Phase II/Phase III Environmental Site Assessment

Mystic River Boathouse Project

123 Greenmanville Avenue
Mystic, Connecticut

Kent + Frost Landscape Architecture

Mystic, Connecticut

March 2018

FUSS & O'NEILL

146 Hartford Road
Manchester, Connecticut 06040

Project No. 20170167.A10

March 23, 2018

Mr. Chad Frost
Kent + Frost Landscape Architecture
1 High Street
Mystic, CT 06355

RE: Phase II/Phase III Environmental Site Assessment
Mystic River Boathouse Project
123 Greenmanville Avenue, Mystic, CT
Fuss & O'Neill Reference Number: 20170167.A10

Dear Mr. Frost:

We are pleased to submit the enclosed report of the Phase II/Phase III Environmental Site Assessment for the above-referenced site. The assessment was conducted using the guidance in the Connecticut Department of Energy and Environmental Protection's Site Characterization Guidance Document (CTDEP, 2010).

The results of our assessment are summarized in the attached report. Thank you for the opportunity to conduct this work. Please contact the undersigned if we can be of further assistance.

Sincerely,

Brianna Church
Environmental Engineer

Daniel R. Jahne
Associate

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List of Common Abbreviations

Units of Measurement	
ug	micrograms
mg	milligrams
kg	kilograms
L	liter
ppb	parts per billion
ppm	parts per million
Analytical Parameters and Chemical Compounds	
ETPH	extractable total petroleum hydrocarbons
PAHs	polycyclic aromatic hydrocarbons
PCBs	polychlorinated biphenyls
PCE	tetrachloroethylene
SPLP	synthetic precipitate leaching procedure
SVOCs	semivolatile organic compounds
TCLP	toxicity characteristic leaching procedure
TCE	trichloroethylene
TPH	total petroleum hydrocarbons
VOCs	volatile organic compounds
Regulatory Abbreviations	
CFR	Code of Federal Regulations
DEC	direct exposure criteria
DEEP[1]	Department of Energy and Environmental Protection
ECAF	Environmental Condition Assessment Form
GWPC	groundwater protection criteria
I/C	industrial/commercial
PMC	pollutant mobility criteria
RCRA	Resource Conservation and Recovery Act
RCSA	Regulations of Connecticut State Agencies
Res	residential
RSRs	Remediation Standard Regulations
TSCA	Toxic Substances Control Act
SWPC	surface water protection criteria
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
VC	volatilization criteria
Other	
AOC	area of concern
AST	aboveground storage tank
COC	constituent of concern
QA/QC	quality assurance/quality control
UST	underground storage tank

[1] In portions of this report we refer to the Connecticut Department of Energy and Environmental Protection (DEEP). The Connecticut Department of Environmental Protection (CTDEP) was re-named the Department of Energy and Environmental Protection (DEEP) in July 2011. For convenience and consistency, we refer to the agency as the DEEP throughout this report, including the timeframe prior to July 2011.

Executive Summary

Background

Fuss & O'Neill, Inc. was retained by Kent + Frost Landscape Architecture to conduct a Phase II/Phase III Environmental Site Assessment (ESA) of the future Mystic Boathouse property located at 123 Greenmanville Avenue in Stonington, Connecticut (the "Site"). The project is being funded under a State of Connecticut Brownfields Revitalization Grant from the Department of Economic and Community Development to the Town of Stonington. The objectives of the investigation were to determine whether releases of hazardous substances or petroleum products have occurred at previously identified areas of concern (AOCs), and to determine the magnitude and extent of the identified releases.

The Site is an approximately 1.42-acre irregularly shaped parcel of land, owned by the Town of Stonington improved with two structures comprised of a garage and residence. The garage is currently used as a training and storage area for crew and rowing activities. The western portion of the Site is grassed open space, which decreases gently in elevation towards a narrow sandy bank bordering the Mystic River. The Site served multiple purposes in the past for the former Rossi Velvet Mill located across the street including a residence, coal staging area, storage area, and river access for mill fire suppression water supply.

Investigation Results

Six Areas of Environmental Concern (AOCs) were identified as a potential for a release of petroleum hydrocarbons or other potentially hazardous substances to the subsurface. Investigation activities performed by Fuss & O'Neill between November 2017 to February 2018 consisted of: ground penetrating radar survey, visual inspection of potential release areas, soil sampling using a direct-push drill rig, installation and sampling of monitoring wells, shoreline soil sampling using manual methods, and laboratory analysis of soil and groundwater samples for constituents of concern specific to each AOC. The results indicate that identified releases occurred at the following AOCs.

- AOC-01 Site Wide Fill
- AOC-02 Former Tunnel/Fire Pump Void/Conduit
- AOC-03 Former 500 Gallon Gasoline UST/Former Gas Engine

The Site is "made land" comprised of fill ranging in thickness from 6 to 12 feet overlying estuarine deposits. The fill contains coal ash, slag, coal fragments, metal fragments, glass, concrete, brick, and wood. Infrastructure associated with the Former Rossie Velvet Mill operations across the street still exist at the Site within the fill. This includes former building foundations, piping and conduit for a former fire suppression system, a septic leaching field, and other piping where the past use is unknown. The fill contains pollutants comprised of petroleum hydrocarbons, metals (primarily arsenic and lead), and a local area containing a low concentration of PCBs (2.5 mg/kg). Due to the heterogeneity of the fill (particularly the occurrence of coal ash), which is inferred to be the primary source of the petroleum hydrocarbons and metals, concentrations of pollutants in the fill have the potential to exceed the Remediation Standard Regulations (RSR) Direct Exposure Criteria. Samples of the fill collected from the upland and the shoreline bank above the high tide line exceed the baseline Direct Exposure Criteria for one or more of these constituents.

A release area of at least 400 square feet in size exists in an area occupied by a former mill fire suppression system and a former building subsurface foundation. Both of these features appear to still be in place. Concentrations of chlorinated volatile organic compounds of cis-1,2-dichloroethene, and trichloroethene exist in the 5 to 8 feet depth interval below the ground surface. Concentrations of these pollutants exceed the baseline RSR Pollutant Mobility Criteria. Groundwater samples collected from a well downgradient of the area contain low concentrations of these pollutants.

A release area of approximately 2,000 square feet in size exists in the northern portion of the Site below the garage and north of the garage at a former underground storage tank location. Petroleum impacted soil at concentrations above RSR baseline Direct Exposure and Pollutant Mobility Criteria was encountered in a depth interval between 6 and 11 feet below the ground surface between the seasonal low and high water table.

Recommendations

The next step in the process is to prepare a Remedial Action Plan based on a final site design for redevelopment of the property. The site design should integrate remedial options to the greatest extent feasible to cost-effectively achieve compliance with the cleanup regulations. This could include construction of a new building along with new parking and landscaped areas to prevent human contact with the underlying polluted soil either through the self-implementing options described in the cleanup regulations or DEEP-approved engineered controls. Select areas may require excavation and off-site disposal.

Soil management strategies should be incorporated into the site design to minimize the quantity of excess polluted soil that will be generated by development activities. The extent to which fill and former infrastructure (piping/conduit, septic field, foundations) need to be removed could depend on site grading and geotechnical conditions.

Additional sampling based on the final site design may need to be performed to address identified data gaps pertaining to groundwater and soil characterization to facilitate soil management strategies, pre-characterization for off-site disposal, and shoreline design.

1 Introduction

Fuss & O'Neill, Inc. was retained by Kent + Frost Landscape Architecture to conduct a Phase II/Phase III Environmental Site Assessment (ESA) of the future Mystic Boathouse property located at 123 Greenmanville Avenue in Stonington, Connecticut (the "Site"). The objectives of the Phase II/Phase III investigation were to determine whether releases of hazardous substances or petroleum products have occurred at previously identified areas of concern (AOCs), and to determine the magnitude and extent of the identified releases.

The Phase II/Phase III investigation activities were conducted using the guidance in the Connecticut Department of Energy and Environmental Protection (DEEP) Site Characterization Guidance Document (DEEP, 2010). This assessment was performed to determine if a release of petroleum or potentially hazardous substances has occurred at the Site and to characterize the degree and extent of identified release areas as part of the redevelopment planning process.

1.1 Regulatory Framework

Analytical results obtained from this investigation were reviewed and compared to the Connecticut Remediation Standard Regulations (RSRs) (Regulations of Connecticut State Agencies [RCSA] Section 22a-133k-1 through 3) numeric criteria. The Connecticut RSRs are the clean-up standards in the State of Connecticut and contain procedures to evaluate whether actions (e.g., remediation or institutional controls) will be required to address identified releases of hazardous substances. The RSRs require that the nature and extent of release areas be fully characterized prior to making a final determination of compliance.

The RSR numeric criteria are presented alongside analytical data collected from this investigation as an evaluative tool and to provide a general benchmark for the environmental quality at the Site. For comparison purposes, the RSR criteria that would be specific to the Site are discussed in the table below.

RSR Criteria Overview

RSR Soil Criteria	Description of Criteria Objectives
Direct Exposure Criteria (DEC)	DEC are applicable to soil within 15 feet of the ground surface. Soil impacted by a release is typically compared to the residential (Res) DEC unless alternatives or variances are applied.
Pollutant Mobility Criteria (PMC)	The PMC protect groundwater from constituents leaching out of impacted soil and are dependent upon the groundwater quality classification of a site. Since the Site is located in a GB-designated area, the GB pollutant PMC were used. The GB criteria apply only to soil located above the seasonal high water table.
RSR Groundwater Criteria	**Description of Criteria Objectives**
Surface Water Protection Criteria (SWPC)	The SWPC ensure that surface water quality is not impaired by the discharge of contaminated groundwater into a surface water body. Groundwater at the Site discharges to the Mystic River.

Volatilization Criteria (VC)	Volatilization criteria protect human health from volatile substances (i.e. VOCs) that may migrate into overlying buildings from shallow groundwater and apply to groundwater within 15 feet of the ground surface (which is applicable at the Site) or a structure intended for human occupancy. The residential (Res) VC apply unless a land use restriction is recorded.

2 Site Overview

2.1 Physical Description

The Site is located on the east side of Greenmanville Avenue in a high-density residential zone of Stonington, Connecticut (New London County). A portion of a United States Geological Survey (USGS) topographic map showing the Site location is provided as Figure 1.

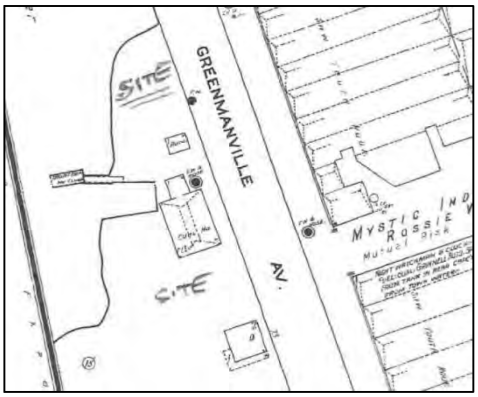
According to Town records, the Site is an approximately 1.42-acre irregularly shaped parcel of land, owned by the Town of Stonington since 2015. The Site is improved with two structures comprised of a garage and residence. Access is via a gravel driveway on the northeastern portion of the Site. The two-story residential structure encompasses approximately 2,692 square feet of gross living space and is located on the southeast portion of the Site. The residential structure was reportedly constructed in 1945 and is currently vacant. A wooden deck is located on the western portion of the house. The deck historically extended to an aboveground swimming pool, which has since been removed. An approximately 1,980 square foot single-story detached garage is located north of the residential structure. The garage is currently used as a training and storage area for crew and rowing activities. The western portion of the Site is grassed open space, which decreases gently in elevation towards a thin sandy bank bordering the Mystic River. A site plan is provided as Figure 2.

Site Utilities

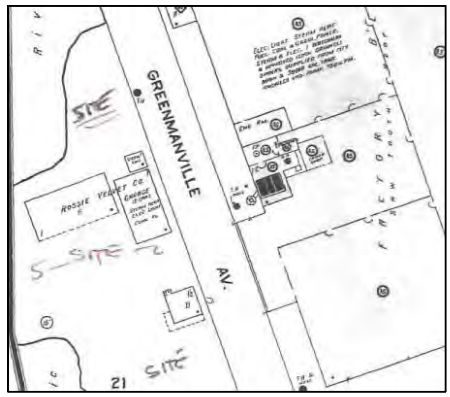
According to the Phase I ESA completed by GEI Consultants in 2016, the Site is connected to public water, sewer, and electricity. Town records confirm that the Site is served by public sewer and previous reports indicate that the property was not connected to the town sewer system until 1973. The Phase I ESA indicated that a private septic system no longer in use is located south of the residential structure. Town records indicate that the residential structure is heated using oil. Electrical service is provided to the Site by overhead lines extending along the eastern side of Greenmanville Road.

An approximate 8-inch diameter hole was observed along the center of the east wall bordering Greenmanville Avenue. Visual and down-hole camera inspection of the hole revealed that a void space measuring approximately 6 to 10 feet square by at least 8 feet deep exists below this portion of the garage. Based on review of historical mapping, we conclude the void space is associated with a sump for a fire pump that existed in 1911 to serve the former Rossi Velvet Mill located across the street (Section 2.2). In 1911 the garage building was smaller than the present day configuration and the shoreline extended right up to the corner of the building.

Based on visual observation with the down-hole camera there is piping representative of fire pump apparatus at the bottom of the void space. A conduit at the bottom of the void extended west to the shoreline to provide a water supply for the mill fire suppression system. The black circle shown on the 1911 map below is the symbol for a fire pump. By 1924 the garage was extended further to the north and the shoreline filled. The conduit to the shoreline may have been extended further to the west and may still be in place based on field observation of a suspected intake pipe that was observed protruding from the river during low tide (see Figure 2).



1911 Sanborne Depicting Garage



1924 Sanborne Depicting Garage

The pipes visible in the void space below the garage appear to extend to the east below Greenmanville Avenue to the former mill.

A storm water line from Greenmanville Avenue extends along the southern boundary of the Site through a twenty feet wide drainage easement area with the discharge outlet visible to the Mystic River (Figure 2). Based on visual inspection of the riverbank during low tide, there are at least three other pipes that protrude from the northern portion of the site that could be legacy utilities serving the former mill across the street.

Surrounding Land Use

Based on observations made during the field reconnaissance and available mapping, the surrounding land use includes a mix of commercial and residential properties along Greenmanville Avenue.

The property north of the Site is occupied by a small, seasonal restaurant. The properties across Greenmanville Avenue to the northeast are occupied by residential structures. The former Rossie Velvet Mill is located across Greenmanville Avenue to the East. Mystic Seaport currently occupies the former mill. A restaurant associated with the Mystic Seaport is located south of the Site. The Mystic River provides the western Site boundary.

2.2 Site History

An 1879 map of Mystic and an 1898 post card of the former Rossie Velvet Mills, both included in the 2008 Phase I ESA report, indicate that the Site formerly occupied a very narrow strip of land running north-south along the western side of Greenmanville Avenue. Sanborn fire insurance maps dated 1903 through 1924 depict the gradual extension of the land further into the Mystic River, indicating that much of the Site is comprised of fill material (See Section 5.1.1).

