Task 220: Exploratory Site Investigation

101 Norris Avenue
Westbrook, Connecticut

Office Copy

ConnDOT Assignment No. 401-2545
ConnDOT Project No. 310-007

GEI Consultants, Inc.

188 Norwich Avenue
Colchester, CT 06415
(860) 537-0751

SUBMITTED TO

State of Connecticut
Department of Transportation
Division of Environmental Compliance
P.O. Box 317546 • 2800 Berlin Turnpike
Newington, CT 06131-7456

May 3, 2002
Project #020890-220

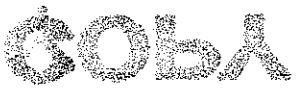


Table of Contents

Table of Contents (continued)

Tables

Figures

Appendices

J:\WPROC\BLG\CONNDOT\Westbrook\220 Report Norris\101norris220.doc

Executive Summary

GEI Consultants, Inc. (GEI) was retained by the Connecticut Department of Transportation (ConnDOT) to conduct an Exploratory Site Investigation (ESI), at the Westbrook Department of Public Works maintenance facility located at 101 Norris Avenue in Westbrook, Connecticut. The scope of the work included a review of local, state, and governmental environmental agency files and databases, historic maps and documents, aerial photographs, and a site inspection.

The subject property forms a narrow rectangle of 0.84 hectare (2.08 acres), oriented east-to-west along the south side of the Amtrak railroad corridor, approximately one-quarter mile north of the town center. The property has been occupied for the past 30-plus years by the Westbrook Department of Public Works maintenance facility.

The property was originally part of the Captain J.W. Spencer estate, and was included in land sold to the New York, New Haven & Hartford Railroad in 1905. The railroad owned the property for approximately 60 years, and apparently used the land as a freight or maintenance depot. The property was transferred to the Town of Westbrook in 1964; the public works facility was constructed five years later and has occupied the site since that time.

Conclusions

- Historic railroad operations on the property appear to have included the placement of polluted fill materials on and alongside the property, in the form of ash and coal clinkers. These materials were directly observed at only one location, but are anticipated to be rather widespread along the northerly boundary.

- Former gasoline and diesel USTs and vehicle fueling operations do not appear to have caused negative impacts to soils and groundwater on the property. However, recent (1999 to present) gasoline spills at the current municipal fueling station have introduced MTBE to the local groundwater; the concentration of that compound at the east end of the maintenance garage slightly exceeds RSR criteria.

- The existing heating oil UST appears to be intact and leak-free, as evidenced by adjacent soil and groundwater samples. There were also no indications that the septic tank and leach bed have caused any negative impacts to nearby soils.

- Waste and surplus building materials and maintenance equipment stored at the rear of the DPW yard appear to have imparted elevated PAH, lead, and TPH concentrations to the shallow soils on that part of the property.

Recommendations

In the event that ConnDOT determines to acquire the subject property for proposed railroad station construction, GEI recommends that a Task 320: Remedial Management Plan be designed and implemented to address the excavation, handling, storage, and disposal of contaminated materials, in order safeguard the health of construction workers, nearby residents and passersby, and the local environment.

1. Introduction

The Connecticut Department of Transportation (ConnDOT) retained GEI Consultants, Inc. (GEI) to perform a Task 220, Exploratory Site Investigation (ESI), at the Westbrook Department of Public Works maintenance facility located at 101 Norris Avenue in Westbrook, Connecticut. The subject property location is depicted in Figure 1. ConnDOT has proposed a total take of the subject parcel for proposed improvements to the Westbrook Railroad Station (ConnDOT Project No. 310-0007E).

The purpose of the Task 220 was to perform an investigation of the subject property, to assess the presence of on-site contamination, and to evaluate whether proposed construction activities may include management of contaminated soil and dewatering liquids. This investigation consists of surface-soil, subsurface soil and groundwater sampling and analysis. The investigation program is described in Section 4.0.

GEI previously conducted a Task 120, Preliminary Site Evaluation (April, 2002) for the subject site, which can be referenced for complete site information; summary information is presented herein.

The environmental concerns at this site are primarily related to the possible storage and handling of potentially hazardous materials during historic railroad operations on the property, the characteristics of fill material which may have been placed on the property while owned by the railroad, the potential impacts to the property by former vehicle fueling operations, and potential impacts related to both existing and former gasoline, diesel, and heating oil USTs on the property. This task was conducted in accordance with the Task 220, Exploratory Site Investigation Work Plan.

This document provides a brief description and history of the subject site (Section 2.0); the field investigation methods and rationale (Section 3.0); laboratory analytical results and evaluation of data (Section 4.0); a discussion of the local environment and receptors (Section 5.0); and the summary and conclusions (Section 6.0).

Dimensions are given in metric units, with the standard equivalents in parentheses. Exceptions are made where specific standard units are part of the historical or regulatory record (for instance, underground storage tank [UST] volumes, building dimensions), or are industry-standard specifications (e.g., well-screen length). A chart of equivalent units is provided as Appendix A.

2. Site Description and History

The subject property is a 0.84 hectare (2.08 acre) parcel located on the north side of the Westbrook town center and commercial district. The Westbrook Tax Assessor's designation for the subject site is Map 36, Lot W4.

The subject property forms an elongated rectangle bounded to the north by the Amtrak railroad corridor; to the east by a small vacant parcel formerly occupied by a wood-framed residence; to the south by occupied residential properties, and to the west by the Patchogue River.

The subject property has been owned by the Town of Westbrook since August 6, 1964 and is occupied by the Public Works Department maintenance garage. The facility consists of a seven-bay garage, a concrete block stray dog shelter and an open concrete block storage building containing a salt shed and sand/salt spreader boxes. A vehicle fueling station is located at the east end of the property; the remaining margins of the property are used for outside storage of equipment and materials. The property is surrounded by chain link fence and is accessed from Norris Avenue through a gate at the southeasterly property corner.

A review of land title records was conducted to determine previous site ownership and land usage. Westbrook land records indicate that the subject property was owned by the New York, New Haven, and Hartford Railroad Company from 1905 to 1964; prior to railroad ownership the property was held by Captain J.W. Spencer, his heirs and assigns.

3. Local Environment

3.1 Groundwater

Groundwater below and near the site is classified by the Connecticut Department of Environmental Protection (CTDEP) as a GA groundwater area (Reference 1). The GA classification indicates groundwater within the area of influence of private and potential public water supply wells that is presumed suitable for direct human consumption without need for treatment. The state's goal is to maintain the quality of the drinking water.

3.2 Surface Water

The property is abutted to the west by the Patchogue River, a tidal stream that ebbs and flows with considerable current and force. This margin of the property is within the limits of 100-year flood, as delineated in 1992 and depicted on the Westbrook flood insurance rate map 090070-0006D. The remainder of the property is located in an area of minimal flooding.

The Patchogue River is classified by the CTDEP as SB/SA, designating the waters for use as a marine fish, shellfish, and wildlife habitat, shellfish harvesting, for direct human consumption, recreation, and all other legitimate uses, including navigation (Reference 1). The SB/SA classification indicates that the water does not meet water quality criteria for one or more designated uses. The state's goal is Class SA.

3.3 Water Supply

Potable water is supplied to the site by the Connecticut-American Water Company, Guilford-Chester Division (Reference 2). It is possible that privately owned residential water supply wells may still be in use in the site vicinity. No public water supply wells or surface water sources are located within 1.6 kilometers (1.0 mile) of the site (Reference 3).

3.4 Bedrock Geology

According to the United States Geological Survey (USGS) bedrock geology mapping, the subject property is underlain by the Brimfield Formation of biotite schist. An intrusion of amphibiolite and calc-silicate gneiss is identified beneath the easterly margins of the site.

