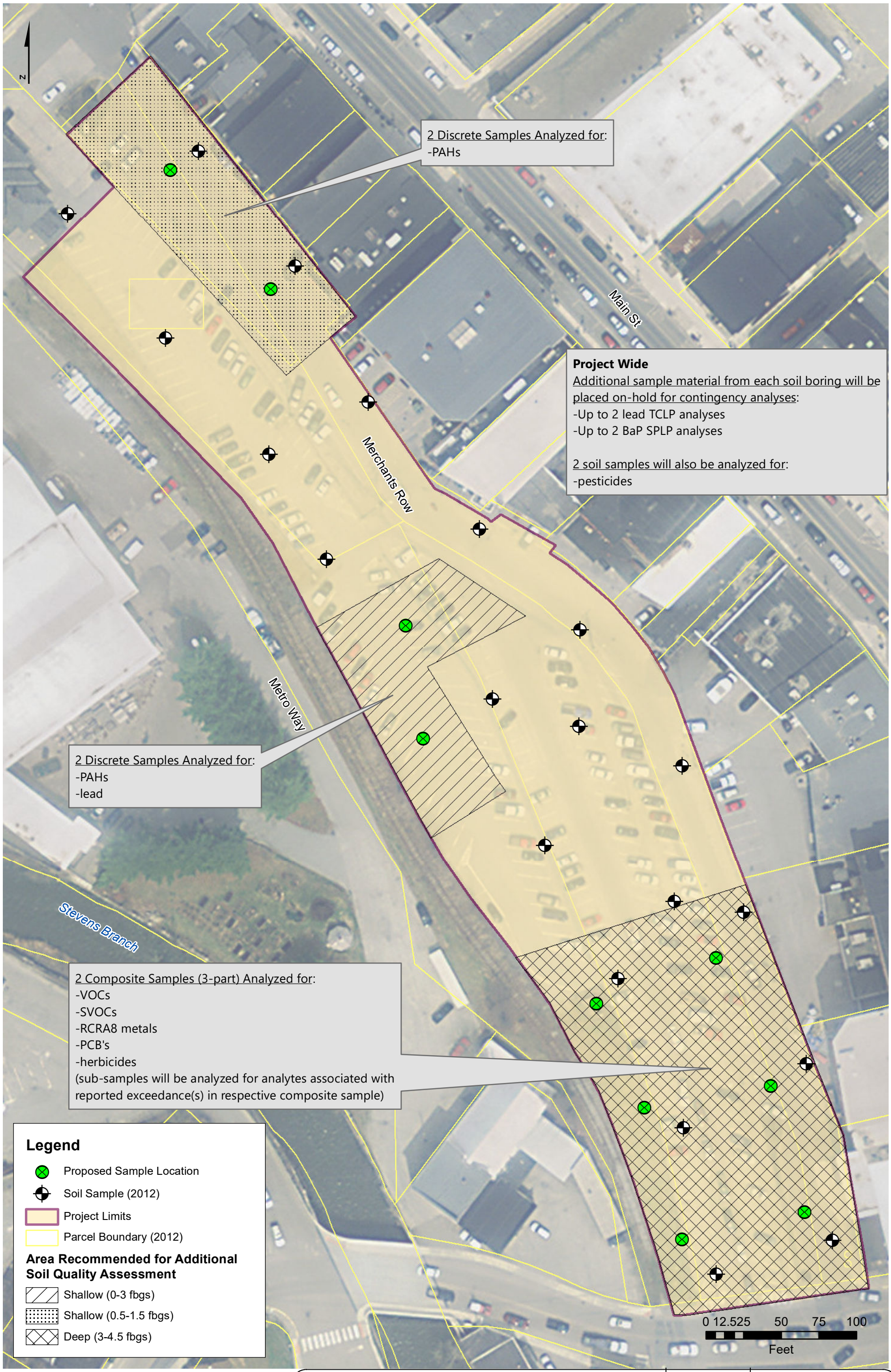
Notes:
Ind./Res. = industrial/residential
RSL: EPA Regional Screening Level
VSL: Vermont Screening Level (IRULE, July 2017)
Urb. Bkgd: VTDEC Urban Background Soil Concentration (IRULE, 2017)
BaP-TEQ: benzo(a)pyrene toxicity equivalence
Sources: Nobis (2012); VCGI (2012).
Aerial Imagery from NAIP (2016).

FIGURE 2: SOIL ANALYTICAL RESULTS FROM 2012 NOBIS INVESTIGATION
MERCHANT'S ROW REDEVELOPMENT PROJECT
BARRE, VERMONT

vhb
40 IDX Drive, Building 100, Suite 200
South Burlington, VT 05403

Drawn by: DEB Date: 12/10/18
Reviewed by: DVR Date: 12/10/18
Scale: 1 in = 60 ft Project: 583414.00

\\VTMODATA\proj_gis$\58341.00 City of Barre Merchants Row\gis\MXDs\WorkPlan\Figure 3 - Proposed Soil Boring Locations.mxd



Sources: Nobis (2012); VCGI (2012).
Aerial Imagery from NAIP (2016).

FIGURE 3: PROPOSED SOIL BORING LOCATIONS
MERCHANT'S ROW REDEVELOPMENT PROJECT
BARRE, VERMONT

vhb
40 IDX Drive, Building 100, Suite 200
South Burlington, VT 05403

Drawn by: SGH Date: 4/1/19
Reviewed by: JKM Date: 4/1/19
Scale:1 in = 60 ft Project: 583414.00