A two-story residential structure with a basement is shown on the 1903 Sanborn fire insurance map in approximately the same location as the existing residential structure to the South of the Site. Town records indicate that the existing residential structure was built in 1945.

An inlet, likely used for boat mooring, can be observed on the 1911 Sanborn fire insurance map, along with an associated dock and structures labeled "boat box, no floor." A covered coal storage building located north of the residential structure and a small automobile garage north of the coal storage building are observed on the 1911 Sanborn map. The fire pump previously described, is shown on the 1911 map.

In the 1924 Sanborn fire insurance map, the coal storage building appears to have been replaced with a twelve-car garage positioned in approximately the same location as the existing garage structure. An unidentified single-story structure of similar size as the garage and located perpendicular to the northwest corner of the garage is also shown in the 1924 Sanborn map. Evidence of the former foundation for this structure still being in place was identified during the field investigation by way of visual observation of a concrete foundation wall located north of the garage and shallow refusal for borings advanced in the approximate area of the building footprint.

Both buildings are labeled as belonging to the Rossie Velvet Co. Although still present in a 1934 aerial photograph, the unidentified structure is absent in the 1939 Sanborn map. A detached structure housing a gasoline engine can be observed north of the northeast corner of the garage in the 1924 Sanborn map. The boathouse, small automotive garage, and inlet observed in the 1911 Sanborn map are not found on the 1924 Sanborn map.

In the 1963 Sanborn map, the garage is labeled as an automobile painting facility and city directories reportedly indicate that from at least 1957 through 1961 the auto painters Charles Lamphere Co. occupied the Site. The garage is no longer labeled as belonging to Rossie Velvet Co. in the 1963 Sanborn map, as the mill facilities to the east are labeled as General Dynamics, Electric Boat Company.

From 1966 through 1977, city directories reportedly indicate that the residential dwelling was occupied and that the Electric Boat division of General Dynamics used the garage structure as a warehouse.

The gas engine is reportedly absent from the 1986 aerial photograph, although the garage and residential structures remain. The aboveground pool located west of the residential structure reportedly appears in the 1990 aerial photograph was reportedly present during the 2016 Phase I ESA but no longer remains on the Site.

An interview with a former employee of the Rossie Velvet Co., recorded in the 2008 Phase I ESA, indicates that coal was transported to the Site via the Mystic River and stored there for use by the Rossie Mill. The coal was reportedly transported across Greenmanville Avenue to the Rossie Mill boiler on an electric battery operated cart via an underground tunnel. The interview confirms that the garage structure was used for mill vehicle storage. The interview also indicates that dye wastes were produced on the Site and discharged into the Mystic River at an unknown discharge location.

Both the residential structure and the garage structure, as well as the surrounding neighborhood, are included in the National Register of Historic (NRH) places. The residential structure, referred to as the Lovelace home was reportedly constructed around 1900. The garage structure is listed as being constructed in 1989 as a warehouse. The description in the application for the registration, included in the 2016 Phase I ESA, indicates the garage structure was formerly used as a blacksmith shop for the Rossie Mill and later as a stonecutter's workshop in the 1930s.

2.3 Environmental Setting

2.3.1 Topography

Both the Site and regional topography slope gradually to moderately down to the west toward the Mystic River, which makes up the western boundary of the Site (USGS, 1984).

2.3.2 Geology

Surficial Geology

Surficial material at the site is mapped as sand and gravel overlying sand (USGS, 1992). Based on soil borings conducted on the Site during the Phase II investigation activities and during previous investigations, these natural deposits are overlain by 6-10 feet of fill material comprised of coal and coal ash, brick, and metal slag.

Bedrock Geology

Bedrock beneath the site is mapped as Mamacoke Formation, an interlayered light- to dark-grey, medium-grained gneiss (USGS, 1985). Bedrock outcroppings were not encountered during Site reconnaissance and bedrock was not encountered during the investigation.

2.3.3 Hydrogeology

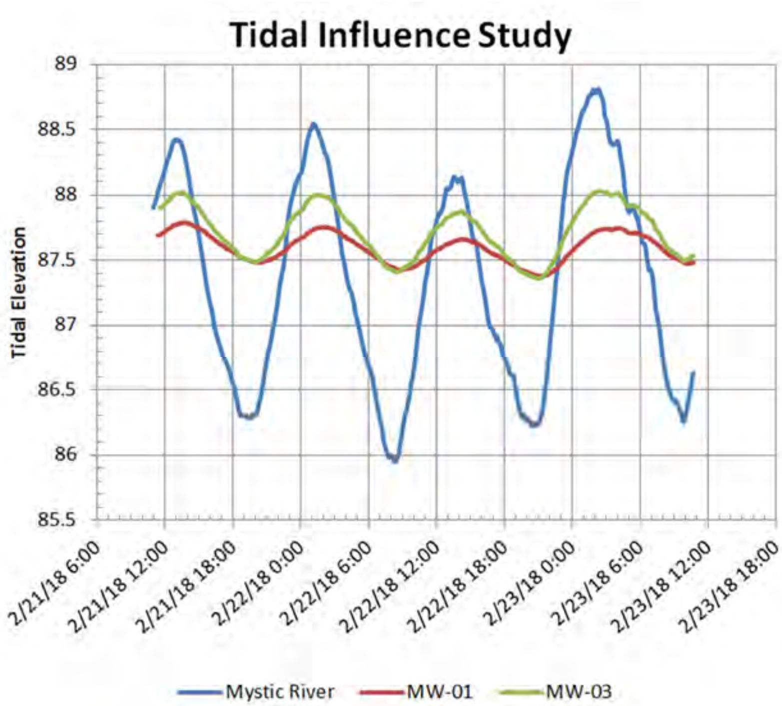
Depth to groundwater at the Site was measured to be approximately 9 feet below grade on the eastern portion of the Site to 2 feet below grade on the western and southern portions of the Site. Refer to Table 1 for a summary of well construction and groundwater elevation data and to Figure 3 for the inferred groundwater flow direction. Groundwater elevation data indicates that groundwater at the Site generally flows radially toward the Mystic River.

Based on groundwater measurements collected by the US Geological Survey at two stations in Groton, CT, approximately 5.8 miles southwest of the Site, the seasonal low water table levels occur around August or September. The seasonal low water levels at these stations are approximately two feet lower than the groundwater measurements recorded for late December through late February. Based on this information, the seasonal low water table at the Site may range from approximately 11 feet below grade on the eastern portion of the Site to approximately 4 feet below grade on the western and southern portions of the Site.

Depth to groundwater was measured November 2017 and February 2018 with the highest groundwater measured less than 2 feet below the ground on the southern portion of the site (MW-01) and almost 10 feet below the ground in the northern portion of the Site along Greenmanville Avenue (MW-04).

Three water level pressure transducers were installed at the Site to assess tidal influence on the depth to groundwater over a 48-hour period. The tidal range observed in the Mystic River abutting the Site was recorded to be approximately 2.5 feet. The tidal fluctuations in monitoring well MW-01, located on the southeast portion of the Site were measured to be approximately 0.25 feet. The tidal fluctuations in monitoring well MW-03, located in the center of the Site were measured to be approximately 0.5 feet. The Tidal Influence Study graph, below, demonstrates the tidal fluctuations during the deployment of the water level pressure transducers. The measuring point elevations used for the wells and for the transducer placed directly offsite in the Mystic River were based on an assumed reference point elevation.

The foundation associated with the building historically located east of the garage structure, the tunnels associated with the Rossie Mills and the fire pump on the Site, or other underground features related to these structures may have the potential to affect groundwater flow in this portion of the Site.



2.3.4 Water Quality Classifications

Groundwater Classification

The quality of groundwater beneath the subject site is classified by the DEEP as GB, which is identified as groundwater that may not be suitable for human consumption without treatment due to waste discharges, spills, leaks of chemicals, or land use impacts (DEEP, 2017).

Surface Water Classification

The nearest surface water body is Mystic River, which provides the western boundary of the Site (USGS, 1984). The Mystic River is classified by the DEEP as SB, which is identified as surface waters that are known or presumed to be suitable for the following designated uses: habitat for marine fish and aquatic life and wildlife, commercial shellfish harvesting, recreation, industrial water supply, and navigation (DEEP, 2017).

2.3.5 Potential Receptors

A preliminary assessment was conducted to identify sensitive human health or ecological receptors are present at or directly downgradient of the Site. The results of this inventory are presented below:

- Endangered Species – No potential threatened or endangered species habitats are present at the Site or within 0.25 miles of the Site (CTECO, 2017).
- Ecological Receptors –An ecological risk assessment has not been performed.
- Wetlands –Wetland delineation performed by others indicates that wetlands exist within 5 to 15 feet landward of mean high water (see Figure 2).
- Surface Waters – The nearest surface water body is the Mystic River, which provides the western boundary of the Site.
- Aquifer Protection Areas – No aquifer protection areas were identified within a 0.5-mile radius of the Site (CTECO, 2017).
- Public Water Supply Wells – The Atlas of Public Water Supply Sources and Drainage Basins of Connecticut (CTDEEP, 1982) shows no public water supply wells within 0.5-mile radius of the Site.
- Private Water Supply Wells – The Site is located in an urbanized area where municipal water is available to the Site and the surrounding area. The Phase I ESA report indicates that no residential wells were identified within ½ mile of the Site.
- Physical Contact with Soil – The potential exists for site occupants and visitors to be exposed to impacted soil or fill.
- Potential for Vapor Intrusion – Groundwater samples were collected and analyzed for volatile organic compounds. The results of the sampling are described in Section 5.2.

3 Previous Investigations

The following documents were reviewed to assess the investigation and remediation activities conducted at the Site:

- Phase I Environmental Site Assessment – 123 Greenmanville Avenue, Mystic Connecticut; prepared by Paul Burgess, LLC; dated July 2008
- Phase I Environmental Site Assessment – Baumgarten Property, 123 Greenmanville Avenue; prepared by GEI Consultants, Inc.; dated October 2016

The findings of these documents identified the following areas of concern (AOCs) at the Site:

AOC-1: <u>Site-Wide Fill</u>
Coal, coal ash, brick, and metal slag are present across the Site and visible at the surface and along the riverbanks.

AOC-2: <u>Former Tunnel</u>
The former coal tunnel as identified as an AOC because its exact location was unknown and it was not observed during previous Phase I investigations. Additionally, sampling results indicated a release of petroleum impacted wastewater attributed to the upgradient mill.

AOC-3: <u>Former 500-Gallon Gasoline UST</u>
A 500-gallon gasoline underground storage tank (UST), removed June 18, 2008, was located adjacent to the northern wall of the garage structure. The fuel lines and tank were removed and reportedly, there was no visible evidence of any holes or a release. Five samples were reportedly collected and were below DEEP standards; however, the data was not available for review. Low levels of VOCs were reported.

AOC-4: <u>Floor Drain in Garage</u>
A floor drain is present in the center of the garage structure.

AOC-5: <u>ASTs</u>
A 275-gallon above ground storage tank (AST) is present in the basement of the vacant residence and a former fuel oil AST was reportedly located in the crawl space beneath the southern portion of the garage structure. Elevated petroleum hydrocarbons were reported in a sample near this tank location.

Based on our review of the Site history and previous environmental investigations, we identified the private septic leach field located south of the residential structure as AOC-6.

AOC-6: <u>Septic Leach Field</u>
The private septic leach field located south of the residential structure was identified as being an AOC requiring further investigation.

4 Phase II Scope of Study

The first mobilization of the Phase II/Phase III investigation was conducted at Site between November 2, 2017 and November 13, 2017 and the second mobilization was conducted between February 2, 2018 and February 23, 2018. The investigation targeted the six AOCs identified in the previous section.

This section provides an overview of the methods used to investigate the Site and evaluate the data collected and describes data quality objectives, constituents of concern, laboratory methods used to analyze environmental samples, and field investigation methods.

4.1 Data Quality Objectives and Reasonable Confidence Protocols

Data quality objectives are used to ensure that data is collected in a manner that permits it to be used to evaluate a site and support decisions based on those evaluations. Procedures used to ensure that the DQOs for the project were met include:

- Development of preliminary conceptual models based on Phase I research, release mechanisms, and migration pathways to guide investigations
- Selection of sampling locations and constituents of concern (COCs) appropriate to the potential release area
- Use of background data to evaluate AOC-specific results
- Use of multiple lines of evidence to close data gaps and support conclusions
- Selection of analytical methods with appropriate detection limits
- Use of pre-determined procedures for sample handling, custody, data management, and documentation
- Use of trip blanks, duplicates, and laboratory matrix spikes (MS) for quality assurance/quality control (QA/QC)
- Use of the Connecticut Reasonable Confidence Protocol laboratory methods and completion of Data Quality Evaluations and Data Usability Assessments in general accordance with DEEP guidance to verify the quality of the data.

4.2 Constituents of Concern

A list of constituents of concern to be investigated was developed for each AOC. The constituent list comprises those compounds most likely to be released based on knowledge of site operations and results of any previous investigation. The constituents of concern include:

- Volatile organic compounds (VOCs)
- Extractable total petroleum hydrocarbons (ETPH)
- Polynuclear aromatic hydrocarbons (PAHs)
- Polychlorinated biphenyls (PCBs)
- Resource Conservation Recovery Act (RCRA) 8 Metals

The analytical methods presented in the following table were selected to identify and evaluate potential releases because they are capable of achieving analytical detection limits less than the baseline numeric RSR clean-up criteria applicable to the Site.

<table>
<tr><th>Constituent of Concern</th><th>Analytical Method</th></tr>
<tr><td rowspan="2">VOCs</td><td>Field screening using a photoionization detector (PID) Where suspected, VOCs were confirmed with analysis by EPA Method 8260.</td></tr>
<tr><td>Analysis by EPA Method 8260 following synthetic precipitate leaching procedure (SPLP)</td></tr>
<tr><td>Petroleum hydrocarbons</td><td>Connecticut ETPH Method</td></tr>
<tr><td rowspan="2">PAHs</td><td>EPA Method 8270</td></tr>
<tr><td>EPA Method 8270 following SPLP</td></tr>
<tr><td>PCBs</td><td>EPA Method 8082</td></tr>
<tr><td rowspan="3">Metals</td><td>SW6010 (arsenic, barium, cadmium, chromium, lead, selenium, and silver)
SW-7471 (mercury)</td></tr>
<tr><td>SW6010 and SW-7471 following SPLP</td></tr>
<tr><td>SW6010 and SW-7471 following toxicity characteristic leaching procedure (TCLP)</td></tr>
</table>

All soil and groundwater samples collected from the Site were submitted to Phoenix Environmental Laboratories (Phoenix), a state-certified laboratory located in Manchester, Connecticut, for laboratory analysis of one or more of the constituents of concern.

4.3 Investigative Procedures

The Phase II/Phase III investigation can be broken down into the following general field methods used to develop lines of evidence for each AOC based on its initial conceptual model.

4.3.1 Ground Penetrating Radar Survey

On October 24, 2017, Fuss & O'Neill oversaw Underground Surveying, LLC of Brookfield, Connecticut, as they completed a GPR survey of select areas of the Site. The GPR survey was performed across the Site to clear the initial boring locations and in the vicinity of the former 500-gallon gasoline UST. The GPR survey did not indicate anomalies characteristic of an existing UST, however, the limits of the former tank grave could be approximated to ensure placement of the soil boring was located in the former tank grave. The GPR survey also included the area east of the garage structure to identify the approximate location of the tunnel along the eastern side of the building, adjacent to the street (see Figure 2).