3.5 Surficial Geology

According to the United States Geological Survey (USGS) surficial geology mapping, the subject property is underlain by a glacial end moraine, elongated northeast to southwest. The moraine consists of till and stratified drift – sand, gravel, cobbles, and crushed rock.

Site-specific geology and hydrology are provided in Sections 5.0 and 6.0 of this report.

4. Areas of Potential Environmental Concern

4.1 Objective

The objective of this investigation was to conduct a subsurface investigation (220) to assess the presence of contamination within the property. To investigate these sources, surface soil, subsurface soil, and groundwater sampling and analysis was conducted. The field aspects of this investigation were conducted on April 22nd and 23rd, 2002 by Douglas Bonoff of GEI.

The environmental concerns addressed by this investigation include:

- Historic railroad operations on the property may have included the storage and handling of potentially hazardous materials. In addition, the characteristics of fill material that may have been placed on the property during this period are unknown.

- Former gasoline and diesel USTs and vehicle fueling operations may possibly have causes hydrocarbon impacts to soils and groundwater on the property. The condition of an existing heating oil UST is unknown.

- Surplus and waste building materials stored at the rear of the facility may have caused impacts to surficial soils; likewise old maintenance equipment stored in this area may have experienced leakage of fuels, oils, and other contaminants.

4.2 Sampling Plan and Rationale

This subsection provides an overview of the site sampling plan, including the rationale for sampling locations and individual sample selection for laboratory analysis. Sample locations are shown in Figure 2. Sample locations were surveyed relative to site features and existing boundary monumentation. Elevation benchmarks were established relative to NAVD 88 transferred from nearby Connecticut Geologic Survey Monument C37. The rationale for the placement of sample locations is summarized in Table 1.

4.3 Field Investigation and Sampling Methods

4.3.1 Subsurface Soil Sampling

The drilling subcontractor, Earth Technology, LLC, completed the work on April 22 and 23, 2002. GEI personnel were on site to monitor the test boring and well installation activities.

4.3.1.1 Geoprobe® Sampling

Subsurface-soil samples were collected using a truck-mounted, direct-push (Geoprobe®) drilling rig. Samples were collected continuously from the ground surface to the final depth of each boring using a 4-foot long, approximately 2-inch diameter, stainless steel, macrocore sampling tube. At sampling locations that were overlain by pavement, sampling began immediately beneath the pavement and any underlying gravels. Soil samples were collected by driving the macrocore sampling tube equipped with a dedicated acetate liner into the soil. The recovered soils from each successive 4-foot interval were inspected, screened with the OVA meter, and logged for geological and contaminant characteristics, after which individual samples were collected for laboratory analysis.

Geoprobe® sampling began near the northwesterly corner of the subject property, where SB-4 was advanced with the intention of screening materials adjacent to the railroad corridor. Soils from zero to 2.4± meters (8± feet) below surface grade contained some ash, clinkers and foreign material, but below that depth no contaminant indicators were noted. No odors or OVA response were observed. The boring was advanced through the water table to refusal at 7.5± meters (24± feet) below surface grade.

Geoprobe® borings SB-5 and SB-6 were advanced at the southeasterly and southwesterly corners, respectively, of the maintenance garage. SB-5 was located in close proximity to the existing underground heating oil storage tank, and SB-6 was situated at the approximate center of the former gasoline and diesel fuel tank grave. The borings continued through the water table to refusal at 8.5± meters (28± feet) and 7.3± meters (24± feet), respectively, below surface grade. The soils consisted of fine-to-coarse tan/brown to orange/brown sand, small gravel, and crushed stone; no stains, odors, OVA responses, or other contaminant indicators were noted in any of these materials.

SB-7 was advanced through parking-area pavement directly northeast of the facility's septic tank and leaching bed. No stains, odors, or OVA response were noted in any of the orange/brown sand and gravel at this location. The boring met refusal at 5.8± meters (19± feet) below surface grade; the water table was not encountered within this depth.

The Geoprobe® rig was then moved to the west end of the subject property, in order to characterize materials in the vicinity of the open material/equipment storage area. A number of attempts were made to advance the sampler beyond a continuous hard surface encountered

at 0.6± meters (2.0± feet) below surface grade, but no deeper penetration was achieved. The DPW director subsequently observed that, some decades past, a local contractor had been allowed to dump waste concrete in this area. SB-8 and SB-9 as depicted on Figure 3 represent two groupings of attempted borings at the westerly and southwesterly extents, respectively, of the accessible subject property. Samples were composited to represent the materials overlaying the concrete cap. Soils in the vicinity of SB-9 exhibited slight hydrocarbon stains and odors.

SB-10 was situated opposite and downgradient of the salt shed, at the north side of the sand pile. Two boring attempts met refusal at 3.4± meters (11± feet) below surface grade. No stains, odors, OVA response, or other contaminant indicators were noted in any of the recovered materials, and no free water was observed.

SB-11 was located at the west side of the sand pile, in another attempt at deeper penetration on the west side of the property. The boring was advanced to 4.9± meters (16.0± feet) below surface grade, but again met refusal before encountering the water table.

SB-12, situated south of the sand pile along the southerly site boundary, met refusal at 1.8± meters (6.0± feet), ending the effort to intercept the downgradient water table. Soils from 0.5± to 1.2± meters (1.5± to 4.0± feet) below surface grade, however, were observed to exhibit light but fairly continuous black staining and a slight weathered chemical odor, with a low but positive OVA response. The nomenclature SB-13 was assigned to a duplicate sample collected from this material.

The final on-site Geoprobe® boring was advanced through the pavement at the center of the temporary railroad parking area. The location was selected as being downgradient of a manhole-covered drywell, the discharge point of curtain drains running behind the DPW buildings. The boring met refusal at 1.8± meters (6.0± feet); subsurface materials included brown fine-medium sand without noticeable stains or odors.

4.3.1.3 Soil Sample Selection

The recovered soils were visually examined and logged in the field by GEI personnel. Each soil sample was screened for total volatile organic compounds (VOCs) using an organic vapor analyzer. Soil samples were selected for laboratory analysis based on visual evidence of contamination, OVA screening results, any odors observed, the water table interface, and observed geologic features that may affect the migration of contaminants. If soils from a particular sampling location did not exhibit any evidence of contamination, then the sample corresponding with the water table interface or from a depth consistent with the proposed construction activity was typically submitted for analysis. In general, the attempt was made to provide samples that would characterize the full depth range of on-site materials.

4.3.1.4 Decontamination Procedure

To prevent cross contamination between sampling rounds, the split-spoons and other sampling tools used to collect samples as indicated in subsequent sections of this report were decontaminated in accordance with GEI Standard Operating Procedures (SOPs). Soil samples were collected in accordance with GEI SOPs.

4.3.2 Groundwater Sampling Methods

At borings that were advanced below the water table (3 on-site locations), temporary groundwater monitoring wells were constructed. The wells were completed with approximately 5 feet of 1-inch inner diameter (I.D.) Schedule 10 PVC screen with a 0.010-inch slot width; the top of each screen was installed approximately 2 feet above the encountered water table. 1-inch I.D. PVC riser pipe was used to complete the well to the surface. The annulus surrounding each screened interval was packed with sand and topped with a bentonite clay seal. The remainder of each borehole was backfilled with native material, and the well was completed with a protective steel cover grouted flush to the ground.

Groundwater purging and sampling was performed on April 24, 2002 with a peristaltic pump and dedicated vinyl tubing. Prior to sampling, the depths to groundwater were measured and minimum purge volumes calculated. The overburden at MW-4 and MW-5 proved to be fairly permeable, and produced a steady flow of groundwater. These wells were both slow-purged of 4± gallons prior to sampling. The soils at MW-6 allowed a slower recharge; this well was pumped dry and allowed to recover three times before the samples were collected.