4.3.2 Direct-Push Soil Sampling

During the first mobilization between November 2, and November 3, 2017, Fuss & O'Neill oversaw Glacier Drilling (Glacier), of Durham Connecticut, as they advanced soil borings at select locations across the Site using their direct-push Geoprobe® drill rig. During the second mobilization on February 21, 2018, Fuss & O'Neill oversaw Cisco Geotechnical (Cisco), of Glastonbury, Connecticut as they advanced soil borings at additional locations selected based on data gap analysis using their direct-push Geoprobe® drill rig.

Soil samples were collected continuously from the ground surface using 60- and/or 48-inch stainless steel samplers, and each soil core was inspected by a field engineer for physical evidence of contamination, such as staining or odors. Where VOCs were a potential constituent of concern, samples were also field screened for vapor-phase VOCs using a photoionization detector (PID).

Where visual inspection and/or field screening indicated evidence of impacted soil, soil samples were collected from depth-intervals where evidence of a release was observed. If visual inspection and field screening did not yield evidence of impacted soil, samples were selected for laboratory analysis from predetermined intervals based on the conceptual release model for each REC or based on the interval at which previously identified impacts were observed.

Field observations at each boring were recorded on the boring logs included in Appendix A.

4.3.3 Monitoring Well Installation

Four groundwater monitoring wells (MW-01 through MW-04) were installed at the Site by Glacier during the first mobilization in November 2017 and one monitoring well (MW-05) by Cisco during the second mobilization in February 2018, using their respective direct-push Geoprobe® drill rigs. The monitoring wells were completed between 12 and 15 feet below grade and were constructed with standard 1.5-inch PVC riser and a 10-foot, pre-packed, PVC screened interval that intersected the water table at each location. Each monitoring well was finished with flush-mount curb boxes. The specific monitoring well construction details are provided on the well completion logs in Appendix A and are summarized in Table 1.

Following installation, the monitoring wells were developed using surge-and-purge techniques to remove suspended sediments from the well and to increase the hydraulic connection between the wells and the aquifer. Monitoring wells were then surveyed in relation to an assumed reference point to obtain relative measuring point elevations.

4.3.4 Groundwater Sampling

Fuss & O'Neill collected groundwater samples from monitoring wells MW-01 through MW-04 on November 13, 2017 and from all five monitoring wells (MW-01 through MW-05) on February 23, 2018. Prior to groundwater sampling, the depth to water was measured at each well to provide data that could be used to establish water table elevation and groundwater flow direction (Table 1).

A Fuss & O'Neill field engineer sampled each well using a peristaltic pump and dedicated tubing, and followed low-flow sampling techniques. Groundwater quality parameters, including pH, specific conductivity, dissolved oxygen, temperature, turbidity, and oxidation/reduction potential were monitored and recorded at approximately 5- to 10-minute intervals until each had stabilized. The groundwater quality parameters were recorded on the field data sheets, provided as Appendix B.

4.3.5 Shoreline Surficial Sampling

Fuss & O'Neill collected seven surficial soil samples along the riverbank on November 2, 2017 as part of the first mobilization and an additional two surficial soil samples on February 21, 2018 during the second mobilization to characterize the riverbank for the presence of fill material. Surficial soil samples were collected at areas where large pieces of debris were absent using dedicated plastic trowels.

Field observations at each surficial sampling location were recorded on the field data sheets, provided as Appendix B.

4.4 QA/QC Review and Data Usability

The results for QA/QC samples submitted by Fuss & O'Neill (trip blanks, equipment blanks, and duplicates) and laboratory narratives provided with each lab report were reviewed to identify issues that could affect the usability of the data. The results of the review are summarized below.

Trip Blanks

Trip blanks for VOC analysis were provided by the laboratory to accompany each cooler of environmental samples to be analyzed for VOCs. Trip blank results were used to determine whether samples may have been compromised as a result of sample container handling or transport. A total of 3 soil trip blanks and 2 groundwater trip blanks were submitted during the Phase II investigation. VOCs were not detected above laboratory reporting limits in any of the trip blanks submitted.

Duplicates

Duplicate samples were generally submitted at a frequency of 1 per 20 samples per matrix. A total of two duplicate samples were collected during soil sampling, two duplicate samples were collected during groundwater monitoring and one matrix spike/matrix spike duplicate was collected during the Phase II investigation. Each duplicate was collected at the same time as the corresponding primary sample and was analyzed for the same parameters.

Precision is measured by the relative percent difference (RPD) between the primary and duplicate sample results. RPD goals are ≤50 percent for soil and ≤30 percent for water. RPDs during Phase II investigations were generally within the target range. Where RPDs were higher than these ranges, the difference was typically attributed to sample heterogeneity or low reporting limits and/or detected concentrations where small differences can result in a high RPD. The variation in RPDs is not expected to affect the interpretation of analytical results, but as a conservative measure, release areas were evaluated with respect to the greater of primary or duplicate analytical results.

Reasonable Confidence Protocols

The reasonable confidence protocol packages provided with laboratory reports were reviewed. The laboratory reported that "reasonable confidence" was achieved on all analyses conducted. A review of the narratives identified minor QA/QC issues regarding laboratory method control/blanks that were considered in interpreting the data. These issues were reviewed and it was determined that the usability of the data was not affected.

5 Phase II/Phase III Investigation Results

The results from the Phase II/Phase III investigation, conducted November 2, 2017 through February 23, 2018, are presented in the following subsections. The analytical data for samples collected during these investigations as compared to the baseline RSR criteria are summarized in Table 2 & 3. Copies of the laboratory analytical reports are provided in Appendix C.

5.1 Soil Sampling Analytical Results

During the first mobilization, on November 2, and November 3, 2017, twelve soil borings were advanced in select locations across the Site (SB-01 through SB-12) and an addition four soil borings were advanced across the Site and completed as monitoring wells (MW-01 through MW-04). Following soil characterization and sampling methods described in previous sections of this report, a total of 22 soil samples were collected and submitted to Phoenix for laboratory analysis of RCRA 8 metals, ETPH, PAHs, PCBs, and/or VOCs. Based on receipt, review, and analysis of the analytical data, data gaps associated with the site-wide fill (AOC-1) in the vicinity of soil boring SB-03, former tunnel (AOC-2) in the vicinity of SB-07, and former 500-gallon gasoline UST (AOC-3) were identified. During the second mobilization, on February 21, 2018, seven additional soil borings were advanced in each of those three areas (SB-13 through SB-19) and one additional soil boring was advanced in the vicinity of AOC-2, the former tunnel, and completed as a monitoring well. Following soil characterization and sampling methods described in previous sections of this report, an additional nine soil samples were collected and submitted to Phoenix for laboratory analysis of ETPH, SPLP ETPH, PCBs, VOCs, and/or SPLP VOCs.

On November 2, 2017, seven hand-dug surficial soil samples (SS-01 through SS-07) were collected along the shoreline bank of the Mystic River, which makes up the western Site boundary. Following soil characterization and sampling methods described in previous sections of this report, a total of six soil samples were submitted to Phoenix for laboratory analysis of RCRA 8 metals, ETPH, and PAHs. Based on receipt, review, and preliminary analysis of the analytical results, data gaps associated with the sample location (SS-01) on the southwestern-most portion of the Site were identified. On February 21, 2018, two additional hand-dug surficial soil samples (SS-08 and SS-09) were collected in the vicinity of SS-01. Following soil characterization and sampling methods described in previous sections of this report, these two additional soil samples were submitted to Phoenix for laboratory analysis of ETPH and SPLP ETPH.

A summary of the AOC-specific soil analytical results compared to the baseline RSR criteria is discussed in the subsections below.

5.1.1 Site-Wide Fill

Evidence of fill material, including coal, coal ash, brick, and metal slag, was observed in all of the soil borings and hand-dug samples collected across the Site and along the shoreline abutting the Site. The following subsections describe the analytical results for interior fill found in the upland and shoreline bank.

Interior Fill

Sixteen soil boring samples (SB-01 through MW-12) located across the Site were collected during the first mobilization in November 2017 and analyzed to characterize interior fill. The fill ranged in thickness from approximately 6 to 12 feet below the ground surface (Table 4). All sixteen soil samples were analyzed for total metals, ETPH, and PAHs. ETPH was only identified in soil borings near or downgradient of the former 500-gallon gasoline UST and is discussed in more detail in the appropriate subsection below.

Varying concentrations of metals were detected in each of the sixteen soil samples, as summarized in the table below:

Compound	Number of Samples	Number of Detections	Concentration Range (mg/kg)
Arsenic	16	14	0.99-26.7
Barium	16	16	17.5-306
Cadmium	16	7	0.37-11.8
Chromium	16	16	6.95-48
Copper	16	16	6.12-1,210
Lead	16	15	1.83-1,660
Mercury	16	9	0.03-0.29
Nickel	16	16	3.76-26.3
Selenium	16	0	ND

Compound	Number of Samples	Number of Detections	Concentration Range (mg/kg)
Silver	16	2	3.01-44
Zinc	16	16	12.2-1,360

Metals concentrations in soil varied across the Site, however, the ranges depicted above are typical for concentrations associated with fill material in a former industrial setting.

Concentrations of arsenic and lead at several locations that do not co-exist near one another exceed the RSR baseline Res DEC. At SB-03, located on the southwest portion of the Site, lead was reported at a concentration exceeding both the ResDEC and I/C DEC. This sample was later extracted for SPLP and TCLP analysis. Lead after extraction by SPLP at SB-03 was not detected above the laboratory reporting limit. Lead after extraction by TCLP was reported above the laboratory reporting limit, but below the RSR baseline PMC.

Elevated levels of arsenic at concentrations above the ResDEC and I/C DEC were reported at several locations west of the existing Site buildings. Corresponding SPLP analytical results indicate that SPLP arsenic concentrations do not exceed the baseline RSR PMC criteria. The site was formerly used as a coal receiving area and storage area for the former Rossi Velvet mill. The boring logs indicate that coal fragments and coal ash were frequently identified in the subsurface at various depth intervals. Based on field observation of random coal ash throughout the site and the heterogeneity of the arsenic and lead results, the source for the lead and arsenic detected in the subsurface at the site is coal ash in the fill. While PAHs were analyzed in all sixteen samples collected from across the Site, concentrations of select PAH compounds were only detected in ten of the samples, as summarized in the table below:

Compound	Number of Samples	Number of Detections	Concentration Range (mg/kg)
2-Methylnaphthalene	16	2	210-270
Acenaphthene	16	0	ND
Acenaphthylene	16	0	ND
Anthracene	16	0	ND
Benz(a)anthracene	16	5	180-1,000
Benzo(a)pyrene	16	4	270-1,100
Benzo(b)fluoranthene	16	6	190-940
Benzo(ghi)perylene	16	3	200-560
Benzo(k)fluoranthene	16	3	190-720
Chrysene	16	7	180-940
Dibenz(a,h)anthracene	16	0	ND
Fluoranthene	16	8	250-1,400
Fluorene	16	0	ND
Indeno(1,2,3-cd)pyrene	16	3	320-1,000
Naphthalene	16	0	0

Compound	Number of Samples	Number of Detections	Concentration Range (mg/kg)
Phenanthrene	16	7	200-610
Pyrene	16	9	150-1,100

Only one PAH compound, benzo(a)pyrene, was detected above the applicable RSR criteria in one sample, collected from SB-02 (0.5-2'). The benzo(a)pyrene compound was detected at a concentration of 1,100 micrograms per kilogram (ug/kg), as compared to the GB PMC, ResDEC, and I/C DEC criteria of 1,000 ug/kg. Soil boring SB-02 is located on the western-most portion of the Site and several other PAHs were detected above the laboratory reporting limits at this location.

Boring logs identified the presence of coal ash and asphalt fragments at various depth intervals across the Site. Overall, the concentrations of ETPH, metals, and PAHs observed across the Site appear evident of background concentrations for fill material rather than indicative of a release at the Site, with the exception of the former 500-gallon gasoline UST as further described in the Section 5.1.3.

PCBs

Of the sixteen soil boring samples collected for fill characterization, six (SB-01, SB-03, SB-05, SB-07, SB-09, and MW-02) were analyzed for PCBs in addition to metals, ETPH, and PAHs. Sample locations analyzed for PCBs were selected for a distribution across the Site to assess the representative sequential filling of the property based on review of the historically mapping. Of the six samples analyzed, PCBs were detected in only one sample. At SB-03 (5-6.5'), located on the southwestern portion of the Site, total PCBs (2.5 mg/kg) were reported at concentrations exceeding the ResDEC (1 mg/kg).

To further assess if location SB-03 could potentially be a source of PCBs, during the second mobilization on February 21, 2018, three soil borings (SB-17 through SB-19) were collected within 5 feet of SB-03. PCBs were not detected above the laboratory reporting limits in any of the samples submitted from these three borings. The boring log for SB-03 identified the presence of fill containing dark brown-colored silt, coal, slag, and coal ash to a depth of approximately 6 feet below the ground surface. No petroleum staining, field screening readings or odors were identified. Based on analytical testing and visual observation the conceptual model is that the PCBs detected in SB-03 are associated with the fill.

Two additional soil borings (SB-13 and SB-14) were advanced in the garage during the second mobilization to determine if PCBs may have been release to the subsurface due to past activities conducted in the garage. PCBs were not detected in the samples.

Shoreline Fill

The shoreline of the site consists of a gentle slope from the southern perimeter extending northward for approximately 160 feet turning eastward for approximately 150 feet. The slope along this reach consists primarily of sand and vegetation. However, coal fragments, slag, metal fragments, plastic, glass, rock, brick, and metal were observed at frequencies varying from dense to sparse along this section. There was no evidence of erosion from the upland to the river along this section. The slope continues northward for approximately another 240 feet becoming parallel with Greenmanville Avenue. Along this reach the slope is very steep and is comprised primarily of rock and woody vegetation including tree roots. Metal fragments, concrete block, glass, plastic, coal, and slag were also observed. The rock and woody vegetation in the steeply-sloped section appears to stabilize the bank and no evidence of erosion of the bank to the river was observed.

Six hand-dug surficial soil samples (SS-01 through SS-06) located along the perimeter of the Site were collected during the first mobilization on November 2, 2017, and analyzed to characterize the environmental quality of the shoreline slope. The samples were collected from the slope upland of the high tide line. All six surficial soil samples were analyzed for total metals, ETPH, and PAHs. Samples collected from SS-01 through SS-03 were also analyzed for SPLP metals and samples collected from SS-03 and SS-05 were sampled for SPLP PAHs.

ETPH was detected above laboratory reporting limits in surficial soil samples collected from SS-01, SS-04, SS-05, and SS-06. The concentration of ETPH exceeded the applicable RSR criteria (GB PMC and ResDEC and I/C DEC) only at SS-01. During the second mobilization, two additional hand-dug surficial soil samples (SS-08 and SS-09) were collected, west and north of SS-01, respectively, to delineate the extent of ETPH-impacted soil. ETPH was detected above the laboratory reporting limit but below the applicable RSRs at both SS-08 and SS-09.

Varying concentrations of metals were detected in each of the six surficial soil samples, as summarized in the table below:

Compound	Number of Samples	Number of Detections	Concentration Range (mg/kg)
Arsenic	6	6	1.96-34.7
Barium	6	6	17.4-2,230
Cadmium	6	4	0.49-9.67
Chromium	6	6	9.04-51.7
Copper	6	6	11.7-729
Lead	6	6	22.5-807
Mercury	6	5	0.05-0.69
Nickel	6	6	6.97-147
Selenium	6	0	ND
Silver	6	0	ND
Zinc	6	6	39.4-2,250

Metals concentrations in surficial soil samples along the shoreline varied, which is an indicator of the heterogeneity of the environmental quality of the fill material. Arsenic and lead concentrations were elevated in select samples where the presence of coal ash was identified contained.

At SS-02, located on the southwest shoreline, lead was reported at a concentration exceeding the ResDEC. This sample was later extracted for SPLP analysis. SPLP lead at SS-02 was detected above the laboratory reporting limit, but below the GB PMC.

Elevated levels of arsenic at concentrations above the ResDEC and I/C DEC were reported at surficial soil samples SS-01 through SS-04, located along the southern- and western- most portions of the shoreline. Corresponding SPLP analytical results indicate that SPLP arsenic concentrations do not exceed RSR criteria.

Varying concentrations of PAHs were detected in each of the six surficial soil samples, as summarized in the table below:

Compound	Number of Samples	Number of Detections	Concentration Range (mg/kg)
2-Methylnaphthalene	6	0	ND
Acenaphthene	6	0	ND
Acenaphthylene	6	2	420-640
Anthracene	6	4	150-1,100
Benz(a)anthracene	6	6	300-5,400
Benzo(a)pyrene	6	6	320-5,100
Benzo(b)fluoranthene	6	6	320-4,100
Benzo(ghi)perylene	6	6	300-3,900
Benzo(k)fluoranthene	6	6	360-5,900
Chrysene	6	6	350-6,200
Dibenz(a,h)anthracene	6	2	160-510
Fluoranthene	6	6	510-7,400
Fluorene	6	1	410
Indeno(1,2,3-cd)pyrene	6	6	340-3,800
Naphthalene	6	1	240
Phenanthrene	6	5	240-4,600
Pyrene	6	6	460-11,000

Several PAHs were detected at SS-03, SS-05, and SS-06 above the applicable RSR criteria. Surficial soil samples collected from SS-03 and SS-05 were also extracted for SPLP analysis. Several PAHs were detected above the applicable laboratory reporting limit, but below applicable RSR criteria. Where PAH concentrations exceeded RSR baseline criteria, there was no evidence of a petroleum release based on absence of staining, stressed vegetation, odor, and field screening measurements.

5.1.2 Former Tunnel & Fire Pump Void/Conduit

Previous investigations identified a reported former coal tunnel below the roadway, however an actual tunnel was not observed. During the GPR survey on October 24, 2017, an anomaly consistent with a void representing a utility conduit or possibly a tunnel was identified along the eastern side of the garage and sidewalk (Figure 2). The anomaly extended below the roadway toward the former mill building across the street. The exterior location of the anomaly possibly representing the tunnel is adjacent to the 8-inch diameter hole and void space below the garage which likely represents the former fire pump system previously described in Section 2.1.

Fuss & O'Neill observed the river at low tide on December 13, 2017 and observed an approximately 24-inch diameter metal pipe positioned vertically in the sand. Although the pipe initially appeared similar in nature to the debris found along the rest of the shoreline, the pipe was discovered to be firmly positioned, filled with sand, and could not be moved (Figure 2). Review of the historical Sanborn maps indicates that this structure is located in approximately the same area as the mouth of the shoreline inlet observed in the 1911 map. Based on observation and orientation of the void space below the garage and the position of the 24-inch diameter pipe in the river, the fire pump conduit may still be in place.

During the first mobilization on November 3, 2017, one soil boring, SB-07, was advanced west of the northwest corner of the garage structure, approximately in line with the supposed intake structure and the fire pump. The PID used for field screening indicated a detection of VOCs at approximately 6-7.5 feet below grade and a sample was collected from that interval. Analytical soil results indicated that cis-1,2-dichloroethene (cis-1,2-DCE) was detected above laboratory detection limits but below the applicable RSR criteria and that trichloroethene (TCE) was detected above the pollutant mobility criteria (PMC) for class GB areas.

During the second mobilization on February 21, 2018, four additional soil borings, one of which was completed as a monitoring well, (SB-15, SB-16, SB-16A, and MW-05) were advanced and installed in an approximately 10-foot radius around SB-07. Refusal was encountered approximately five feet below grade at SB-16, which was advanced approximately ten feet east of SB-07, likely on the top of the former tunnel structure or on building material associated with the structure formerly located on that portion of the Site. Soil boring SB-16A was offset approximately five feet north of SB-16 and no refusal was encountered. At MW-05, the 5 to 10 foot soil boring interval contained an approximately 10-inch long piece of decomposing wood. A second boring, offset from MW-05 by approximately 3 feet to the southeast, was advanced and the 5-10-foot soil boring re-collected and sampled. The PID did not detect evidence of volatiles in any of the soil borings advanced in the vicinity of SB-07.

One sample each from SB-15, SB-16A, and MW-05 was collected from approximately 6-7.5 feet below grade, the same interval at which the impacted soil was encountered at SB-07. Although no VOCs were detected in the soil from MW-05, cis-1,2-DCE was detected above laboratory reporting limits in both SB-15 and SB-16A and TCE was detected above the GB PMC at SB-16A. Furthermore, SPLP cis-1,2-DCE was detected above laboratory reporting limits at SB-16 and SB-16A and SPLP TCE was detected above laboratory reporting limits at SB-16A, indicating that there is the potential for cis-1,2-DCE and TCE to leach into the groundwater. The impacted area is approximately 20-foot by 20-foot area west of the northwest corner of the garage in the location of the suspected conduit.

5.1.3 Former 500-Gallon Gasoline UST

A former 500-gallon gasoline UST, located north of the northeast corner of the garage, was identified in previous investigations as an AOC. The UST was removed in 2008 and confirmatory soil samples from the tank grave reportedly indicated that the soil in the grave was clean. Historic Sanborn fire insurance maps indicate that a gasoline engine was formerly located in approximately the same area. It is therefore possible that the tank that was removed in 2008 was not the original tank and that the tank grave sampled following the tank removal was not the original tank grave soils.

During the first mobilization in November 2017, three soil borings were advanced in the vicinity of the former UST, one of which was completed as a monitoring well (SB-08, SB-09, and MW-04). Soil boring SB-08 is located in the eastern portion of the former tank grave, boring SB-09 is located north of the former tank, and monitoring well MW-04 is located in the western portion of the former tank grave. Glacier initially encountered refusal at SB-08 approximately two feet below grade on what may have been a concrete footing for the existing garage structure or for a former structure. While drilling at SB-08 and MW-04, Glacier noted that there seemed to be substantial void space in the area of the former tank grave and consequently avoided positioning their Geoprobe® rig directly over the former grave.

During field screening, the PID indicated a detection of VOCs between approximately 10-14 feet below grade at each of the three borings and one sample from each was collected from that interval. Physical evidence of petroleum, including evidence of a sheen and a petroleum odor, was also observed at approximately the same interval in all three borings. A petroleum odor was also identified in the 8 to 10 foot sample in the downgradient boring SB-6. Analytical results identify the detection of several metals, VOCs (including sec-butylbenzene), and the PAH 2-methynaphthalene above their respective laboratory reporting limits at MW-04. Additionally, the VOCs 1,2,4- and 1,3,5-trimethylbenzene concentrations exceeded the GB PMC and the ETPH concentration exceeded the ResDEC at MW-04. The VOC 1,2,4-trimethylbenzene was detected above the laboratory reporting limit, but below the applicable RSR criteria at soil boring SB-08. Neither ETPH nor any PAHs were detected at either SB-08 or SB-09.

During the second mobilization, on February 21, 2018, two soil borings (SB-13 and SB-14) were advanced inside of the garage structure to evaluate the extent of the petroleum impacts towards the south. Both field screening with the PID and physical observations indicated petroleum impacts around 12-13.5 feet below grade at both SB-13 and SB-14 and one soil sample from each was collected at that interval and analyzed for ETPH, VOCs, and SPLP VOCs. Neither ETPH nor VOCs were detected at SB-13, which is located approximately 20 feet south of MW-04. ETPH and SPLP sec-butylbenzene were both detected above laboratory reporting limits but below applicable RSR criteria at SB-14, which is located approximately 10 feet south of MW-04.

No petroleum impacts were observed in SB-10 or SB-11, located in an assumed downgradient direction northwest of the former tank. Evidence of petroleum impacts were, however, identified in soil boring SB-06, located in an assumed downgradient direction southwest of the tank. Field screening and physical observations at SB-06, including staining and a petroleum odor, indicated VOC-impacted soil in the interval approximately 6.2-7.2 feet below grade and one sample was collected from that interval. Analytical results indicate concentrations of ETPH, the VOC carbon disulfide, and the PAHs fluoranthene and pyrene above the laboratory reporting limits but below applicable RSR criteria.

The size of the release area spanning borings SB-6, SB-09, MW-04, and SB-13 is approximately 2,000 square feet with impacted petroleum containing-soil located between the seasonal high and low water table between 6 and 11 feet below the ground surface.

5.1.4 Floor Drain in Garage

A floor drain located in the center of the garage floor was identified in previous investigations as a potential receptor of petroleum and/or other potentially hazardous substances. The concrete floor surrounding the floor drain appeared to be in good condition and no staining was observed. One soil boring (SB-12) was advanced approximately 3 feet south of the floor drain using a post-hole digger once the concrete floor had been cored. A soil sample was collected from the first 6 inches of soil below the bottom of the floor slab. Several metals and the PAHs chrysene and pyrene were detected at concentrations below the applicable RSR criteria at levels consistent with fill (Table 2). There was no evidence that a release from the floor drain has occurred.

5.1.5 ASTs

275-Gallon AST in Vacant Residence

The residential structure located on the southern portion of the Site was historically heated by a 275-gallon AST located in the basement of the structure. The AST was contained in a dedicated, walled-in room and no visual evidence of leaks or of petroleum impacts was observed. No evidence of petroleum impacts were observed in soil boring SB-01, located just south of the residential structure.

Former Fuel Oil AST in Garage Crawl Space

A former fuel oil AST was historically located in the southwestern corner of the crawl space found below the floor in the southern portion of the garage structure. The tank has since been removed and Site reconnaissance has confirmed that it is no longer present on Site. Previous reports indicate that elevated petroleum hydrocarbons were reported in a sample collected near this tank location.

During the first mobilization of the Phase II/Phase III investigation on November 3, 2017, one soil boring, SB-05, was advanced just west of the garage structure to evaluate the soil for petroleum impacts associated with the former tank. No physical evidence of petroleum impacts was observed and the analytical results indicate that no ETPH or VOCs were detected at SB-05.

5.1.6 Septic Leach Field

Fuss & O'Neill identified the former leach field, located south of the vacant residence, as being an AOC. The leach field is no longer in use as reportedly the Site has been served by public sewer since 1973. Two soil borings were advanced in the area of the former leach field, one of which was completed as a monitoring well (SB-01 and MW-01). No physical impacts were identified in either of the borings. Analytical results indicate that several PAHs were detected in the soil at MW-01 at concentrations below the applicable RSR criteria and at levels consistent with the fill observed across the Site. Note that a relatively high water table was measured well MW-01 ranging from 1.8 to 2.9 feet below the ground surface. Mounding of water retained in the former leach field could be occurring.

5.2 Groundwater Sampling Analytical Results

During the first mobilization on November 13, 2017, four groundwater samples were collected from the newly installed monitoring wells, MW-01 through MW-04. The samples were submitted to Phoenix for laboratory analysis of metals, ETPH, VOCs, and PAHs. During the second mobilization on February 23, 2018, groundwater samples were collected from MW-01 through MW-04 and the newly installed MW-05 and analyzed for the same parameters.

A summary of the AOC-specific groundwater analytical results compared to the baseline RSR criteria is discussed in the subsections below. A summary of the groundwater analytical results compared to the baseline RSR criteria is also presented in Table 3 and copies of the laboratory analytical reports are included in Appendix C.

5.2.1 Site-Wide Fill

Generally, low levels of metals were detected in each of the groundwater samples collected from the five monitoring wells over the course of the two sampling events. Due to the high turbidity levels observed at MW-01 during the February sampling event, additional sample volume was collected at MW-01, filtered in the field with a 10-micron filter, and analyzed for dissolved metals in addition to total metals. The analytical results for total metals and for dissolved metals at MW-01 were consistent and indicate that the slightly elevated turbidity did not result in erroneously high metals detections. Arsenic was detected above laboratory reporting limits only at MW-04, located in the vicinity of the former 500-gallon gasoline UST. Silver was detected above laboratory reporting limits only at MW-03, located west of the garage structure, at concentrations over the SWPC. Additional rounds of groundwater monitoring would be required to make a formal determination of groundwater quality relative to RSR compliance; however, based on the low concentrations of metals detected in groundwater samples collected across the Site, impacts of the fill on the groundwater quality at the Site appears to be minor.

5.2.2 Former Tunnel & Fire Pump Void/Conduit

Monitoring wells MW-03 and MW-05 were installed near soil boring SB-07 in the vicinity of the former tunnel and soil area impacted with chlorinated VOCs. Chlorinated VOCs were not detected in the groundwater sample collected from at MW-05 during the February 2018 sampling event. However, groundwater results from monitoring well MW-03 during the February 2018 sampling event indicated detections of cis-1,2-DCE and TCE above their respective laboratory reporting limits but well below the applicable RSR criteria. Monitoring well MW-03 is located in southeast of SB-07 and MW-05, in an assumed side-gradient direction from the soil identified as being impacted. Additional rounds of groundwater monitoring would be required to make a formal determination of groundwater quality in this area relative to RSR compliance.

5.2.3 Former 500-Gallon Gasoline UST

ETPH was detected above both laboratory reporting limits and the SWPC in the sample collected from MW-04, located in the vicinity of the former 500-gallon UST, during the November 11, 2017 sampling event. ETPH was not detected at MW-04 during the second round of sampling in February, nor was it detected in any of the other wells. As discussed in Section 5.1.3, ETPH was also detected in the soil at this location at concentrations exceeding the applicable RSR criteria.

Several VOCs, including sec-butylbenzene, 1,2,4- and 1,3,5-trimethylbenzene, were detected at MW-04 during the November sampling event at concentrations above their respective laboratory reporting limits but below the applicable RSR criteria. No VOCs were detected at MW-04 during the February sampling event. As discussed in Section 5.1.3, these three VOCs were also detected in the soil collected from MW-04 during the installation of the monitoring well.

Several PAHs, including 2-methynaphthalene, were detected at MW-04 during the November sampling event at concentrations above their respective laboratory reporting limits but below the applicable RSR criteria. The PAH compounds acenaphthalene and phenanthrene were detected above the SWPC at MW-04. As discussed in Section 5.1.3, 2-methylnaphthalene was also detected in the soil collected from MW-04 during the installation of the monitoring well.