Groundwater samples were collected for analysis of VOCs, SVOCs, total RCRA 8 metals, and TPH. The VOC sample containers were pre-preserved with hydrochloric acid; groundwater; samples collected for metals analysis were field preserved with nitric acid. Groundwater samples for metals analysis were not filtered so that the sample would simulate groundwater quality for potential construction dewatering activities.

No sheens, discolorations, or odors were noted on any of the purge waters or sample volumes. Due to the low recharge rate at MW-6, the groundwater samples from this location were slightly turbid from entrained silt; the other samples were non-turbid to visual clarity.

4.3.3 Surface Soil Sampling

In two target areas that were found to be inaccessible to the Geoprobe® rig, borings were advanced by stainless-steel hand auger to a general depth of 0.6± meters (2.0± feet) below surface grade. Closely parked cars during working hours prevented Geoprobe® sampling in the middle of the temporary railroad station parking area. A hand-auger boring labeled SB-19 was advanced at the edge of pavement along the railroad security fence. Shallow

materials at this location consisted of lightly-stained reddish/brown fine-medium sand and small gravel; no odors or other obvious contaminant indicators were noted.
SB-20 was situated inside of the westerly equipment shed, in order to characterize soils in the sanding-jet hanger storage area. The shallow sand and gravel was lightly stained, but did not present direct evidence of hydrocarbon leaks or spills. A sample of soils from zero to two feet below surface grade was composited at each location, and analyzed for the same parameters as the deeper soil samples.

The number of samples, rationale for collection, and laboratory analyses conducted are summarized in Table 1. Sample locations are shown in Figure 3.

4.4 Laboratory Analysis

All soil and groundwater samples collected for analysis were placed into an ice cooler immediately after collection. Sample chain-of-custody forms are included in Appendix C.

The samples were analyzed by Spectrum Analytical, Inc. of Agawam, Massachusetts, as specified in Table 1. VOCs and SVOCs were selected for analysis because they comprise chemicals contained in solvents, degreasers, and petroleum products, all of which are commonly associated with areas of potential chemical releases. The metals selected for analysis (arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver) have been identified by the United States Environmental Protection Agency (EPA) as common metal contaminants. Polychlorinated biphenyls (PCBs) were selected for analysis because of unknown characteristics of on-site fill and/or their association with transformer fluids, hydraulic fluids, and waste oils. Total petroleum hydrocarbon (TPH) analysis was conducted because it can provide an overall indication of petroleum-related impacts.

5. Geology

Surficial materials on site consist of stratified drift – well-sorted sand and gravel – deposited from glacial outwash. Bedrock outcrops are visible on adjoining properties east and southeast of the subject property. Bedrock was not conclusively encountered in any of the borings, but the deeper borings (down to 28± feet below surface grade) met refusal on very dense sand and crushed rock - material that resembles glacial till, generally found directly above the bedrock surface. The depth of overburden apparently increases with greater proximity to the Patchogue River drainage.

6. Hydrogeology

6.1 Groundwater Flow Direction

The flow direction of groundwater is controlled mainly by topography. However, flow is also influenced by aquifer type, depth to bedrock, watercourses near the site, groundwater use, and subsurface structures. Generally, groundwater flows from topographic high points to low points. Based on the limited number of monitoring wells (three on-site wells and one well on the easterly adjacent property), the topography of the site and vicinity, and the other controlling factors indicated, local groundwater flow is inferred to be westerly and northwesterly toward the Patchogue River. The high water line on the riverbank has an elevation of approximately 2.20 feet. The average groundwater gradient across the site is relatively shallow at approximately 1/240 or 0.4%.

An east-to-west cross sectional view of the study area is presented as Figure 4. The major borings and subsurface site features are represented in this view. Selected boring logs are included as Appendix 2.

Groundwater Elevation Data

Monitoring Well ID	Date	Time	MP* Elevation	Depth to Groundwater	Groundwater Elevation
MW-1	4-24-02	0900	25.35	21.07	4.28
MW-4	4-24-02	0900	22.66	20.15	2.51
MW-5	4-24-02	0900	24.44	20.34	4.10
MW-6	4-24-02	0900	22.66	18.97	3.69

* Measuring point consisted of top of PVC riser for all wells. Elevations are relative to NAD 83.

7. Laboratory Analytical Results

7.1 CTDEP Cleanup Criteria

7.1.1 *Overview and Applicability*

Analytical results for soil and groundwater samples obtained during this investigation were compared to the Connecticut Remediation Standard Regulations (RSRs) (January 1996) developed by the CTDEP. The cleanup standards are summarized herein, but the actual referenced document should be consulted for complete details.

The CTDEP's intent in developing these regulations is to define: minimum remediation performance standards, specific numeric cleanup criteria, and a process for establishing an alternative site-specific standard.

The regulations apply at any action taken to remediate polluted soil, surface water, or a groundwater plume at or emanating from a release area, provided that the remedial action is: (1) required pursuant to Chapter 445 (Hazardous Waste) or 446K (Water Pollution Control) of the Connecticut General Statutes; or (2) undertaken pursuant to the voluntary cleanup provisions of Public Act 95-183 or 95-190; including, but not limited to, any such action required to be taken or verified by a licensed environmental professional, except as otherwise provided in the regulations. Specifically, the regulations provide that the standards do not apply to: (1) the soil and water within the zone of influence of a groundwater discharge permitted under Section 22a-430 CGS; or (2) a release which has been remediated and which remediation has been approved in writing by the CTDEP.

7.1.2 *Soil Cleanup Criteria*

The CTDEP soil remediation goals integrate two soil cleanup criteria: (1) Direct Exposure Criteria (DEC) to protect human health and the environment from risks associated with direct exposure to pollutants in contaminated soil; and (2) Pollutant Mobility Criteria (PMC) to protect groundwater quality from pollutants that migrate from the soil to groundwater. Soils to which both criteria apply must be remediated to a level that is equal to the more stringent criteria. The CTDEP cleanup criteria also include a requirement that contaminated soils which pose an ecological risk be remediated on a case-by-case basis.

Direct Exposure Criteria (DEC). Specific numeric exposure criteria for a broad range of pollutants in soil have been established by CTDEP, based on exposure assumptions relative to incidental ingestion of pollutants in soils and dermal contact with soils. The DEC apply to accessible soil to a depth of 15 feet. The DEC for substances other than PCBs do not apply to inaccessible soil at a release area provided that an environmental land-use restriction (ELUR) is in effect with respect to the subject parcel. Refer to the cleanup regulations for specific requirements regarding PCB-contaminated soil. Inaccessible soil generally means polluted soil which is: (1) more than 4 feet below the ground surface; (2) more than 2 feet

below a paved surface comprised of a minimum of 3 inches of bituminous concrete or concrete; (3) beneath an existing building; or (4) beneath another permanent structure(s) approved by the Commissioner. Inaccessible soil cannot be exposed by excavation, demolition, or construction activities without written approval from the Commissioner.

CTDEP has established two sets of DEC using exposure assumptions appropriate for residential land use or for industrial and certain commercial land use. In general, all sites are required to be cleaned up to the residential criteria. An industrial/commercial site (in lieu of meeting the residential standards) may meet the industrial land-use criteria, if an ELUR is in effect with respect to such parcel.