Based on physical observations of the soil in the vicinity of the former 500-gallon gasoline UST, the groundwater impacts reported during the November sampling event, and the evidence of petroleum in soil from MW-04 and adjacent soil borings SB-08, and SB-14, it is likely that the petroleum impacts are evidence of a release to the Site. However, additional rounds of groundwater monitoring would be required to make a determination of a release or a formal determination of groundwater quality impacts.

5.2.4 Floor Drain in Garage

No monitoring wells were installed in the immediate vicinity of the floor drain in the garage. Monitoring wells MW-01 and MW-02 are assumed to be hydraulically downgradient of the floor drain in the garage. No ETPH, VOCs, or PAHs were detected in the groundwater samples collected from either well during the November 2017 or February 2018 sampling events. As discussed in Section 5.1.4, no visual evidence of impact was identified near the floor drain, nor did analytical soil results indicate evidence of impact to the shallow subsurface soils near the floor drain.

5.2.5 ASTs

No monitoring wells were installed in the immediate vicinity of either the AST found in the basement of the residential structure or the former AST located in the crawl space below the floor of the garage structure. Monitoring wells MW-01 and MW-02 are assumed to be hydraulically downgradient of the ASTs. No ETPH, VOCs, or PAHs were detected in the groundwater samples collected from either well during the November 2017 or February 2018 sampling events. As discussed in Section 5.1.5, no visual evidence of impact was identified in the vicinity of either AST, nor did analytical soil results indicate evidence of impact to the soil in the vicinity of either AST.

5.2.6 Septic Leach Field

Monitoring well MW-01 is located west of the former septic leach field, in an assumed downgradient direction. No ETPH, VOCs, or PAHs were detected in the groundwater samples collected from MW-01 during either the November 2017 or February 2018 sampling events. As discussed in Section 5.1.6, analytical soil results from soil collected in the vicinity of the former septic leach field indicate no evidence of impact to a soil associated with this AOC.

6 Conclusions and Recommendations

Fuss & O'Neill conducted the Phase II/Phase III investigation activities at the Site between November 2, 2017 and February 23, 2018 using the following investigatory methods:

- Ground penetrating radar survey
- Visual inspection of potential release areas
- Soil sampling using a direct-push drill rig
- Installation and sampling of monitoring wells
- Shoreline soil sampling using hand sampling tools
- Analysis of soil and groundwater samples for constituents of concern specific to each AOC

Releases to soil have been identified at the following AOCs:

Identified Releases

AOC	Building or Area	Released Constituents	Constituents Detected Above Baseline RSR Criteria (Y/N)
AOC-01	Site Wide Fill	Metals, PAHs, PCBs, ETPH	Yes
AOC-02	Former Tunnel/Fire Pump Void/Conduit	VOCs	Yes
AOC-03	Former 500-Gallon Gasoline UST/former Gas Engine	VOCs, PAHs, ETPH	Yes

The Site is "made land" comprised of fill ranging in thickness from 6 to 12 feet overlying estuarine deposits. The fill contains coal ash, slag, coal fragments, metal fragments, glass, concrete, brick, and wood. Infrastructure associated with the Former Rossie Velvet Mill operations across the street still exists at the Site within the fill. This includes former building foundations, piping and conduit for a former fire suppression system, a septic leaching field, and other piping where the past use is unknown. The fill contains pollutants comprised of petroleum hydrocarbons, metals (primarily arsenic and lead), and a local area containing relatively low concentrations of PCBs (2.5 mg/kg). Due to the heterogeneity of the fill (particularly the occurrence of coal ash), which is inferred to be the primary source of the petroleum hydrocarbons and metals, concentrations of pollutants in the fill have the potential to exceed the Remediation Standard Regulations Direct Exposure Criteria. Samples of the fill collected from the upland and the shoreline bank above the high tide line exceed the baseline Direct Exposure Criteria for one or more of these constituents.

A release area of at least 400 square feet in size is associated with a former mill fire suppression system or a former building where the subsurface foundation is likely still in place. Concentrations of chlorinated volatile organic compounds of cis-1,2-dichloroethene, and trichloroethene exist in the 5 to 8 feet depth interval below the ground surface. Concentrations of these pollutants exceed the baseline RSR Pollutant Mobility Criteria. Groundwater samples collected from a well downgradient of the area contained low concentrations of these pollutants in one of two sampling rounds.

A release area of approximately 2,000 square feet in size exists in the northern portion of the Site below the garage and north of the garage at a former underground storage tank location. Petroleum impacted soil at concentrations above RSR baseline Direct Exposure and Pollutant Mobility Criteria was encountered in a depth interval between 6 and 11 feet below the ground surface between the seasonal low and high water table.

Recommendations

The next step in the process is to prepare a Remedial Action Plan based on a final site design for redevelopment of the property. The site design should integrate remedial options to the greatest extent feasible to cost-effectively achieve compliance with the cleanup regulations. This could include construction of a new building along with new parking and landscaped areas to prevent human contact with the underlying polluted soil either through the self-implementing options described in the cleanup regulations or DEEP-approved engineered controls. Select areas may require excavation and off-site disposal.

Soil management strategies should be incorporated into the site design to minimize the quantity of excess polluted soil that will be generated by development activities. The extent to which fill and former infrastructure (piping/conduit, septic field, foundations) need to be removed could depend on site grading and geotechnical conditions.

Additional sampling based on the final site design may need to be performed to address identified data gaps pertaining to groundwater and soil characterization to facilitate soil management strategies, pre-characterization for off-site disposal, and shoreline design.

7 References

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Tables

Table 1
Monitoring Well Construction and Groundwater Elevation Data

Mystic Boathouse
123 Greenmanville Avenue, Mystic, CT

Monitoring Well ID	Completion Date	Well Diameter (in)	Well Depth (fbg)	Screened Interval (fbg)	Measuring Point Elevation (ft)	Guaging Date	Depth to Water (fbg)	Groundwater Elevation (ft)
MW-01	11/2/2017	1.5	12	2-12	90.40	11/3/2017	1.81	88.59
						11/13/2017	2.31	88.09
						2/23/2018	2.89	87.51
MW-02	11/2/2017	1.5	12	2-12	91.22	11/3/2017	2.21	89.01
						11/13/2017	3.15	88.07
						2/23/2018	3.47	87.75
MW-03	11/2/2017	1.5	13	3-13	92.71	11/3/2017	4.59	88.12
						11/13/2017	4.92	87.79
						2/23/2018	4.92	87.79
MW-04	11/2/2017	1.5	15	5-15	97.38	11/13/2017	9.37	88.01
						2/23/2018	9.81	87.57
MW-05	2/21/2018	1.5	12	2-12	93.46	2/21/2018	5.18	88.28
						2/23/2018	5.82	87.64

Notes:

Monitoring well measuring point elevations are based on an assumed elevation and NGVD 29

Monitoring well measuring point elevations and depth to water measurements are based on measurements to top of the steel well casing

in - inch

fbg - feet below grade

ft - feet

Table 2
Summary of Soil Analytical Results

Mystic Boathouse
123 Greenmanville Ave, Mystic, Connecticut

	CT DEEP RSRs			Monitoring Wells				
Sample Location				MW-01	MW-02	MW-03	MW-04	MW-05
Sample Depth (feet)				2-3.5	0.25-2.25	0.5-2.5	10-11	5.75-6.78
Sample Date				11/2/2017	11/2/2017	11/2/2017	11/2/2017	2/21/0218
Sample Number				1305171102-03	1305171102-10	1305171102-14	1305171102-16	1305180221-06
Parameters	GB PMC	Res DEC	I/C DEC					
Metals, Total (mg/Kg)								
Arsenic	N/A	10	10	**6.7**	**23.5**	**26.7**	**1.2**	---
Barium	N/A	4,700	140,000	**186**	**270**	**127**	**17.5**	---
Cadmium	N/A	34	1,000	< 0.59	**0.96**	**1.77**	< 0.41	---
Chromium	N/A	100	100	**22.4**	**11.8**	**28.9**	**7.08**	---
Copper	N/A	2,500	76,000	**41.8**	**35.7**	**1,210**	**8.22**	---
Lead	N/A	400	1,000	**183**	**20.4**	**117**	**3.43**	---
Mercury	N/A	20	610	< 0.05	< 0.04	**0.29**	< 0.03	---
Nickel	N/A	1,400	7,500	**13.3**	**18.9**	**26.3**	**3.76**	---
Selenium	N/A	340	10,000	< 2.4	< 1.8	< 1.4	< 1.6	---
Silver	N/A	340	10,000	< 0.59	< 0.44	< 0.35	< 0.41	---
Zinc	N/A	20,000	610,000	**118**	**24**	**370**	**112**	---
Metals, SPLP (mg/L)								
Arsenic	0.5	N/A	N/A	---	---	**0.005**	---	---
Barium	10	N/A	N/A	---	---	**0.027**	---	---
Cadmium	0.05	N/A	N/A	---	---	<0.005	---	---
Chromium	0.5	N/A	N/A	---	---	<0.010	---	---
Lead	0.15	N/A	N/A	---	---	**0.025**	---	---
Mercury	0.02	N/A	N/A	---	---	<0.0005	---	---
Selenium	0.5	N/A	N/A	---	---	<0.020	---	---
Silver	0.36	N/A	N/A	---	---	<0.010	---	---
Metals, TCLP (mg/L)								
Lead	0.15	N/A	N/A	---	---	---	---	---
ETPH (mg/Kg)								
Ext. Petroleum H.C. (C9-C36)	2500	500	2500	< 95	< 68	**76**	**870**	---
PCBs (ug/Kg)								
Total PCBs	N/A	1000	10000	---	< 450	---	---	---
Volatiles (ug/Kg)								
1,2,4-Trimethylbenzene	[28,000]	[500,000]	[1,000,000]	---	---	---	**33,000**	<8.2
1,3,5-Trimethylbenzene	[28,000]	[500,000]	[1,000,000]	---	---	---	**28,000**	<8.2
Carbon Disulfide	[8,000]	[500,000]	[1,000,000]	---	---	---	< 1300	<8.2
cis-1,2-Dichloroethene	14,000	500,000	1,000,000	---	---	---	< 1400	<8.2
n-Propylbenzene	[10,000]	[500,000]	[1,000,000]	---	---	---	**4,700**	<8.2
p-Isopropyltoluene	[5,000]	[500,000]	[1,000,000]	---	---	---	**3,200**	<8.2
sec-Butylbenzene	[70,000]	[500,000]	[1,000,000]	---	---	---	**3,400**	<8.2
trans-1,2-Dichloroethene	20,000	500,000	1,000,000	---	---	---	< 2000	<8.2
Trichloroethene	1,000	56,000	520,000	---	---	---	< 670	<8.2
SPLP Volatiles (ug/L)	*10 x GWPC*							
cis-1,2-Dichloroethene	700			---	---	---	---	<1.0
sec-Butylbenzene	3,500			---	---	---	---	<1.0
Trichloroethene	50			---	---	---	---	<1.0
PAHs (ug/Kg)								
2-Methylnaphthalene	[5,600]	[270,000]	[1,000,000]	< 250	< 180	< 150	**270**	---
Acenaphthene	[84,000]	[1,000,000]	[2,500,000]	< 250	< 180	< 150	< 240	---
Acenaphthylene	84,000	1,000,000	2,500,000	< 250	< 180	< 150	< 240	---
Anthracene	400,000	1,000,000	2,500,000	< 250	< 180	< 150	< 240	---
Benz(a)anthracene	1,000	1,000	7,800	**270**	< 180	**270**	< 240	---
Benzo(a)pyrene	1,000	1,000	1,000	**270**	< 180	**270**	< 240	---
Benzo(b)fluoranthene	1,000	1,000	7,800	**290**	< 180	**310**	< 240	---
Benzo(ghi)perylene	[1,000]	[8,400]	[78,000]	< 250	< 180	**200**	< 240	---
Benzo(k)fluoranthene	1,000	8,400	78,000	< 250	< 180	**190**	< 240	---
Chrysene	[1,000]	[84,000]	[780,000]	**310**	< 180	**320**	< 240	---
Dibenz(a,h)anthracene	[1,000]	[1,000]	[1,000]	< 250	< 180	< 150	< 240	---
Fluoranthene	56,000	1,000,000	2,500,000	**690**	< 180	**530**	< 240	---
Fluorene	56,000	1000000	2,500,000	< 250	< 180	< 150	< 240	---
Indeno(1,2,3-cd)pyrene	[1,000]	[1,000]	[7,800]	< 250	< 180	**320**	< 240	---
Naphthalene	56,000	1,000,000	2,500,000	< 250	< 180	< 150	< 240	---
Phenanthrene	40,000	1,000,000	2,500,000	**610**	< 180	**340**	< 240	---
Pyrene	40,000	1,000,000	2,500,000	**640**	< 180	**500**	< 240	---
SPLP PAHs (ug/L)	*10 x GWPC*							
Benzo(a)anthracene	0.6	N/A	N/A	---	---	---	---	---
Benzo(a)pyrene	2	N/A	N/A	---	---	---	---	---
Benzo(b)fluoranthene	0.8	N/A	N/A	---	---	---	---	---
Benzo(k)fluoranthene	5	N/A	N/A	---	---	---	---	---
Chrysene	[48]	N/A	N/A	---	---	---	---	---
Fluoranthene	2,800	N/A	N/A	---	---	---	---	---
Indeno(1,2,3-cd)pyrene	[1.0]	N/A	N/A	---	---	---	---	---
Phenanthrene	2,000	N/A	N/A	---	---	---	---	---
Pyrene	2,000	N/A	N/A	---	---	---	---	---

Notes:

Bold indicates a detection
Bold and highlighted cells indicates an exceedance of one or more of the listed criteria
Res DEC - Residential Direct Exposure Criteria
I/C DEC - Industrial/Commercial Direct Exposure Criteria
GA PMC - Pollutant Mobility Criteria
[Green Text] = DEEP fast-track approveable additional polluting substances; DEEP approval required
N/A - not applicable

SB-03 DUP - indicates
mg/kg - milligrams
mg/L - milligrams p
VOCs - Volatile Or
PAHs - Polynuclear
PCBs - Polycyclic C
ETPH - Extractabl
** Pollutant Mobilit

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Table 2
Summary of Soil Analytical Results

Mystic Boathouse
123 Greenmanville Ave, Mystic, Connecticut

Parameters	CT DEEP RSRs GB PMC	CT DEEP RSRs Res DEC	CT DEEP RSRs I/C DEC	Soil Borings SB-01	SB-02	SB-03 DUP	SB-04	SB-05	SB-06	SB-07	SB-09	SB-08	SB-10	SB-11	SB-12	SB-13 DUP	SB-14	SB-15	SB-16A	SB-17	SB-18	SB-19
Sample Location				SB-01	SB-02	SB-03 DUP	SB-04	SB-05	SB-06	SB-07	SB-09	SB-08	SB-10	SB-11	SB-12	SB-13 DUP	SB-14	SB-15	SB-16A	SB-17	SB-18	SB-19
Sample Depth (feet)				0.5-2	0.5-2	5-6.5	0.25-2	6.2-7.2	5.5-6.5	6-7.5	13-14.25	12.5-14	0.75-2.7	0.8-3.2	0-0.5	12-13.5	13-Dec	6.2-7.2	5.75-6.9	5.4-6.3	5-5.8	5-6.5
Sample Date				11/2/2017	11/2/2017	11/2/2017	11/2/2017	11/3/2017	11/3/2017	11/3/2017	11/3/2017	11/3/2017	11/3/2017	11/3/2017	11/3/2017	2/21/2018	2/21/2018	2/21/2018	2/21/2018	2/21/2018	2/21/2018	2/21/0218
Sample Number				1305171102-01	1305171102-05	1305171102-07/08	1305171102-12	1305171103-29	1305171103-31	1305171103-33	1305171103-35	1305171103-37	1305171103-39	1305171103-41	1305171103-43	1305180221-03/04	1305180221-05	1305180221-07	1305180221-08	1305180221-10	1305180221-13	1305180221-16
Metals, Total (mg/Kg)																						
Arsenic	N/A	10	10	5.18	19	14.6	24.9	< 0.76	2.25	13.3	< 0.83	0.99	7.82	5.54	4.22	---	---	---	---	---	---	---
Barium	N/A	4,700	140,000	76.9	306	72.1	58.4	18.9	22.8	29.2	24.3	35.8	119	53.3	52.8	---	---	---	---	---	---	---
Cadmium	N/A	34	1,000	< 0.41	0.68	11.8	0.66	< 0.38	0.43	< 0.56	< 0.42	< 0.39	0.57	< 0.40	0.37	---	---	---	---	---	---	---
Chromium	N/A	100	100	22.4	13.4	48	9.38	8.37	27.9	9.67	10.7	11.1	14.6	15.7	6.95	---	---	---	---	---	---	---
Copper	N/A	2,500	76,000	40.4	39.5	76.9	30.8	8.11	27.1	86.2	6.12	8.19	53.7	31.5	20.9	---	---	---	---	---	---	---
Lead	N/A	400	1,000	80	16.5	1,660	28.7	2.52	9.6	29.5	1.83	< 0.39	14.7	70.1	47.1	---	---	---	---	---	---	---
Mercury	N/A	20	610	0.06	0.09	0.22	0.03	< 0.03	0.05	0.06	< 0.04	< 0.03	0.11	0.07	< 0.03	---	---	---	---	---	---	---
Nickel	N/A	1,400	7,500	11.7	13.8	16.7	10.4	8.68	14.9	10.8	4.73	5.37	12.4	12.7	11	---	---	---	---	---	---	---
Selenium	N/A	340	10,000	< 1.6	< 1.8	< 2.0	< 1.6	< 1.5	< 1.6	< 2.2	< 1.7	< 1.5	< 1.5	< 1.6	< 1.3	---	---	---	---	---	---	---
Silver	N/A	340	10,000	< 0.41	< 0.45	< 0.50	< 0.39	< 0.38	3.01	44	< 0.42	< 0.39	< 0.37	< 0.40	< 0.33	---	---	---	---	---	---	---
Zinc	N/A	20,000	610,000	92.3	115	1,360	30.6	48.1	197	88.3	12.2	14.5	139	49.1	23.8	---	---	---	---	---	---	---
Metals, SPLP (mg/L)																						
Arsenic	0.5	N/A	N/A	---	---	<0.004	---	---	---	0.006	---	---	0.004	---	---	---	---	---	---	---	---	---
Barium	10	N/A	N/A	---	---	0.052	---	---	---	0.012	---	---	0.032	---	---	---	---	---	---	---	---	---
Cadmium	0.05	N/A	N/A	---	---	<0.005	---	---	---	<0.005	---	---	< 0.005	---	---	---	---	---	---	---	---	---
Chromium	0.5	N/A	N/A	---	---	<0.010	---	---	---	<0.010	---	---	< 0.010	---	---	---	---	---	---	---	---	---
Lead	0.15	N/A	N/A	---	---	<0.010	---	---	---	<0.010	---	---	0.054	---	---	---	---	---	---	---	---	---
Mercury	0.02	N/A	N/A	---	---	<0.0005	---	---	---	<0.0005	---	---	< 0.0005	---	---	---	---	---	---	---	---	---
Selenium	0.5	N/A	N/A	---	---	<0.020	---	---	---	<0.020	---	---	< 0.020	---	---	---	---	---	---	---	---	---
Silver	0.36	N/A	N/A	---	---	<0.047	---	---	---	<0.010	---	---	< 0.010	---	---	---	---	---	---	---	---	---
Metals, TCLP (mg/L)																						
Lead	0.15	N/A	N/A	---	---	0.069	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
ETPH (mg/Kg)																						
Ext. Petroleum H.C. (C9-C36)	2500	500	2500	< 63	< 63	< 74	81	< 57	220	320	< 64	< 62	< 55	< 59	< 56	<58	230	---	---	---	---	---
PCBs (ug/Kg)																						
Total PCBs	N/A	1000	10000	< 430	---	2,500	---	< 380	---	< 510	< 430	---	---	---	---	<390	<390	---	---	<770	<700	<560
Volatiles (ug/Kg)																						
1,2,4-Trimethylbenzene	[28,000]	[500,000]	[1,000,000]	---	---	---	---	< 310	< 370	< 520	< 5.5	25	< 710	---	< 7.8	<5.9	<320	<10	<8.0	---	---	---
1,3,5-Trimethylbenzene	[28,000]	[500,000]	[1,000,000]	---	---	---	---	< 310	< 370	< 520	< 5.5	< 5.4	< 710	---	< 7.8	<5.9	<320	<10	<8.0	---	---	---
Carbon Disulfide	[8,000]	[500,000]	[1,000,000]	---	---	---	---	< 310	9.8	< 8.6	< 5.5	< 5.4	< 9.6	---	< 7.8	<5.9	<320	<10	<8.0	---	---	---
cis-1,2-Dichloroethene	14,000	500,000	1,000,000	---	---	---	---	< 310	< 6.6	1,600	< 5.5	< 5.4	< 9.6	---	< 7.8	<5.9	<320	780	2,700	---	---	---
n-Propylbenzene	[10,000]	[500,000]	[1,000,000]	---	---	---	---	< 310	< 370	< 520	< 5.5	< 5.4	< 710	---	< 7.8	<5.9	<320	<10	<8.0	---	---	---
p-Isopropyltoluene	[5,000]	[500,000]	[1,000,000]	---	---	---	---	< 310	< 370	< 520	< 5.5	< 5.4	< 710	---	< 7.8	<5.9	<320	<10	<8.0	---	---	---
sec-Butylbenzene	[70,000]	[500,000]	[1,000,000]	---	---	---	---	< 310	< 370	< 520	< 5.5	< 5.4	< 710	---	< 7.8	<5.9	<320	<10	<8.0	---	---	---
trans-1,2-Dichloroethene	20,000	500,000	1,000,000	---	---	---	---	< 310	< 6.6	370	< 5.5	< 5.4	< 9.6	---	< 7.8	<5.9	<320	<10	<8.0	---	---	---
Trichloroethene	1,000	56,000	520,000	---	---	---	---	< 100	< 6.6	2,100	< 5.5	< 5.4	< 9.6	---	< 7.8	<5.9	<320	<10	1,700	---	---	---
SPLP Volatiles (ug/L)	*10 x GWPC*																					
cis-1,2-Dichloroethene	700			---	---	---	---	---	---	---	---	---	---	---	---	<2.0	<2.0	4.5	6.5	---	---	---
sec-Butylbenzene	3,500			---	---	---	---	---	---	---	---	---	---	---	---	<2.0	3	<1.0	<1.0	---	---	---
Trichloroethene	50			---	---	---	---	---	---	---	---	---	---	---	---	<2.0	<2.0	<1.0	1.4	---	---	---
PAHs (ug/Kg)																						
2-Methylnaphthalene	[5,600]	[270,000]	[1,000,000]	< 340	< 170	< 350	210	< 260	< 310	< 560	< 300	< 290	< 260	< 310	< 150	---	---	---	---	---	---	---
Acenaphthene	[84,000]	[1,000,000]	[2,500,000]	< 340	< 170	< 350	< 150	< 260	< 310	< 770	< 300	< 290	< 260	< 310	< 150	---	---	---	---	---	---	---
Acenaphthylene	84,000	1,000,000	2,500,000	< 340	< 170	< 350	< 150	< 260	< 310	< 770	< 300	< 290	< 260	< 310	< 150	---	---	---	---	---	---	---
Anthracene	400,000	1,000,000	2,500,000	< 340	< 170	< 350	< 150	< 260	< 310	< 770	< 300	< 290	< 260	< 310	< 150	---	---	---	---	---	---	---
Benz(a)anthracene	1,000	1,000	7,800	< 340	1,000	180	< 150	< 260	< 310	< 770	< 300	< 290	< 260	400	< 150	---	---	---	---	---	---	---
Benzo(a)pyrene	1,000	1,000	1,000	< 340	1,100	< 350	< 150	< 260	< 310	< 770	< 300	< 290	< 260	390	< 150	---	---	---	---	---	---	---
Benzo(b)fluoranthene	1,000	1,000	7,800	< 340	940	< 350	190	< 260	< 310	< 770	< 300	< 290	470	430	< 150	---	---	---	---	---	---	---
Benzo(ghi)perylene	[1,000]	[8,400]	[78,000]	< 340	560	< 350	< 150	< 260	< 310	< 770	< 300	< 290	< 260	330	< 150	---	---	---	---	---	---	---
Benzo(k)fluoranthene	1,000	8,400	78,000	< 340	720	< 350	< 150	< 260	< 310	< 770	< 300	< 290	< 260	400	< 150	---	---	---	---	---	---	---
Chrysene	[1,000]	[84,000]	[780,000]	< 340	940	< 350	260	< 260	< 310	< 770	< 300	< 290	460	490	180	---	---	---	---	---	---	---
Dibenz(a,h)anthracene	[1,000]	[1,000]	[1,000]	< 340	< 170	< 350	< 150	< 260	< 310	< 770	< 300	< 290	< 260	< 310	< 150	---	---	---	---	---	---	---
Fluoranthene	56,000	1,000,000	2,500,000	< 340	1,400	580	250	< 260	340	< 770	< 300	< 290	400	880	< 150	---	---	---	---	---	---	---
Fluorene	56,000	1000000	2,500,000	< 340	< 170	< 350	< 150	< 260	< 310	< 770	< 300	< 290	< 260	< 310	< 150	---	---	---	---	---	---	---
Indeno(1,2,3-cd)pyrene	[1,000]	[1,000]	[7,800]	< 340	1,000	< 350	< 150	< 260	< 310	< 770	< 300	< 290	< 260	340	< 150	---	---	---	---	---	---	---
Naphthalene	56,000	1,000,000	2,500,000	< 340	< 170	< 350	< 150	< 260	< 310	< 770	< 300	< 290	< 260	< 310	< 150	---	---	---	---	---	---	---
Phenanthrene	40,000	1,000,000	2,500,000	< 340	430	200	350	< 260	< 310	< 770	< 300	< 290	490	330	< 150	---	---	---	---	---	---	---
Pyrene	40,000	1,000,000	2,500,000	< 340	1,100	660	260	< 260	370	< 770	< 300	< 290	480	850	150	---	---	---	---	---	---	---
SPLP PAHs (ug/L)	*10 x GWPC*																					
Benzo(a)anthracene	0.6	N/A	N/A	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Benzo(a)pyrene	2	N/A	N/A	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Benzo(b)fluoranthene	0.8	N/A	N/A	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Benzo(k)fluoranthene	5	N/A	N/A	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Chrysene	[48]	N/A	N/A	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Fluoranthene	2,800	N/A	N/A	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Indeno(1,2,3-cd)pyrene	[1.0]	N/A	N/A	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Phenanthrene	2,000	N/A	N/A	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Pyrene	2,000	N/A	N/A	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

Notes:
Bold indicates a detection
Bold and highlighted cells indicates an exceedance of one or more of the listed criteria
Res DEC - Residential Direct Exposure Criteria
I/C DEC - Industrial/Commercial Direct Exposure Criteria
GA PMC - Pollutant Mobility Criteria
[Green Text] = DEEP fast-track approveable additional polluting substances; DEEP app
N/A - not applicable

s a duplicate sample was collected; the higher results of the two samples was reported
per kilogram
per Liter
ganic Compounds
Aromatic Hydrocarbons
hlorinated Biphenyls
Total Petroleum Hydrocarbons
ty Criteria units for PCBs are mg/L