Pollutant Mobility Criteria (PMC). The PMC that will apply to remediation of a site depend on the groundwater classification of the site. The purpose of these criteria is to prevent any contamination to groundwater in GA-classified areas, and to prevent unacceptable further degradation to groundwater in GB-classified areas. The PMC generally apply to all soil in the unsaturated zone, from the ground surface to the seasonal low water table in GA-classified areas. For sites within GB-classified areas, the PMC are applicable to all soils from the ground surface to the seasonal high water table. The PMC or an appropriate alternative criteria may also be applied to soils below the water table if such soils constitute an ongoing source of groundwater pollution and if remediation of such soils is technically practicable. The criteria do not apply to environmentally isolated soils that are polluted with substances other than VOCs provided that an ELUR is recorded for the site, which ensures that such soils will not be exposed as a result of demolition of the building or other activities. Environmentally isolated soils are defined as contaminated soils beneath an existing building (or other permanent structure, as approved by the Commissioner), which are not a source of ongoing pollution. "Urban fill" material (coal or wood ash, or asphalt fragments) may also be exempt from the PMC in certain cases.

A substance, other than an inorganic substance or PCB, in soil shall be remediated to at least that concentration at which the results of a mass analysis of soil for such substance does not exceed the PMC applicable to the groundwater classification (e.g., GA/GAA) of the area in which the soil is located. An inorganic substance or PCB in soil shall be remediated to at least that concentration in which the results of a toxicity characteristic leaching procedure (TCLP) or synthetic precipitation leaching procedure (SPLP) analysis of such soil for such substance does not exceed the PMC applicable to the groundwater classification of the area in which the soil is located. If certain conditions are met, a site in a GA area need only be remediated to GB standards.

7.1.3 Groundwater Remediation Standards

Similar to remediation standards for soil, groundwater remediation requirements are dependent upon the groundwater classification. The objectives of these standards are to: (1) protect and preserve groundwater in GA areas as a natural resource; (2) protect existing use of groundwater regardless of the area's groundwater classification; (3) prevent further degradation of groundwater quality; (4) prevent degradation of surface water from discharges of contaminated groundwater; and (5) protect human health.

The Groundwater Remediation Standards regulate remediation of groundwater based on each substance present in a plume and by each distinct plume of contamination. Several factors influence the remediation goal at a site, including: background groundwater quality, the groundwater classification, the proximity of nearby surface water, existing groundwater uses, and existing buildings and their use. When assessing general groundwater remediation requirements, all of these factors must be considered in conjunction with the major numeric components of the RSRs.

The three major numeric components, which are described herein, include the following.

- Groundwater Protection Criteria (GWPC)
- Surface Water Protection Criteria (SWPC)
- Volatilization Criteria (VC)

Groundwater Protection Criteria. The GWPC apply to all groundwater in a GA-classified area. The GWPC ensure that groundwater contamination resulting from on-site sources which exceeds background is remediated to levels that adequately protect its designated use as an existing or potential supply of water suitable for drinking without treatment. In general, compliance with GWPC is achieved when the concentration of all substances in a plume is less than the GWPC.

Surface Water Protection Criteria. The SWPC apply to all groundwater which discharges to surface water. The SWPC ensure that groundwater contamination resulting from on-site sources, which exceeds background, is remediated to levels that adequately protect the surface water quality. SWPC are based on Connecticut's water quality standards, which are protective of both human health and the environment. In general, compliance with the SWPC is achieved when the average concentration of a compound in groundwater emanating from a site is less than the SWPC established by the CTDEP.

Volatilization Criteria. The VC apply to all groundwater polluted with a volatile organic substance within 15 feet of the ground surface or a building. According to the regulations, the volatile organic substance of concern will be remediated to a concentration, which is equal to or less than the applicable residential VC for groundwater. If groundwater polluted with a volatile organic substance is below a building used solely for industrial or commercial activity, groundwater may be remediated to the applicable industrial/commercial VC in lieu of the residential VC for groundwater, provided that an ELUR is in effect with respect to the parcel (or portion of the parcel covered by the building). The ELUR also must ensure that the parcel (or portion thereof beneath the building) will not be used for any residential purpose in the future and that any future use is limited to industrial or commercial activity. There are a number of exceptions to the VC under the RSRs.

In GA-classified areas, the remediation goal is generally the background concentration and compliance with the SWPC and VC. Background concentration for a compound in groundwater at a site is defined as the concentration of that compound in groundwater (immediately upgradient of the contamination plume) that is not affected by any release of pollutants on or related to the site.

Groundwater in a GA area can be remediated to the numerical GWPC, rather than background, under one of two scenarios, as follows.

- When the following conditions are met.
  - Groundwater background concentration is less than or equal to the GWPC.
  - A public water supply system is available within 200 feet of the site.
  - The site is not located within an aquifer protection area.
  - The site is not located within an area of influence associated with a public water supply well.

Or:

- If prior to remediation, the maximum concentration in the plume is less than or equal to the GWPC.

7.2 Evaluation of Data

7.2.1 *Soil Sample Analytical Results*

Shallow soils and fill material at SB-4 were found to contain PAH concentrations above the RDEC; the concentrations of benzo(a)pyrene in two samples also exceeded the IDEC for that compound. Extractable TPH was measured at 280-290 mg/kg, below the RSR criteria. Barium, cadmium, chromium, and lead were also detected in the samples, at concentrations similar to those found at other locations on site; none of the metal compounds were detected by SPLP analysis. No VOCs or PCBs were detected here or at any other on-site soil sample locations. The TPH and PAH impacts at this location are attributed to waste materials in old (19^{th}-century) fill.

Extractable TPH was not detected (at the laboratory detection limit of 20 mg/kg) in soils adjacent to the heating oil UST or in the former fuel tank grave on the opposite end of the maintenance garage. No PAH compounds were found in either SB-5 (8'-12') or SB-6 (12'-14'), VOCs were absent, and metal concentrations were within the general range; all indications that the heating oil tank is intact and that the former fueling area was not adversely impacted by hydrocarbon leaks or spills. Likewise no adverse impacts were noted in shallow soils (SB-7 (2'-6') adjacent to the septic tank and leach bed.

Composites of surficial soil at the west end of the DPW yard (0'-2' at SB-8 and SB-9) were found to contain PAH levels above the RDEC; three of the compound concentrations also exceeded the IDEC. The latter composite sample also exhibited a leachable lead concentration above the GA PMC and an extractable TPH concentration (3,900 mg/kg), exceeding all of the applicable RSR criteria. These impacts are attributed to long-term storage of waste and surplus construction materials and maintenance equipment in this vicinity.

These soil conditions do not appear to be continuous across the entire yard, as the samples collected around the sand pile (SB-10 [0'-4'] and SB-11 [4'-12']) contained no compounds above background level. However the same characteristics of elevated PAH and ETPH

concentrations (but excluding elevated lead concentrations) were found in shallow soils beneath the pavement at the south-center of the property (SB-12 [1'-4']).

No adverse impacts were noted in the vicinity of the rear drywell (SB-14 [2'-6']). At 840 mg/kg, the ETPH concentration in soils beneath the sanding jet hangers (SB-20 [0'-2']) was above the RDEC but below the IDEC; no other impacts were noted at this location.

The analytical data is presented in Table 2, and the sampling locations are shown on Figure 3. The full laboratory report is provided as Appendix C.

7.2.2 Groundwater Analytical Results

Two onsite groundwater samples (MW-4 and MW-5) were visually clear and free of observable odor or discoloration. The quality of sample MW-6 was negatively impacted by the presence of a small quotient of suspended silt; the result of insufficient recharge capacity to thoroughly clear the well screen.

SVOCs were not detected in any of the groundwater samples; neither was TPH (analyzed by Method 418.1) found above the detection limit. Barium was reported in each of the groundwater samples, at concentrations that correlate to the apparent background level of this compound in local soils. The higher barium concentration and the presence of cadmium and chromium in MW-6 are attributed to the greater turbidity of this sample.

VOC analysis found methyl-tert-butyl-ether (MTBE) at 110 ug/l, slightly above the GA GPC of 100 ug/l. MTBE was also detected at trace levels (1.6 ug/l and 1.2 ug//l) in MW-4 and MW-6, respectively. No other volatile organic compounds were found in the groundwater samples.