Table 2
Summary of Soil Analytical Results

Mystic Boathouse
123 Greenmanville Ave, Mystic, Connecticut

Parameters	CT DEEP RSRs			Surficial Samples							
Sample Location				SS-01	SS-02	SS-03	SS-04	SS-05	SS-06	SS-08	SS-09
Sample Depth (feet)				0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5
Sample Date				11/2/2017	11/2/2017	11/2/2017	11/2/2017	11/2/2017	11/2/2017	2/21/2018	2/21/2018
Sample Number				1305171102-18	1305171102-19	1305171102-20	1305171102-21	1305171102-22	1305171102-23	1305180221-18	1305180221-19
	GB PMC	Res DEC	I/C DEC								
Metals, Total (mg/Kg)											
Arsenic	N/A	10	10	32.3	11.8	34.7	13.9	3.23	1.96	---	---
Barium	N/A	4,700	140,000	120	2,230	110	97.1	20.4	17.4	---	---
Cadmium	N/A	34	1,000	9.67	4.4	0.84	0.49	< 0.37	< 0.40	---	---
Chromium	N/A	100	100	23.3	51.7	11.7	10.2	9.04	15.2	---	---
Copper	N/A	2,500	76,000	729	647	49.5	40	19.5	11.7	---	---
Lead	N/A	400	1,000	345	807	128	35.1	22.5	34.2	---	---
Mercury	N/A	20	610	0.13	0.69	0.32	0.07	< 0.03	0.05	---	---
Nickel	N/A	1,400	7,500	79.2	147	8.13	9.55	8.39	6.97	---	---
Selenium	N/A	340	10,000	< 1.6	< 1.5	< 1.8	< 1.3	< 1.5	< 1.6	---	---
Silver	N/A	340	10,000	< 0.39	< 0.38	< 0.44	< 0.33	< 0.37	< 0.40	---	---
Zinc	N/A	20,000	610,000	2,520	1,240	45.4	53.4	39.4	40.4	---	---
Metals, SPLP (mg/L)											
Arsenic	0.5	N/A	N/A	<0.004	<0.004	<0.004	---	---	---	---	---
Barium	10	N/A	N/A	0.121	0.915	<0.010	---	---	---	---	---
Cadmium	0.05	N/A	N/A	<0.005	<0.005	<0.005	---	---	---	---	---
Chromium	0.5	N/A	N/A	<0.010	<0.010	<0.010	---	---	---	---	---
Lead	0.15	N/A	N/A	0.049	0.146	<0.010	---	---	---	---	---
Mercury	0.02	N/A	N/A	<0.0005	<0.0005	<0.0005	---	---	---	---	---
Selenium	0.5	N/A	N/A	<0.020	<0.020	<0.020	---	---	---	---	---
Silver	0.36	N/A	N/A	<0.010	<0.010	<0.010	---	---	---	---	---
Metals, TCLP (mg/L)											
Lead	0.15	N/A	N/A	---	---	---	---	---	---	---	---
ETPH (mg/Kg)											
Ext. Petroleum H.C. (C9-C36)	2500	500	2500	3,800	< 61	< 310	200	420	85	74	94
PCBs (ug/Kg)											
Total PCBs	N/A	1000	10000	---	---	---	---	---	---	---	---
Volatiles (ug/Kg)											
1,2,4-Trimethylbenzene	[28,000]	[500,000]	[1,000,000]	---	---	---	---	---	---	---	---
1,3,5-Trimethylbenzene	[28,000]	[500,000]	[1,000,000]	---	---	---	---	---	---	---	---
Carbon Disulfide	[8,000]	[500,000]	[1,000,000]	---	---	---	---	---	---	---	---
cis-1,2-Dichloroethene	14,000	500,000	1,000,000	---	---	---	---	---	---	---	---
n-Propylbenzene	[10,000]	[500,000]	[1,000,000]	---	---	---	---	---	---	---	---
p-Isopropyltoluene	[5,000]	[500,000]	[1,000,000]	---	---	---	---	---	---	---	---
sec-Butylbenzene	[70,000]	[500,000]	[1,000,000]	---	---	---	---	---	---	---	---
trans-1,2-Dichloroethene	20,000	500,000	1,000,000	---	---	---	---	---	---	---	---
Trichloroethene	1,000	56,000	520,000	---	---	---	---	---	---	---	---
SPLP Volatiles (ug/L)	*10 x GWPC*										
cis-1,2-Dichloroethene	700			---	---	---	---	---	---	---	---
sec-Butylbenzene	3,500			---	---	---	---	---	---	---	---
Trichloroethene	50			---	---	---	---	---	---	---	---
PAHs (ug/Kg)											
2-Methylnaphthalene	[5,600]	[270,000]	[1,000,000]	< 150	< 160	< 1200	< 150	< 150	< 150	---	---
Acenaphthene	[84,000]	[1,000,000]	[2,500,000]	< 150	< 160	< 2900	< 150	< 150	< 150	---	---
Acenaphthylene	84,000	1,000,000	2,500,000	< 150	< 160	< 2900	< 150	640	420	---	---
Anthracene	400,000	1,000,000	2,500,000	180	< 160	< 2900	150	1,100	180	---	---
Benz(a)anthracene	1,000	1,000	7,800	870	300	5,400	580	4,600	980	---	---
Benzo(a)pyrene	1,000	1,000	1,000	750	320	5,100	570	4,400	1,200	---	---
Benzo(b)fluoranthene	1,000	1,000	7,800	650	320	4,100	500	3,800	1,000	---	---
Benzo(ghi)perylene	[1,000]	[8,400]	[78,000]	490	300	3,900	400	2,100	840	---	---
Benzo(k)fluoranthene	1,000	8,400	78,000	740	360	5,900	460	3,000	1,100	---	---
Chrysene	[1,000]	[84,000]	[780,000]	910	350	6,200	700	4,100	1,600	---	---
Dibenz(a,h)anthracene	[1,000]	[1,000]	[1,000]	< 150	< 160	< 1300	< 150	510	160	---	---
Fluoranthene	56,000	1,000,000	2,500,000	1,800	510	7,400	1,100	6,100	2,300	---	---
Fluorene	56,000	1000000	2,500,000	< 150	< 160	< 2900	< 150	410	< 150	---	---
Indeno(1,2,3-cd)pyrene	[1,000]	[1,000]	[7,800]	560	340	3,700	440	3,800	840	---	---
Naphthalene	56,000	1,000,000	2,500,000	< 150	< 160	< 2900	< 150	240	< 150	---	---
Phenanthrene	40,000	1,000,000	2,500,000	800	240	< 2900	890	4,600	1,300	---	---
Pyrene	40,000	1,000,000	2,500,000	1,600	460	11,000	1,200	5,900	2,600	---	---
SPLP PAHs (ug/L)	*10 x GWPC*										
Benzo(a)anthracene	0.6	N/A	N/A	---	---	0.07	---	0.09	---	---	---
Benzo(a)pyrene	2	N/A	N/A	---	---	0.04	---	0.07	---	---	---
Benzo(b)fluoranthene	0.8	N/A	N/A	---	---	0.08	---	0.08	---	---	---
Benzo(k)fluoranthene	5	N/A	N/A	---	---	0.08	---	0.08	---	---	---
Chrysene	[48]	N/A	N/A	---	---	0.08	---	0.11	---	---	---
Fluoranthene	2,800	N/A	N/A	---	---	< 0.10	---	0.2	---	---	---
Indeno(1,2,3-cd)pyrene	[1.0]	N/A	N/A	---	---	0.05	---	0.04	---	---	---
Phenanthrene	2,000	N/A	N/A	---	---	< 0.05	---	0.12	---	---	---
Pyrene	2,000	N/A	N/A	---	---	< 0.10	---	0.21	---	---	---

Notes:
Bold indicates a detection
Bold and highlighted cells indicates an exceedance of one or more of the listed criteria
Res DEC - Residential Direct Exposure Criteria
I/C DEC - Industrial/Commercial Direct Exposure Criteria
GA PMC - Pollutant Mobility Criteria
[Green Text] = DEEP fast-track approveable additional polluting substances; DEEP appr
N/A - not applicable

Table 3
Summary of Groundwater Analytical Results

Mystic River Boathouse Project
123 Greenmanville Ave
Mystic, Connecticut

Parameters	CT DEEP RSRs Res VC	CT DEEP RSRs SWPC	MW-01	MW-01	MW-02	MW-02	MW-03	MW-03	MW-04DUP	MW-04DUP	MW-05
Sample Date			11/13/2017	2/23/2018	11/13/2017	2/23/2018	11/13/2017	2/23/2018	11/13/2017	2/23/2018	2/23/2018
Sample Number			1305171113-02	1305180223-06	1305171113-03	1305180223-02	1305171113-04	1305180223-07	1305171113-05/06	1305180223-03/04	1305180223-05
Metals, Total (mg/L)											
Arsenic	NE	[0.87]	< 0.004	<0.004	< 0.004	<0.020	< 0.004	<0.004	**0.009**	**0.005**	<0.020
Barium	NE	[2.2]	**0.091**	**0.108**	**0.06**	**0.035**	**0.168**	**0.097**	**0.339**	**0.554**	**0.057**
Cadmium	NE	0.006	< 0.001	<0.001	< 0.001	<0.005	< 0.001	<0.001	< 0.001	**0.001**	<0.005
Chromium	NE	0.11	**0.003**	**0.004**	**0.021**	**0.013**	**0.002**	**0.019**	< 0.001	**0.004**	<0.005
Lead	NE	0.013	< 0.002	**0.007**	< 0.002	<0.010	**0.003**	<0.002	< 0.002	<0.002	<0.010
Mercury	NE	0.0004	< 0.0002	<0.00015	< 0.0002	<0.0002	< 0.0002	<0.0002	< 0.0002	<0.0002	<0.0002
Selenium	NE	0.05	< 0.010	<0.010	< 0.010	<0.050	< 0.010	<0.010	< 0.010	<0.010	<0.050
Silver	NE	0.012	< 0.001	<0.001	< 0.001	<0.005	**0.018**	**0.108**	< 0.001	<0.001	<0.005
Metals, Filtered - 10um (mg/L)											
Arsenic	NE	[0.87]	---	<0.004	---	---	---	---	---	---	---
Barium	NE	[2.2]	---	**0.103**	---	---	---	---	---	---	---
Cadmium	NE	0.006	---	<0.001	---	---	---	---	---	---	---
Chromium	NE	0.11	---	**0.002**	---	---	---	---	---	---	---
Lead	NE	0.013	---	**0.005**	---	---	---	---	---	---	---
Mercury	NE	0.0004	---	<0.00015	---	---	---	---	---	---	---
Selenium	NE	0.05	---	<0.010	---	---	---	---	---	---	---
Silver	NE	0.012	---	<0.001	---	---	---	---	---	---	---
ETPH (mg/L)											
Ext. Petroleum H.C. (C9-C36)	NE	[0.25]	< 0.069	<0.070	< 0.068	<0.066	< 0.069	<0.067	**0.31**	<0.070	<0.070
VOCs (ug/L)											
1,2,4-Trimethylbenzene	940	150	< 1.0	<1.0	< 1.0	<1.0	< 1.0	<1.0	**13**	<1.0	<1.0
1,3,5-Trimethylbenzene	730	260	< 1.0	<1.0	< 1.0	<1.0	< 1.0	<1.0	**4**	<1.0	<1.0
2-Isopropyltoluene	870	200	< 1.0	<1.0	< 1.0	<1.0	< 1.0	<1.0	**1**	<1.0	<1.0
cis-1,2-Dichloroethene		6,200	< 1.0	<1.0	< 1.0	<1.0	< 1.0	**1.3**	< 1.0	<1.0	<1.0
Isopropylbenzene	900	210	< 1.0	<1.0	< 1.0	<1.0	< 1.0	<1.0	**1.2**	<1.0	<1.0
Naphthalene	{259}	210	< 1.0	<1.0	< 1.0	<1.0	< 1.0	<1.0	**29**	<1.0	<1.0
n-Propylbenzene	1,200	10,000	< 1.0	<1.0	< 1.0	<1.0	< 1.0	<1.0	**2.2**	<1.0	<1.0
p-Isopropyltoluene			< 1.0	<1.0	< 1.0	<1.0	< 1.0	<1.0	< 1.0	<1.0	**2.9**
sec-Butylbenzene	1,500	10,000	< 1.0	<1.0	< 1.0	<1.0	< 1.0	<1.0	**2.3**	<1.0	<1.0
Trichloroethene	219	2,340	< 1.0	<1.0	< 1.0	<1.0	< 1.0	**2.7**	< 1.0	<1.0	<1.0
PAHs (ug/L)											
2-Methylnaphthalene	1,000	62	< 0.05	< 0.05	< 0.05	<0.05	< 0.05	< 0.05	**6.8**	<0.05	<0.05
Acenaphthene	30,500	150	< 0.05	< 0.05	< 0.05	<0.05	< 0.05	< 0.05	**1.3**	<0.05	<0.05
Acenaphthylene	{48,935}	0.3	< 0.05	< 0.05	< 0.05	<0.05	< 0.05	< 0.05	**4.5**	**0.13**	<0.05
Anthracene	{50,000}	1,100,000	< 0.05	< 0.05	< 0.05	<0.05	< 0.05	< 0.05	**2.3**	**0.26**	<0.05
Benz(a)anthracene	NE	0.3	< 0.05	< 0.05	< 0.05	<0.05	< 0.05	< 0.05	**0.14**	**0.05**	<0.05
Benzo(a)pyrene		0.3	< 0.05	< 0.05	< 0.05	<0.05	< 0.05	< 0.05	< 0.05	**0.06**	<0.05
Benzo(b)fluoranthene		0.3	< 0.05	< 0.05	< 0.05	<0.05	< 0.05	< 0.05	< 0.05	**0.05**	<0.05
Benzo(ghi)perylene		150	< 0.05	< 0.05	< 0.05	<0.05	< 0.05	< 0.05	< 0.05	<0.05	<0.05
Benzo(k)fluoranthene		0.3	< 0.05	< 0.05	< 0.05	<0.05	< 0.05	< 0.05	< 0.05	**0.05**	<0.05
Chrysene	NE	0.54	< 0.05	< 0.05	< 0.05	<0.05	< 0.05	< 0.05	**0.1**	<0.05	<0.05
Dibenz(a,h)anthracene		0.3	< 0.01	<0.01	< 0.01	<0.01	< 0.01	**0.01**	< 0.01	**0.01**	<0.01
Fluoranthene	NE	3,700	< 0.05	<0.05	< 0.05	<0.05	< 0.05	< 0.05	**1.8**	**0.05**	<0.05
Fluorene	{37,642}	140,000	< 0.05	<0.05	< 0.05	<0.05	< 0.05	< 0.05	**7.4**	<0.05	<0.05
Naphthalene	{259}	210	< 0.10	<0.10	< 0.10	<0.10	< 0.10	< 0.10	**26**	<0.10	<0.10
Phenanthrene	{50,000}	0.077	< 0.05	<0.05	< 0.05	<0.05	< 0.05	< 0.05	**8.9**	<0.05	<0.05
Pyrene	NE	110,000	< 0.05	<0.05	< 0.05	<0.05	< 0.05	< 0.05	**1.3**	<0.05	<0.05

Notes:

Bold indicates a detection

Bold and shaded cells indicates an exceedance of one or more of the listed criteria

GWPC - Groundwater Protection Criteria

SWPC - Surface Water Protection Criteria

Res VC - Residential Volatilization Criteria

[Green Text] = DEEP fast-track approveable additional polluting substances and alternative criteria; DEEP approval required

{Red text} = draft proposed 2008 criteria for which no other recommendations have been made; DEEP approval required

N/A - not applicable

MW-04DUP - indicates a duplicate sample was collected; the higher results of the two samples was reported

mg/L - milligrams per Liter

ug/L - micrograms per Liter

VOCs - Volatile Organic Compounds

PAHs - Polynuclear Aromatic Hydrocarbons

ETPH - Extractable Total Petroleum Hydrocarbons

Table 4
Summary of Fill Type and Thickness
Mystic Boathouse
123 Greenmanville Avenue, Mystic, CT

Boring ID	Depth of Fill (ft)	Type of Fill	COCs Detected Below RSR Criteria	COCs Detected Above RSR Criteria
MW-01	6.75	Coal, coal ash, organic material	Metals PAHs	
MW-02	7.1	Coal, coal ash, organic material Metal Slag Shells	Metals	Arsenic > ResDEC & I/C DEC
MW-03	6.1	Coal, coal ash Brick Metal Slag	Total & SPLP Metals ETPH PAHs	Arsenic > ResDEC & I/C DEC
MW-04	10.75	Coal Metal slag	Metals VOCs PAHs (2-Methylnaphthalene)	ETPH > ResDEC VOCs: 1,2,4- and 1,3,5-Trimethylbenzene > GBPMC
SB-01	8	Coal, coal ash, organic material	Metals	
SB-02	7.2	Coal, coal ash, organic material Brick Metal slag	Metals PAHs	Arsenic > ResDEC & I/C DEC PAHs: Benzo(a)pyrene > GBPMC, ResDEC, & I/C DEC
SB-03	10	Coal, coal ash, organic material Brick Metal slag Shells	Total, SPLP, and TCLP Metals PAHs	Arsenic and Lead > ResDEC & I/C DEC Total PCBs > ResDEC
SB-04	10	Coal, coal ash, organic material Brick Metal slag	Metals ETPH PAHs	Arsenic > ResDEC & I/C DEC
SB-05	7.5	Coal, coal ash Brick Metal Slag	Metals	
SB-06	7.4	Coal, coal ash Metal slag	Metals ETPH VOCs (Carbon Disulfide) PAHs	
SB-07	12	Coal, coal ash, organics Brick Metal slag	Metals ETPH VOCs	Arsenic > ResDEC & I/C DEC VOCs: Trichloroethene > GB PMC
SB-08	8.5	Coal, coal ash, organic material Concrete Metal slag	Metals VOCs (1,2,4-Trimethylbenzene)	
SB-09	7.1	Coal, organic material Metal slag	Metals	
SB-10	10	Coal, coal ash Brick Metal slag	Total & SPLP Metals PAHs	
SB-11	8	Coal, coal ash, organic material Metal Slag	Metals PAHs	
SB-12	>2.5	Coal, coal asho, organic material Metal slag	Metals PAHs	
SB-13	10	Coal, coal ash, organic material Asphalt Brick Metal slag		
SB-14	9	Coal, coal ash, organic material Brick Metal slag	ETPH SPLP VOCs (sec-Butylbenzene)	
SB-15	11.9	Coal, coal ash, organic material Brick Metal slag Shells	VOCs (cis-1,2-Dichloroethene) SPLP VOCs (cis-1,2-Dichloroethene)	
SB-16A	10.2	Coal, organic material Metal slag Shells	VOCs (cis-1,2-Dichloroethene) SPLP VOCs (cis-1,2-Dichloroethene & Trichloroethene)	VOCs: Trichloroethene > GB PMC
SB-17	10	Coal, coal ash, organic material Metal slag Shells		
SB-18	10	Coal, coal ash, organic material Metal slag Shells		
SB-19	10	Coal, coal ash, organic material Metal Slag Shells		