The groundwater analytical data is presented in Table 3, and the monitoring well locations are depicted on Figure 3. The full laboratory report is included as Appendix C.

7.2.3 Quality Assurance/Quality Control (QA/QC)

One duplicate soil sample was collected for QA/QC purposes; SB-13 (1'-4') was a duplicate of SB-12 (1'-4'). The duplicate sample was analyzed for all of the same parameters as the parent sample.

The analytical results of the parent and duplicate soil samples matched very closely, comparing analyte-by-analyte to a 15±% spread of PAH and ETPH concentrations. The single statistical comparison is considered adequate to confirm the analytical reliability of the laboratory data.

8. Receptors

The following is a summary of affected environmental media and associated potential receptors.

8.1 Groundwater and Soils

Receptors of contaminated soils could include construction workers via direct exposure and area residents via exposure to windblown particles from the construction activities. Contaminated soil and groundwater could also migrate to surface waters. It is not anticipated that any nearby privately-owned water supply wells could be impacted by on-site activities.

8.2 Surface Water

The Patchogue River is a tidal stream that ebbs and flows with considerable volume and velocity along the westerly margins of the property. The back of the active DPW yard is subsurficially capped with concrete; the grout slurry extends over the historic fill material at the west end of the property and effectively prevents further erosion or slumping of the top of bank.

The property boundaries extend across a thick shoreline band of fragmites and estuarine grasses, and the high water line of the Patchogue River is defined by an enmeshed fringe of plastic debris and rotten vegetation. A well-anchored and intact silt fence is in place at the bottom of the bank. It is not anticipated that any current or proposed on-site activities could negatively impact the quality of this surface water.

9. Conclusions and Recommendations

9.1 Conclusions

- TPH and PAH impacts were widely observed in shallow soils across the westerly half of the study area. While these contaminants probably originated from different sources, the overall impact may be more or less continuous across the rear of the property. Any future excavations in this vicinity will likely encounter contaminated materials.

- No negative impacts were noted regarding the former gasoline and diesel USTs and fueling station; likewise there was no indication that the heating oil UST had leaked or that the septic tank and leach bed had caused any negative impacts. However, MTBE was found at a concentration exceeding RSR criteria in the upgradient groundwater sample; the compound was also detected at trace levels in the downgradient wells. The source of MTBE contamination appears to be located at the front of the maintenance garage, and most likely was caused by recent (1999 to present) gasoline spillage at the municipal vehicle fueling station.

- As to the present concerns, the water table in this vicinity is more than 6 meters (20 feet) below surface grade, and is not likely to be encountered during most of the proposed construction activities, with the exception that the construction of a pedestrian tunnel beneath the railroad corridor may necessitate some excavation dewatering.

9.2 Recommendations

- In the event that ConnDOT proceeds with the acquisition of this property for proposed railroad station construction, GEI recommends that a Task 320: Remedial Management Plan be developed and implemented to ensure that any contaminated materials encountered during proposed construction activities are properly handled, stored, and disposed, in order to protect the health of construction workers, nearby residents and passersby, and the local environment.

10. Limitations

The investigation described in this report and this report were conducted and prepared on behalf of and for the exclusive use of ConnDOT and its counsel. No other entity may rely upon the results of the investigation or contents of this report for any reasons or purpose whatsoever.

The conclusions summarized herein were based on the limited observations and investigations described within this submittal at the time the investigation was conducted. Future events at the site or the surrounding properties may alter these findings.

In preparing this report, GEI relied on direction and certain information provided by state and local officials, and information and representations made available to GEI at the time of the assessment. To the extent that such information is incomplete or inaccurate, GEI is not responsible. To the extent that specific subsurface conditions have not been characterized or identified, GEI is not responsible.

GEI has performed this study in a professional manner using that degree of skill and care exercised for similar projects under similar conditions by reputable and competent environmental consultants. The conclusions provided by GEI are based solely on the scope of work conducted, and on observations and limited explorations described within this submittal at the time these services were conducted. No other warranty, expressed or implied, is made as to the professional opinions included by GEI in this report.

References

1. *Water Quality Classification Map of Connecticut.* Connecticut Department of Environmental Protection, Bureau of Water Management, Planning and Standards Division, February 1993.

2. *Community Water Systems in Connecticut*: A 1984 Inventory. CTDEP, Natural Resources Center.

3. *Atlas of the Public Water Supply Sources and Drainage Basins of Connecticut.* June 1982, D.E.P. Bulletin No. 4, CTDEP and Natural Resources Center.

Tables

Table 1
Exploratory Site Investigation
Sampling Rationale and Analysis

ID	Location/Rationale	Sample Designations	VOCs	SVOCs	ETPH	PCB	Total Metals	SPLP Metals	SPLP SVOCs
SB-4	Characterize soils and groundwater adjacent to railroad corridor at northwesterly property corner	SB-4 (0'-4')	•	•	•	•	•	•	*
		SB-4 (4'-8')	•	•	•	•	•	•	*
		SB-4 (19'-23')	•	•	•	•	•	•	*
		MW-4	•	•	•		•		
SB-5	Characterize soils and groundwater adjacent to heating oil storage tank and existing fueling station	SB-5 (8'-12')	•	•	•	•	•	•	*
		MW-5	•	•	•		•		
SB-6	Characterize soils and groundwater in the vicinity of former USTs and fueling station	SB-6 (12'-14')	•	•	•	•	•	•	*
		MW-6	•	•	•		•		
SB-7	Characterize soils adjacent to septic tank and leach bed	SB-7 (2'-6')	•	•	•	•	•	•	*
SB-8	Characterize soils at rear storage area	SB-8 (0'-2')	•	•	•	•	•	•	*
SB-9	Characterize soils at rear storage area	SB-9 (0'-2')	•	•	•	•	•	•	*
SB-10	Characterize soils opposite salt shed	SB-10 (0'-4')	•	•	•	•	•	•	*
SB-11	Characterize soils adjacent to rear storage area	SB-11 (4'-8')	•	•	•	•	•	•	*
		SB-11 (8'-12')							
SB-12	Characterize soils at the south-center of the property	SB-12 (1'-4')	•	•	•	•	•	•	*
SB-14	Characterize soils adjacent to rear drywell	SB-14 (2'-6')	•	•	•	•	•	•	*
SB-19	Characterize soils adjacent to railroad bed	SB-19 (0'-2')	•	•	•	•	•	•	*
SB-20	Characterize soils below sanding jet hangers	SB-20 (0'-2')	•	•	•	•	•	•	*

Notes:

1. Test methods from U.S. EPA SW-846.
2. VOCs refers to volatile organic compounds analyzed by Method 8260
3. SVOCs refer to semivolatile organic compounds analyzed by Method 8270.
4. ETPH refers to extractable total petroleum hydrocarbons.
5. PCB refers to polychlorinated biphenyls analyzed by Method 8080.
6. Total metals refer to the mass analysis of the eight RCRA metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver).
7. SPLP metals and SVOCs refer to analysis of leachable or mobile compounds using the Synthetic Precipitate Leaching Procedure.

*Contingent analysis based on total mass results.

Table 2
Soil Analytical Results Summary
101 Norris Avenue
Westbrook, Connecticut

Analytes	RDEC	I/C DEC	GA PMC	Sample ID/Depth Interval								
				SB-4 (0'-4')	SB-4 (4'-8')	SB-4 (23'-27')	SB-5 (8'-12')	SB-6 (12'-14')	SB-7 (2'-6')	SB-8 (0'-2')	SB-9 (0'-2')	SB-10 (0'-4')
Volatile Organic Compounds (VOCs) ug/Kg (ppb)												
VOCs	---	---	---	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Semivolatile Organic Compounds (SVOCs) mg/Kg (ppm)												
Anthracene	1,000	2,500	40	0.72	0.58	BDL	BDL	BDL	BDL	1.20	1.40	BDL
Acenaphthene	1,000	2,500	8.4	BDL	0.30	BDL	BDL	BDL	BDL	0.31	BDL	BDL
Acenaphthylene	1,000	2,500	8.4	0.54	0.36	BDL	BDL	BDL	BDL	1.00	0.82	BDL
Benz(a)anthracene	1	7.8	1	3.70	2.20	BDL	BDL	BDL	BDL	7.40	4.80	BDL
Benzo(b)fluoranthene	1	7.8	1	4.70	3.20	BDL	BDL	BDL	BDL	10.00	7.10	BDL
Benzo(k)fluoranthene	8.4	78	1	2.90	1.60	BDL	BDL	BDL	BDL	5.10	3.30	BDL
Benzo(a)pyrene	1	1	1	3.90	2.10	BDL	BDL	BDL	BDL	8.60	5.30	BDL
Benzo(g,h,i)perylene	1,000	2,500	4.2	2.20	1.20	BDL	BDL	BDL	BDL	5.60	3.40	BDL
Chrysene	84	780	1#	4.30	3.00	BDL	BDL	BDL	BDL	8.50	6.60	BDL
Fluoranthene	1,000	2,500	5.6	7.80	5.10	0.25/0.27	BDL	BDL	BDL	16.00	12.00	BDL
Indeno(1,2,3-cd)pyrene	1#	7.8	1#	2.10	1.10	BDL	BDL	BDL	BDL	4.50	3.00	BDL
Phenanthrene	1,000	2,500	4	3.90	3.80	0.19/0.26	BDL	BDL	BDL	9.10	7.10	BDL
Pyrene	1,000	2,500	4	6.70	4.40	0.21/0.25	BDL	BDL	BDL	14.00	9.10	BDL
Dibenzofuran	270	2,500	1	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Fluorene	1,000	2,500	5.6	BDL	0.30	BDL	BDL	BDL	BDL	0.49	0.62	BDL
Dibenz(a,h)anthracene	1	1	1	BDL	BDL	BDL	BDL	BDL	BDL	1.10	BDL	BDL
Naphthalene	1,000	2,500	5.6	BDL	0.32	BDL	BDL	BDL	BDL	BDL	BDL	BDL
2-Methylnaphthalene	474	2,500	0.98	BDL	0.25	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Total Resource Conservation Recovery Act (RCRA)-8 Metals (ppm)												
Arsenic	10	10	---	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Barium	4,700	140,000	---	36.5	43	34.1	35.6	31.7	32.5	44	33.9	34.2
Cadmium	34	1,000	---	1.08	0.743	BDL	0.876	0.484	BDL	BDL	BDL	0.588
Chromium, Total*	100	100	---	8.39	10.8	6.38	11.6	9.83	7.17	6.84	9.75	6.94
Lead	500	1,000	---	42.3	63.5	3.28	4.29	2.21	11.1	32.1	219	BDL
Selenium	340	10,000		BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Silver	340	10,000		BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Mercury	20	610	---	0.867	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
SPLP Resource Conservation Recovery Act (RCRA)-8 Metals (mg/L)												
Arsenic	---	---	0.05	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Barium			1	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.086	BDL
Cadmium			0.005	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Chromium	---	---	0.5	BDL	BDL	BDL	BDL	BDL	BDL	0.0067	BDL	BDL
Lead			0.015	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.135	BDL
Selenium			0.05	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Silver			0.036	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Mercury			0.002	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Extractable Total Petroleum Hydrocarbons (ETPH) mg/Kg (ppm)												
ETPH	500	2,500	500	280	290	BDL	BDL	BDL	BDL	350	2300	BDL
Polychlorinated Biphenyls (PCBs) (ppm)												
PCBs	1	10	0.0005	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL

Notes: Only those compounds detected are shown.

CTDEP stands for the Connecticut Department of Environmental Protection
RDEC stands for the Residential Direct Exposure Criteria
I/C DEC stands for Industrial Commercial Direct Exposure Criteria
GA PMC stands for the GA groundwater Pollutant Mobility Criteria
SPLP stands for Synthetic Precipitation Leaching Procedure

--- Indicates CTDEP criteria is not applicable
NE Indicates CTDEP criteria is not established
ppm Indicates parts per million
BDL Indicates Below Laboratory Detection Limit
# Indicates criteria is based upon detection limits
* Indicates that no RDEC and IDEC values are established for total hexavalent

Table 2 (continued)
Soil Analytical Results Summary
101 Norris Avenue
Westbrook, Connecticut

Analytes	RDEC	I/C DEC	GA PMC	Sample ID/Depth Interval						
				SB-11 (4'-8')	SB-11 (8'-12')	SB-12 (1'-4')	SB-13 (1'-4')	SB-14 (2'-6')	SB-19 (0'-2')	SB-20 (0'-2')
VOCs	---	---	---	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Anthracene	1,000	2,500	40	BDL	BDL	43.00	40.00	BDL	BDL	BDL
Acenaphthene	1,000	2,500	8.4	BDL	BDL	15.00	15.00	BDL	BDL	BDL
Acenaphthylene	1,000	2,500	8.4	BDL	BDL	8.90	9.10	0.24	BDL	BDL
Benz(a)anthracene	1	7.8	1	BDL	BDL	83.00	77.00	BDL	BDL	BDL
Benzo(b)fluoranthene	1	7.8	1	BDL	BDL	64.00	66.00	BDL	BDL	BDL
Benzo(k)fluoranthene	8.4	78	1	BDL	BDL	45.00	39.00	BDL	BDL	BDL
Benzo(a)pyrene	1	1	1	BDL	BDL	60.00	57.00	BDL	BDL	BDL
Benzo(g,h,i)perylene	1,000	2,500	4.2	BDL	BDL	32.00	31.00	BDL	BDL	BDL
Chrysene	84	780	1#	BDL	BDL	81.00	75.00	BDL	BDL	BDL
Fluoranthene	1,000	2,500	5.6	BDL	BDL	180.00	160.00	0.24	0.27	BDL
Indeno(1,2,3-cd)pyrene	1#	7.8	1#	BDL	BDL	32.00	30.00	BDL	BDL	BDL
Phenanthrene	1,000	2,500	4	BDL	BDL	120.00	110.00	0.33	BDL	BDL
Pyrene	1,000	2,500	4	BDL	BDL	140.00	130.00	0.23	0.24	BDL
Dibenzofuran	270	2,500	1	BDL	BDL	10.00	10.00	BDL	BDL	BDL
Fluorene	1,000	2,500	5.6	BDL	BDL	18.00	18.00	BDL	BDL	BDL
Dibenz(a,h)anthracene	1	1	1	BDL	BDL	8.80	8.10	BDL	BDL	BDL
Naphthalene	1,000	2,500	5.6	BDL	BDL	0.33	0.31	BDL	BDL	BDL
2-Methylnaphthalene	474	2,500	0.98	BDL	BDL	0.92	0.92	BDL	BDL	BDL
Arsenic	10	10	---	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Barium	4,700	140,000	---	25.7	229.4	27.5	24.4	43.8	28.4	16.9
Cadmium	34	1,000	---	BDL	BDL	BDL	0.52	0.669	BDL	BDL
Chromium, Total*	100	100	---	5.68	6.37	5.82	4.75	5.57	7.67	8.36
Lead	500	1,000	---	BDL	BDL	10.8	11.2	BDL	14.5	24.3
Selenium	340	10,000		BDL	BDL	BDL	BDL	BDL	BDL	BDL
Silver	340	10,000		BDL	BDL	BDL	BDL	BDL	BDL	BDL
Mercury	20	610	---	BDL	BDL	BDL	BDL	BDL	BDL	0.427
Arsenic	---	---	0.05	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Barium			1	BDL	BDL	BDL	BDL	BDL	0.0314	0.0341
Cadmium			0.005	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Chromium	---	---	0.5	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Lead			0.015	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Selenium			0.05	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Silver			0.036	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Mercury			0.002	BDL	BDL	BDL	BDL	BDL	BDL	BDL
ETPH	500	2,500	500	BDL	BDL	3300	3200	59	74	840
PCBs	1	10	0.0005	BDL	BDL	BDL	BDL	BDL	BDL	BDL

Notes: Only those compounds detected are shown.

CTDEP stands for the Connecticut Department of Environmental Protec

RDEC stands for the Residential Direct Exposure Criteria

I/C DEC stands for Industrial Commercial Direct Exposure Criteria

GA PMC stands for the GA groundwater Pollutant Mobility Criteria

SPLP stands for Synthetic Precipitation Leaching Procedure

--- Indicates CTDEP criteria is not applicable

NE Indicates CTDEP criteria is not established

ppm Indicates parts per million

BDL Indicates Below Laboratory Detection Limit

# Indicates criteria is based upon detection limits

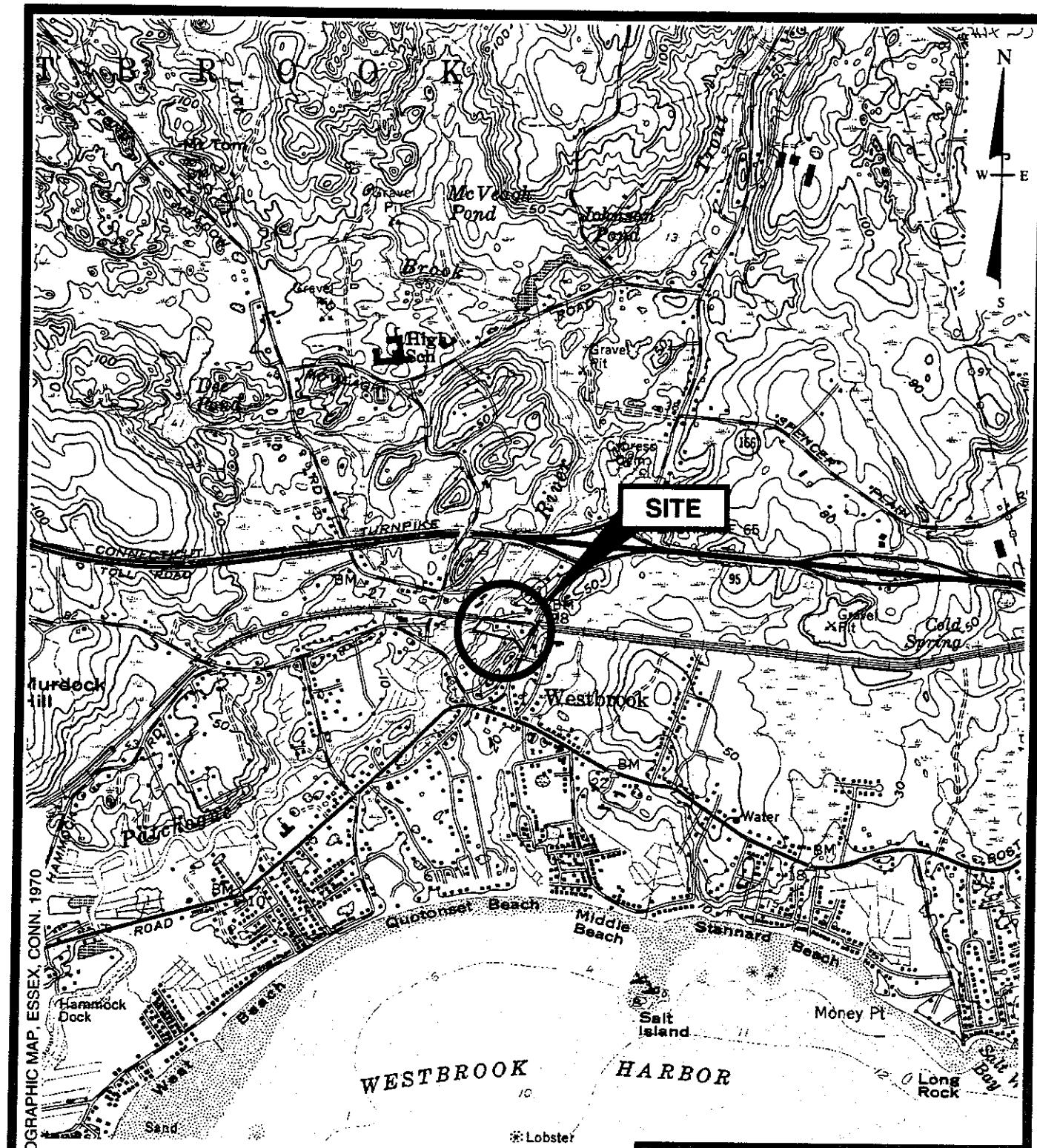
* Indicates that no RDEC and IDEC values are established for total hexavalent

Table 3
Groundwater Analytical Results Summary
101 Norris Avenue
Westbrook, Connecticut

Analytes	Sample ID				
	GA GWPC	SWPC	MW-4	MW-5	MW-6
Volatile Organic Compounds (VOCs) ug/L (ppb)					
MTBE	100	NE	1.6	110	1.2
Semivolatile Organic Compounds (SVOCs) ug/L (ppb)					
SVOC	---	---	BDL	BDL	BDL
Total Resource Conservation Recovery Act (RCRA) 8 Metals ug/L (ppb)					
Barium	1,000	NE	55.7	26.2	250
Cadmium	5	6	BDL	BDL	1.7
Chromium	50	NE	BDL	BDL	103
Extractable Total Petroleum Hydrocarbons (ETPH) ug/L (ppb)					
ETPH	500	NE	BDL	BDL	BDL

Notes: Only those compounds detected are shown.
CTDEP stands for the Connecticut Department of Environmental Protection
GA GWPC stands for the Groundwater Protection Criteria for a GA groundwater area
SWPC stands for Surface Water Protection Criteria
BDL stands for below the detection limit
NE means that CTDEP Standard is not established or applicable
ug/L means micrograms per liter
ppb means parts per billion

Figures



GEI Consultants, Inc.

FIGURE 1
SITE LOCATION MAP
101 NORRIS AVENUE, WESTBROOK

CONNDOT PROJECT NO. 0300-0017
WESTBROOK RAILROAD STATION
WESTBROOK, CONNECTICUT

CDOT\WESTBROOK\RAILROAD\WBK-LOC.PPT

Appendix B

Boring Logs

GEI Consultants, Inc.

GEOPROBE SOIL BORING LOG

Boring ID:	**SB-4/MW-4**	**Client:**	**ConnDOT**
Project Number:	**020900**	**Project Name:**	**Westbrook Railroad Station**
Logged By:	**Bonoff**	**Site Address:**	**101 Norris Avenue**
Date:	**04-22-02**	**Contractor:**	
Total Depth:		**Driller:**	**Earth Technology, LLC**

Depth (feet)	Recovery (inches)	PID (ppm)	Soil Description
0-4			0.0-1.0 Bituminous concrete and subbase 1.0-2.0 Brown fine sand 2.0-4.0 Banded black/gray/brown silty sand, some ash
4-8			4.0-8.0 Banded black/brown fine sand
8-12			9.5-10.0 Black/brown fine sand grading to orange fine-coarse sand
12-16			12.5-16.0 Tan fine-medium sand
16-20			17.0-20.0 Tan/brown fine sand, some bands of crushed rock
20-24			20.0-23.0 Orange/brown fine-coarse sand and gravel, wet 23.0-24.0 Tan/brown fine silty sand Completed as monitoring well Screened interval: 19-24' Sample intervals: 0-4', 4-8', and 19-23'

GEI Consultants, Inc.

GEOPROBE SOIL BORING LOG

Boring ID:	**SB-5/MW-5**	**Client:**	**ConnDOT**
Project Number:	**020900**	**Project Name:**	**Westbrook Railroad Station**
Logged By:	**Bonoff**	**Site Address:**	**101 Norris Avenue**
Date:	**04-22-02**	**Contractor:**	
Total Depth:		**Driller:**	**Earth Technology, LLC**

Depth (feet)	Recovery (inches)	PID (ppm)	Soil Description
0-4			0.0-1.0 Bituminous concrete and subbase 1.0-4.0 Brown fine-medium sand and small gravel, black-stained midway
4-8			5.0-7.0 Brown fine-coarse sand and gravel 7.0-8.0 Brown silty fine sand, dense, compact
8-12			8.0-9.0 Brown silty fine sand 9.0-10.0 Silty sand and crushed cobbles 10.0-11.5 Orange/brown silty fine sand, compact 11.5-12.0 Brown fine-medium sand, looser
12-16			12.5-13.5 Brown fine-medium sand 13.5-15.5 Orange fine-medium sand, loose 15.5-16.0 Brown fine sand and crushed stone
16-20			16.0-20.0 Orange/red to orange/brown fine-medium sand, some silt, some gravel, compact, slightly moist at bottom
20-24			20.0-21.5 Orange/brown fine-medium sand, fairly dry 21.5-24.0 Orange fine-coarse sand and crushed cobbles, wet Completed as monitoring well Screened interval: 18.5-23.5' Sample interval: 8-12'

GEI Consultants, Inc.

GEOPROBE SOIL BORING LOG

Boring ID:	**SB-6/MW-6**	**Client:**	**ConnDOT**
Project Number:	**020900**	**Project Name:**	**Westbrook Railroad Station**
Logged By:	**Bonoff**	**Site Address:**	**101 Norris Avenue**
Date:	**04-22-02**	**Contractor:**	
Total Depth:		**Driller:**	**Earth Technology, LLC**

Depth (feet)	Recovery (inches)	PID (ppm)	Soil Description
0-4			No data
4-8			No data
8-12			8.0-12.0 Tan/brown fine-medium sand
12-16			12.0-14.0 Brown fine sand and gravel, slight staining 14.0-16.0 Tan banded fine sand, compact, uniform, slightly moist
16-20			16.0-20.0 Fine sand and crushed rock, moist
20-24			20.0-24.0 Fine sand and crushed rock, wet
			Completed as monitoring well Screened interval: 17.5-22.5' Sample interval: 12-14'

GEI Consultants, Inc.

GEOPROBE SOIL BORING LOG

Boring ID:	**SB-7**	**Client:**	**ConnDOT**
Project Number:	**020900**	**Project Name:**	**Westbrook Railroad Station**
Logged By:	**Bonoff**	**Site Address:**	**101 Norris Avenue**
Date:	**04-23-02**	**Contractor:**	
Total Depth:		**Driller:**	**Earth Technology, LLC**

Depth (feet)	Recovery (inches)	PID (ppm)	Soil Description
0-4			0.0-1.0 Bituminous concrete and subbase 1.0-3.5 Orange/brown fine-medium sand with some small gravel 3.5-4.0 Tan/brown fine-coarse sand with some small gravel
4-8			5.0-6.0 Brown fine-medium silty sand, slightly moist, compact 6.0-7.0 Crushed rock 7.0-8.0 Reddish-brown fine silty sand, dense, compact
8-12			8.5-9.5 Black crushed rock grading to reddish-brown fine silty sand 9.5-11.5 Reddish-brown fine sand and crushed cobbles 11.5-12.0 Orange fine sand with some silt, some small gravel
12-16			12.0-13.0 Brown sand and gravel 13.0-15.0 Orange fine-coarse sand and small gravel 15.0-16.0 Sand and crushed cobbles, fine silty compact sand at bottom
16-20			16.0-19.0 Orange fine-medium sand and crushed cobbles, fairly dry 19.0 Refusal Sample interval: 2-6'

GEI Consultants, Inc.

GEOPROBE SOIL BORING LOG

Boring ID:	**SB-10**	**Client:**	**ConnDOT**
Project Number:	**020900**	**Project Name:**	**Westbrook Railroad Station**
Logged By:	**Bonoff**	**Site Address:**	**101 Norris Avenue**
Date:	**04-23-02**	**Contractor:**	
Total Depth:		**Driller:**	**Earth Technology, LLC**

Depth (feet)	Recovery (inches)	PID (ppm)	Soil Description
0-4			1.0-1.5 Fine-coarse sand 1.5-3.5 Sand and crushed cobbles 3.5-4.0 Fine-coarse sand and small gravel
4-8			4.0-8.0 Tan fine sand grading through darker bands with gravel and crushed rock
8-12			8.0-11.0 Tan fine sand grading to dense, compact silty sand 11.0 Refusal
			Sample interval: 0-4'

GEI Consultants, Inc.

GEOPROBE SOIL BORING LOG

Boring ID:	**SB-11**	**Client:**	**ConnDOT**
Project Number:	**020900**	**Project Name:**	**Westbrook Railroad Station**
Logged By:	**Bonoff**	**Site Address:**	**101 Norris Avenue**
Date:	**04-23-02**	**Contractor:**	
Total Depth:		**Driller:**	**Earth Technology, LLC**

Depth (feet)	Recovery (inches)	PID (ppm)	Soil Description
0-4			0.0-4.0 Orange/brown fine-medium sand and some crushed rock
4-8			4.0-8.0 Orange/brown fine sand and some gravel
8-12			8.0-10.5 Orange/brown fine-medium sand (same as above) grading to coarse sand above black crushed rock 10.5-12.0 Tan/brown fine silty sand, compact, dense
12-16			12.0-16.0 Orange/brown fine-medium sand with small gravel (same as above)
16-20			16.0 Refusal, dry Sample interval: 4-8'

GEI Consultants, Inc.

GEOPROBE SOIL BORING LOG

Boring ID:	**SB-12/SB-13**	**Client:**	**ConnDOT**
Project Number:	**020900**	**Project Name:**	**Westbrook Railroad Station**
Logged By:	**Bonoff**	**Site Address:**	**101 Norris Avenue**
Date:	**04-23-02**	**Contractor:**	
Total Depth:		**Driller:**	**Earth Technology, LLC**

Depth (feet)	Recovery (inches)	PID (ppm)	Soil Description
0-4			0.0-1.0 Bituminous concrete and subbase 1.0-1.5 Brown fine sand and crushed rock 1.5-4.0 Brown fine silty sand with some rock, dense, compact, no stains or odors
4-8			7.0 Refusal Sample interval: 1-4'

GEI Consultants, Inc.

GEOPROBE SOIL BORING LOG

Boring ID:	**SB-14**	**Client:**	**ConnDOT**
Project Number:	**020900**	**Project Name:**	**Westbrook Railroad Station**
Logged By:	**Bonoff**	**Site Address:**	**101 Norris Avenue**
Date:	**04-23-02**	**Contractor:**	
Total Depth:		**Driller:**	**Earth Technology, LLC**

Depth (feet)	Recovery (inches)	PID (ppm)	Soil Description
0-4			0.0-1.0 Bituminous concrete and subbase 1.0-4.0 Brown fine-medium sand with some crushed rock
4-8			5.5-6.0 Refusal Sample interval: 2-6'