__Notes:__
ft - feet
GB PMC - Pollutant Mobility Criteria for class GB area
ResDEC - Residential Direct Exposure Criteria
I/C DEC - Industrial/Commercial Direct Exposure Criteria
(2-Methylnaphthalene) - Constituents in parentheses are the only constituents of that type detected

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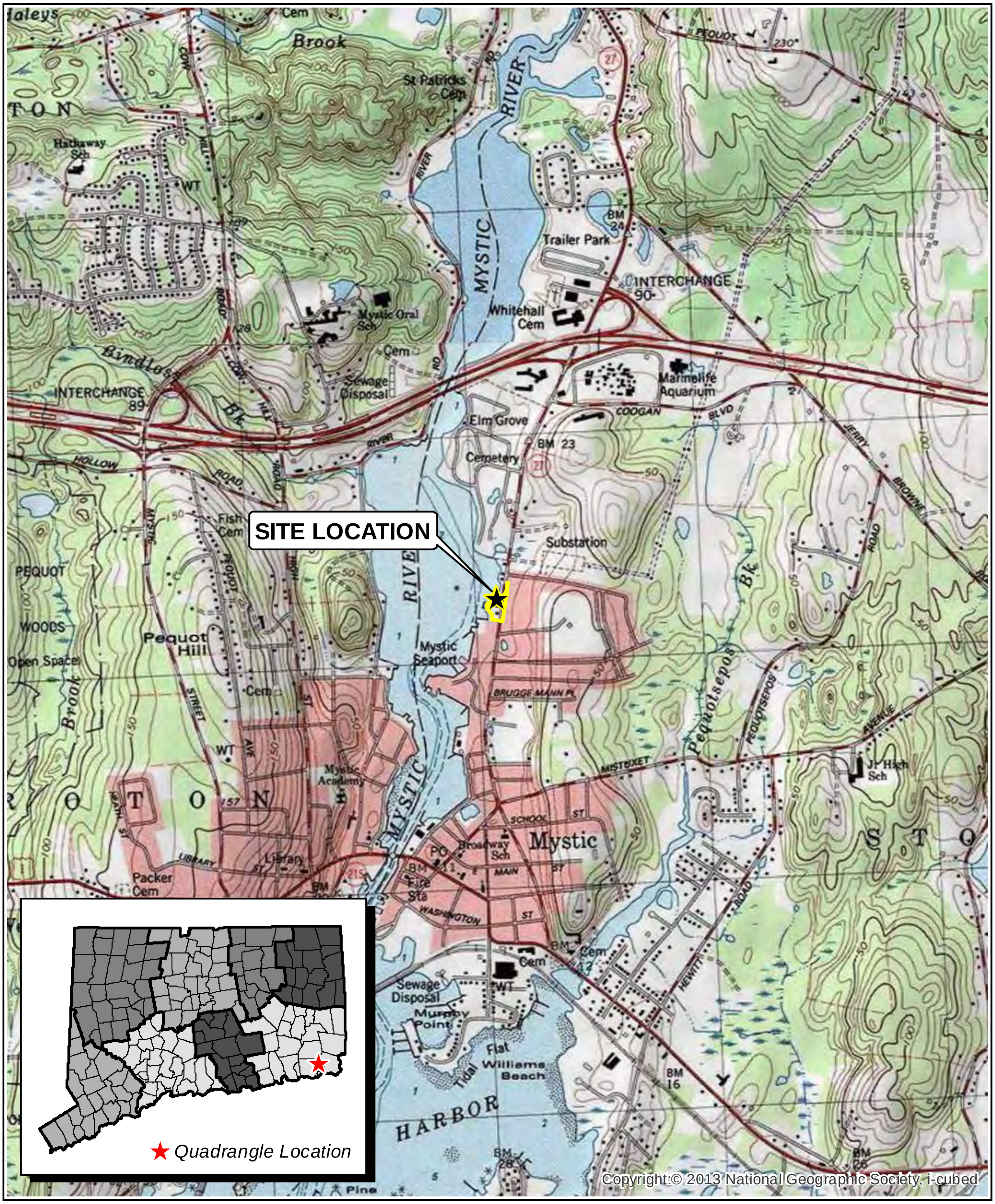
Figures

Path: F:\P2017\0167\A10\Phase II ESA - Report\GIS\Phase_I_Figures_Basemap.mxd



N

0 0.25 0.5

Miles

Data Source(s):
1. Parcel boundaries - CT DEEP
2. Basemap - National Geographic TOPO! 1:24,000-scale maps; TOPO! maps are seamless, scanned images of United States Geological Survey (USGS) paper topographic maps.
http://goto.arcgisonline.com/maps/USA_Topo_Maps

Disclaimer: This map is not the product of a Professional Land Survey. It was created by Fuss & O'Neill, Inc. for general reference, informational, planning and guidance use, and is not a legally authoratative source as to location of natural or manmade features. Proper interpretation of this map may require the assistance of appropriate professional services. Fuss & O'Neill, Inc. makes no warrantee, express or implied, related to the spatial accuracy, reliability, completeness, or currentness of this map.

Site Location Map
Mystic Boathouse

MYSTIC CONNECTICUT

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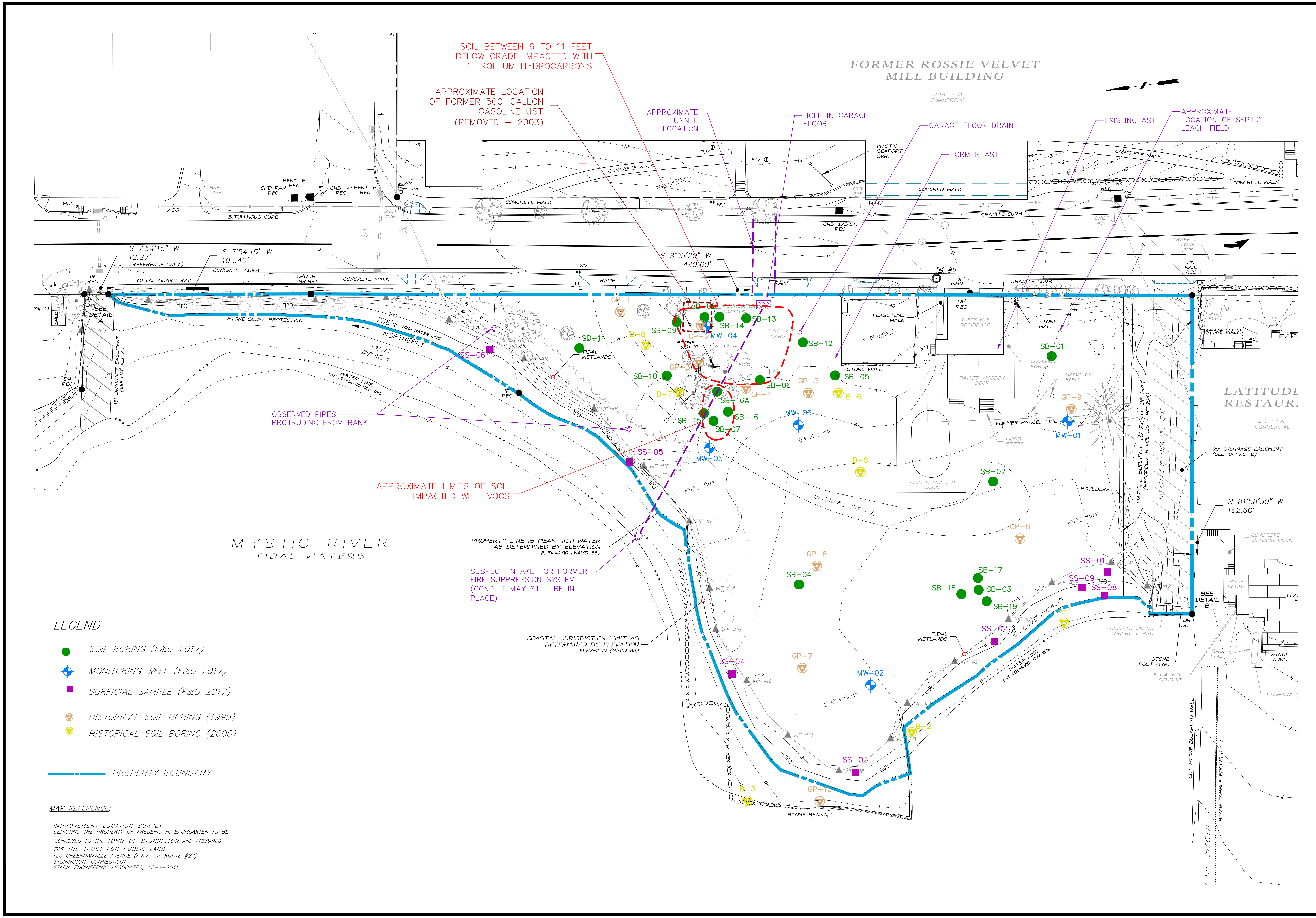
DATE: MARCH 2018

FIGURE 1



No.	DATE	DESCRIPTION	DESIGNER	REVIEWER
1.			XX/XX	XX

SCALE:
HORZ.: 1" = 30'
VERT.:
DATUM:
HORZ.:
VERT.:
0 15 30
GRAPHIC SCALE

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SITE PLAN AND SAMPLING LOCATIONS

123 GREENMANVILLE AVENUE

MYSTIC CONNECTICUT

PROJ. No.: 20170167A10
DATE: MARCH 2018

FIGURE 2

File Path: J:\DWG\P2017\0167\A10\Environmental\Plan\20170167A10_STP01.dwg Layout: 18X24-L Plotted: Thu, March 22, 2018 - 4:19 PM User: bchurch
Plotter: DWG TO PDF.PC3 CTB File: FO HALF.STB
LAYER STATE:
MS VIEW:

File Path: J:\DWG\P2017\0167\A10\Environmental\Plan\20170167A10_GWC.dwg Layout: 18X24-L Plotted: Fri, March 23, 2018 - 10:19 AM User: bchurch
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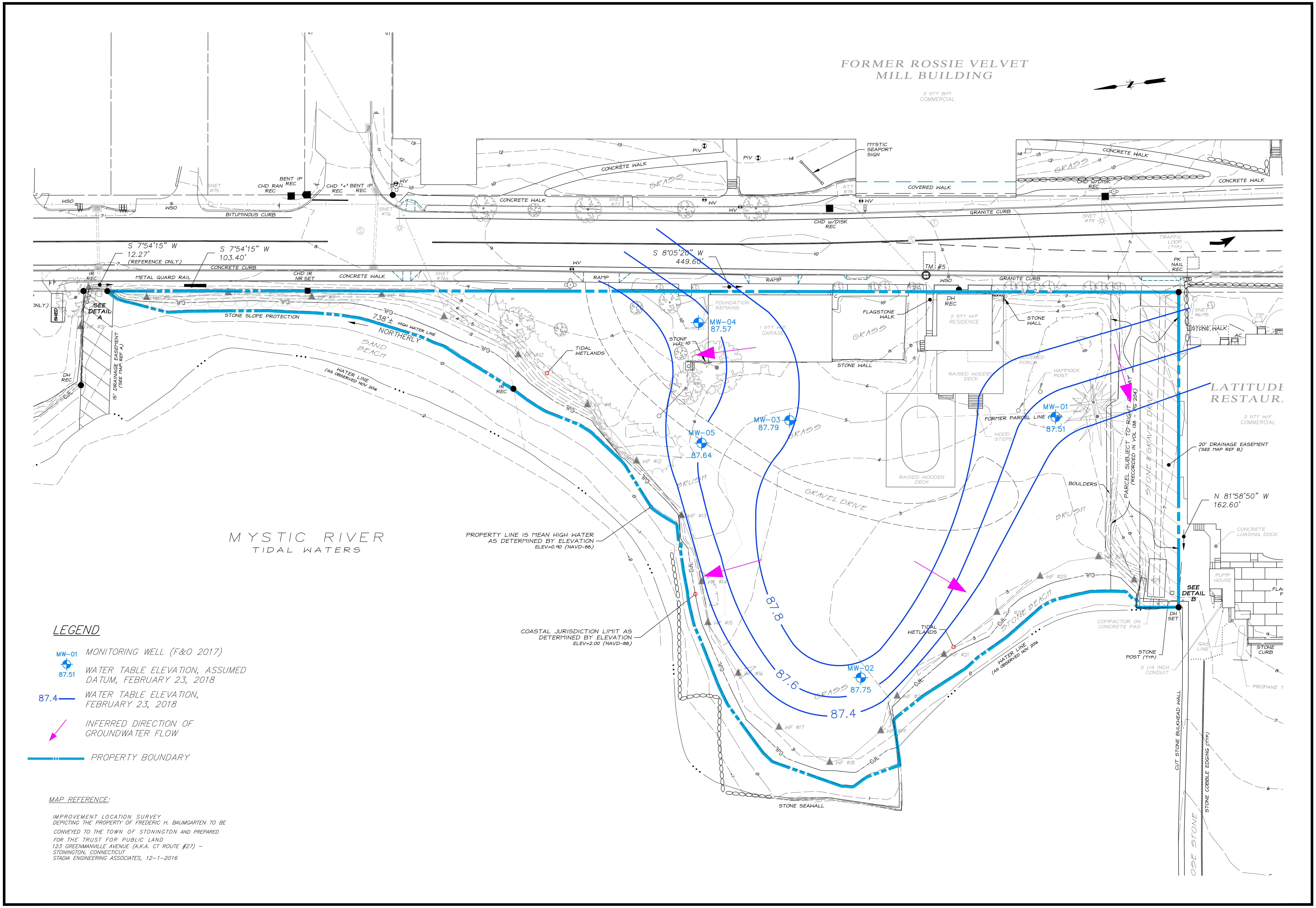

No.	DATE	DESCRIPTION	DESIGNER	REVIEWER
1.			XX/XX	XX

SCALE:
HORZ.: 1" = 30'
VERT.:
DATUM:
HORZ.:
VERT.:
0 15 30
GRAPHIC SCALE

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GROUNDWATER ELEVATION CONTOUR MAP
123 GREENMANVILLE AVENUE
MYSTIC CONNECTICUT

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DATE: MARCH 2018

FIGURE 3

MS VIEW:
LAYER STATE: