REMEDIAL ALTERNATIVES REPORT

AND

REMEDIAL WORKPLAN

Prepared for the

Long Dock Beacon Site

NYSDEC Brownfields Program Site: C314112

Located at

Red Flynn Drive
City of Beacon
Dutchess County, New York

February 2008

Prepared By:

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ESI File: SG96152.52

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The undersigned has reviewed this Remedial Alternatives Report and Remedial Workplan and certifies to The Scenic Hudson Land Trust, Inc. and Foss Group Beacon, LLC, that the information provided in this document is accurate as of the date of issuance by this office.

Any and all questions or comments, including requests for additional information, should be submitted to the undersigned.

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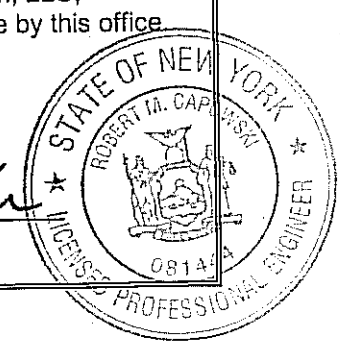


TABLE OF CONTENTS

1.0 INTRODUCTION 1

1.1 Purpose

1.2 Site Information
- 1.2.1 Site Location and Description
- 1.2.2 Site History
- 1.2.3 Proposed Future Usage of the Site

1.3 Site Environmental Conditions
- 1.3.1 Nature and Extent of Contamination
- 1.3.2 Exposure Assessment

2.0 REMEDIAL ALTERNATIVES ANALYSIS 6

2.1 Overview of Screening Process

2.2 Screening Methodology
- 2.2.1 Remedial Objectives
- 2.2.2 NYSDEC Review Criteria

2.3 Identification/Preliminary Screening of Alternatives
- 2.3.1 Identification of Possible Remedial Alternatives
- 2.3.2 Preliminary Screening of Alternatives
- 2.3.3 Preliminary Comparative Analysis of Alternatives

2.4 Detailed Analysis of Remedial Alternatives
- 2.4.1 Common Elements and Considerations
- 2.4.2 Detailed Analysis of Alternatives
- 2.4.3 Comparative Analysis of Alternatives
- 2.4.4 Recommendation of Preferred Alternative

3.0 REMEDIAL WORKPLAN…….....25

3.1 Scope of Work

3.2 Overview of Proposed Remediation Services

3.3 Site Preparation of Services
- 3.3.1 Agency Notification
- 3.3.2 Equipment Calibration
- 3.3.3 Guidance Levels
- 3.3.4 Site Remediation Coordination Activities
- 3.3.5 Health and Safety Plan
- 3.3.6 Community Air Monitoring Plan
- 3.3.7 Dust Suppression
- 3.3.8 Hours of Operation

3.4 Proposed Specific Remediation Services
- 3.4.1 Design Process
- 3.4.2 Excavation of Contaminated Soils
- 3.4.3 In-situ Chemical Oxidation Treatment for Petroleum Contamination
- 3.4.4 Installation of Vapor Barrier and Sub-Slab Depressurization System
- 3.4.5 Groundwater Monitoring
- 3.4.6 Documentation of Site Remediation and/or Closure

3.5 Project Schedule

TABLE OF CONTENTS (cont'd)

TABLES:

Table 2: Summary of Alternative Technologies Subject to Screening 9
Table 3: Proposed Excavation Areas.....31
Table 4: ISCO Treatment Schedule.....34
Table 5: Project Schedule.....37

APPENDICES:

A *Reference*

B *Figures*
1 - Site Location Map
2 - Proposed Site Plan - Future Use Map
3 - Proposed Grading Plan - Future Use Map
4 - Proposed Building Cross Section - Future Use Map
5 - Fieldwork Map
6 - Proposed Site Remediation Map
7 - Direction of Groundwater Flow - Low Tide
8 - Direction of Groundwater Flow - High Tide

C *Soil Volume Calculations (includes Table 1)*

D *Cost Estimates for Remedial Alternatives*

E *Health and Safety Plan*

F *Resumes of Key Environmental Personnel*

G *Quality Assurance /Quality Control Plan*

1.0 INTRODUCTION

1.1 Purpose

Ecosystems Strategies, Inc. (ESI) has prepared this Remedial Alternatives Report and Remedial Workplan (RAR/RWP) in order to summarize an analysis of potential remedial alternatives, and present a Workplan for proposed environmental response actions, at the "Long Dock Beacon" property (hereafter referred to as the "Site"), located at Red Flynn Drive, City of Beacon, New York. These proposed environmental response actions address known environmental conditions at the Site documented in the Remedial Investigation Report (RIR), dated November 2007. All work was performed in general conformance with regulations specified in 6 NYCRR Part 375 (Environmental Remediation Programs) and applicable NYSDEC guidance documents (Draft Division of Environmental Remediation-10, Technical Guidance for Site Investigation and Remediation [DER-10] and Draft Brownfield Cleanup Program Guide [BCP Guide]). A list of referenced documents, abbreviations, and acronyms is provided as Appendix A of this RAR/RWP.

The Remedial Alternatives Report (RAR) identifies and evaluates alternatives for mitigating documented contamination and/or controlling the impacts of such contamination. Through a process of identifying potential remedies and screening each relative to a predetermined set of criteria, a remedial response is selected that is technically feasible, protective of human health and the environment, cost-effective and consistent with the local objectives for the property. The Remedial Workplan (RWP) presents a conceptual design for the selected remedial response, which is proposed in order to meet the objectives determined through the alternatives analysis. A Remedial Design Report (RDR) will be prepared in order to fully develop design components and technical specifications to execute the selected remedial response.

1.2 Site Information

1.2.1 Site Location and Description

The Site is an 8.85 acre irregular-shaped parcel situated on a peninsula on the eastern shore of the Hudson River, in the City of Beacon, Dutchess County, New York. The northern half of the Site was formerly known as the "Beacon Salvage" property, and the southern half of the Site was known as the "Garret Storm" property. The former Beacon Salvage property and the former Garret Storm property were combined as a single site under the New York State Department of Environmental Conservation (NYSDEC) Brownfields Clean-up Program [BCP] (Site ID: C314112) in May 2006.

The Site extends approximately 1,200 feet westwards from Red Flynn Drive and includes lands submerged in the Hudson River. A barn and a vacant single-family dwelling are located on the northeastern portions of the Site, a concrete foundation is located in the vicinity of the western shoreline, and a boathouse and two small storage sheds, utilized by the Dutchess Boat Club, are located on the southwest portion. The remaining portions of the Site consist of vacant, overgrown areas. A Site Location Map (Figure 1) is provided in Appendix B.

1.2.2 Site History

Historic maps and municipal records indicate on-site structures as early as the late-1800s, and document a variety of industrial uses, including coal and petroleum storage, soap manufacturing, and the presence of a salvage yard. Aboveground petroleum storage tank structures associated with the former major oil storage facility (MOSF) were present at the south-central portion of the Site between the 1930s and 1994. Based on historic information and known and suspected environmental conditions, the Site was accepted into the NYSDEC BCP in May 2006. Environmental investigations of the Site are summarized in Section 1.3, below.

1.2.3 Proposed Future Usage of the Site

The Site is proposed for use as a mixed-use waterfront development, which includes a hotel, conference center, restaurants, offices, retail stores, water dependent uses, and a public park with public access to waterfront-related amenities. All existing on-site structures will be demolished with the exception of the barn. Most of the Site will be occupied by a new structure extending from the northwestern shore of the Site to Red Flynn Drive (116,110 square feet of gross floor area).

Steel piles will provide foundation support for the new structure. The ground level of the northern and southwestern side of the main structure (at final invert grade of 12 feet above mean sea level [msl]) will be supported by a hollow core slab, with a ventilated void of 5 feet between the underlying substrate (gravel) and the hollow core slab. The hollow core slab will be supported by beams sitting on top of the steel piles. The foundation level of the southern side of the main structure (at final invert grade of 3 feet above msl) will be supported by a slab foundation sitting on top of the steel piles. The foundation level will contain an underground service tunnel, with approximate dimensions of 490 feet by 20 feet. This tunnel will house heating, ventilating, and air conditioning (HVAC) units and serve as a corridor to be utilized by service personnel. The tunnel will be the only portion of the structure located below surface grade and the only portion containing a slab in direct contact with an underlying substrate (gravel) above Site soils.

The proposed Site plan, grading plan, and building cross section displaying elevations are illustrated in Figure 2, Figure 3, and Figure 4, respectively (Appendix B).

1.3 Site Environmental Conditions

This section provides a summary of known and suspected Site Environmental conditions. The findings of all previous environmental investigations performed to date are detailed in ESI's RIR, which was performed according to the NYSDEC approved Remedial Investigation Workplan (RIWP) and the Supplemental Remedial Investigation Workplan (SRIWP), collectively referred to as the "Modified Workplan".

1.3.1 Nature and Extent of Contamination

Data documented in the RIR provide a comprehensive assessment of existing on-Site environmental conditions. The results of field investigation services (including laboratory analyses) are summarized below for soil, groundwater, and surface-water and sediments in the Hudson River. Soil sampling locations documented in the RIR are illustrated on a Fieldwork Map, provided as Figure 5 (Appendix B).

1.3.1.1 Soil

Soils are contaminated with arsenic, lead, mercury, polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons (PAHs), and petroleum compounds (semi-volatile organic compounds [SVOCs], volatile organic compounds [VOCs], and total petroleum hydrocarbons – diesel range organics [TPH-DROs]).

Arsenic contamination is present in the northeastern portion of the Site (particularly east of the barn), to the north of the boathouse, and in the northeast portion of the area of the former MOSF. Arsenic contamination throughout the Site generally extends vertically from the surface to approximately 4 feet bsg (arsenic contamination in the areas south and immediately east of the barn is estimated to occur between 5 to 10 feet below surface grade [bsg]). There is the potential for arsenic to be found off-site, northeast of the barn. Arsenic contamination is likely to be derived from the fill material present on Site; off-site areas, particularly north of the barn, are also comprised of fill material and could potentially be contaminated with arsenic.

Lead contamination is present in surface soils located east and west of the barn, with the exception of an area immediately east of the barn where lead was encountered in subsurface soils (4 - 6 feet bsg). Lead contamination was also encountered east of the dwelling and in the area of the former MOSF, with a maximum depth of 3 feet bsg. PCB contamination is present in limited areas immediately west, east, and southeast of the barn, (northeast portion of the Site) at 0 to 3 feet bsg. Six of seven sampling locations with lead contamination overlap areas with arsenic contamination and nine of eleven sampling locations with PCB contamination overlap areas with arsenic contamination.

SVOC and mercury contamination is present in a well-defined area east of the barn (SB-1), in the northeast portion of the Site, at a depth of 7 - 9 feet bsg. Site-wide peak concentrations of ten SVOCs (all PAHs) were detected at this location. In addition, SVOC contamination (mainly PAHs) is present east of the concrete pad, in the western end of the Site, at a depth of 4 feet bsg.

Generally, SVOC and VOC contamination is limited to the area of the former MOSF, with higher VOC and SVOC concentrations at the southeastern portion of this area. SVOC contamination extends vertically from approximately 3 to 5 feet bsg and VOC contamination extends vertically from 3 to 20 feet bsg. TPH-DRO concentrations are higher in the central portion and less elevated to the east. The presence of elevated levels of SVOCs, VOCs, and TPH-DRO are consistent with observed field evidence of contamination.

Petroleum contamination is present along the southern property line at approximately 5 -20 feet bsg and may extend off-site to the southeast of the former MOSF. Impacts of petroleum contamination on off-site soils, or the effect of future remedial actions on these areas, are unknown at this time. Data from off-site monitoring wells does not indicate significant groundwater contamination; additional off-site soil sampling, however, is necessary.

A map delineating areas of known contamination in soils is provided as Figure 6, Appendix B.

1.3.1.2 Groundwater

VOC contamination (benzene, ethyl benzene, toluene, and total xylenes; collectively known as BTEX) is present in groundwater east of the former MOSF. These compounds are likely to originate from activities at the former on-site MOSF. Low-levels of VOCs (below guidance levels) are present in, and south of, the former MOSF. Low-levels of SVOCs (below guidance levels) are mainly within the area of the former MOSF. Low-level arsenic (at concentrations approaching the guidance level) is present east of the barn. Generally, areas with low-levels of VOC, SVOC and arsenic in groundwater corresponded to known areas of contamination in soils located in the former MOSF and east of the barn. Analytical data and field observations indicate that groundwater contamination likely originated from soil contamination.

Changes in groundwater levels during low and high tide have an impact on the volume of saturated soils in the western and north-central portions of the Site; approximately half of the volume of contaminated soils is subject to tidal influences. No impacts are anticipated in the volume of saturated soils in the south-central and eastern portions of the Site. In these areas contamination is present below the saturated zone and/or groundwater levels are not susceptible to significant tidal influences. Groundwater elevation and direction of flow during low and high tide are illustrated on Figure 7 and 8, respectively. Groundwater elevations and fluctuations are tabulated in Table 1, Appendix C. Based on the relatively immobility of PCBs and metals, and an absence of significant groundwater contamination warranting active groundwater remediation, groundwater flow is not likely to have a significant impact in the horizontal and vertical movement of soil contamination.

1.3.1.3 Hudson River: Surface-water and Sediment

Hudson River sediments are contaminated with PCB, lead and low-levels of SVOCs; no significant contamination however is present in the Hudson River surface-water.

PCB contamination is present in sediments along the western shore of the Site at a depth of 0.5 to 2.5 feet below river bottom surface, with the exception of sediments north and southwest of the concrete foundation and west of the boathouse, where PCB contamination extends 1 to at least 4 feet below river bottom surface. The composition of the PCBs indicates that this contamination is not attributed to on-site activities. PCBs in sediments are similar to PCBs found in other contaminated areas of the Hudson River. Lead contamination is present along the western shore at a depth of 0.5 to at least 5.5 feet below river bottom surface and northwest of the dwelling at a depth of 4 to at least 6.5 feet below river bottom surface. Five of seven sampling locations with PCB contamination overlap areas with lead contamination. Low-level exceedences of SVOCs are present in sediments northwest of the dwelling at a depth of 4.5 to at least 6.5 feet below river bottom surface.

1.3.2 Exposure Assessment

The RIR documents an exposure assessment, which was conducted to qualitatively assess the potential impacts of the existing Site on human health. Both current (existing conditions) and future use (development and operation of the proposed mixed-use waterfront development) scenarios were considered. A summary of this exposure assessment is presented below.

Soils

The primary contaminants present in Site soils are PCBs, SVOCs (mainly PAHs), total VOCs, TPH-DRO, arsenic, lead and mercury. The potential exists for arsenic and petroleum contamination in soils to be found off-site (northeast of the barn and southeast of the former MOSF, respectively).

Limited existing or potential exposure pathways for on-site contaminated surface soils are anticipated during the current scenario. During the current scenario, restricted access to the Site and heavy vegetation covering surface soils will minimize the possibility of direct contact with contaminated soils. No existing or potential exposure pathways for on-site and potentially off-site contaminated subsurface soils are anticipated during the current scenario as subsurface soils will not be disturbed during the current scenario and access to subsurface soils is currently restricted by overlying surface soils and vegetation.

During the future scenario, contaminated soils are a potential source of concern during development activities. Inhalation of dust, and direct contact with soils, are the likely routes of exposure for receptor populations (trespassers, construction workers, and users of adjoining properties). The implementation of a Health and Safety Plan (HASP) (incorporating a Community Health and Safety Plan) and a Community Air Monitoring Plan (CAMP) will mitigate possible impacts to the on-site and off-site receptor populations.

Access to potential soil and groundwater contamination likely to remain on Site (low-level SVOCs and VOCs) will be limited by paved areas, building footprints and a proposed barrier layer. No existing or potential exposure pathways through direct contact or ingestion are anticipated for low-level contamination in subsurface soils during the operation of the waterfront development.

Limited existing or potential exposure pathways for potential off-site contaminated subsurface soils are anticipated during the future scenario. The possibility exists for subsurface soils to be disturbed by future off-site developments. Future development plans for the off-site property north of the Site (where arsenic contamination is suspected) are unknown at this time. The Volunteer has control over the off-site property south of the Site (where petroleum contamination is suspected). The future scenario for the off-site property south of the Site does not include the disturbance of subsurface soils.

Soil Vapors

Documented VOC contamination in and southeast of the area of the former MOSF indicates the potential for vapors. No existing or potential exposure pathways for on-site and potential off-site soil vapors are anticipated as no structures exist either on-site in the area of the former MOSF or off-site southeast of the former MOSF.

During the future scenario, soil vapors are a potential source of concern during development activities. Inhalation of soil vapors are the likely routes of exposure for receptor populations (trespassers, construction workers, and users of adjoining properties). The implementation of a HASP (incorporating a Community Health and Safety Plan), and a CAMP, will mitigate possible impacts to the on-site and off-site receptor populations.

The potential exist for low-level VOC contamination in soil and groundwater to remain on-site after development activities. Inhalation of soil vapors is a potential route of exposure for receptor populations (on-site workers, users, and users of adjoining properties). A Sub-Slab Depressurization System (SSDS) with a vapor barrier, or other necessary mitigation (e.g., open space beneath structures), is proposed in order to remove any potential vapors that might accumulate beneath all new on-site structures. No existing or potential exposure pathways for potential off-site soil vapors are anticipated as no off-site structures are proposed southeast of the area of the former MOSF.

Groundwater

The primary contaminants of concern in groundwater are VOCs, SVOCs and low-level metals. The potential exists for petroleum contamination to be found in off-site groundwater (southeast of the former MOSF). During the current scenario, no existing or potential exposure pathways for on-site and potentially off-site contaminated groundwater are anticipated (No local uses of groundwater are known to exist).

During the future scenario, direct contact with on-site and off-site groundwater during construction and periodic sampling is a potential route of exposure for receptor populations (trespassers, construction workers, and sampling personnel). During Site development activities, groundwater exposure will be controlled by strict health and safety protocols. No existing or potential exposure pathways for on-site and potential off-site contaminated groundwater are anticipated during the operation of the waterfront development. No current use of groundwater exits and no future use is proposed. Use of on-site groundwater will be further restricted through institutional controls. Potential exposures, therefore, will be limited to groundwater monitoring activities.

Hudson River: Surface-water and Sediment

No significant contamination is present in surface-water. No significant existing or potential exposure pathways for migration of contamination are anticipated during the current scenario. Appropriate construction measures to manage stormwater, dust, and/or sediment run-off will mitigate possible impacts to the Hudson River.

The primary contaminants of concern in sediments are PCBs and lead, with localized SVOC contamination. Although the future use of the Site does not include planned use or contact with sediments, limited existing or potential exposure pathways for sediment contamination could exist during the current or future scenario via direct contact with off-shore sediment.

2.0 REMEDIAL ALTERNATIVES ANALYSIS

Section 2.0 of this RAR/RWP summarizes the screening process for various remedial alternatives (Section 2.1 and Section 2.2), provides a brief description of each potential remedial alternative (Section 2.3), and presents a thorough analysis of the alternatives with the intent of selecting the most appropriate alternative for this Site (Section 2.4). Detailed discussions of the methodology by which the remedial technologies and remedial alternatives will be evaluated (Section 2.1), and of the criteria used in the evaluation process (Section 2.2), are provided below.

2.1 Overview of Screening Process

In order to identify and screen potential remedial technologies, remedial objectives and clean-up criteria are established. These objectives and criteria are based on NYSDEC regulations (6 NYCRR Part 375) and applicable guidance documents (DER-10 and BCP Guide), community input, and risk-based assessments. These criteria are also a function of known recognized environmental conditions (RECs) on this Site.

Based on the media that are subject to potential remediation, an initial screening of various potential technologies is conducted (Section 2.3). For each alternative, this screening considers three factors: the feasibility of each technology specific to the Site; the estimated cost of implementation; and, the effectiveness in achieving the Site-specific objectives. Remedial approaches that are determined not to be feasible, cost-effective, or sufficiently effective are dropped from further consideration.

The technologies that pass the initial screening are then assessed in greater detail in Section 2.4, using the criteria set forth in Section 2.2.2. The various alternatives are also qualitatively compared to each other to assess which is most successful at achieving each individual criterion (Section 2.4.3), a process instrumental in identifying a preferred alternative (Section 2.4.4).

2.2 Screening Methodology

This section provides a discussion of the overall remedial objectives for this Site (Section 2.2.1) and the methodology used in screening potential remedial alternatives (Section 2.2.2 and Section 2.2.3). The goals specified below are consistent with NYSDEC procedures outlined in DER-10.

2.2.1 Remedial Objectives

The remedial objectives considered to be appropriate for this Site have been determined through a process established for this purpose by the NYSDEC. A significant element in that process is the proposed future use of a particular site, so that potential remedial actions can be assessed, and a preferred remedial action can be ultimately recommended and selected that is compatible with the intended future use. As stated above (see Section 1.2.3), this Site is proposed for use as a mixed-use waterfront development.

It is the overall objective of this project to implement remedial actions that provide for the appropriate level of protection of the public health and environment. To the extent feasible and practical, such protection should be maintained for as long as the Site is used for the most sensitive purpose around which the protection was designed (i.e. mixed-use waterfront development). Objectives are set forth for each media of concern to ensure that appropriate levels of remediation are achieved. Objectives include the protection of public health and also the environmental health of the Site (including wildlife). For this Site, the media warranting remediation include: soils impacted by PCBs, PAHs, petroleum compounds, and metals; potential VOC impacts in soil vapors; and groundwater impacted by VOCs, SVOCs and metals.

The following remedial objectives and guidance levels for soil, soil vapor, and groundwater (to be achieved following remedial activities) have been established:

Soil

The remedial objective for soil consists of the elimination, to the extent practical, of potential direct human or wildlife exposure to PCB, PAH, petroleum and metals contamination in on-site soils. Guidance levels for all compounds in soil will be based on NYSDEC Remedial Program Soil Cleanup Objectives (SCOs) for Unrestricted and Commercial Restricted Use, as provided in 6 NYCRR Subpart 375, Table 375-6.8(a) and Table 375-6.8(b), and (as warranted) on NYSDEC Technical and Administrative Guidance Memorandum #4046 (TAGM 4046), including subsequent NYSDEC memoranda.

Soil Vapor

The remedial objective for soil vapor consists of the elimination, to the extent practical, of potential human inhalation of VOCs. Guidance levels and procedures established in NYSDOH's Guidance for Evaluating Soil Vapor Intrusion in the State of New York (GESVI, October 2006) will be used to assess current VOC concentrations and the need for (and extent of) potential remediation of these soil vapors.

Groundwater

The remedial objectives for groundwater consist of the prevention of exposure of on-site groundwater with VOC, SVOC and metal levels exceeding drinking water standards, and the removal of the source of groundwater contamination to the extent practical. Guidance levels for all compounds in water will be based on NYSDEC Division of Water Technical and Operational Guidance Series 1.1.1, Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations (TOGS 1.1.1).

No remedial objectives were established for surface-water as this medium does not warrant remediation at this time. No remedial objectives were established for sediments. Remediation of contaminated sediments documented as being present near the Site is being sought in conjunction with existing NYSDEC initiatives in the Hudson River. Remediation of sediments is outside the scope of this report.

2.2.2 NYSDEC Review Criteria

Potential technologies and specific Site remedial alternatives are analyzed relative to criteria developed by the NYSDEC outlined in 6 NYCRR Part 375 and DER-10. This section discusses each of these criteria, with particular concern for their relevance to this Site. The following review criteria have been developed to address the technical and policy considerations that are used in selecting the preferred remedial alternative:

1. Overall Protection of Human Health and the Environment The community's post-remedial exposure to affected materials is evaluated. The surrounding environment's exposure is also evaluated. All media that could directly or indirectly affect the community are evaluated: air, groundwater, soils, sediments, surface waters, and wildlife vectors.
2. Compliance with Standards, Criteria, and Guidance Values (SCGs) Detected compounds of concern are compared to relevant federal, state or local regulatory standards, guidance levels, or health risk limits. SCGs for media to be directly or indirectly remediated are presented in Section 2.2.1.
3. Short-term Effectiveness Short-term effectiveness is measured relative to the level of protection afforded to the community during remediation activities. Also, any other impacts to the environment are assessed, as well as the time necessary to implement each alternative.

4. Long-term Effectiveness and Permanence Long-term effectiveness and permanence of the remedial action is assessed. Generally, a time frame of 30 years is used for purposes of comparison and analysis; however, the ultimate objective is to promote a remedial alternative that is effective for the time period that this Site is used as a waterfront development. In addition, residual risks are evaluated, and the adequacy and reliability of proposed controls are assessed as they relate to the proposed remedy and the surrounding community.
5. Reduction of Toxicity, Mobility, and Volume The reduction of several factors of concern is assessed. These factors include toxicity, mobility, and volume of the identified contaminants of concern. The anticipated reduction in volume, and the post-remedial mobility and toxicity of remaining Site contaminants, is assessed.
6. Implementability The suitability of each alternative is analyzed in relation to Site-specific conditions, as well as how reasonable is its implementation. As part of this assessment, the availability of services and materials, and the alternative's cost-effectiveness is considered.
7. Community Acceptance The people most directly impacted by the final selection of a Site remedy are the inhabitants of the local community. The concerns of the community are assessed in conjunction with the first six criteria. Community acceptance is evaluated following the public comment period. Within this RAR/RWP, the issues most likely to be of concern, or generate controversy, are discussed.
8. Land Use Consideration is given to the current and future land uses of the Site and its surroundings. Factors taken into consideration in the land use evaluation consist of: historical and recent development patterns; Brownfield Opportunity Areas; applicable comprehensive community master plans; proximity to residential, urban, commercial, agricultural, and recreational areas, cultural and natural resources and floodplains; environmental justice concerns; federal or state land use designations; population growth, accessibility to infrastructure; vulnerability of groundwater; geography and geology; and current institutional controls.
9. Cost Consideration is given to the costs associated with each potential remedial alternative. A cost for each alternative is formulated based on reasonably foreseeable expenses (both initial and long term costs). Costs that not easily quantified are also identified.

2.3 Identification/Preliminary Screening of Alternatives

This section identifies and assesses remedial alternatives that have been selected for possible implementation on the Site. These alternatives are identified utilizing the remedial response objectives (see Section 2.2 above) as a guide.

Subsequent to identification, each alternative is assessed relative to the review criteria specified by the NYSDEC for Brownfields sites. Specifically, each alternative is assessed relative to:

- Overall protection of human health and the environment
- Compliance with Standards, Criteria, and Guidance Values
- Short-term effectiveness
- Long-term effectiveness and permanence
- Reduction of toxicity, mobility, and volume
- Feasibility
- Community acceptance
- Land Use
- Cost

2.3.1 Identification of Possible Remedial Alternatives

This Section identifies a wide range of reasonable remedial options. A summary of remedial options is provided in Table 2. Subsequent to this preliminary identification, a preliminary screening and comparison of the alternatives is provided below in Sections 2.3.2 and 2.3.3, and a detailed discussion of the alternatives is provided in Section 2.4.

Table 2: Summary of Alternative Technologies Subject to Screening

Alternative	Benefits	Deficiencies
No Further Action (Section 2.3.2.1)	• Easily implemented • No additional costs	• No short- or long-term effectiveness • Not protective of human health or the environment • Prevents re-use of the Site
Site Control and Security (Section 2.3.2.2)	• Easily implemented • Low short-term cost • Limited short term effectiveness	• No long-term effectiveness • Limited protection of human health or the environment • Prevents re-use of the Site
Full Soil Removal (Section 2.3.2.3)	• Protective of human health and the environment • Long- & short-term effectiveness • Allows for flexible Site re-use	• High cost • Difficult to implement
Partial Soil Removal/ In-Situ Remediation Alternative (Section 2.3.2.4)	• Relatively simple implementation • Protective of human health and the environment • Long- & short-term effectiveness • Allows for flexible Site re-use • Potential short treatment time	• Moderate to high cost • Remaining contamination requires engineering controls

2.3.2 Preliminary Screening of Alternatives

The alternatives identified above for this Site are summarized below, and are evaluated for effectiveness, implementability, and cost. These alternatives are also thoroughly described and analyzed (as warranted) in Section 4.0.

2.3.2.1 No Further Action Alternative

Description

The No Further Action Alternative would involve absolutely no active remediation of the Site. The existing buildings would remain and all existing (and suspected) contaminated media would remain in place. No attempt to minimize, treat, or eliminate known on-site contaminants would occur. Consideration of this alternative is required by the NYSDEC to ensure that any costs and societal benefits (e.g., protection of human health, elimination of contaminant migration) associated with the selected alternative are justified.

Implementability

The No Further Action Alternative would be simple to implement. No local approvals would be required for implementation.

Cost

No short term costs are associated with this alternative. For the purposes of this RAR/RWP, no long term cost calculations are made for the No Further Action Alternative. The opportunity cost of not developing this property is estimated to be relatively high. Qualitatively, the opportunity costs include lost construction jobs, pre-construction costs, and property taxes.

Effectiveness

The No Further Action Alternative is not considered to be protective of human health and the environment in either the short or long term. Site access will remain relatively unrestricted and the potential will therefore exist for contact by future Site users with PCB, PAHs, petroleum and metals-contaminated soils, which will remain on-site. Based on these findings, it is concluded that the No Further Action Alternative does not meet the requirement for long-term protection of public health from the known on-site contaminants.

2.3.2.2 Site Control and Security Alternative

Description

The Site Control and Security Alternative would involve no active remediation of the Site. Existing buildings would be demolished. No attempt to minimize, treat, or eliminate known on-site contaminants would occur. This alternative requires implementation of institutional and engineering controls. Institutional controls (IC) include restrictions on the use of on-site groundwater to prevent direct contact and ingestion. Engineering controls (EC) include the installation of additional fencing and/or maintenance of these expanded fences to prevent exposure to contaminated soils.

Implementability

The Site Control and Security Alternative would be simple to implement. No local approvals would be required for implementation. On-going Site management activities, however, would be required. Site safety is a present and future consideration. Site fences are in fair condition and most likely will require repair in the future. Additional fences are needed along the southern boundary of the property to restrict the Site completely. Some consideration (and therefore costs) for future maintenance of Site control features (e.g., fences) must be included in this alternative. Improving and maintaining Site access control features may become burdensome to the owner.

Cost

The Site Control and Security Alternative would be relatively inexpensive to implement. Expenses include the costs of removing all on-site structures, and maintaining (in some cases installing and improving) fences and other Site access control features. For the purpose of cost calculations, a project lifetime of thirty years is assumed in this analysis. Total short-term costs for the Site Control and Security Alternative are estimated at $50,000 as most of the Site is currently fenced (see Appendix D for detailed cost estimates). Long-term costs are indeterminate at this time.

The opportunity cost of not developing this property is estimated to be relatively high. Qualitatively, the opportunity costs include lost construction jobs, pre-construction costs, and property taxes.

Effectiveness

This Site Control and Security Alternative provides limited protection to human health and the environment in the short term as limited access to the Site will reduce exposure to contaminants. However, the Site Control and Security Alternative is not considered to be protective of human health and the environment in the long term. The potential will exist for contact by future Site users with PCB, PAHs, petroleum and metals-contaminated soils, which will remain on-site. Based on these findings, it is concluded that the Site Control and Security Alternative does not meet the requirement for long-term protection of public health from the known on-site contaminants.

2.3.2.3 Full Soil Removal Alternative

Description

The Full Soil Removal Alternative would involve:

- Site clearing and demolition of all existing structures with the exception of the barn;
- Removal of all surface and subsurface soils known or suspected to contain PCB, PAHs, petroleum and/or metals contamination above Soil Cleanup Objectives (SCOs) outlined in the NYSDEC BCP for Unrestricted Use;
- Relocation of the barn, if necessary, to access potentially contaminated soils and,
- Back-filling excavated areas not subject to construction with certified clean fill soils.

It is anticipated that as much as 63,400 cubic yards, the majority of the soils on Site, will be removed as a result of widespread contamination throughout the entire Site. Soil volume calculations for the Full Soil Removal Alternative are presented in Appendix C. If necessary, additional material will be excavated until all contaminated Site soils are removed and clean end points are encountered.

Implementability

The Full Soil Removal Alternative is considered to be difficult to implement. Soil removal is likely to be complex due to the potential large volume of soils to be excavated and the complications presented by excavating soils below or in the proximity of the groundwater table and adjacent to the Hudson River. The volume of saturated soil requiring dewatering is estimated to be 45,500 cubic yards. Volume calculations for saturated soils for the Full Soil Removal Alternative are presented in Appendix C. Excavated soils and imported clean fill will be transported via trucks.

Cost

The costs associated with this alternative include: the design process; removal of all on-site structures with the exception of the barn; excavation, dewatering, removal, and proper disposal of contaminated soils; and importation and handling of any needed fill materials. Associated laboratory costs for post-excavation confirmatory sampling will also be incurred. Total costs for the Full Soil Removal Alternative are $11,675,000 (see Appendix D).

Effectiveness

This alternative is the most effective for protecting human health and the environment. It will also allow maximum flexibility for future development.

2.3.2.4 Partial Soil Removal/In-Situ Remediation Alternative

Description

The Partial Soil Removal/In-Situ Remediation Alternative would involve:

- Site clearing and demolition of all existing structures with exception of the barn;
- Removal of surface and subsurface soils with significant PCB, PAHs, petroleum and/or metals contamination above SCOs outlined in the NYSDEC BCP for Commercial Use.
- Back-filling excavated areas (as required for Site development) with certified clean fill;
- Additional excavation of soil as required for the construction of the new structure (includes excavation of soils for the foundation slab of the underground service tunnel [excavation depth of 3.5 feet bsg] and grading activities);
- Implementing a in-situ remediation treatment (chemical oxidation) for the purpose of reducing petroleum contamination in soils within the boundary of the former MOSF;
- Installation of a SSDS under building slabs in contact with contaminated soil, in order to intercept potential vapors and thereby prevent these vapors from entering the proposed on-site structure; and,
- Covering the entire Site with a protective barrier layer (e.g. buildings, fill soils, paved surfaces, etc.) to prevent direct contact with low-level contamination remaining on-site.

It is anticipated that approximately 8,000 – 11,500 cubic yards of soil may need to be removed from the Site during the excavation activities in order to remove all significant contamination. Soil volume calculations for the Partial Soil Removal/In-Situ Remediation Alternative are presented in Appendix C. If necessary, additional material will be excavated until all soils contaminated above restricted commercial use guidance levels are removed and sufficiently clean end points are encountered.

Implementability

The Partial Soil Removal/In-Situ Remediation Alternative is considered to be relatively simple to implement. However, soil removal is likely to present difficulties due to the complications presented by excavating soils below or in the proximity of the groundwater table and adjacent to the Hudson River. The volume of saturated soil requiring dewatering is estimated to be 3,925 cubic yards. Volume calculations for saturated soils for the Partial Soil Removal/In-Situ Remediation Alternative are presented in Appendix C. Limited groundwater management will be necessary. Excavated soils will be transported via trucks.

Appropriate coordination and management of remedial actions and site development activities will be necessary to ensure that site development does not interfere with the implementation of the Partial Soil Removal/In-Situ Remediation Alternative.

Cost

The costs associated with this alternative include: the design process; removal of all on-site structures with the exception of the barn; excavation, dewatering, removal and proper disposal of contaminated soils; back-fill of excavated areas (as warranted); implementation, monitoring and maintenance of in-situ remediation treatment; installation and maintenance of the SSDS; and installation of a barrier layer. Professional and laboratory costs associated with the testing of the in-situ remediation treatment and the SSDS will also be incurred. Total costs for the Partial Soil Removal/In-Situ Remediation Alternative are $4,548,000 (see Appendix D).

Effectiveness

This alternative is effective for protecting human health and the environment. It will also allow flexibility for future development (with limitations relating to the areas of remaining contamination).

2.3.3 Preliminary Comparative Analysis of Alternatives

The No Further Action and Site Control and Security Alternatives are not consistent with the goals of the NYSDEC Brownfields program as they would not permit the re-use of the Site as planned by the Applicant (mixed-use waterfront development). Furthermore, these Alternatives are not likely to meet the criteria of public acceptance and will not provide long-term protection of public health and the environment. Therefore, the No Further Action and Site Control and Security Alternatives are not considered to be appropriate remedial strategies for this Site.

The Full Soil Removal and Partial Soil Removal/In-Situ Remediation Alternatives, which include excavation of soils likely to contain significant contaminant concentrations, are appropriate remedial strategies for this Site. These alternatives provide for effective long-term protection of public health and the environment. Additionally, because all significantly impacted soils are likely to be removed, there will be more flexibility in future Site use. In comparison to the Site Control and Security Alternative, there will be less future oversight necessary with regard to the maintenance of Site access controls.

The Full Soil Removal and the Partial Soil Removal/In-Situ Remediation Alternatives are assessed in greater detail in Section 2.4, below.

2.4 Detailed Analysis of Remedial Alternatives

This Section provides a detailed analysis of the Full Soil Removal and Partial Soil Removal/In-Situ Remediation Alternatives. A detailed analysis is not warranted for the No Further Action and Site Control and Security Alternatives.

2.4.1 Common Elements and Considerations

Several work elements are common to the Full Soil Removal and Partial Soil Removal/In-Situ Remediation Alternatives. By reference, these common elements are incorporated in the detailed description and/or implementation of these alternatives provided in Section 2.4.2.

Design Process

The NYSDEC has determined that a full-scale Remedial Design is necessary for the project. Design components and design deliverables will be established in the design process for the preferred Remedial Alternative. The design process will occur in consultation with the NYSDEC and NYSDOH. The design components and design deliverables will be outlined in the RWP for the preferred Remedial Alternative. Specifications, drawings, and design details for the preferred Remedial Alternative will be presented in the RDR.

Site Work Boundaries and Utility Locations

Prior to any substantive Site work, Site work boundaries and utility locations will be established. If not available, a survey will be conducted by a licensed surveyor, and a certified survey map of the Site boundaries will be filed with the appropriate agencies. The field Survey will include the placement of field markers or the identification of existing pins. A Survey Map and a “metes and bounds” description will be filed with the appropriate governmental agencies. This map and description will incorporate all tax lots associated with the Site, as well as delineate the areas of special concern.

The Full Soil Removal and Partial Soil Removal/In-Situ Remediation Alternatives will require utility "mark-outs". As part of this task, underground utility demarcations will be ordered from the appropriate utility providers. These demarcations will be field-checked prior to fieldwork activities.

Site Clearing

All on-site structures, with the exception of the barn, will be demolished prior to the implementation of remedial activities. Specifically, all on-site structures will be razed using mechanized equipment and hand tools, as required, after proper removal of all asbestos-containing materials. Any encountered waste materials will be disposed of in accordance with applicable NYSDEC regulations (6 NYCRR Part 360).

Prior to any demolition, a HASP will be prepared for the selected alternative that provides comprehensive and appropriate protections for all on-site personnel and surrounding populations. The HASP will detail known and possible areas of concern. The HASP will include safety and monitoring plans that conform to the standards and requirements of applicable agencies, including the New York State Department of Labor (NYSDOL) and the Occupational Safety and Health Administration (OSHA).

Soil Removal Activities and Confirmatory Soil Sampling

All soils will be excavated and disposed of in accordance with applicable regulations (6 NYCRR Part 360). Dewatering measures for soils below or in the proximity of the groundwater table and adjacent to the Hudson River will implemented as appropriate. Soil sampling will be conducted during soil excavation in order to characterize soils for off-site disposal. Confirmatory endpoint sampling will be conducted to document the integrity of remaining soils. Soil sampling will be conducted according to protocols outlined in the RWP, Quality Assurance/Quality Control Plan (QA/QC Plan), and according to repository analytical requirements.

Following construction excavation, any overtly impacted remaining soils, and any soils with significant confirmed contamination, will be further excavated until clean end points are encountered.

Personnel performing soil excavation and sampling will be properly trained in accordance with OSHA and NYSDOL requirements. Site personnel will be informed of Site-specific concerns and properly instructed with regard to pertinent details. These concerns, details, and procedures will be detailed in the RDR.

2.4.2 Detailed Analysis of Alternatives

2.4.2.1 Full Soil Removal Alternative

Description

The Full Soil Removal Alternative would include the common elements in Section 2.4.1, and the following tasks:

- Excavation and removal of all Site soils exceeding Unrestricted Use SCOs (maximum depth of 20 feet). Excavation will be determined by location-specific contamination;
- Relocation of the barn, if necessary, to access potentially contaminated soils; and,
- Back-filling excavated areas with certified clean fill soils.

Implementation Schedule

It is estimated that the time necessary to design and conduct demolition and soil removal would be 15 months. This time schedule is divided into a design phase of one month, a bid solicitation

and award phase of two months, and a fieldwork phase of 12 months. This schedule assumes no seasonal constraints. Should the project schedule result in the construction occurring in the winter, the total project schedule timetable will be extended.

Criteria Assessment

Short Term Effectiveness: The Full Soil Removal Alternative is considered to be effective in protecting human health and the environment in the short term. This alternative would involve the removal of all on-site contaminated soils, and would eliminate exposure to contaminant sources. The implementation of appropriate measures during building demolition and/or on-site soil disturbance activities is likely to effectively prevent the release of significant contaminants into the environment. Construction workers operating under appropriate management procedures are not likely to be significantly impacted by on-site contaminants (personal protective equipment would be worn consistent with the documented risks within the respective work zones). This alternative provides short term effectiveness in protecting the surrounding community by decreasing the risk of contact with on-site contaminants. The implementation of a HASP (incorporating a Community Health and Safety Plan) and a CAMP will serve to minimize potential short term impacts to the surrounding community from increased vehicle traffic, dust, vapors, and noise.

Long Term Effectiveness: The Full Soil Removal Alternative would remove the on-site sources of contamination and remove future concerns with regard to potential RECs. Long term impacts to the surrounding community will be positive because future threats to human health and the environment will be eliminated.

Implementability: Removing all on-Site contaminated soils will be difficult to implement. Soil removal is likely to be complex due to the potential large volume of soils to be excavated and the complications presented by excavating soils below or in the proximity of the groundwater table and adjacent to the Hudson River. The volume of saturated soil requiring dewatering is estimated to be 45,500 cubic yards. Volume calculations for saturated soils for the Full Soil Removal Alternative are presented in Appendix C. Groundwater management will be necessary. In addition, the barn is likely to obstruct access to potentially arsenic and lead impacted soils, and therefore relocation of the barn may be necessary.

Supervision of demolition personnel will be necessary during the demolition of the relevant structures in order to avoid accidental dispersion of impacted soils and/or human contact with these soils. The Site has reasonably clear access for trucks to enter and exit and sufficient space for the loading and unloading (including temporary stockpiling) of materials.

Compliance with Standards, Criteria, and Guidance Values: This alternative removes known sources of contamination and associated contaminated soil from the Site. Post-remedial conditions would meet or exceed cleanup requirements for unrestricted use.

Overall Protection of Human Health and the Environment: This alternative provides for the protection of human health and the environment in both the short and long term.

Reduction in Toxicity, Mobility, and Volume: The Full Soil Removal Alternative will eliminate all on-site material considered to be contaminated.

Community Acceptance: This alternative provides the community with the opportunity to transform this Site from an industrial Site partially used to a more desirable waterfront development; therefore increasing community acceptance. Community concern is most likely to focus on the anticipated increase in truck traffic during remedial activities.

Land Use: This alternative provides improvement in Site and local area land use area by transforming the Site from an abandoned industrial property to a mixed-use waterfront development. This improvement is consistent with: the planned land use of the Site and adjacent and surrounding land uses; recent development patterns; population growth projections; the City

of Beacon Comprehensive Plan; the City's local Waterfront Revitalization Plan; Dutchess County Plans; and state and regional plans and land use designations. In addition, this alternative is generally in conformance with the City of Beacon's Waterfront Development Zoning District. Currently, the Site is not within a Brownfield Opportunity Area.

The proposed action is in close proximity to residential property, and commercial, transportation and recreational areas, and is expected to result in increased accessibility to existing and proposed infrastructure. The proposed action is expected to increase pedestrian public access to the waterfront, encourage a mix of uses on the waterfront, and provide for the economic and physical revitalization of the waterfront area. No environmental justice concerns are anticipated under this alternative. The proposed action is anticipated to result in the development of open space and publicly accessible recreational areas. The community has been involved in the Brownfield Cleanup Program process through public meetings and comment periods.

No historical or archeological resources are located within the Site. The Site is in the general vicinity of several cultural resources (e.g. the former Federal Paperboard industrial facility, the Reformed Church of Fishkill Landing, the Spy Hill local historic district, and the Tompkins Avenue/High Street residential local historic building). The proposed action is expected to have a positive impact in surrounding cultural resources by enhancing the area's visual quality.

Existing terrestrial ecology at the Site is representative of the Site's industrial history and land uses. Terrestrial communities are ruderal in nature and limited in their potential to support wildlife. Vegetation removal and general construction activities are expected to have limited impact in the terrestrial ecology and be of short-term duration. Beneficial impacts are anticipated as the proposed action will result in the removal of contaminated surface and subsurface soil, removal of debris and the implementation of a complete landscaping plan (Figure 3, Appendix B).

The westernmost portion of the Site is submerged in the Hudson River (a mapped federal wetland). No other wet areas or mapped wetlands are present at the Site or surrounding areas. Approximately 80% of the Site is located in a 100-year flood plain. The Hudson River supports many species of fish, aquatic macroinvertebrates, and shoreline vegetation. Proper implementation of a stormwater management plan, sediment and erosion controls, construction site management, and dewatering techniques during the construction phase of the project is expected to reduce any potential impact to the Hudson River. Construction activities are expected to have limited impact in the aquatic ecology of the Hudson River and be of short-term duration.

No endangered, threatened, or exploitably vulnerable plant species currently exist at the Site. No Protected Native Plants were observed during field investigations. The following Protected Native Plants exist in the parcel immediately south of the Site: estuary beggar-ticks and flowering dogwood. No records exist of rare animal species occurring at the Site. The presence of rare animal species (bald eagle, least bittern and shortnose sturgeon) is documented in records for the Hudson River and for the general vicinity of the mouth of the Fishkill Creek (approximately 2,000 feet south of the Site). Available records show no Federal or State-listed endangered fish or wildlife species at the Site. Indiana bats (a Federal or State-listed endangered species) exists 27 miles south of the Site.

Available records show no critical habitat in accordance with the Endangered Species Act at the Site. Several significant habitats exist in the vicinity of the mouth of the Fishkill Creek (classified as a Significant Coastal and Wildlife Habitat): anadromous fish concentration area, waterfowl concentration area, and other rare tidal habitats. No impacts are anticipated to Protected Native Plants, rare animal species, Indiana bats, or surrounding significant habitats as a result of this remedial alternative and proposed Site development activities.

The proposed action is consistent with existing geography and geology at the Site. The vulnerability of the groundwater is not a significant concern with this remedial alternative as the removal of contaminated soils is expected to reduce existing groundwater contamination. In

addition, groundwater is not expected to be used as a drinking water source under existing or future conditions. No institutional controls are known to currently exist at the Site.

Cost: The costs associated with the Full Soil Removal Alternative would be costs resulting from the design process, demolition of on-site structures, relocation of the barn, removal and disposal of all contaminated soils, dewatering, and replacement of excavated soil with clean fill. For the purpose of cost calculations, a project lifetime of thirty years is assumed in this analysis. Total costs for the Full Soil Removal Alternative are estimated at a present value of $11,675,000 (see Appendix D).

2.4.2.2 Partial Soil Removal/In-Situ Remediation Alternative

Description

The Partial Soil Removal/In-Situ Remediation Alternative would include the common elements in Section 2.4.1 and the following tasks:

- Excavation and removal of all: Site soils exceeding Commercial Restricted Use SCOs for PCBs, arsenic, lead and mercury; soils east of the concrete foundation exceeding Commercial Restricted Use SCOs for individual SVOCs (mainly PAHs); and soils east of the barn exceeding the TAGM 4046 guidance level for total SVOCs (maximum depth of 20 feet). The extent of excavation will be determined by location-specific contamination;
- Back-filling excavated areas (as warranted) with certified clean fill soils;
- Implementing a chemical oxidation treatment within the boundary of the former MOSF;
- Installation of a SSDS under portions of buildings in contact with contaminated soil; and,
- Covering the entire Site with a protective barrier layer (e.g. buildings, fill soils, paved surfaces, etc.).

A Proposed Site Remediation Map showing areas of excavation (Figure 6) is presented in Appendix B.

Design and Implementation of the In-Situ Chemical Oxidation Treatment

An in-situ chemical oxidation treatment will be implemented in the south-central portion of the Site, in the vicinity of the MOSF, to remediate petroleum contaminated soils. Prior to full-scale implementation of the chemical oxidation treatment, bench scale testing and a pilot program will be performed in soils in the vicinity of sampling location SB-15 (significantly contaminated area) to assess the effectiveness of reagents, document the presence of limiting conditions (which would necessitate a modification to the original treatment formulation) and refine treatment cost estimates.

The following goals for the pilot program are proposed to measure the effectiveness of the chemical oxidation treatment:

- Removal of petroleum odors and other significant field indications of contamination (sheen, discoloration, etc.)
- Evaluate safe application of ISCO reagents
- Reduction of petroleum compounds to the guidance levels established in Section 2.2.1 for soil and groundwater

Based on the pilot program data, a Site-specific scope of work will be prepared to design the full-scale application. During the full-scale application chemical oxidation agents will be propagated through the ground at different depths and doses via a direct-push injection method prior to completing the foundation slab for the underground service tunnel within the proposed main structure. Multiple injections may be necessary to achieve desired results. Six to eight months are anticipated for the completion of the full-scale treatment. The effectiveness of the in-situ

chemical oxidation treatment will be monitored through laboratory analysis of soil, groundwater and soil vapors in the area. Design and implementation of the in-situ chemical oxidation treatment will be conducted according to the approved RDR.

Installation, Testing, and Operation of Sub-Slab Depressurization System (SSDS)

A properly designed SSDS, including a suitable vapor barrier, will be installed beneath the foundation slab of the main building's underground service tunnel, to capture and manage potential remaining soils vapors (other portions of the main building are designed such that air will flow freely beneath the structure, effectively preventing sub-slab vapors from entering the building, and thereby obviating the need for an SSDS in those areas). Should Site development plans change, a SSDS (or other necessary mitigation measure, e.g. open space) will be installed beneath the foundation slabs of any other constructed buildings. The effectiveness of the SSDS will be documented through physical measurements, laboratory analysis of discharge stack samples, and post-construction indoor air quality monitoring. Installation, testing, and maintenance of the SSDS will be conducted according to the approved RDR.

Barrier Layer

The entire Site will be covered with a protective barrier layer. Portions of the Site not covered by the concrete foundations of proposed new structures or by other impermeable materials (e.g., asphalt pavement) will be subsequently covered by a barrier layer of at least two feet of soil (such material must be approved by the NYSDEC as acceptable for Site use). It is estimated that approximately 15,000 cubic yards of material will be needed.

Implementation Schedule

It is estimated that the time necessary to design and conduct demolition, soil removal, in-situ chemical oxidation, and installation of the SSDS would be 12 – 15 months. This time schedule is divided into a design phase of one month, a bid solicitation and award phase of one month, and a fieldwork phase of 10 - 12 months. This schedule assumes no seasonal constraints. Should the project schedule result in the remediation occurring in the winter, the total project schedule timetable will be extended.

Criteria Assessment

Short Term Effectiveness: The Partial Soil Removal/In-Situ Remediation Alternative is considered to be effective in protecting human health and the environment in the short term. This alternative is likely to remove significantly contaminated soils on-site, and would greatly reduce exposure to contaminant sources (any remaining low-level contaminants would be buried beneath the barrier layer, asphalt, or future on-site structure).

The implementation of appropriate measures during building demolition, chemical oxidation treatment, and/or on-site soil disturbance activities is likely to effectively prevent the release of significant contaminants into the environment. Construction workers operating under appropriate management procedures are not likely to be significantly impacted by on-site contaminants (personal protective equipment would be worn consistent with the documented risks within the respective work zones). Protective measures, to be outlined in the RDR, will be implemented to ensure worker safety during any concurrent site development activities. This alternative provides short term effectiveness in protecting the surrounding community by decreasing the risk of contact with on-site contaminants.

The implementation of a HASP (incorporating a Community Health and Safety Plan), a site-specific Health and Safety Plan for chemical oxidation (to be prepared by the subcontractor providing in-situ remediation services), and CAMP will serve to minimize potential short term impacts to the surrounding community from increased vehicle traffic, odors, vapors, dust, noise and other potential impacts related to chemical oxidation.

Long Term Effectiveness: The Partial Soil Removal/In-Situ Remediation Alternative is likely to remove significant on-site sources of contamination and remove future concerns with regard to potential RECs. Long term impacts to the surrounding community will be positive because future threats to human health and the environment are likely to be extremely limited.

Implementability: Supervision of demolition personnel will be necessary during the demolition of the relevant structures in order to avoid accidental dispersion of impacted soils and/or human contact with these soils. It is technically feasible to excavate severely impacted soils from the Site. The barn is likely to obstruct access to soils potentially impacted by arsenic and lead and those materials may remain on-site. The barn footprint, however, will serve as a barrier layer to prevent exposure to impacted soils.

Soil removal, particularly in the western end of the Site and in excavation areas exceeding 5 feet bsg in depth, is likely to be moderately complex due the complications presented by excavating soils below or in the proximity of the groundwater table and adjacent to the Hudson River. The volume of saturated soil requiring dewatering is estimated to be 3,925 cubic yards. Volume calculations for saturated soils for the Partial Soil Removal/In-Situ Remediation Alternative are presented in Appendix C. Limited groundwater management will be necessary.

The Site has reasonably clear access for trucks to enter and exit and sufficient space for the loading and unloading (including temporary stockpiling) of materials.

It is technically feasible to coordinate site development (demolition of structures, site preparation, site grading, dynamic compaction, pile driving, and construction of the foundation slab for the underground service tunnel) with remedial activities. Remedial activities proposed under the Partial Soil Removal/In-Situ Remediation Alternative will take priority over Site development activities if Site development activities would interfere with the implementation of this alternative.

The following order of events for remedial and Site development activities is proposed:

- Site clearing and demolition of on-site structures (with exception of the barn), also considered site development activities, will occur simultaneously with the excavation of contaminated soils and the pilot program for in-situ chemical oxidation located in the southeastern portion of the former MOSF.
- Removal of soils in the area of the former MOSF (arsenic and lead contaminated soils and soils necessary to build the foundation of the underground service tunnel) will occur first in order to commence full-scale in-situ chemical oxidation treatment in this area.
- Chemical oxidation treatment and excavation of contaminated soil in areas outside of the former MOSF will occur simultaneously.
- Chemical oxidation in the area of the building footprint will be implemented prior to the construction of the foundation slab for the underground service tunnel.
- Site development activities concerning the underground service tunnel will proceed (to the extent possible) after the proposed chemical oxidation injections are applied and preliminary data documents successful removal of VOCs, SVOCs, and TPH-DROs.
- The installation of a vapor barrier and SSDS will occur prior to the construction of the slab foundation of the underground service tunnel (or any other foundation slabs in contact with Site soils).
- If additional chemical oxidation injections are necessary underneath the underground service tunnel foundation, forty-five degree angle injections and/or additional treatment in areas adjacent to the underground service tunnel will be implemented.
- Remaining portions of the barrier layer (any additional building foundations, imported soil, and/or pavement) will be installed after the chemical oxidation treatment and Site grading activities.

Compliance with Standards, Criteria, and Guidance Values: This alternative is likely to remove and/or remediate all significantly contaminated soils from the Site. Post-remedial conditions will meet or exceed cleanup requirements. It is anticipated that low-level contamination will remain on-site beneath the foundation of on-site structures and barrier layer, consistent with the proposed commercial use of the Site.

Overall Protection of Human Health and the Environment: This alternative provides for the protection of human health and the environment in both the short and long term (any remaining contaminants are not likely to represent a significant risk to human health or the environment).

Reduction in Toxicity, Mobility, and Volume: The Partial Soil Removal/In-Situ Remediation Alternative is likely to drastically reduce the volume and toxicity of all on-site material considered to be significantly contaminated. In addition, the barrier layer is likely to reduce the mobility of the low-level contamination expected to remain on-site.

Community Acceptance: This alternative provides the community with the opportunity to transform this Site from an industrial Site partially used to a more desirable waterfront development and therefore increase community acceptance. Community concern is most likely to focus on the anticipated increase in truck traffic during remedial activities.

Land Use: This alternative provides improvement in Site and local area land use area by transforming the Site from an abandoned industrial property to a mixed-use waterfront development. This improvement is consistent with: the planned land use of the Site and adjacent and surrounding land uses; recent development patterns; population growth projections; the City of Beacon Comprehensive Plan; the City's local Waterfront Revitalization Plan; Dutchess County Plans; and state and regional plans and land use designations. In addition, this alternative is generally in conformance with the City of Beacon's Waterfront Development Zoning District. Currently, the Site is not within a Brownfield Opportunity Area.

The proposed action is in close proximity to residential property, and commercial, transportation and recreational areas, and is expected to result in increased accessibility to existing and proposed infrastructure. The proposed action is expected to increase pedestrian public access to the waterfront, encourage a mix of uses on the waterfront, and provide for the economic and physical revitalization of the waterfront area. No environmental justice concerns are anticipated under this alternative. The proposed action is anticipated to result in the development of open space and publicly accessible recreational areas. The community has been involved in the Brownfield Cleanup Program process through public meetings and comment periods.

No historical or archeological resources are located within the Site. The Site is in the general vicinity of several cultural resources (e.g. the former Federal Paperboard industrial facility, the Reformed Church of Fishkill Landing, the Spy Hill local historic district, and the Tompkins Avenue/High Street residential local historic building). The proposed action is expected to have a positive impact in surrounding cultural resources by enhancing the area's visual quality.

Existing terrestrial ecology at the Site is representative of the Site's industrial history and land uses. Terrestrial communities are ruderal in nature and limited in their potential to support wildlife. Vegetation removal and general construction activities are expected to have limited impact in the terrestrial ecology and be of short-term duration. Beneficial impacts are anticipated as the proposed action will result in the removal of contaminated surface and subsurface soil, removal of debris and the implementation of a complete landscaping plan (Figure 3, Appendix B).

The westernmost portion of the Site is submerged in the Hudson River (a mapped federal wetland). No other wet areas or mapped wetlands are present at the Site or surrounding areas. Approximately 80% of the Site is located in a 100-year flood plain. The Hudson River supports many species of fish, aquatic macroinvertebrates, and shoreline vegetation. Proper implementation of a stormwater management plan, sediment and erosion controls, construction

site management, and dewatering techniques during the construction phase of the project is expected to reduce any potential impact to the Hudson River.

Construction activities are expected to have limited impact in the aquatic ecology of the Hudson River and be of short-term duration. No endangered, threatened, or exploitably vulnerable plant species currently exist at the Site. No Protected Native Plants were observed during field investigations.

The following Protected Native Plants exist in the parcel immediately south of the Site: estuary beggar-ticks and flowering dogwood. No records exist of rare animal species occurring at the Site. The presence of rare animal species (bald eagle, least bittern and shortnose sturgeon) is documented in records for the Hudson River and for the general vicinity of the mouth of the Fishkill Creek (approximately 2,000 feet south of the Site). Available records show no Federal or State-listed endangered fish or wildlife species at the Site. Indiana bats (a Federal or State-listed endangered species) exists 27 miles south of the Site.

Available records show no critical habitat in accordance with the Endangered Species Act at the Site. Several significant habitats exist in the vicinity of the mouth of the Fishkill Creek (classified as a Significant Coastal and Wildlife Habitat): anadromous fish concentration area, waterfowl concentration area, and other rare tidal habitats. No impacts are anticipated to Protected Native Plants, rare animal species, Indiana bats, or surrounding significant habitats as a result of this remedial alternative and proposed Site development activities.

The proposed action is consistent with existing geography and geology at the Site. The vulnerability of the groundwater is not a significant concern with this remedial alternative as the removal of significantly contaminated soils and in-situ chemical treatment is expected to reduce existing groundwater contamination. In addition, groundwater is not expected to be used as a drinking water source under existing or future conditions.

No institutional controls are known to currently exist at the Site. It s anticipated that this alternative will restrict on-site groundwater use through institutional controls in order to prevent ingestion of groundwater (low-level contamination is anticipated to remain on-site).

Cost: The costs associated with the Partial Soil Removal/In-Situ Remediation Alternative would be costs resulting from: the design process; demolition of on-site structures; excavation, removal, and dewatering of significantly contaminated soils; installation/operation of the in-situ chemical oxidation treatment and SSDS; and installation of the barrier layer. For the purpose of cost calculations, a project lifetime of thirty years is assumed in this analysis. Total costs for the Partial Soil Removal/In-Situ Remediation Alternative are estimated at a present value of $4,548,000 (see Appendix D).

2.4.3 Comparative Analysis of Alternatives

In this Section, the strengths and weaknesses of the Full Soil Removal and Partial Soil Removal/ In-Situ Remediation Alternatives are assessed relative to the No Further Action and Site Control and Security Alternatives, for each analysis criteria.

2.4.3.1 Short-Term Effectiveness

Full Soil Removal and Partial Soil Removal/In-Situ Remediation Alternatives are considered to be effective in the short term in protecting human health and the environment. The No Further Action and Site Control and Security Alternatives are not considered to be effective in the short term in protecting human health and the environment.

2.4.3.2 Long Term Effectiveness

The Full Soil Removal Alternative is considered to be the best alternative with regard to long-term effectiveness (this Alternative is marginally better than the Partial Soil Removal/In-Situ Remediation Alternative). The Full Soil Removal and Partial Soil Removal/In-Situ Remediation Alternatives are protective of human health and the environment in the long-term by eliminating on-site contaminants. The Full Soil Removal Alternative will result in the most flexibility in future Site uses; however, limitations imposed by Partial Soil Removal/In-Situ Remediation are minimal.

The No Further Action Alternative and the Site Control and Security Alternative afford the least long-term effectiveness. The eventual degradation of structures will result in a steady worsening of Site conditions and may increase potential future contamination.

2.4.3.3 Implementability

The No Further Action Alternative is the most easily implemented option. The Site Control and Security Alternative is easily implemented in the short-term; however, long-term management considerations may significantly complicate implementation of this alternative.

The Partial Soil Removal/In-Situ Remediation Alternative is considered to be relatively simple to implement, but with the potential for complications due to dewatering of soils and the coordination of remedial and Site development activities. However, the Full Soil Removal is consider the most difficult to implement due to the complexity of removing large amounts of soil below or in the vicinity of the groundwater table and adjacent to the Hudson River.

2.4.3.4 Reduction of Toxicity, Mobility, and Volume

The Full Soil Removal and Partial Soil Removal/In-Situ Remediation Alternatives are the most successful at reducing toxicity, mobility, and volume of on-site contaminants. In these alternatives, all areas of significant contamination will be removed or will be adequately sequestered. This would eliminate future toxicity and mobility concerns.

The No Further Action Alternative and the Site Control and Security Alternative do not reduce the volume of contaminated material on-site. These alternatives also potentially increase the mobility of contaminants in the long-term, due to the degradation of on-site structures.

2.4.3.5 Compliance with Standards, Criteria, and Guidance Values

The Full Soil Removal and Partial Soil Removal/In-Situ Remediation Alternatives comply with established SCGs. The Full Soil Removal Alternative best complies with established SCGs, by eliminating soil materials containing contamination above Unrestricted Use SCOs. The Partial Soil Removal/In-Situ Remediation Alternative also complies with SCGs by eliminating soil materials containing PCB, arsenic, lead, and mercury, and individual SVOCs east of the concrete foundation above Commercial Restricted Use SCOs, and total SVOCs east of the barn above TAGM 4046 guidance levels.

In addition, remediation of contaminated soils with petroleum compounds in the area of the former MOSF is expected to significantly reduce contamination in this area. Remaining contaminants are expected to be covered with a protective barrier layer (on-site structures, paved surfaces, site-wide barrier layer, etc.), to prevent exposure to impacted soils. SCGs for these conditions are likely to be relatively more permissive.

The No Further Action Alternative and the Site Control and Security Alternative do not meet basic SCGs. The Site would not be fit for future re-use under these alternatives.

2.4.3.6 Overall Protection of Human Health and the Environment

The Full Soil Removal Alternative best protects human health and the environment (this Alternative is only marginally better than the Partial Soil Removal/In-Situ Remediation Alternative). Short periods will occur during remedial activities when dust generation and contaminant exposure have the potential to impact human health and the environment. However, the strict implementation of a NYSDEC-approved HASP and the RDR will mitigate these concerns.

The No Further Action Alternative and the Site Control and Security Alternative would do little to safeguard human health or the environment from environmental concerns in the long-term.

2.4.3.7 Community Acceptance

Community acceptance cannot be definitively determined until public comment has been solicited and incorporated into this RAR/RWP. The presence of continued on-Site contamination and increased truck traffic are the potential issues most like to generate public concern and controversy. With respect to these two issues, the Full Soil Removal and Partial Soil Removal/In-Situ Remediation Alternatives are likely to have the highest level of community acceptance. Given that the Full Soil Removal Alternative would result in no significant contamination left on-site and the Partial Soil Removal/In-Situ Remediation Alternative would result in no exposure to remaining low-level contamination, these alternatives are the most likely ones to be accepted.

It is anticipated that the No Further Action Alternative and the Site Control and Security Alternative would be least accepted by the public. The public is likely to be concerned about taking no remedial actions for two significant reasons: 1) worry over the safety of dust and runoff leaving the Site, and 2) concerns for the safety of residents, especially children, that may be accidentally exposed to Site contaminants or hurt in on-site structures that are in disrepair.

2.4.3.8 Land Use

The No Further Action and Site Control and Security Alternatives are not expected to change the current land use of the Site (an abandoned industrial property). These Alternatives will allow contamination to remain on-site, not permit the re-use of the Site, limit waterfront access to the public, and be inconsistent with local area land uses, proposed revitalization plans and zoning.

The Full Soil Removal and Partial Soil Removal/In-Situ Remediation Alternatives will allow for the re-use of the Site because significantly contaminated soils will be removed and/or remediated. These Alternatives are consistent with local land uses, proposed revitalization plans and zoning, and provide access to an improved and aesthetically pleasing waterfront.

2.4.3.9 Cost

The No Further Action Alternative is the least expensive alternative as no significant direct costs are associated with this option. The Site Control and Security Alternative would be relatively inexpensive to implement ($50,000). The No Further Action Alternative and the Site Control and Security Alternative would do little to safeguard human health or the environment from environmental concerns.

The Partial Soil Removal/In-Situ Remediation Alternative is considered to be moderately expensive to implement ($4,548,000). The Full Soil Removal is considered the most expensive alternative ($11,675,000). The Full Soil Removal and Partial Soil Removal/In-Situ Remediation Alternatives will safeguard human health or the environment from environmental concerns.

2.4.4 Recommendation of Preferred Alternative

The recommended remedial alternative for this Site is the Partial Soil Removal/In-Situ Remediation Alternative, for the following reasons:

1. The Partial Soil Removal/In-Situ Remediation Alternative meets remedial objectives set forth in Section 2.2.1, consistent with the development and future use of the Site.

2. Based on available environmental data, it is very likely that this alternative will lead to the removal/remediation of all significant on-site contamination; remaining contamination is likely to be minimal and will be deeply buried beneath a protective barrier layer (building footprints, pavement, or site-wide barrier layer of imported soil), which will cover the entire Site. This Alternative therefore provides effective protection of public health and the environment in both the short-term and the long term, and eliminates the possibility that future users would come into contact with on Site contaminants.

3. This alternative provides the owner with both short-term and long-term effective methods of securing the Site and preventing contaminants from migrating off-site or impacting future users.

4. The Partial Soil Removal/In-Situ Remediation Alternative is less difficult to implement than the Full Soil Removal Alternative based on the amount of soils to be excavated and dewatering requirements. In addition, the Partial Soil Removal/In-Situ Remediation Alternative has the potential to be successfully integrated into the waterfront development planning process.

5. Although the Full Soil Removal Alternative has the same favorable outcomes as the Partial Soil Removal/In-Situ Remediation Alternative, the cost and feasibility constraints associated with the Partial Soil Removal/In-Situ Remediation Alternative are likely to be less than the Full Soil Removal Alternative.

3.0 REMEDIAL WORKPLAN

This Remedial Workplan (RWP) presents a conceptual design for the proposed remedial response actions to address known and suspected environmental conditions on the Site, as detailed in ESI's Remedial Investigation Report (RIR). A summary of Site environmental conditions is presented in Section 1.3, above. Response actions will be conducted consistent with the preferred Remedial Alternative as selected in Section 2.4.4, above (Partial Soil Removal/In-Situ Remediation Alternative), which calls for removal of significantly contaminated soil during construction activities, in-situ chemical oxidation treatment, and the installation of a Sub-Slab Depressurization System (SSDS) beneath the foundation of the underground service tunnel (and any other foundation slabs in contact with Site soils). A Proposed Site Remediation Map (Figure 6), depicting relevant Site features and areas of proposed excavation and in-situ remediation, is provided in Appendix B. All proposed work will be conducted according to a Site specific Health and Safety Plan (HASP), provided as Appendix E. A Remedial Design Report (RDR) will be prepared in order to fully develop design components and technical specifications to execute the preferred Remedial Alternative.

For the purpose of the work detailed in this RWP, the "Volunteer" is defined as Foss Group Beacon and The Scenic Hudson Land Trust, Inc. which will contract with the environmental consultant and/or remediation firm (hereafter referred to as the On-site Coordinator [OSC]) to provide the services detailed below. Resumes of key ESI personnel who will provide OSC services are provided in Appendix F.

3.1 Scope of Work

The Proposed Remedial Actions will consist of the following:

1. Preparation of full-scale Remedial Design (RD) drawings and specifications, as per the direction of the NYSDEC. RD components and deliverables will be established in the design process (see Section 3.4.1), which will occur in consultation with the NYSDEC and NYSDOH.
2. Demolition of the on-site dwelling and boathouse in accordance with applicable NYSDOL (12 NYCRR Part 56) and NYSDEC (6 NYCRR Part 360) regulations for asbestos and disposition of resulting debris, respectively.
3. The excavation and off-site disposal of: soils containing elevated concentrations (above Commercial Restricted Use SCOs) of arsenic, lead, mercury, and PCB, and individual SVOCs east of the concrete foundation (2SB-2); and soils containing elevated concentrations (above TAGM 4046 guidance level) of total SVOCs east of the barn (SB-1). It is anticipated that the majority of the excavated contaminated soils will be managed as non-hazardous solid waste. A limited volume of the excavated soils, approximately 15% (calculations provided in Appendix C), is estimated to require management as hazardous waste. Pre-treatment of soils, if required, will be minimal and will not substantially delay the project.

   The volume of contaminated soil to be excavated, including non-hazardous and hazardous solid waste, is estimated at 8,000 – 11,500 cubic yards, based on existing data (calculations provided in Appendix C). Specific volumes are as follows:
   - Arsenic contaminated soils in the vicinity of the barn (removing most PCB and lead contaminated soils), south and southwest of the dwelling in the area of the former MOSF, and east and southeast of the concrete foundation (~ 10,800 cubic yards);
   - SVOC contaminated soils east of the concrete foundation at 2SB-2 (~260 cubic yards);
   - Lead contaminated soils west of the dwelling at TP-2 (~ 200 cubic yards);
   - SVOC and mercury contaminated soils near the barn at SB-1 (~200 cubic yards); and,
   - PCB contaminated soils southeast of the barn at SS-11 (~50 cubic yards).

4. Confirmatory endpoint samples will be collected to document the effectiveness of contaminant removal activities and the integrity of post-excavation soils.
5. The implementation and management of an in-situ chemical oxidation treatment to measurably reduce petroleum contamination in the south-central portion of the Site, consistent with the remedial objectives set forth in Section 3.3.3 ("Guidance Levels") below.
6. The installation of a SSDS, with a vapor barrier, under the foundation of the proposed underground service tunnel (and any other foundation slabs in contact with Site soils) to manage potential remaining soil vapors in the south-central portion of the Site.
7. The installation of a protective barrier layer (clean soil, building foundations, and paved areas) throughout the entire Site, to prevent exposures to any remaining contaminants.

The implementation schedule is detailed in Section 3.5, below.

3.2 Overview of Proposed Remediation Services

The following remedial services are proposed, consistent with the selection of the Partial Soil Removal/In-Situ Remediation Alternative:

- A Remedial Design will be developed, which provides detailed plans, specifications, workplans and protocols for remedial activities (see Section 3.4.1).
- Significantly contaminated soils, described in detail in Section 3.1, will be removed from the Site (Section 3.4.2). Soils (and any encountered suspect materials) will be monitored and sampled both during and after excavation activities to ensure proper off-site disposition. Confirmatory endpoint sampling will be conducted to document the integrity of remaining soils;
- An in-situ chemical oxidation treatment will be implemented, monitored and assessed to document treatment effectiveness (Section 3.4.3);
- A vapor barrier and SSDS will be installed (concurrent with the construction of the new building foundation) and tested to document system effectiveness (Section 3.4.4);
- Existing groundwater monitoring wells will be sampled prior and following remediation activities to document any changes in groundwater quality (Section 3.4.5);
- A protective barrier layer will be installed over remaining soils throughout the entire Site (formal design specifications will be detailed in the RDR); and,
- A Final Remediation Services Engineering Report (Final Report, signed by a Professional Engineer [PE]) will be submitted to the Volunteer and the NYSDEC (Section 3.4.6).

3.3 Site Preparation Services

This section of the RWP provides details on activities and services that must be initiated and/or completed prior to the implementation of Site remediation services.

3.3.1 Agency Notification

The NYSDEC will be notified in writing at least five (5) business days prior to the initiation of any of the on-site work and during the course of the fieldwork. Changes to fieldwork scheduling will be provided via facsimile transmission and/or email. All applicable local agencies will also be notified prior to the initiation of site work. NYSDEC will have the opportunity to participate in all remediation project status meetings (adequate notice of these meetings will be provided).

Prior to the implementation of any of the remedial tasks outlined below, a request for a complete utility markout of the subject property will be submitted as required by New York State Department of Labor regulations. Confirmation of underground utility locations will be secured, and a field check of the utility markout will be conducted prior to the initiation of work. Any utilities on the Site will be protected (as necessary) by the contractor or Volunteer.

3.3.2 Equipment Calibration

Equipment

Prior to the initiation of fieldwork, all field equipment to be used during the work will be properly decontaminated in accordance with NYSDEC Analytical Services Protocol (ASP) [dated July 2005], and all field instruments will be properly calibrated in accordance with procedures set forth by the equipment manufacturer(s). Unless otherwise specified, a MiniRAE 3000 (Model PGM 7320) photo-ionization detector (PID) will be used for the screening of organic vapors and a DustTrak™ Aerosol Monitor (Dust Monitor, Model No. 8520) will be used to perform particulate monitoring. The PID and Dust Monitor are calibrated to read (respectively) parts per million calibration gas equivalents (ppm-cge) of isobutylene and milligrams per cubic meter (mg/m^3) of particulate matter. Instrument calibration will be performed no more than 24 hours prior to the commencement of fieldwork, and a written record of calibration results will be provided in the project files.

Laboratory

All samples will be collected in accordance with the QA/QC Plan (Appendix G) and will be submitted to a NYSDOH ELAP-certified laboratory using appropriate chain of custody procedures. Dedicated, laboratory supplied glassware will be used for sample collection. One trip blank and one field blank will be supplied for each day of fieldwork involving sample collection. Field personnel will complete all chain of custody forms.

Laboratory reports will include detailed Quality Assurance/Quality Control (QA/QC) analyses, which will be provided in the Final Report. Category B deliverables, as defined in the NYSDEC ASP, will be submitted for confirmatory and final delineation samples. In addition, Data Usability Summary Reports (DUSRs) will be prepared by a third, independent party, which maintains NYSDOH ELAP CLP Certification. Data validation by an independent validator will be conducted if requested by the NYSDEC.

3.3.3 Guidance Levels

Guidance levels for determining the integrity of post-excavation remaining soils and the effectiveness of in-situ chemical oxidation treatment will be based on NYSDEC Remedial Program Soil Cleanup Objectives (SCOs) for Commercial Restricted Use, as provided in 6 NYCRR Subpart 375, Table 375-6.8(b). The frequency of post-treatment sampling in the chemical oxidation treatment will be determined in the RDR.

Guidance levels and procedures established in the NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (GESVI) will be used to assess VOC concentrations and guide potential remediation of soil vapors.

Guidance levels for all compounds in water will be based on NYSDEC Division of Water Technical and Operational Guidance Series 1.1.1, Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations (TOGS 1.1.1).

Section 3.4.1 and Section 3.4.2 list analytes for which soils samples will be assessed after excavation and in-situ chemical oxidation treatment, respectively. Section 3.4.3 and Section 3.4.4 list analytes to be assessed for soil vapors and groundwater, respectively.

3.3.4 Site Remediation Coordination Activities

Prior to the initiation of work, the identities and qualifications of the project managers and associated staff will be supplied to the NYSDEC. The Volunteer will ensure that qualified contractors are used. The NYSDEC will also be notified of any changes in the senior on-site personnel. Resumes of specific professionals to be used by the Volunteer are included in Appendix F. Prior to the initiation of fieldwork, a Site Health and Safety Officer will be designated by the Volunteer, and all on-site personnel (including subcontractors) will review the site-specific HASP (Section 3.3.5) and the site-specific Health and Safety Plan for Chemical Oxidation (to be prepared by the subcontractor providing in-situ remediation services). All necessary insurance certificates will be secured from subcontractors by the Volunteer.

The Volunteer will ensure that appropriate coordination exits between remediation and Site development contractors and subcontractors. The outline below presents the order of events for remedial and Site development activities:

- Site clearing and demolition of on-site structures (with exception of the barn), also considered site development activities, will occur simultaneously with the excavation of contaminated soils and the pilot program for in-situ chemical oxidation located in the southeastern portion of the former MOSF.
- Removal of soils in the area of the former MOSF (arsenic and lead contaminated soils and excavation of soils necessary to build the foundation of the underground service tunnel) will occur first in order to commence full-scale in-situ chemical oxidation treatment in this area.
- Chemical oxidation treatment and excavation of contaminated soil in areas outside of the former MOSF will occur simultaneously.
- Chemical oxidation in the area of the building footprint will be implemented prior to the construction of the foundation slab for the underground service tunnel.
- Site development activities concerning the underground service tunnel will proceed (to the extent possible) after the proposed chemical oxidation injections are applied and preliminary data documents successful removal of VOCs, SVOCs, and TPH-DROs.
- The installation of a vapor barrier and SSDS will occur prior to the construction of the slab foundation of the underground service tunnel (or any other foundation slabs in contact with Site soils).
- If additional chemical oxidation injections are necessary underneath the underground service tunnel foundation, forty-five degree angle injections and/or additional treatment in areas adjacent to the underground service tunnel will be implemented.
- The barrier layer (imported soil and/or pavement) will be installed after the chemical oxidation treatment and Site grading activities.

The sequence of remediation and Site development events will be fully developed in the RDR.

An assessment of subsurface soil characteristics, including soil type, the presence of foreign materials, field indications of contamination (e.g., unusual coloration patterns, or odors), and instrument indications of contamination (i.e., PID readings) will be made by the OSC during all Site remediation work. The OSC will be responsible for identifying any soils that, in the opinion of the OSC, may contain elevated concentrations of contaminants and should, therefore, require special handling.

Those soils identified by the OSC will be removed to the soil stockpiling area for characterization and proper disposition. The OSC will monitor the removal of all contaminated soil, including monitoring the trucks and establishing the designated truck routes. The OSC will also ensure that any unforeseen environmental conditions are managed in accordance with applicable federal and state regulations.

3.3.5 Health and Safety Plan

The site-specific HASP (incorporating a Community Health and Safety Plan) and site-specific Health and Safety Plan for Chemical Oxidation (HASP-CO) will be reviewed with Site personnel and appropriate sub-contractors prior to the initiation of fieldwork. The HASP-CO will be prepared by the subcontractor providing in-situ chemical oxidation services and will address potential health and safety hazards regarding that remedial technology. All proposed work will be performed in "Level D" personal protective equipment; however, field personnel (including subcontractors) will be prepared to continue services wearing more protective levels of equipment should field conditions warrant. A copy of the HASP is provided in Appendix E. A copy of the HASP-CO will be provided in the RDR.

3.3.6 Community Air Monitoring Plan

The NYSDOH generic Community Air Monitoring Plan (CAMP, Appendix E of the HASP) will be implemented during all fieldwork activities specified in this RWP. The CAMP is designed to document the presence or absence of specific compounds in the air surrounding the work zone, which may migrate off-site due to fieldwork activities, and provides guidance on the need for implementing more stringent dust and emission controls based on air quality data.

Continuous air monitoring will be conducted for VOCs and dust during all ground intrusive activities (including soil/waste excavation and handling, test pitting/trenching, and installation of soil borings or monitoring wells) and during the demolition of any structure known or suspected to be contaminated. Periodic monitoring for VOCs will be conducted during non-intrusive activities such as the collection of soil or groundwater samples (continuous monitoring may be conducted based on the proximity of potential sensitive receptors).

Monitoring for VOCs will occur at the downwind perimeter of the immediate work area (i.e., the exclusion zone) on a continuous basis or as otherwise specified using a PID (upwind concentrations will be measured to establish background conditions). If concentrations of organic vapors at the downwind perimeter of the work area or exclusion zone exceed 5 ppm above background for the 15-minute average, work activities will be temporarily halted. Organic vapor concentrations persistently in excess of 5 ppm over background (but less than 25 ppm) will require identification of the source and corrective actions. Organic vapors 200 feet downwind of the exclusion zone or half the distance to the nearest potential receptor or residential/commercial structure (whichever is less, minimum distance 20 feet) must be below 5 ppm over background for the 15-minute average. All work activities will stop if organic vapors are above 25 ppm at the perimeter of the work area.

Odors from the excavation of petroleum contaminated soil may be an issue at this Site. Odor control will be accomplished by wetting soils or through the use of commercially available odor-suppressing foam, which can be sprayed directly onto exposed soils. Thresholds for the implementation of odor-suppression measures will be based on the needs of Site personnel (i.e. odors interfere with work activities or have acute health impacts) and on the presence of significant objectionable odors at Site boundaries, which could impact off-site receptor populations. Odor suppression will be conducted at anytime that odor complaints are received from neighboring properties or local regulatory authorities, or if so directed by NYSDEC personnel.

Particulate concentrations will be monitored continuously at the upwind and downwind perimeters of the exclusion zone using real-time monitoring equipment capable of measuring particulate matter less than 10 micrometers in size (PM-10) and capable of integrating over a period of 15 minutes (or less). Specific locations will change daily, depending on the work being conducted and the direction of the wind. Fugitive dust migration will also be visually assessed during all work activities. Dust suppression techniques will be employed if downwind particulate levels are 100 micrograms per cubic meter (mcg/m^3) greater than background or if airborne dust is observed leaving the work area (work may continue with dust suppression techniques provided

that downwind particulate levels are not greater than 150 mcg/m^3 above background and no visible dust is migrating from the work area). Work will be stopped and procedures will be re-evaluated if downwind particulate levels are greater than 150 mcg/m^3 above background.

3.3.7 Dust Suppression

Dust suppression activities will be conducted during remediation and construction activities that will disturb on-site soils. Engineering controls will be used to control airborne contamination, including wetting soils with water and the placement of plastic sheeting over exposed soil and stockpiles (at a minimum, soils will be misted when site conditions indicate dry soils could potentially generate fugitive dust). Evidence of visible dust leaving the Site will result in the implementation of more aggressive dust suppression activities including increased misting, reduction in soil movement, or cessation of excavation (see Section 3.3.6, above).

3.3.8 Hours of Operation

Remedial work will be conducted between the hours of 7 AM and 5 PM Monday through Friday. No remedial work will be conducted on the weekend (Saturday or Sunday) unless expressly permitted by the NYSDEC. Construction activities not related to Site remediation may occur on weekends and holidays, if so permitted by the local authorities.

3.4 Proposed Specific Remediation Services

This section of the RWP provides a detailed description of the remedial tasks that will be conducted at the subject property. During the course of all remedial activities, appropriate measures (e.g., vehicle traffic patterns, stormwater run-off controls) will be implemented to ensure that contaminated soil is minimally disturbed.

3.4.1 Design Process

A Remedial Design will be completed prior to the start of remediation/construction activities. The RD will describe in detail the means of implementing the selected remedy and the quality control and quality assurance procedures and protocols to be applied to construction, including management of hazardous/regulated materials, Site control and safety, contingency plans, and construction practices. Relevant documents, specifications, permits and drawings to be prepared as part of the design process for the selected remedial action are provided below. Unless otherwise indicated, these components will be included with the submittal of the RDR (anticipated submittal date April 2008):

- Construction Quality Control (CQC) and Construction Quality Assurance (CQA) Plans
- Media Sampling Protocols/Quality Assurance Project Plan
- Contingency Plan
- Specifications for Removal and Remediation of Contaminated Soil (including dewatering specification and survey quality drawings)
- Specifications for Design, Installation, Testing and Maintenance of the Vapor Barrier and Sub-Slab Depressurization System
- Workplan for the Sequencing of Remedial and Site Development Activities
- Health and Safety Plan for Chemical Oxidation
- Work Plan for Bench-Scale Laboratory Study for Chemical Oxidation (February 2008)
- Work Plan for Pilot Program for In-situ Chemical Oxidation (February 2008)
- Bench-Scale Laboratory Study Results for Chemical Oxidation (March 2008)
- Pilot Program Report for In-situ Chemical Oxidation (March/April 2008)
- Scope of Work for Full-Scale In-situ Chemical Oxidation Treatment
- Full-Scale Treatment Program Report for In-situ Chemical Oxidation (to be completed post chemical oxidation treatment and to the included in the Final Report)
- Environmental Easement (to be completed post remediation activities)

A Stormwater Pollution Prevention Control Plan, Stormwater Management Plan and Sediment and Erosion Control Plan will be prepared by the Volunteer as part of the Site development activities. In addition, appropriate permits (i.e. State Pollutant Discharge Elimination System (SPDES) permit for construction and remediation activities, etc.) will be secured by the Volunteer as part of Site development activities.

Site construction and remediation activities will be properly managed by developing an appropriate site layout, and establishing adequate staging areas and exclusions zones. These components will be fully developed in the Workplan for the Sequencing of Remedial and Site Development Activities, to be submitted as part of the RDR.

3.4.2 Excavation of Contaminated Soils

Previous investigations have documented the presence of soils contaminated by arsenic, lead, and SVOCs at several locations throughout the Site, and mercury and PCB in the vicinity of the barn. The total volume of impacted soils is estimated to be up to 8,000 - 11,500 cubic yards. These contaminated soils will be removed from the Site in accordance with applicable NYSDEC regulations (6 NYCRR Part 360 and Part 370). All appropriate disposal documentation will be maintained by the Volunteer for inclusion in the Final Report. The location of known contaminated soils subject to the removal procedures detailed below is provided on the Proposed Site Remediation Map, Figure 6, Appendix B.

1. Surface material such as concrete, metal, and other miscellaneous materials will be removed and stockpiled or properly disposed of off-site as exempt waste. Any subsurface debris encountered during the excavation of on-site soils will be disposed of in a manner consistent with applicable Part 360 regulations. If any underground storage tanks are encountered during excavation, appropriate regulatory agencies will be notified and the tank(s) will be properly drained and cleaned prior to removal and off-site disposal. All tank closure activities will be properly documented, including tank condition, removal and disposal of the tank(s) and any wastes, and disposal of any encountered contaminated soils.
2. Four proposed excavation areas, presented in Table 3, have been identified.

Table 3: Proposed Excavation Areas

Area	Location	Contamination	Proposed Excavation Depth (bsg)
1	east of the concrete foundation - western portion of the Site	PAHs & Arsenic	4 feet
2	west and southwest of the barn - north-central portion of the Site	Arsenic, Lead & PCBs – north of sampling location TP-1 Arsenic & Lead – south of sampling location TP-1	4 feet – north of sampling location TP-1 2 feet – south of sampling location TP-1
3	east and southeast of the barn - eastern portion of the Site	PAH, Arsenic, Lead, Mercury & PCBs – north of sampling location 2SB-29 Arsenic, Lead & PCBs– south of sampling location 2SB-29	9 feet – north of sampling location 2SB-29 4 feet – south of sampling location 2SB-29
4	south of the barn - southeastern portion of the Site	Arsenic	10 feet

Excavation of soils exhibiting field evidence of contamination will be conducted in a manner consistent with field conditions and technical observations from field personnel. Soils not indicating field evidence of contamination will be segregated, stockpiled, sampled, and analyzed to verify their integrity prior to off-site disposal.

3. Field screening and confirmatory sampling will be conducted (as appropriate) for remaining, post-excavation soils. Soil samples will be placed in laboratory-supplied glassware using decontaminated stainless steel trowels and dedicated, disposable latex gloves. Samples will be maintained at cold temperatures and shipped to a NYSDOH ELAP-certified laboratory within 24 hours under appropriate chain of custody. Laboratory analyses for excavated soils will be based on the requirements of the repository. Remaining post-excavation soils will be analyzed for the specific constituents of concern identified in Table 3 (i.e., soils proposed for removal because of elevated arsenic will result in post-excavation samples [walls and floor] to be analyzed for only arsenic). For those areas where multiple contaminants are present above guidance levels, all such compounds will be tested for in the confirmatory samples.

   The number of post-excavation soil samples will be determined in the field based on the size and dimensions of the excavation. At a minimum, one soil sample will be collected from each 50 feet of wall (minimum of one sample per wall) and one sample will be collected from every 400 square feet of floor (minimum of one sample per floor). Wall samples will be collected from a depth consistent with the depth of previously identified contamination; floor samples will be spatially distributed throughout the base of the excavation. Encountered soils that exhibit unusual field conditions will be additionally analyzed for specific compounds as determined by the field technician (in consultation with the NYSDEC Project Manager) to be most appropriate.
4. Dewatering at areas of proposed excavation will be necessary in order to excavate relatively dry material, observe and collect confirmatory samples, and backfill excavated areas. Approximately 3,925 cubic yards of saturated soil will necessitate dewatering (see Appendix C for calculations). It is anticipated that dewatering will be necessary in Areas 1, 3, and 4 (limited dewatering may be required in Area 2).
5. Necessary approvals for water discharge to the Hudson River or sewer system (i.e. State Pollutant Discharge Elimination System (SPDES) permit for construction and remediation activities) will be secured by the Volunteer as part of Site development activities. Water removed from a given excavation area will be visually inspected for indications of contamination. Water displaying field evidence of contamination will be passed through oil/water separators and active charcoal filters prior to disposal. Dewatering designs and protocols will be fully developed in the RDR.
6. Any excavated soils temporarily stored on-site will be placed on double-lined, 6-mil plastic sheeting and covered with a single sheet of 6-mil plastic. The stockpile will be located to minimize the likelihood of direct contact with standing water or water resulting from a storm event. The integrity of the overlaying plastic will be periodically inspected, and replacement of the plastic will occur when appropriate until such time as all soils are removed from the Site. To the extent feasible, landfill approvals will be secured to permit direct loading of trucks.
7. Appropriate erosion and sediment controls and stormwater management will be implemented in accordance with the required NYSDEC SPDES permit. Sediment and erosion controls to minimize soil stockpile erosion and sedimentation include the use of stabilized construction entrances, stockpile protections, silt fencing, hay bale check dams, catch basin covers, and dewatering pits, if needed, to control for migration of sediment to groundwater or adjacent surface water.
8. All contaminated materials will be removed from the property by an appropriately licensed hauler who will be responsible for exiting the Site and traveling on a pre-determined truck route. Trucks will be covered and leak-proof and appropriate measures will be taken to control the generation of fugitive dust from the trucks during transport.
9. All soils (either regulated or exempt) removed from the Site will be documented with appropriate transportation manifests and weight tickets, as well as disposal/recycling certificates from the off-site facility, which will be included in the Final Report.
10. All wastes will be transported from the Site in a manner appropriate to reduce dust generation and/or fugitive discharges of soils onto City streets. The specific truck routes will be dependent on the location of the particular repository.

3.4.3 In-situ Chemical Oxidation Treatment for Petroleum Contamination

In-situ chemical oxidation (ISCO) using modified Fenton's reagent is the in-situ treatment proposed to remediate petroleum contaminated soils within the footprint of the former MOSF.

A representative number of soil, groundwater and soil vapor samples will be collected to characterize baseline conditions prior to the ISCO treatment. Soil vapor samples will be collected from sampling locations in the vicinity of the proposed new structure (Figure 6, Appendix B). If deemed necessary, additional soil vapor samples will be collected in areas with significant VOC concentrations documented in the RIR. Soil and groundwater samples will be analyzed for TCL VOCs + 10 (USEPA Method 8260) and TCL SVOCs + 20 (USEPA Method 8270). In addition, soil samples will be analyzed for TPH-DRO (USEPA Method 8015). Soil vapor samples will be analyzed for VOCs (USEPA Method TO-15).

Prior to full-scale implementation of the ISCO treatment in the area of the former MOSF, a bench scale laboratory study and a pilot program are proposed. Workplans for the bench scale laboratory study and the pilot program will be submitted to NYSDEC for approval. A bench scale laboratory study will be conducted prior to the pilot program to determine optimal reagent loading. Five weeks are anticipated for the completion of the bench scale laboratory study. The objective of the pilot program is to evaluate the feasibility and effectiveness of the chemical oxidation technology and collect design data (radius of influence information and mass destruction data) for the proposed full-scale treatment.

The pilot program area (7,200 square feet) will be located in the southeastern portion of the MOSF, corresponding to significantly elevated levels of VOCs and SVOCs documented in the RIR. Two injection events are anticipated for the pilot program. Each injection event is expected to occur within a two-week time frame. The time period between injection events is expected to be four to five weeks. Completion of the pilot is anticipated to require three to four months.

The following goals for the pilot program are proposed to measure the effectiveness of the ISCO treatment:

- Removal of petroleum odors and other significant field indications of contamination (sheen, discoloration, etc.)
- Evaluate safe application of ISCO reagents
- Reduction of petroleum compounds to the guidance levels established in Section 2.2.1 for soil and groundwater

If preliminary data provide adequate information to implement the full-scale application and confirms the effectiveness of the treatment, the full-scale application could begin within the time frame of the pilot program. The results of the bench scale laboratory study and pilot program will be submitted to NYSDEC for review.

Based on the pilot program data, a Site-specific scope of work will be prepared to design the full-scale application. The area of full-scale in-situ chemical oxidation will be divided into treatment parcels (5 to 6 treatment parcels of approximately 10,000 square feet each) to ensure systematic applications and appropriate staging. Chemical oxidation agents will be propagated through the ground at different depths and doses via a direct-push injection method prior to completing the foundation slab for the underground service tunnel. Multiple injections may be necessary to achieve desired results.

Currently, two full-scale injection events at each treatment parcel are planned. Each injection event per treatment parcel is expected to occur within a within a two-week time frame. The time period between the injection events in a treatment parcel is expected to be approximately four to six weeks. Injection events for the treatment parcels will occur consecutively. Six to eight months are anticipated for the completion of the full-scale treatment.

The effectiveness of the in-situ chemical oxidation treatment will be monitored through laboratory analysis of soil, groundwater and soil vapor in the treatment area. Design and implementation of the ISCO treatment will be conducted according to the approved RDR.

3.4.3.1 System Installation and Operation of Chemical Oxidation Treatment

Subject to modifications from the pilot program, the treatment systems for the full-scale application will consist of the following:

- Direct push injection points spaced approximately 16 – 20 feet apart (current estimate is for 250 - 300 injection points for the initial injection event over the entire area of the MOSF) with the capability of releasing the treatment reagents into the subsurface at the target depth of 4 – 17 feet bsg. Separate injections may be conducted into the 4-10 feet and 10-17 feet bsg intervals.
- Injection points will be of sufficient diameter to allow a discharge of approximately 500 gallons of reagent per location at a rate of 3 - 4 gallons per minute (gpm).
- Reagent will be introduced over a period of several weeks (up to two weeks per pilot study event and per full-scale treatment parcel) and injection rates will be monitored.
- Soil, groundwater, and vapor sampling will be conducted on a periodic basis by on-site personnel. All data will be maintained for inclusion in the Final Report and submitted to NYSDEC for review.

3.4.3.2 System Closure

Upon completion of the monitoring phase, ESI personnel will collect a sufficient number of soil, soil vapor and groundwater samples within or in the vicinity of the footprint of the treatment area and within ± 1 feet of the baseline samples collected. Soil sample locations (not less than eight) will be distributed vertically and horizontally to provide an accurate representation of all areas of reagent exposure. Soil, groundwater and soil vapor samples will be analyzed according to the analyte list used to characterize baseline conditions (Section 3.4.3).

3.4.3.3 Detailed In-Situ Chemical Oxidation Schedule

The following schedule, presented in Table 4, is anticipated for implementing the ISCO treatment in this RWP:

Table 4: ISCO Treatment Schedule

Event	Start Week No.	End Week No.	Duration (Weeks)	Total Weeks from Start
Pilot Event I	1	2	2	2
Aquifer equilibration/Sampling/Analysis/Data receipt	3	6	4	6
Pilot Event II	7	8	2	8
Aquifer equilibration/Sampling/Analysis/Data receipt	9	12	4	12
Pilot Report	13	14	2	14
Full Scale Event I	15	26	12	26
Aquifer equilibration/Sampling/ Analysis/Data receipt	Occurring between parcel treatments			26
Full Scale Event II	27	38	12	38
Aquifer equilibration/Sampling/Analysis/Data receipt	38	42	4	42
Full Scale Report	43	46	4	46
Additional applications	To be determined if needed			

3.4.4 Installation of Vapor Barrier and Sub-Slab Depressurization System

It is anticipated that remedial excavation and in-situ treatment activities will result in the removal of all significant sources of volatile organic soil vapors. As a supplemental preventive measure, a vapor barrier underlain by a SSDS will be installed under the proposed underground service tunnel (or any other building foundations in contact with Site Soils) in order to eliminate potential vapor migration. All other portions of the building are underlain with ventilated space, which will intercept any vapors prior to entering the occupied levels of the building. These ventilated areas eliminate the need for any SSDS in these other portions of the building.

The design and installation of the SSDS will be conducted in accordance with the concepts and practices outlined in (1) the Radon Prevention in the Design and Construction of Schools and Other Large Buildings (RP Document), prepared by the United States Environmental Protection Agency (USEPA) [dated June 1994] and (2) NYSDOH's GESVI, and will consider all soil and vapor sampling data.

3.4.4.1 System Design and Installation

The sub-slab vapor barrier will consist of a minimum 10 mil plastic liner (or equivalent), which overlies a highly porous substrate (e.g., gravel) containing a horizontal network of SSDS piping (perforated four-inch slotted PVC pipes). The horizontal piping network will be connected to non-perforated vertical piping which extends above the roofline of the proposed building. All vapor barrier penetrations and overlapping sections of plastic liner will be appropriately sealed, as will any penetrations or significant openings in sub-grade portions of foundation slabs or foundation walls. Low-grade vacuum pumps or fans, sized to maintain vacuum beneath the foundation slab, will be connected to the vertical piping system. System discharge points will be located above the roofline and at a sufficient distance from roof-mounted air intakes to prevent re-entrainment of airborne contaminants. A visual pressure indicator (U-tube manometer or magnehelic gauge) will be installed for regular inspection purposes. In addition, an audible and/or visual fail-safe system will be installed to alert maintenance personnel to conditions of insufficient vacuum, which may be cause by vacuum pump/fan failure. The precise system design will be developed following confirmation of in-situ treatment soil conditions.

3.4.4.2 System Start-up, Testing and Maintenance

System start-up and initial testing will occur after the concrete slab of the underground service tunnel has been poured. The following activities will be conducted:

1. Prior to system start-up all visible system components will be visually inspected for verification of proper installation. The system will be temporarily started and all vacuum pumps/fans will be inspected for proper functioning. The system will be shut off and documentation of system conditions will be maintained in field logbooks.
2. Temporary monitoring points will be installed throughout the building by drilling ¼ inch – ½ inch diameter holes through the tunnel slab. An assessment of sub-lab pressure, both with the system off and with the system temporarily on, will be made at each monitoring point using a digital micro-manometer. A difference in pressure of -0.002 inches of water column at each monitoring point, or a sustained sub-slab pressure of at least -0.01 inches of water column with the system on, will indicate proper system functioning. Observed pressure readings that fall short of these standards may indicate the need for system modification.
3. Carbon filtration will be installed at each system discharge point. The system will be operated for a minimum of 12 hours and subsequently, pre- and post carbon filtration effluent air samples will be collected and analyzed for VOCs (USEPA Method TO-15). These data will be used to determine the need for and extent of an air quality permit (including the need for continued air discharge treatment).
4. The system will be permanently engaged following the completion of system modifications, the addition of any effluent air treatment, and the receipt of any necessary permits.

5. After the system has been permanently engaged the Volunteer will be responsible for weekly inspections of the system's pressure. In addition, the system fans will be inspected on an annual basis for signs of wear and/or failure.

3.4.4.3 Post-Construction Indoor/Outdoor Air Sampling

The Volunteer will conduct post-construction indoor and outdoor air quality sampling to document on-site air quality both within the on-site structure(s) and the exterior areas. The Volunteer will consult with the NYSDEC and the NYSDOH prior to sampling. Sampling of indoor air quality will be performed in accordance with established NYSDOH protocols, outlined in the GESVI, and will include analyses for the VOCs previously detected in on-site soil.

Three air samples will be collected to determine external air quality. Prior to sample location, meteorological data on wind velocity and direction will be collected to provide quality assurance to the data set. Measurable precipitation and/or average wind speed in excess of ten miles per hour will be conditions which will necessitate rescheduling of outdoor air quality sampling. The sampling event will consist of one upwind location and two downwind locations. Internal air quality will be determined by collecting and analyzing three air samples at locations inside the structure. Samples will be analyzed for VOCs using USEPA Method TO-15. All sample locations will be shown on a Site map to be provided to the NYSDEC in the Final Report.

3.4.5 Groundwater Monitoring

No active groundwater remediation is proposed in this RWP; existing data indicate only low-level contamination of VOCs and low-level concentrations (below guidance levels) of metals and SVOCs, which do not require an active response action. All groundwater monitoring wells will be sampled prior to the start of remediation. The Site Management Plan, to be developed following completion of remedial activities, will require that monitoring wells be sampled on a quarterly basis over the next year following remediation activities. Quarterly sampling will commence after the implantation of the ISCO treatment. In addition, monitoring wells will be sampled periodically thereafter based on NYSDEC's review of the monitoring data for the first year to document any change in concentrations. In the event that any of the existing on-site monitoring wells are destroyed during construction the NYSDEC will be informed and, in consultation with the NYSDEC, a determination will be made as to whether well replacement will be required.

3.4.5.1 Groundwater Sampling and Analysis

Groundwater sampling will be conducted in a manner consistent with technical specifications outlined in the RDR. Based on previous sampling data, which showed low-level contamination by VOCs and low-level concentrations of SVOCs and metals, groundwater samples will be submitted for laboratory analysis of TAL metals (USEPA methods 6010 and 7471), TCL VOCs + 10 TICs (USEPA method 8260), and TCL SVOCs + 20 TICs (USEPA method 8270).

3.4.5.2 Groundwater Flow Calculations

The direction of groundwater flow will be determined based on elevations of static groundwater as measured at all on-site wells, measured prior to water quality sample collection. Measurements will be collected with an electronic depth meter with an accuracy of measuring depth to the nearest 0.01 foot. Data will be recorded in field logbook for use in generating a Direction of Groundwater Flow Map to be provided in the Final Report.

3.4.6 Documentation of Site Remediation and/or Closure

At the completion of all services specified in the RDR, a Final Remediation Services Engineering Report will be prepared. The Final Report will include, at a minimum, results of any laboratory analyses generated during activities described in the RDR, waste transport/disposal manifests from all soil excavation and disposal activities, proof of implementation and effectiveness of in-

situ remediation treatment (e.g., sampling data, photographs, field notes), proof of vapor barrier and SSDS installation (e.g., photographs, field notes) and documentation of SSDS effectiveness, and maps illustrating Site closure activities.

The Final Report will be signed, certified and stamped by a PE licensed to practice in the State of New York and will affirmatively document that all remedial measures described in the RDR have been properly implemented. The Final Report will be submitted to the NYSDEC for review and approval. In conjunction with the submission of the Final Report, a Site Management Plan (SMP) and an Environmental Easement will be prepared for this Site. Detailed within the SMP will be the following:

- Specification of maintenance activities for the barrier layer and a methodology for managing soils encountered during any future excavation work on the Site;
- Groundwater use restrictions at the Site;
- Groundwater monitoring plan for any wells remaining after the construction of the new on-site building;
- Maintenance and operations plan for the SSDS; and,
- An inspection and reporting schedule to document the continued integrity of these institutional and engineering controls.

An Environmental Easement will be prepared by the Volunteer, in conjunction with NYSDEC, to provide appropriate management of the proposed controls outline in the SMP. The Volunteer or subsequent property owner(s) must periodically certify to the NYSDEC that the institutional and engineering controls included in the Environmental Easement remain in-place and effective throughout the lifetime of the Site.

3.5 Project Schedule

Table 5, below, presents a schedule for implementing the actions detailed in this RWP:

Table 5: Project Schedule

Months	Action	Deliverables
0 – 1	Design Process	Remedial Design Report
0 – 1	Pre-Remediation Groundwater Monitoring	
1 – 4	Soil Excavation/Removal	Weekly Status Memos on remedial actions (includes summary laboratory data)
1 – 12	Chemical Oxidation Treatment	Status Memo on in-situ treatment implementation and effectiveness
3 – 36	Building Construction**	Milestones in building construction will be reported (as appropriate) in relevant reports
12 – 24	Quarterly Groundwater Monitoring (following remedial activities)	Quarterly Status Memo for groundwater results
14 – 16	SSDS Installation/Testing	Status Memo on SSDS completion/effectiveness
16 – 136	Groundwater Monitoring (post first year quarterly sampling, 10 year schedule assumed)	Data to be included in the Final Report and in SMP related reports
30 – 36	Barrier Layer Installation	Data to be included in the Final Report and in SMP related reports
37 – 41	Project Closure	Final Report with SMP and Environmental Easement

** "Building Construction" includes soil excavation activities in the area of the underground service tunnel and all other construction activities to the extent that these do not significantly interfere with the chemical oxidation treatment; the erection of the building will begin several months after initial soil excavation work.

APPENDIX A

Reference

REFERENCE

Abbreviations and Acronyms

As	Arsenic
ASP	Analytical Services Protocol
BCP	Brownfields Clean-up Program
bsg	below surface grade
CLP	Contract Laboratory Protocol
CQA	Construction Quality Assurance
CQC	Construction Quality Control
CY	Cubic Yard
DUSRs	Data Usability Summary Reports
EC	Engineering Controls
ELAP	Environmental Laboratory Approval Program
gpm	gallons per minute
Hg	Mercury
HVAC	House Heating, Ventilating and Air Conditioning Units
IC	Institutional Controls
ISCO	In-Situ Chemical Oxidation
ISOTEC	In-Situ Oxidative Technologies, Inc.
MOSF	Major Oil Storage Facility
msl	mean sea level
mg/m^3	milligrams per cubic meter
NYCRR	New York Codes, Rules and Regulations
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
NYSDOL	New York State Department of Labor
OSHA	Occupational Safety and Health Administration
PAHs	Polycyclic Aromatic Hydrocarbons

Pb	Lead
PCBs	Polychlorinated Biphenyls
PE	Professional Engineer
PID	Photo-Ionization Detector
ppm-cge	parts per million calibration gas equivalents
RECs	Recognized Environmental Conditions
RD	Remedial Design
SCG	Standards, Criteria and Guidance Values
SCOs	Soil Cleanup Objectives
SPDES	State Pollutant Discharge Elimination System
SSDS	Sub-Slab Depressurization System
SVOCs	Semi-volatile Organic Compounds
TAL	Target Analyte List
TCL	Target Compound List
TPH-DROs	Total Petroleum Hydrocarbons – Diesel Range Organics
USEPA	United States Environmental Protection Agency
VOCs	Volatile Organic Compounds
YR	Year
$\mu g/m^3$	micrograms per cubic meter

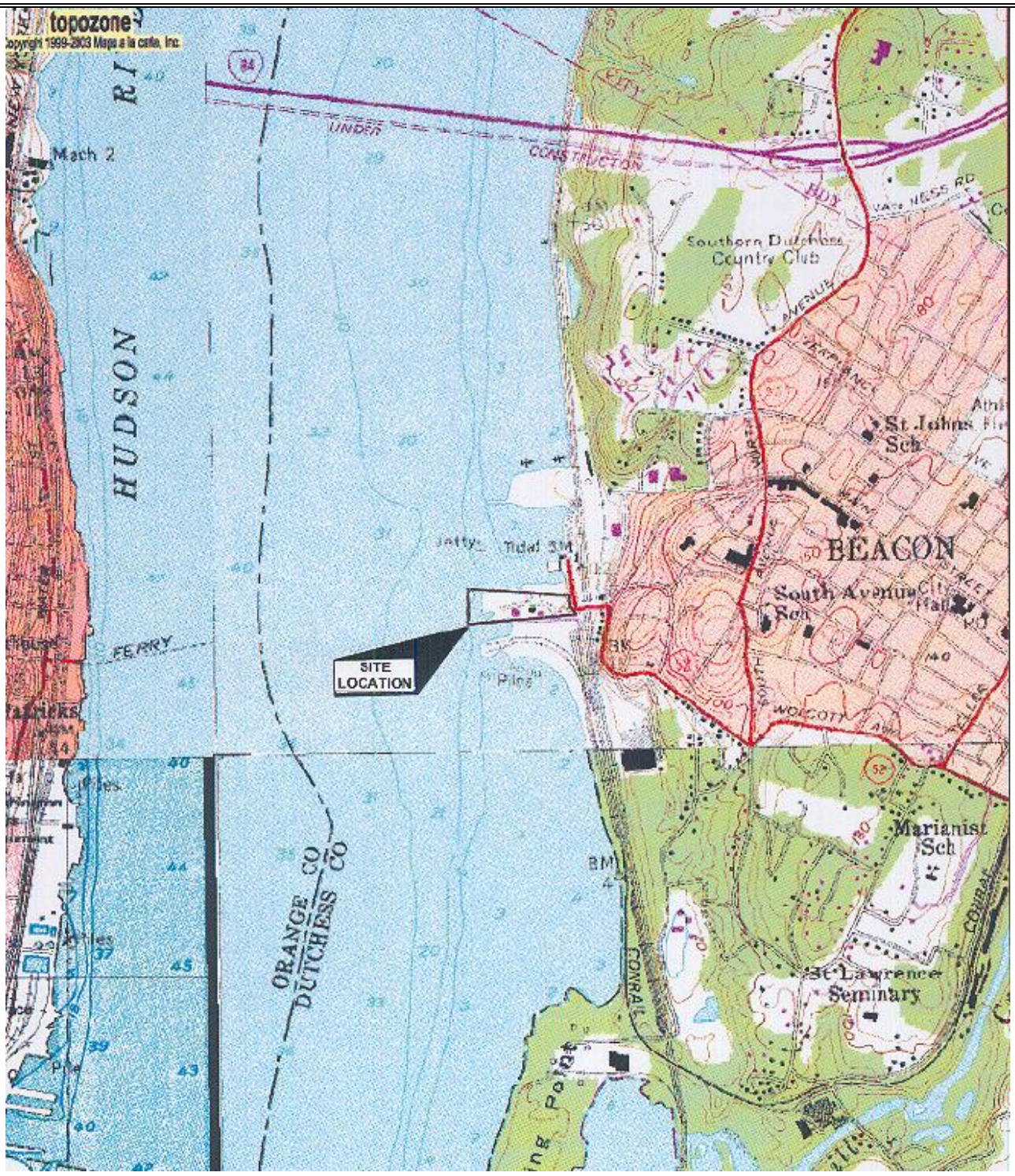
Documents and Publications

BCP Guide	Draft Brownfield Cleanup Program Guide, prepared by NYSDEC, dated May 2004.
CAMP	Community Air Monitoring Plan, prepared by NYSDOH (included in DER-10), dated December 2002.
DER-10	Draft Division of Environmental Remediation -10, Technical Guidance for Site Investigation and Remediation, prepared by NYSDEC, dated December 2002.
GESVI	Guidance for Evaluating Soil Vapor Intrusion in the State of New York, prepared by NYSDOH, dated October 2006.
HASP	Health and Safety Plan, prepared by ESI, dated January 2008.

HASP-CO	Health and Safety Plan for Chemical Oxidation, to be prepared by subcontractor, expected release February/March 2008.
QA/QC Plan	Quality Assurance /Quality Control Plan, prepared by ESI, dated January 2008.
RAR/RWP	Remedial Alternatives Report and Remedial Workplan, prepared by ESI, dated January 2008.
RDR	Remedial Design Report, to be prepared by ESI, expected release date April 2008.
RIR	Remedial Investigation Report, prepared by ESI, dated November 2007.
RIWP	Remedial Investigation Workplan, prepared by ESI, dated August 2006.
RP Document	Radon Prevention in the Design and Construction of Schools and Other Large Buildings, prepared by USEPA, dated June 1994.
SRIWP	Supplemental Remedial Investigation Workplan, prepared by ESI, dated January 2007.
TAGM 4046	Technical and Administrative Guidance Memorandum #4046 including subsequent NYSDEC memoranda, prepared by NYSDEC, dated January 1994.
TOGS 1.1.1	Technical and Operational Guidance Series 1.1.1, Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations, prepared by NYSDEC, dated June 1998.

APPENDIX B

Figures



Source: USGS Topographic Map of Wappingers Falls, New York Quadrangle, dated 1981, digital image provided by Maps a la carte, Inc. (Topozone.com)

Figure 1 - Site Location Map
(Scale : 1:50000)
Long Dock Beacon
Red Flynn Drive, City of Beacon
Dutchess County, New York

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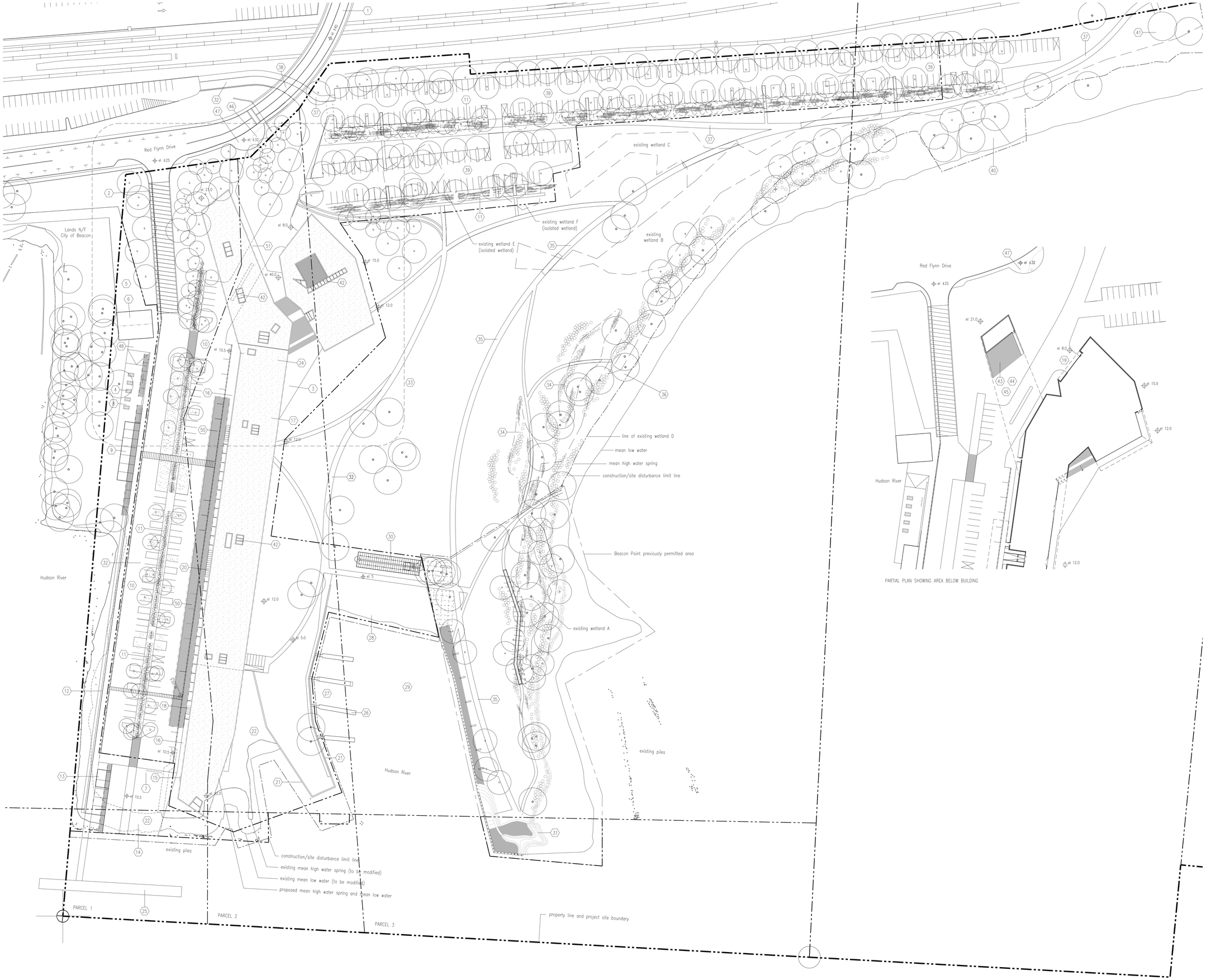
ESI File: SG96152.52

January 2008

Appendix B



PARTIAL PLAN SHOWING AREA BELOW BUILDING

1. Existing Red Flynn Drive Vehicular Overpass
2. Relocated Site Driveway
3. Deck
4. Picnic Tables
5. Red Barn Outdoor Workspace
6. Existing Red Barn
7. Bicycle Rack
8. Picnic Platform
9. Greenhouse Building – greenhouse and public restrooms
10. North Parking
11. Stormwater Treatment Swale Drainage System
12. Rivers Edge Terraces
13. Public Plaza Building – take-out food and covered seating
14. Public Plaza
15. Bridge
16. Planted Slot
17. Hotel and Conference Center
18. Bistro Entry
19. Hotel Loading Bay, Garbage, Recycling
20. Hotel and Conference Center Entry
21. Restored Bulkhead
22. Area where land is excavated to form new river
23. Not Used
24. Green Roof
25. Generic dock pending harbor management planning
26. Existing floating docks
27. Existing boat ramp
28. Beach
29. Quiet Harbor
30. Kayak Storage and Rental Building
31. Beacon Point – Trakas installation
32. Fire and Service Access
33. Meadow
34. Proposed Wetland
35. Trail
36. Proposed shoreline stabilization above mean high water
37. Relocated Estuary Shoreline Trail
38. Vehicular access below overpass
39. East Parking
40. South Kayak – Canoe Put-in
41. Environmental Demonstration
42. Skylight
43. Water Meter Vault
44. Transformer
45. Lift Station
46. Existing Viewpoint
47. Enlarged portion of existing Viewpoint
48. Barn Loading Area
49. Not Used
50. Porte Cochere Canopy
51. Walkway
52. Not Used
53. Not Used

property line and project site boundary

subdivision line

internal parcel line

mean high water line spring

mean low water line

construction and site disturbance limit line

Existing site conditions and dimensions derived from:
Boundary And Topographic Survey of Lands Now or
Formerly The Scenic Hudson Land Trust, Inc.
City Of Beacon * County Of Dutchess * State Of New York
Vollmer Associates LLP 10-27-04

N

0 50' 100' 150' 200'

No.	Date	Issued for
01	08 Dec 2007	Schematic Design Work in Progress

Seal

Patkau • Gruzen Samton
Architects Planners Interior Designers
320 West 13 Street
New York NY 10014

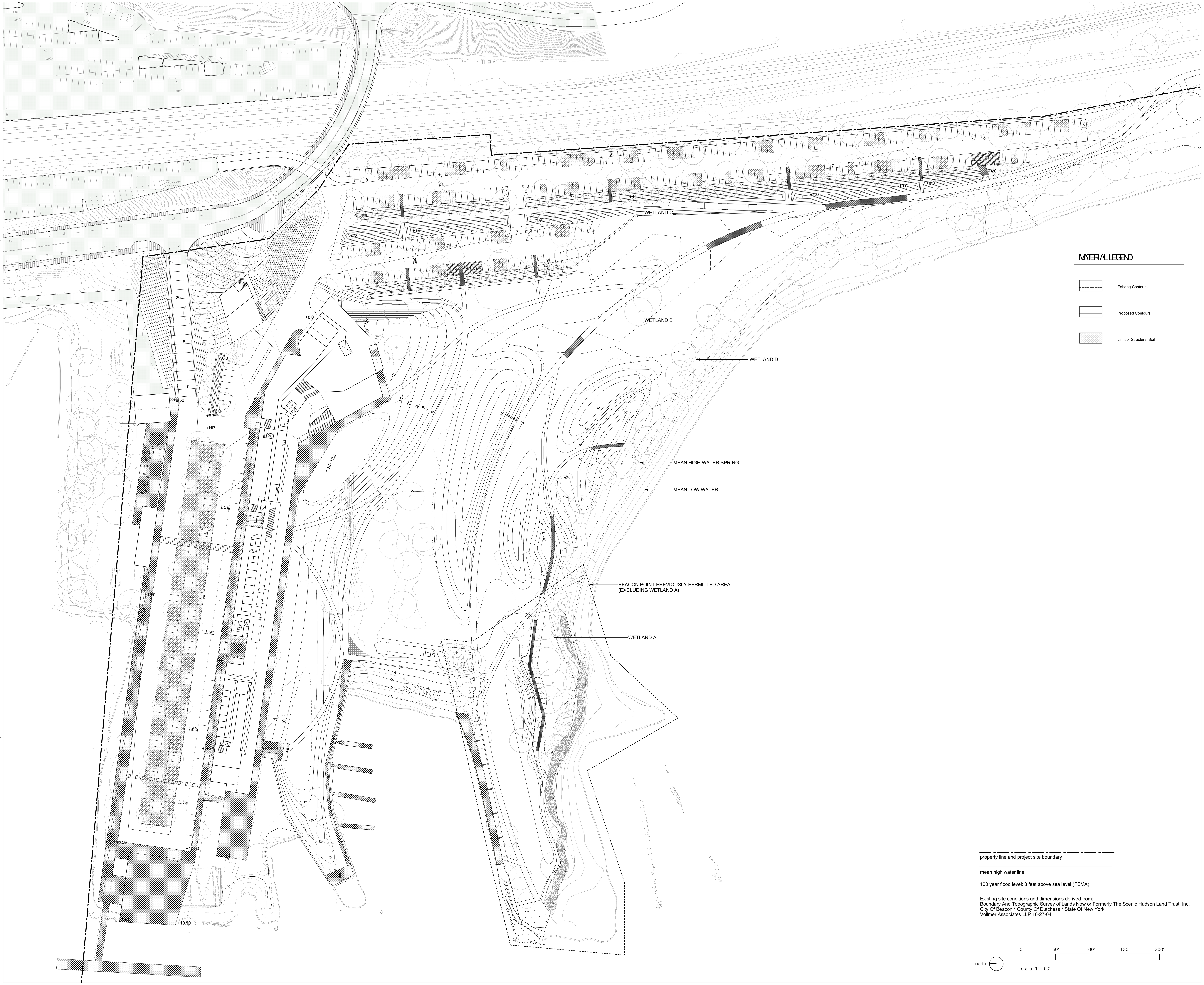
T 212 477-0900
F 212 477-1257

Long Dock Beacon

SCHEMATIC DESIGN
SITE PLAN Figure 2

Date: DECEMBER 07, 2007
Scale: 1"=50'
Drawn by: PA

A-001



GENERAL NOTES

1. Existing conditions and topography data are from a survey prepared by Vollmer Associates LLp dated 10/27/04.
2. True and current site conditions may differ from those indicated on plan. Contractor shall verify true conditions in the field prior to construction.
3. Contractor shall verify location of any existing utilities and services and provide protection during construction. Utilities damaged during construction shall be repaired at contractors expense.
4 Contractor shall contact the Landscape Architect of any unforeseen conditions, which may affect the intended design as set forth in the drawings.
5 Contractor shall obtain permits for the work as required and comply with all laws, ordinances, rules and regulations of the local jurisdiction, the state of New York, and all other authorities having jurisdiction.

GRADING NOTES

1. Contractor shall verify all existing grades in the field and report any discrepancies immediately to the landscape architect.
2. Stake proposed finish grade and cut/fills of existing grade in the field. Obtain Landscape Architect's approval prior to commencing construction.
3. Slope away from all buildings.
4. Provide vertical curves or roundings at abrupt changes in grade unless otherwise noted. Blend new earthwork smoothly into existing grades.
5. Maintain existing grades at existing plant material to remain
6. Grade surfaces to assure positive drainage from all structures and to prevent ponding of surface drainage.
7. All fill material is subject to approval by Landscape Architect.
8. Pitch evenly between spot grades. All paved areas must pitch to drain at a minimum of 1/8" per foot. Any discrepancies not allowing this to occur shall be reported to the Landscape Architect prior to continuing work.
9. Once grading operations are completed, all disturbed areas within or outside of the limits of work shall be stabilized by fine grading and seeding or mulching as directed by the Landscape Architect.
10. All erosion control measures are to be constructed to meet field conditions at the time of construction and prior to any grading or disturbance of existing material on balance of site.
11. All grading, drainage and drain utilities are schematic. Final drainage utilities, spot grades, and pipe sizing will be issued based on findings of existing site drainage utilities and structures.

No.	Date	Issued for
01	**07 Dec 2007**	**Schematic Design**

Seal

R E E D I H I L D E R B R A N D

Reed Hilderbrand Associates Inc
Landscape Architecture
741 Mt Auburn Street
Watertown MA 02472
P 617 923 2422 F 617 923 3740
www.reedhilderbrand.com

Long Dock Beacon

Subtitle

SCHEMATIC DESIGN GRADING PLAN

Figure 3

Date: **07 December 2007**
Scale: **1" = 50'-0"**
Drawn by: **RHA**

L301

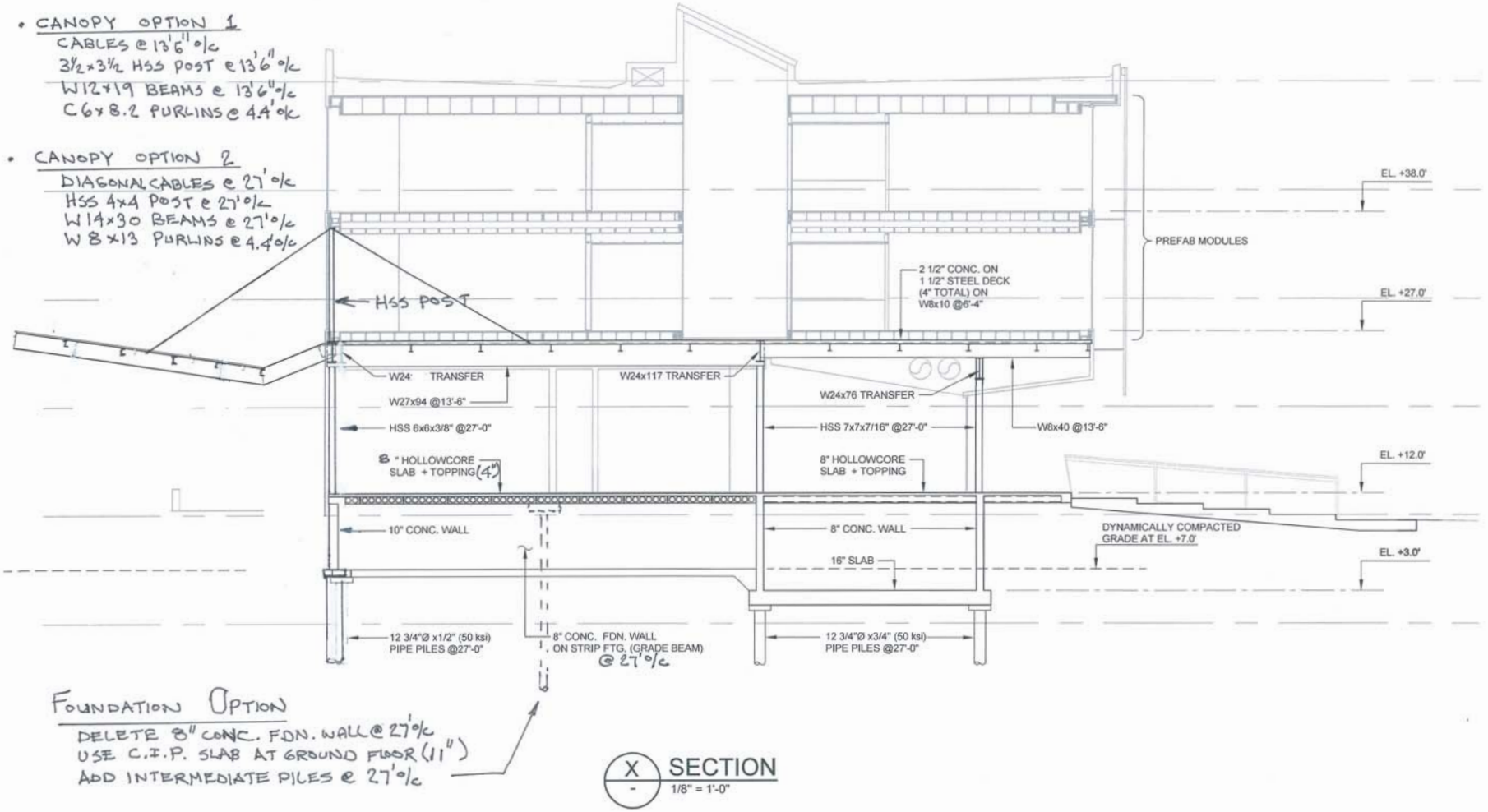


Figure 4 - Proposed Building Cross Section - Future Use Map

Long Dock Beacon
Red Flynn Drive
City of Beacon, Dutchess County, New York

ESI File: SG96152.52

January 2008

Appendix B

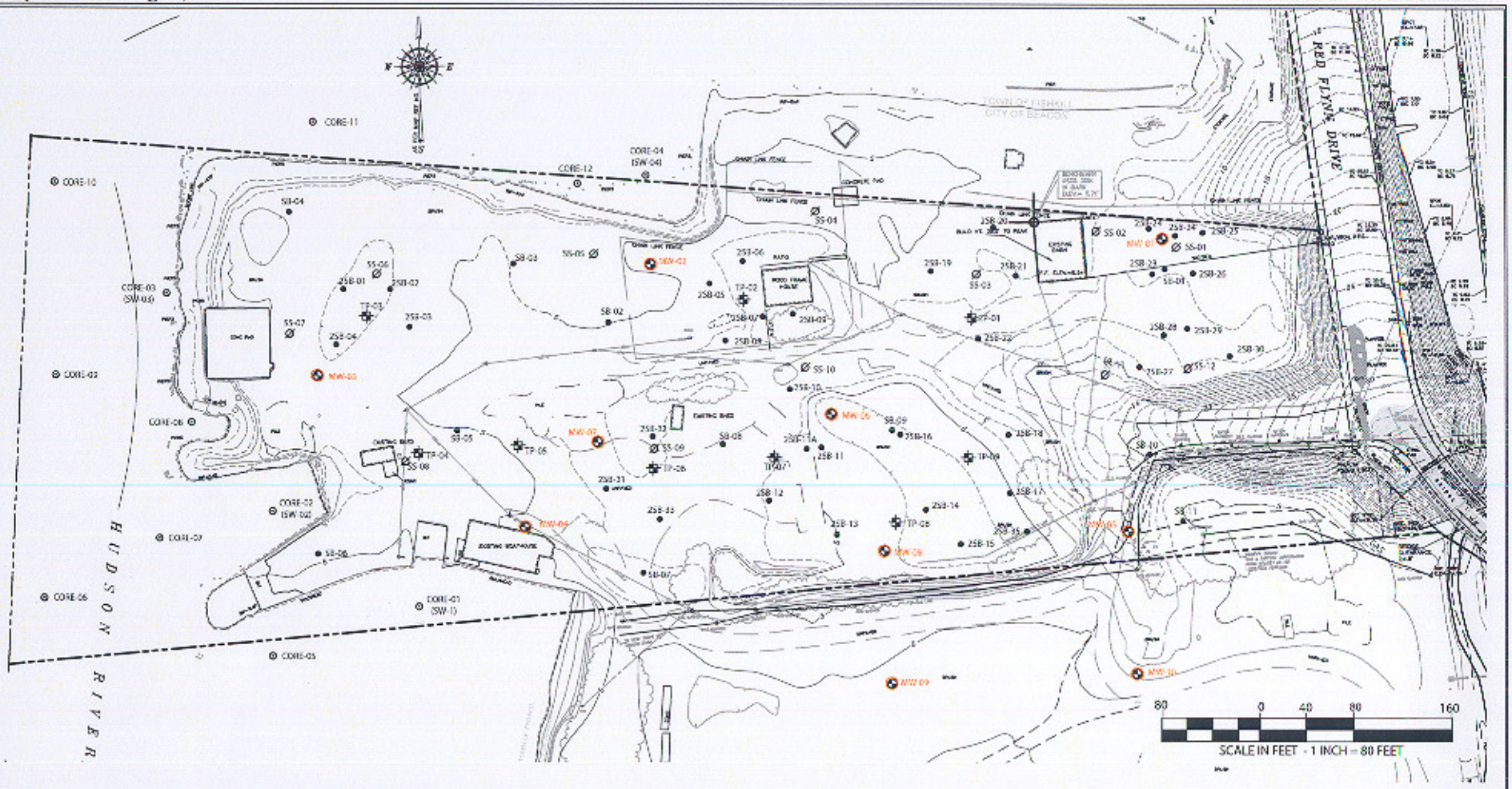


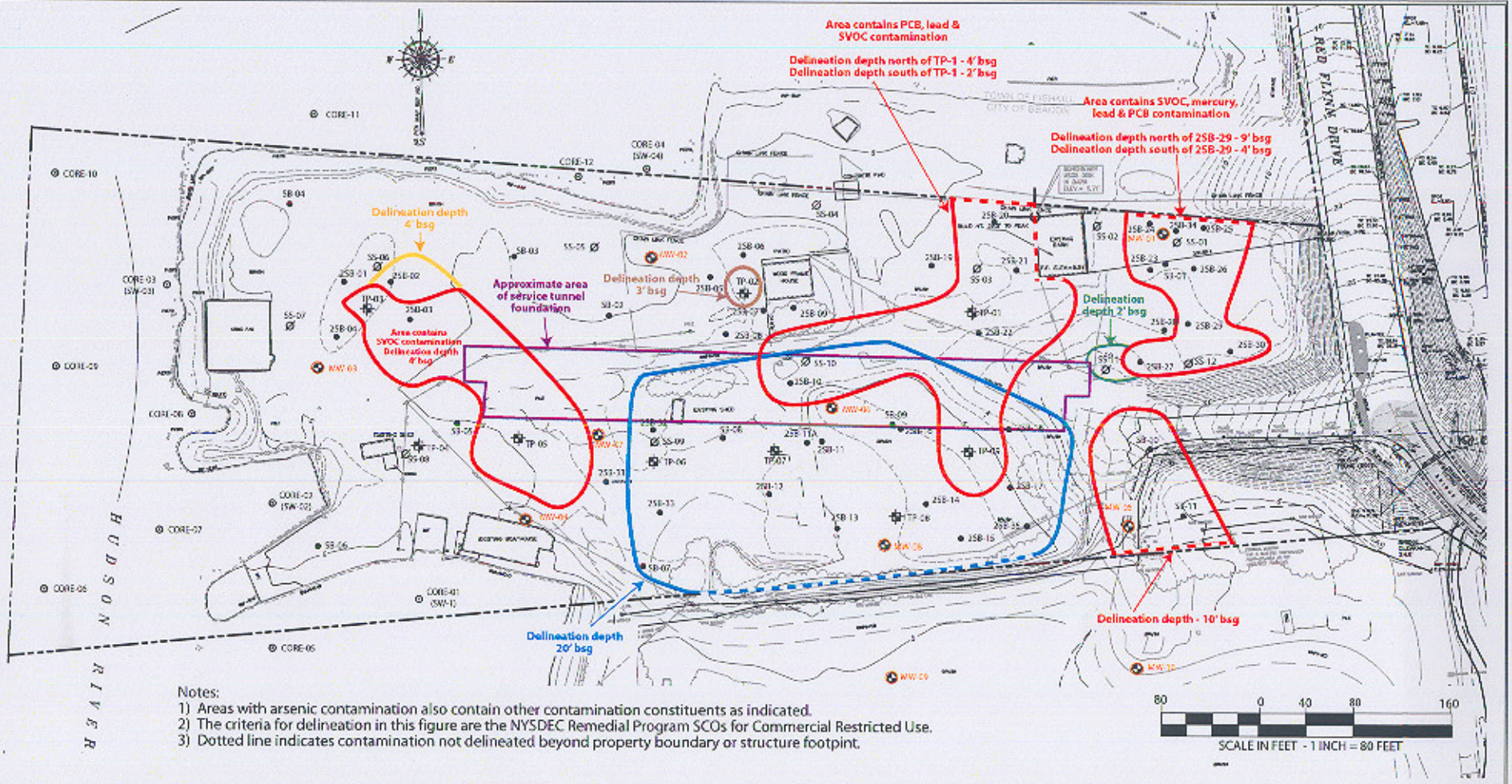
Figure 5 - Fieldwork Map

Long Dock Beacon
Red Flynn Drive
City of Beacon
Dutchess County, New York

Legend:

- Site Boundary
- Soil Boring
- Test Pit
- Surface Sample
- Sediment Sample
- Monitoring Well

ESI File: SG96152.52
January 2008
Scale as shown
Appendix B



Notes:
1) Areas with arsenic contamination also contain other contamination constituents as indicated.
2) The criteria for delineation in this figure are the NYSDEC Remedial Program SCOs for Commercial Restricted Use.
3) Dotted line indicates contamination not delineated beyond property boundary or structure footpint.

Figure 6 - Proposed Site Remediation

Long Dock Beacon
Red Flynn Drive
City of Beacon
Dutchess County, New York

Legend:

- Soil Boring
- Test Pit
- Surface Sample
- Sediment Sample
- Monitoring Well
- Area of former MOSF and proposed in-situ remediation (VOC, SVOC and TPH-DRO contamination)
- Boundary of areas with arsenic contamination
- Site Boundary
- Boundary of area with lead contamination and no arsenic contamination
- Boundary of area with PCB contamination and no arsenic contamination
- Boundary of area with significant SVOC contamination and no arsenic contamination

ESI File:	SG96152.52
	January 2008
	Scale as shown
	Appendix B

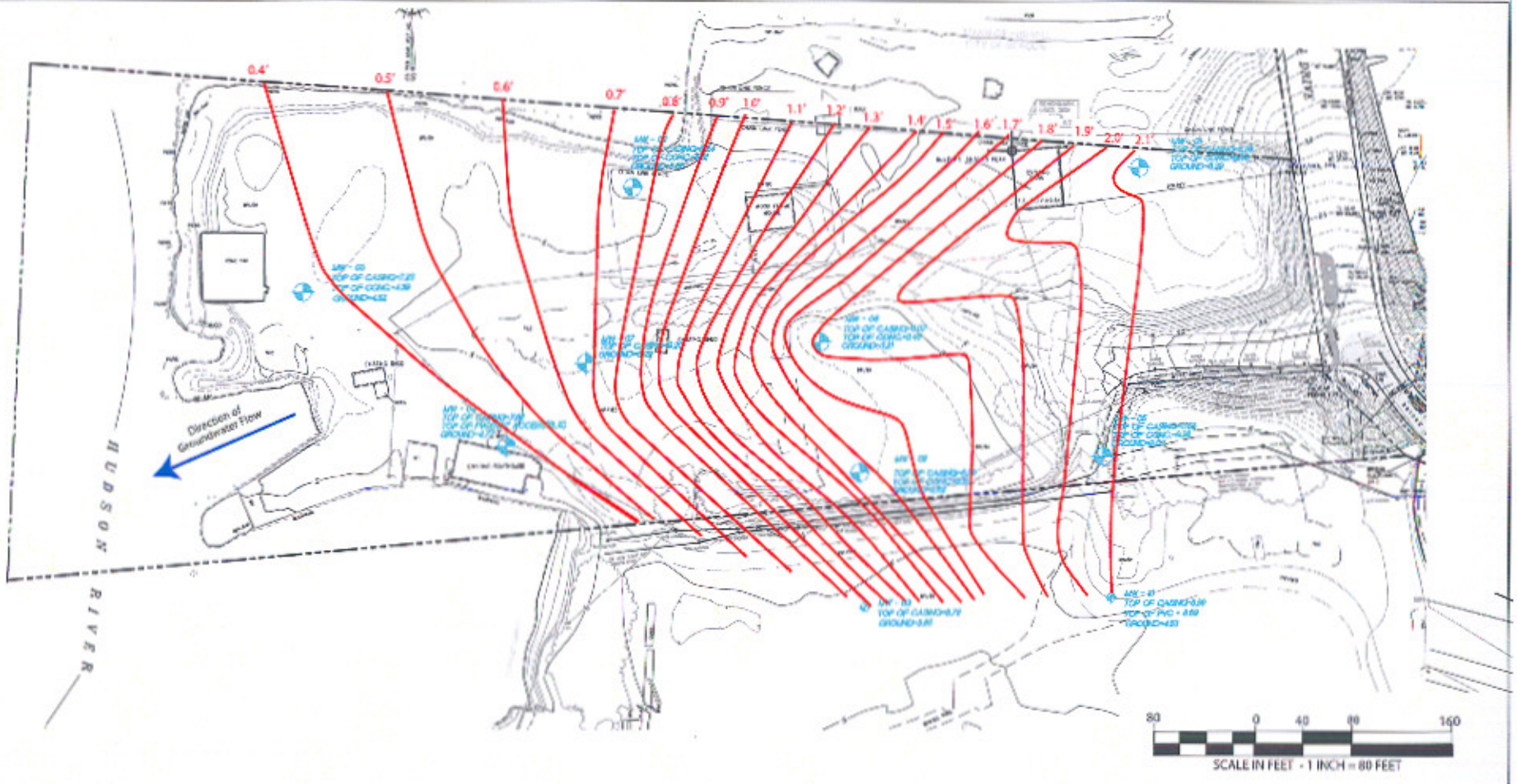


Figure 7 - Direction of Groundwater Flow - Low Tide

Long Dock Beacon
Red Flynn Drive
City of Beacon
Dutchess County, New York

Legend:

Site Boundary

Monitoring Well

0.0' Groundwater isopleths, elevation in feet above mean sea level

ESI File: SG96152.52
January 2008
Scale as shown
Appendix B

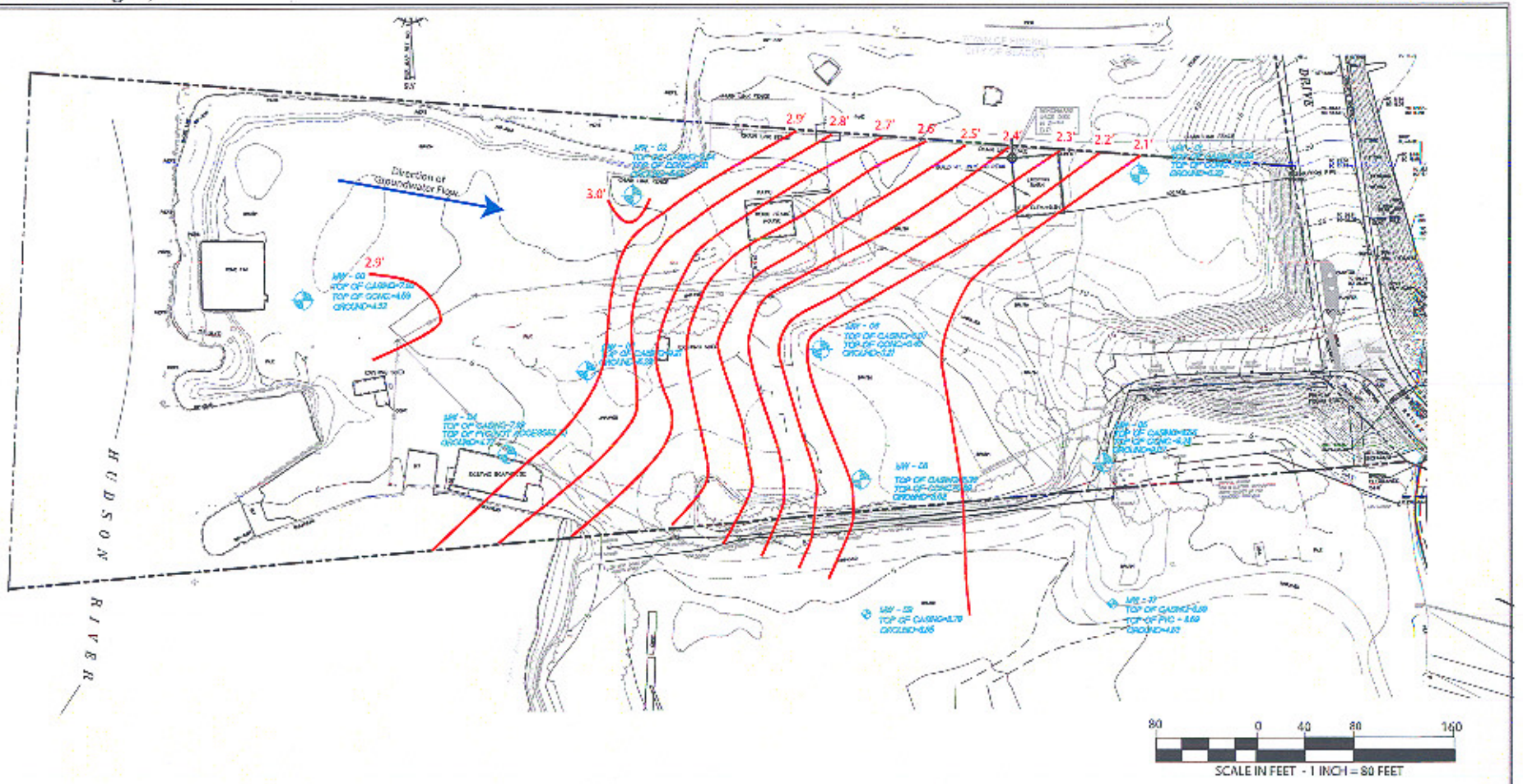


Figure 8 - Direction of Groundwater Flow - High Tide

Long Dock Beacon
Red Flynn Drive
City of Beacon
Dutchess County, New York

Legend:

- Site Boundary
- Monitoring Well
- 0.0' Groundwater Isopleths, evelvation in feet above mean sea level

ESI File:	SG96152.52
January 2008	
Scale as shown	
Appendix B	

APPENDIX C

Soil Volume Calculations

Table 1: Groundwater Elevations and Fluctuations

Well Number	Surveyed Top of Casing (feet)	Distance from Top of PVC to Top of Casing (inches)	Low Tide				High Tide				Groundwater Fluctuation (feet)
			Date	Time	Water Level from Top of PVC (feet)	Water Elevation (feet) MSL	Date	Time	Water Level from Top of PVC (feet)	Water Elevation (feet) MSL	
1	8.29	13.60	8/16/2007	10:43	5.03	2.13	8/16/2007	15:04	5.09	-0.32	-0.06
2	8.24	5.30	8/16/2007	10:27	7.06	0.74	8/16/2007	15:09	4.79	0.68	2.27
3	7.23	3.50	8/16/2007	10:21	6.57	0.37	8/16/2007	15:12	4.07	1.76	2.50
4	7.82	5.50	8/16/2007	10:17	7.11	0.25	8/16/2007	15:17	4.41	2.71	2.70
5*	11.65	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
6	6.07	4.50	8/16/2007	10:31	3.87	1.83	8/16/2007	15:21	3.56	4.85	0.31
7	9.21	5.90	8/16/2007	10:13	8.14	0.58	8/16/2007	15:16	5.79	5.60	2.35
8	6.39	3.30	8/16/2007	10:35	4.53	1.59	8/16/2007	15:23	3.98	6.83	0.55
9	6.78	2.50	8/16/2007	10:10	5.63	0.94	8/16/2007	15:27	4.43	7.79	1.20
10	8.89	2.50	8/16/2007	10:03	6.58	2.10	8/16/2007	15:30	6.62	8.61	-0.04

Notes:

* MW-5 damaged and could not be measured.
NM = Not measured

Full Soil Removal Alternative - Soil Volume Calculati

Assumptions:

(1) Given that concentrations above Unrestricted SCO are prevalent throughout the site (approx. 55 out 67 sampling locations have samples w/ concentration > Unrestricted SCO), the area of contaminated soils to be removed is assumed to be 80% of the total Site area

Area of Site (from Draft EIS)

	upland
Panel 1	3.49 acres
Panel 2	3.44 acres
	6.93 acres = 301,870.8 sq ft

Area of cont. soil = 301,870.8 sq.ft. (80%)
= 241,496.64 sq ft

(2) Average depth of contamination in shallow areas = 4 ft

(3) Areas w/ deep contamination consist of:
a. area of former MOSF ≈ 62,200 ft²
b. vicinity of SB-10 & SB-11 ≈ 9,200 ft²
c. vicinity of SB-1 ≈ 630 ft²

(4) Depth of contamination in these areas is estimated

Calculations - Full Soil Removal

Soil Volume in Areas of Shallow Contamination (SC)

Vol_{SC} = 241,496.64 sq ft × 4'
= 965,986.56 ft3
= 35,777.28 cyd ≈ 35,800 cyd

Soil Volume in Areas of Deep Contamination (DC)

$Vol_{DC(a)}$ = 62,200 sq ft × 11'
= 684,200 ft3
= 25,340.74 cyd
↑ Area of former MOSF

$Vol_{DC(b)}$ = 9,200 ft2 × 6'
= 55,200 ft3
= 2,044.44 cyd
↑ vicinity of SB-10 & SB-11

$Vol_{DC(c)}$ = 630 ft2 × 6'
= 3,780 ft3
= 140 cyd
↑ vicinity of SB-1

$Vol_{Total\ DC}$ =
257,525.18 cyd
≈ 27,600 cyd

Vol_{SC+DC} = 35,800 cyd + 27,600 cyd
= 63,400 cyd

Dewatering cost for Full Soil Removal Alternative

Assumptions:

(1) Dewatering will be required in areas of deep excavation identified as:
   a. area of former MOSF
   b. vicinity of SB-10 & SB-11
   c. vicinity of SB-1

   } $Vol_{Total\,DC} \approx 27{,}600$ cyd

(2) Dewatering will be needed in 50% of the areas of shallow excavation:

Vol_{SC} to be dewatered $\approx 35{,}800$ cyd $\times$ 50% $\approx 17{,}900$ cyd

(3) Dewatering cost $\approx$ \$10,000 / days of excavation

(4) Excavation rate $\approx$ 300 cyd/day

Calculations:

Volume of soil to be dewatered = 27,600 cyd + 17,900 cyd = 45,500 cyd

Days of excavation = soils to be dewatered ÷ excavation ra

$$= \frac{(27{,}600 + 17{,}900)\ \text{cyd}}{300\ \text{cyd/day}}$$

$\approx$ 152 days of excavation

Dewatering cost $\approx$ \$10,000 /day (152 days) = \$1,520,000

As contaminated soil > 16 ppm

Area 1 - W portion of Site
Area 2 - W of barn
Area 3 - E of bar
Area 4 - SE portion of Site

Area 1

(a) $A_a = b \times h \times 1/2$
$= 90' \times 45' \times 1/2$
$= 2025$ sq ft

(b) $A_b = 25' \times 90'$
$= 2590$

(c) $A_c = 85 \times 65 \times 1/2$
$= 2562.5\ ft^2$

(d) $A_d = h(b_1 + b_2)\ 1/2$
$= 55'(40' + 70')\ 1/2$
$= 3025\ ft^2$

(e) $A_e = 45' \times 15' \times 1/2$
$= 337.5\ ft^2$

(f) $A_f = 40' \times 65'$
$= 2,600\ ft^2$

(g) $A_g = 1/2 \times b \times h$
$= 1/2 \times 65' \times 35'$
$= 1137.5\ ft^2$

(h_1) $A_{h_1} = 30' \times 30'$
$= 900\ ft^2$

(h_2) $A_{h_2} = 85' \times 30' \times 1/2$
$= 1275\ ft^2$

Area 1 = 16,452.5 sq. ft

$V_{\text{area 1}} = 16,452.5 ft^2 \times 4' = 65810\ ft^3$
$= 2,437.4$ cyd

A_5 > 16 ppm

Area 2

(i) $A_i = 160' \times 55'$
$= 8800\ ft^2$

(j) $A_j = 75' \times 65'$
$= 4875\ ft^2$

$V_j = 4875\ ft^2 \times 4' = 19,500\ ft^3$
$= 722\ cyd$

(k) $A_k = 1/2\ (h)\ (b_1 + b_2)$
$= 1/2\ (80')\ (100' + 65')$
$= 6600\ ft^2$

(l) $A_l = 95' \times 45'$
$= 4275\ ft^2$

$V_{l,k,l} = 19,675 \times 2' = 39,350\ ft^3$
$= 1,457.40\ cyd$

$V_{area\ 2} = 722 + 1,457.40 = 2179.4\ cyd$

As > 16 ppm

Area 3

(m) $A = 105' \times 45'$
$= 4725\ ft^2$

(n) $A = 1/2\ (h)\ (b_1 + b_2)$
$= 1/2\ (35')\ (95' + 55')$
$= 2625\ ft^2$

(o) $A = 1/2\ b\ (h)$
$= 1/2\ (50')\ (20')$
$= 200\ ft^2$

(p) $A = 120 \times 30$
$= 3600\ ft^2$

$V_{m+n} = 7350\ ft^2 \times 9' = 66,150\ ft^3$

$= 2,450\ cyd$

$V_{m+n} - V_{PAH\ @\ SB-1} = 2450\ cyd - 210\ cyd$
$= 2240\ cyd$

(see page 4)

$V_{o+p} = 3,800\ ft^2 \times 4'$
$= 15,199.99\ ft^3 = 562.96\ cyd$

$V_3 = 2240 + 562.96\ cyd = 2802.9\ cyd$

Area 4

(q) $A = 115' \times 80'$
$= 9,200\ ft^2$

$V_q = 9,200\ ft^2 \times 10'$
$= 92,000\ ft^3$

$V_{Area\ H} = 3,407.4\ cyd$

As VOL TOTAL

$V_1 = 2,437.4\ cyd$

$V_2 = 2,179.4\ cyd$

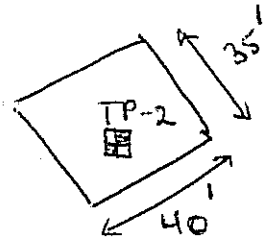
$V_3 = 2802.9\ cyd$

$V_4 = 3,407.4\ cyd$

+

$V_{AS_T} = 10,827\ cyd$

Pb removal at TP-2



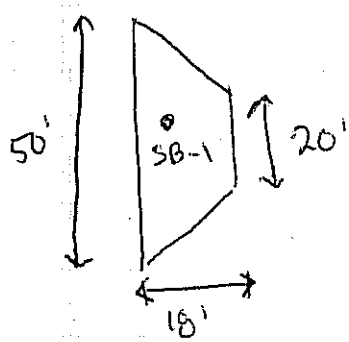
(west of house)

$Pb\ A_1 = 35' \times 40' = 1{,}400\ ft^2$

$Pb\ V_1 = 1{,}400\ ft^2 \times 3\ ft = 4{,}200\ ft^3$

$\approx 160\ cyd$

PAH removal at SB-1



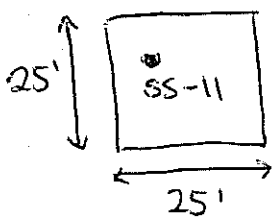
$A_{PAH\text{-}R_1} = 1/2(18')(20 + 50)'$
$= 630\ ft^2$

$V_{PAH\text{-}R_1} = 630 \times 9\ ft = 5{,}670\ ft^3$

$\approx 210\ cyd$

Depth of Contamination
7.8 – 8.2'

PCB Removal at SS-11

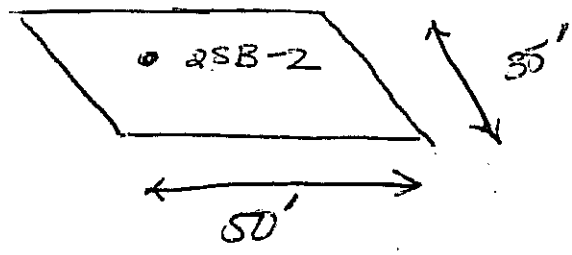


$A_{PCB\text{-}R} = 25 \times 25' = 625\ ft^2$

$V_{PCB\text{-}R} = 625\ ft^2 \times 2\ ft = 1250\ ft^3$

$= 46\ cyd \approx 50\ cyd$

PAH removal at SB-2



(north of As contaminated soil in the west portion of the site)

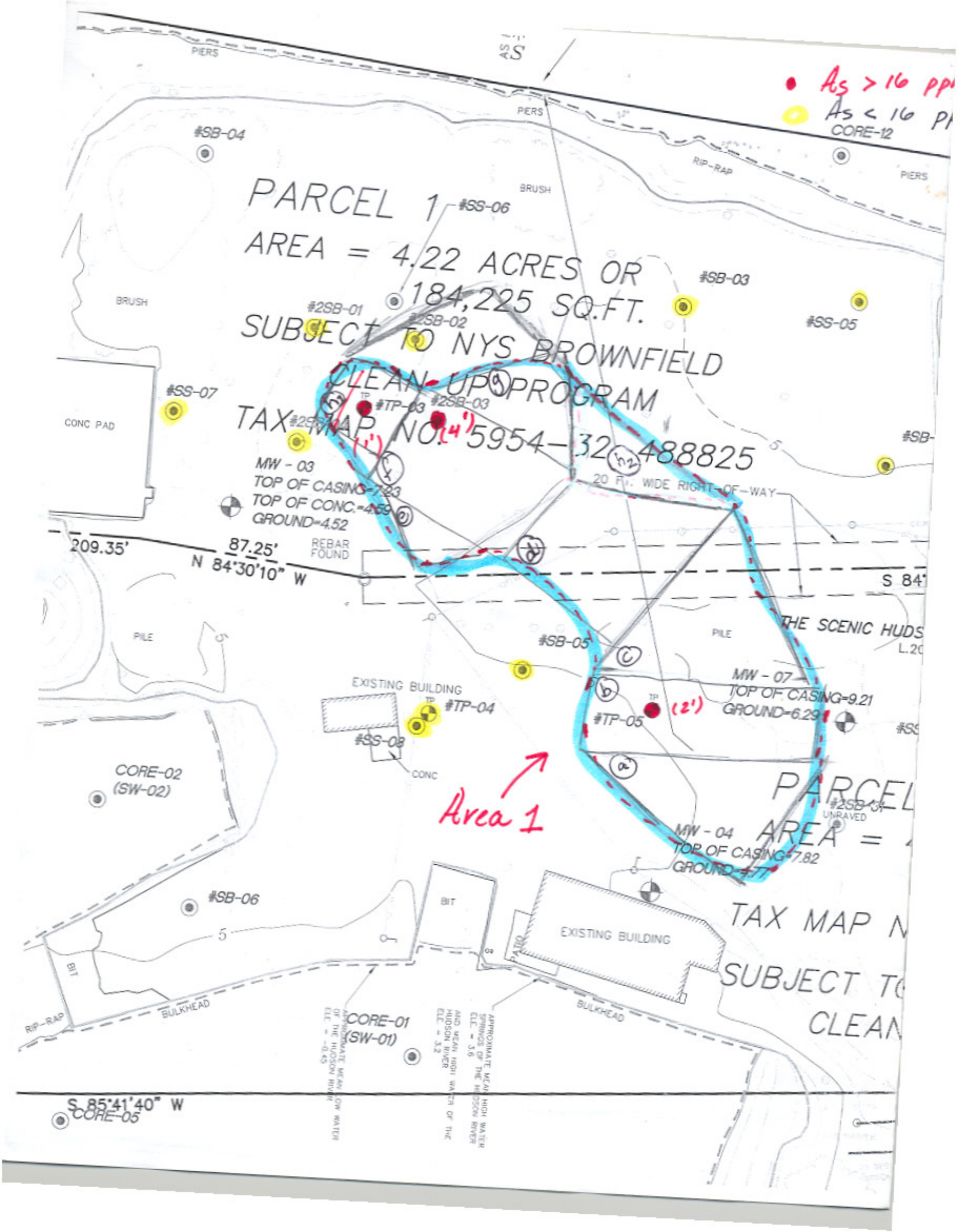
$A_{PAH-R_2} = 35' \times 50'$

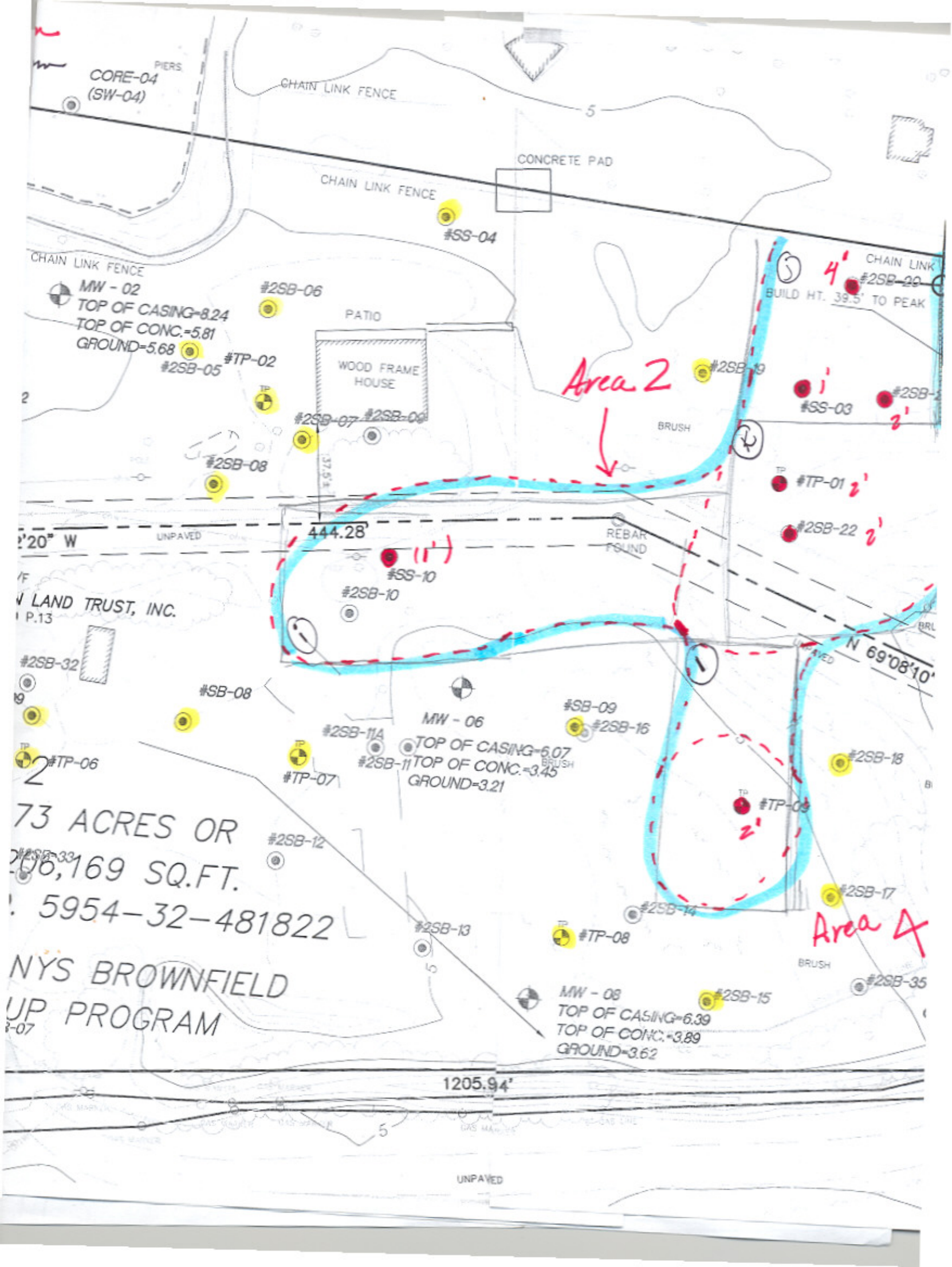
$= 1,750\ ft^2$

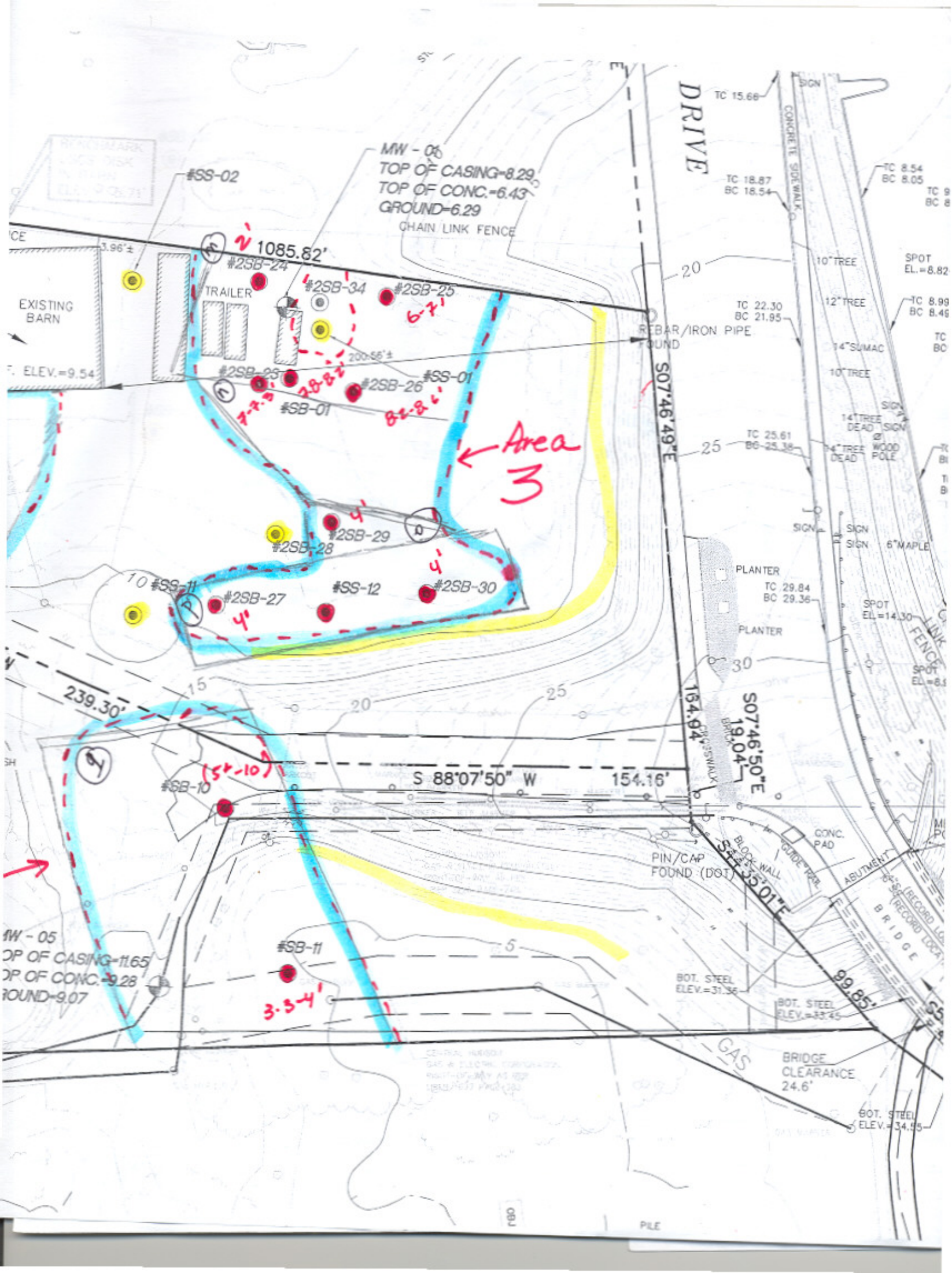
$V_{PAH-R_2} = 1,750\ ft^2 \times 4$

$= 7,000\ ft^3$

$\approx$ **260 cyd.**


As > 16 ppm
As < 16 ppm
PARCEL 1
AREA = 4.22 ACRES OR
184,225 SQ.FT.
SUBJECT TO NYS BROWNFIELD
CLEAN-UP PROGRAM
TAX MAP NO. 5954-32-488825
20 FT. WIDE RIGHT-OF-WAY
#SB-04
#SB-03
#SB-05
#SB-06
#SS-05
#SS-06
#SS-07
#SS-08
#2SB-01
#2SB-02
#2SB-03
#TP-03
#TP-04
#TP-05
MW - 03
TOP OF CASING=7.23
TOP OF CONC.=4.59
GROUND=4.52
MW - 04
TOP OF CASING=7.82
GROUND=4.77
MW - 07
TOP OF CASING=9.21
GROUND=6.29
209.35'
87.25'
N 84°30'10" W
S 84°
S 85°41'40" W
REBAR FOUND
CONC PAD
EXISTING BUILDING
PILE
PIERS
RIP-RAP
BULKHEAD
BRUSH
BIT
CONC
UNPAVED
CORE-01 (SW-01)
CORE-02 (SW-02)
CORE-05
CORE-12
Area 1
THE SCENIC HUDS
PARCEL
TAX MAP N
SUBJECT TO
CLEAN


CORE-04
(SW-04)
PIERS
CHAIN LINK FENCE
CONCRETE PAD
#SS-04
MW - 02
TOP OF CASING=8.24
TOP OF CONC.=5.81
GROUND=5.68
#2SB-05
#TP-02
#2SB-06
PATIO
WOOD FRAME HOUSE
#2SB-07
#2SB-08
Area 2
BRUSH
#2SB-19
#SS-03
#TP-01
#2SB-22
444.28
UNPAVED
REBAR FOUND
#SS-10
#2SB-10
#2SB-32
#SB-08
#SB-09
#2SB-16
MW - 06
TOP OF CASING=6.07
TOP OF CONC.=3.45
GROUND=3.21
#2SB-11A
#2SB-11
#TP-06
#TP-07
#2SB-18
#TP-04
#2SB-12
#2SB-17
#2SB-14
#2SB-13
#TP-08
Area 4
#2SB-35
MW - 08
TOP OF CASING=6.39
TOP OF CONC.=3.89
GROUND=3.62
#2SB-15
1205.94'
UNPAVED
73 ACRES OR
206,169 SQ.FT.
5954-32-481822
NYS BROWNFIELD
UP PROGRAM


DRIVE
MW - 06
TOP OF CASING=8.29
TOP OF CONC.=6.43
GROUND=6.29
CHAIN LINK FENCE
#SS-02
#2SB-24
#2SB-34
#2SB-25
#2SB-26
#SS-01
#SB-01
#2SB-28
#2SB-29
#2SB-27
#SS-12
#2SB-30
#SB-10
#SB-11
1085.82'
TRAILER
EXISTING BARN
ELEV.=9.54
REBAR/IRON PIPE FOUND
S07°46'49"E
Area 3
239.30'
S 88°07'50" W
154.16'
154.94'
S07°46'50"E
19.04'
PIN/CAP FOUND (DOT)
S41°35'01"E
99.85'
BRIDGE CLEARANCE 24.6'
BOT. STEEL ELEV.=31.36
BOT. STEEL ELEV.=33.45
BOT. STEEL ELEV.=34.95
GAS
PILE
CONCRETE SIDEWALK
BLOCK WALL
GUIDE RAIL
CONC. PAD
ABUTMENT
BRIDGE
PLANTER
SIGN
WOOD POLE
10" TREE
12" TREE
14" SUMAC
14" TREE DEAD
6" MAPLE
SPOT EL.=8.82
SPOT EL.=14.30
TC 15.66
TC 18.87
BC 18.54
TC 22.30
BC 21.95
TC 25.61
BC 25.38
TC 29.84
BC 29.36
TC 8.54
BC 8.05
MW - 05
TOP OF CASING=11.65
TOP OF CONC.=9.28
GROUND=9.07

Partial Soil Removal / In-Situ Rem Alt. Calc. Vol Sat. Soi

Area 1 [redacted]. Excavation area east of concrete [redacted] foundation

↑ including excavation in the vicinity of ESB-2

Assumptions:

Area of excavation = 16,452.5 sq ft.

from map ↑ Volume of " = 65,810 ft^3 = 2,437.4 cyd.

Average water elevation = 3[redacted]' above mean sea level (ms

during ↑ high-tide Excavation depth = 4' below surface grade (bsg

Ground elevation = 4.5' above msl

4.5 msl

- [redacted] 3 msl ↑ 1.5 } 4' bsg @ northern portion of Area 1

-0 msl

Ground elevation = 5.5' above msl @ southern portion of Area 1

Calculations:

Depth of excavation to sat. soil @ northern portion of area 1 = ground elev. - avg. water elev = 4.5' - [redacted]3' = [redacted]* ≈ 1.5'

Depth of excavation to sat. soil @ southern portion of Area 1 = 5.5 - [redacted]3' = [redacted] ≈ 2.5'

Vol. of sat soil in the northern portion of Area 1 = area: 16,452.5 sq ft (1/2) × (excavation depth − depth of excavation to sat soil)

= (16,452.5 sq ft × 1/2) × (4' − 1.5'

= 20,565.6 ft³

= 761.6 cyd ≈ 765 cyd

Vol. of sat soil in the southern portion of Area 2 = (16,452.5 sq ft × 1/2) × (4' − 2.5

= 12,339.84 ft³

= 457 cyd ≈ 460 cyd

[redacted]

Vol of sat. soil @ SSB-2 = 1,750 ft² × (4' − 1.5')

= 4,375 ft³ ≈ 160 cyd

Total Vol. Sat Soil in Area 1 = 765 + 460 + 160 cyd

= 1,385 cyd

Partial Soil Removal / In-Situ Rem Alt. - Calc. Vol Sat. So

Area 2 ↑ including excavation in the vicinity of TP-2

→ Area west of the barn

Assumptions:

Area of excavation = 24,550 ft²
Vol. " " = 58,850 ft³ ≈ 2,180 cy d
Average water elevation = 2.25' above msl
Excavation depth
→ north of TP-1 = 4' bsg
→ south of " = 2' bsg
Ground elevation
→ north of access road = 6.25' above msl
→ south of " " = 3.25' above msl

Calculations:

Depth of excavation to sat. soil north of access road = ground elev. - avg. water el
= 6.25' - 2.25'
@ Area 2 = 4'

Depth of excavation to sat. soil south of access road = 3.25' - 2.25'
@ Area 2 = 1'

Vol. of sat soil = 1/3 (area of excavation) x
north of (excavation depth - depth of excava
TP-1 @ Area 2 to sat soil)
= 0

According to calc. no sat. soil exist in north of TP-1, however based on fieldwork observations, sat. soil was encountered ≈ 2.5 bsg ∴ depth of excavation to sat soil is assumed to be 2.5' bsg

= (1/3) 24,550 ft² x (4'-2.5')
= 12,274.9 ≈ 454.6 cyd ≈ 460 cyd

No Sat soils is evident south of TP-1 & north of access road as excavation (to 2' bsg) is relatively shallow.

Vol of sat. soil = (1/3) 24,550 ft² x (2'-1')
south of access road = 8,183.3 ft³ ≈ 310 cyd
@ Area 2

According to calc. no sat. soil is evident in the vicinity of TP-2, however based on proximity to Hudson River shore layer of sat. soil is assumed to be 1'
Vol of sat. soil @ = 1,400 ft² x (1')
TP-2 = 1,400 ft² ≈ 50 cyd

Total Vol of Sat. Soil = 460 + 310 + 50 = 820 cyd

Partial Soil Removal/In-Situ Rem Alt. – Calc. Vol. Sat. Soi

Area 3 — Area East of the barn

↑ including excavation in the vicinity of SS-11

Assumptions:

Area of excavation = 11,150 sq ft.
Volume of excavation = 81,350 ft³ ≈ 3,010 cyd
Average water elevation = 2' above msl
Excavation depth
→ north of 25B-29 = 9' bsg
→ south " " = 4' bsg
Ground elevation ≈ 6' above msl

Calculations:

Depth of excavation to sat. soil = ground elev. – avg. water elev
= 6' – 2' = 4'

Vol. of sat. soil north of 25B-29 = [(2/3)(11,150 sq ft)] x (9' – 4')
= 3716.6 ft³ ≈ 1,380 cyd

Vol. of sat soil south of 25B-29 = (1/3)(11,150 sq ft) x 1'
= 3716.6 ft³
≈ 140 cyd

No sat. soil exist in the vicinity of SS-11 as excavation (to 2' bsg) is relatively shallow.

Total Vol. Sat. Soil = 1,380 + 140 = 1,520 cyd

According to cal
not sat. soil
south of 25B
evident
however based on

Partial Soil Removal / In-Situ Rem Alt. - Calc Vol. Sat. So

Area 4 South of the barn

Assumptions:

Area of excavation = 9,200 ft²
Vol. " " = 92,000 ft³ ≈ 3,400 cyd
Average water elevation ≈ 2' above msl
Excavation depth = 10' bsg
Ground elevation
→ northern portion Area 4 ≈ 15 above msl
→ southern " " ≈ 9.[illegible] above msl

Calculations:
Depth exc. to sat. soil
in the northern portion Area 4 = ground elev. - water elev
15 - 2
Depth exc. to sat soil = 13'
in the southern portion Area 4 = 9 - 2 = 7'

No sat. soil is evident in the northern portion of of Area 4

Vol of sat. soil in = (1/2)(9,200 ft²) x (10' - 7')
the southern portion of Area 4 = 5520 ft³ ≈ 200 cyd

Partial Soil Removal / In-Situ Rem Alt. - Calc. Vol Sat. Soil

Volume Sat. Soil

Area 1	=	1,385 cyd
Area 2	=	820 cyd
Area 3	=	1,520 cyd
Area 4	=	200 cyd
	+	
		3,925 cyd

Dewatering cost for Partial Soil Removal / In-Situ Alternative

Assumptions:

① Dewatering cost ≈ $10,000 / days of excavation

② Excavation rate ≈ 300 cyd / day

Calculations

Vol. of sat. soil to be dewatered = 3,925 cyd

$$\text{Days of excavation} = \frac{\text{soils to be dewatered}}{\text{excavation rate}}$$

$$= \frac{3,925 \text{ cyd}}{300 \text{ cyd}}$$

$$\approx 13 \text{ days}$$

Dewatering cost ≈ $10,000/day (13 days)

≈ $130,000

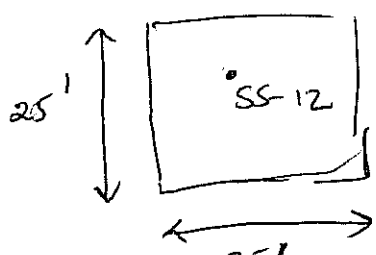
Calculating estimated volume of ~~the~~ potential hazardous material.

Assumptions:

- PCBs > 50 ppm are considered hazardous mat
- Pb > 1,000 ppm " " " "
- As > 200 ppm " " " "
- Although SB-1 has As < 200 ppm given elevated levels of PAHs, it is considered haz. mat.
- Preliminary area calculations for the Preferred Alternative have been used to assess in the haz mat. calculations.

Calculations:

PCBs Removal @ SS-12 > 50 ppm



$A_{PCB>50ppm} = 25' \times 25' = 625\ ft^2$

$V_{PCB>50\ ppm} = 625\ ft^2 \times 2' = 1250\ ft^3$

$= 46\ cyd$

$\approx 50\ cyd$

A ~~PCB~~ 2ppm < PCB > 50ppm * ← requiring diff disposal rate

West of the barn = $Area_{2j} = 75' \times 65' = 4875\ ft^2$

$V_{2j} = 4875\ ft^2 \times 2' = 9750\ ft^3$

$= 361\ cyd$

East of the barn = A_3 = 4725
2625
200
3600
+ 625 ft^2
11,775 ft^2

V_3 = 11,775 ft^2 × 2' = 23,550 ft^3
≈ 873 cyd

$V_{2\,ppm < PCBs > 50\,ppm}$ = 1,233 cyd

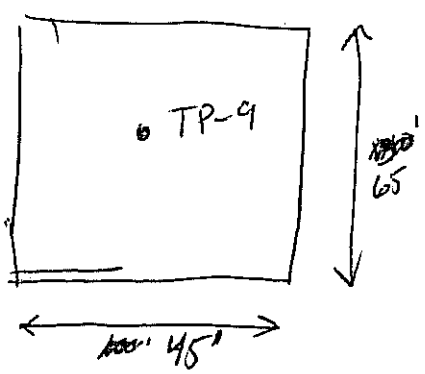
Pb > 1,000 ppm

Pb @ TP-2 V = 160 cyd

Pb @ TP-9 = $A_{@TP-9}$ = 45' × 65' = 2925 ft^2

$V_{@TP-9}$ = 2925 ft^2 × 2' = 5850 ft^3

≈ 217 cyd



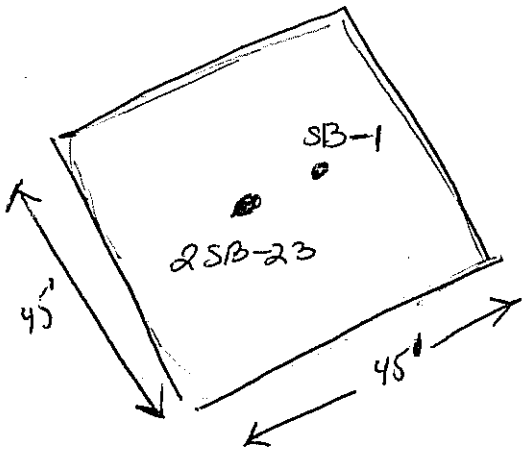
Pb west of the barn = A = 75' × 65' = 4875 ft^2

V = 4875 ft^2 × 2' = 9750 ft^3
= 361 cyd

↑ w/ PCB > 2 ppm

@ 2SB-23

Pb ~~west of the Lagoon~~ (including As >200 @ 2SB-23 and PAHs @ SB-1



$A = 45' \times 45' = 2025\ ft^2$

$V = 2025 \times 9' = 18225\ ft^3$
$\approx 675\ cyd$

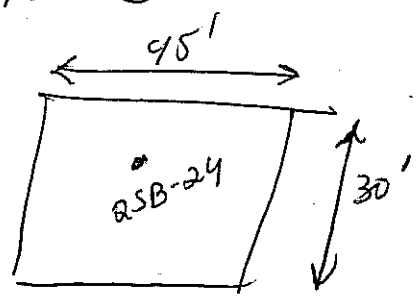
$675 - 150\ cyd = \boxed{525\ cyd}$
(top 2' removed as ~~2~~ 2ppm < PCBs > 50ppm ~~not~~ haz but req. diff. dispos

(2-5.5)

Assumption 1/2 of 525 cyd is treated as haz mat due to ↑ levels of lead & ~~arsenic~~, other half ~~is~~ treated b/c ~~it~~ has elevated levels of PAH & As.

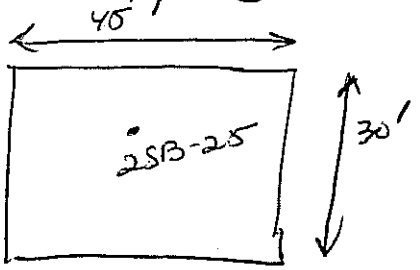
525 (1/2) ≈ 263 cyd haz ~~Pb~~ + Pb
263 cyd haz As + ~~Pb~~ + PAHs

Pb @ 2SB-24



$V = 45' \times 30' \times 2' = 2700\ cyd$
$= \boxed{100\ cyd}$
↑
w/ PCB > 2ppm

As > 200 ppm @ 25B-25



$V = 45' \times 30' \times 9' =$
$= 12,150\ ft^3 =$ 450 cyd

450 cyd − 100 cyd = 350 cyd

↑
removed as top ~~2~~ 2' as PCB
2 ppm < PCBs >
not haz but req. diff. disposal.

Summary of Hazardous Materials.
Potential

	PCBs > 50 ppm	50 cyd
✓	Pb > 1,000 ppm	1,000 cyd ↳ 460 cyd contain PCB > 2 ppm
✓	As > 200 ppm	350 cyd
✓	As + PAHs	+ 263 cyd
		1663 cyd

Non-hazardous

↗ req. diff. disposal fee

2 ppm < PCBs ~~< 50 ppm~~ = 1,233 cyd − 50 cyd (haz PCB > 50 ppm) − 460 (haz for lead) = 723 cyd

✓ Remaining soils 9114 cyd

APPENDIX D

Cost Estimates for Remedial Alternatives

Cost of No Further Action Alternative

No costs are associated with this alternative

Cost of Site Control and Site Security Alternative

Removal of All On-Site Structures and Maintenance of Fences **$ 50,000**

Cost of Full Soil Removal Alternative

Task/Item	Unit Cost	Per	Units	Costs
Short Term Cost				
Design Process (creation of remedial design)				$ 60,000
Removal of On-Site Structures (except barn)				$ 40,000
Re-location of Barn				$ 50,000
Excavation of Contaminated Soils	10	CY.	63400	$ 634,000
Dewatering Activities				$ 1,520,000
Transportation and Disposal of Contaminated Soils				
Hazardous Solid Waste - Metals (As and/or Pb)	191	CY.	1350	$ 257,850
Hazardous Solid Waste - Metals (As and/or Pb) and PAHs	525	CY.	263	$ 138,075
Hazardous Solid Waste - PCBs	390	CY.	50	$ 19,500
Non-hazardous Solid Waste	93	CY.	61737	$ 5,741,541
Replacement Fill Material	20	CY.	63400	$ 1,268,000
Long Term Cost				
No cost	No cost		No cost	No cost
Sub Total				$ 9,728,966
Contingency (10%)[1]				$ 972,897
Administrative (10%)[2]				$ 972,897
Estimated Total				**$ 11,674,759**

Notes:

1 - Contingency cost consist of unforeseen costs related to remedial activites.

2 - Administrative cost includes costs associated with: waste characterization sampling for off-site disposal of soils, confirmatory sampling to document integrity of remaining soils, DUSRs, air/vapor sampling, preparation of reports, professional oversight, and other costs related to administrative oversight.

Cost of Partial Soil Removal/In-Situ Remediation (Chemical Oxidation) Alternative

Task/Item	Unit Cost	Per	Units	Costs
Short Term Cost				
Design Process (creation of remedial design)				$ 60,000
Removal of On-Site Structures (except barn)				$ 40,000
Excavation of Contaminated Soils	10	CY.	11500	$ 115,000
Dewatering Activites				$ 130,000
Transportation and Disposal of Contaminated Soils				
Hazardous Solid Waste - Metals (As and/or Pb)	191	CY.	1350	$ 257,850
Hazardous Solid Waste - Metals (As and/or Pb) and PAHs	525	CY.	263	$ 138,075
Hazardous Solid Waste - PCBs	390	CY.	50	$ 19,500
Non-hazardous Solid Waste	93	CY.	9837	$ 914,841
In-Situ Chemical Oxidation (ISCO) Associated with ISOTEC				
ISCO Treatment[1]				$ 1,231,600
ISCO Direct Push Rig and Operator	1500	DAY	50	$ 75,000
Replacement Fill Material	20	CY.	10150	$ 203,000
Barrier Layer Material	25	CY.	15000	$ 375,000
Installation of Barrier Layer				$ 40,000
Installation/Operation of Sub-Slab Depressurization System				$ 30,000
Long Term Cost				
Maintenance of Barrier Layer ($3,000/yr for 30 yrs)	3000	YR.	30	$ 90,000
Groundwater Monitoring[2]				$ 70,000
Sub Total				$ 3,789,866
Contingency (10%)[3]				$ 378,987
Administrative (10%)[4]				$ 378,987
Estimated Total				**$ 4,547,839**

Notes:

ISOTEC - In-Situ Oxidative Technologies, Inc.

1 - ISCO Treatment cost includes cost associated with: laboratory pilot study, pilot program (including 2 injections events), full-scale treatment program (including 2 injection events), HASP-CO, and corresponding reports.

2 - Groundwater cost includes costs associated with: installation of five new monitoring wells, quaterly sampling during and after remedial activites during the first year, and one sampling post remedial activites for 10 years.

3 - Contingency cost consist of unforeseen costs related to remedial activites.

4 - Administrative cost includes costs associated with: waste characterization sampling for off-site disposal of soils, confirmatory sampling to document integrity of remaining soils, soil sampling related to ISCO treatment, DUSRs, one groundwater sampling prior to remediation activites, air/vapor sampling, preparation of reports, professional oversight, and other costs related to administrative oversight.

APPENDIX E

Health and Safety Plan

HEALTH AND SAFETY PLAN

FOR

SITE REMEDIATION

(INCORPORATING COMMUNITY HEALTH AND SAFETY PLAN)

LONG DOCK BEACON SITE

RED FLYNN DRIVE, CITY OF BEACON
DUTCHESS COUNTY, NEW YORK

NYSDEC Brownfields Cleanup Program Site ID: C314112

January 2008

ESI File: SG96152.52

Appendix E of the Remedial Alternatives Report and Remedial Workplan

Prepared By

ECOSYSTEMS STRATEGIES, INC.
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Poughkeepsie, New York 12603
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TABLE OF CONTENTS

1.0 INTRODUCTION 1
- 1.1 Purpose
- 1.2 Site Location and Description
- 1.3 Work Activities

2.0 HEALTH AND SAFETY HAZARDS 2
- 2.1 Hazard Overview for On-site Personnel
- 2.2 Potential Hazards to the Public from Fieldwork Activities
- 2.3 Identified Chemical Contaminants

3.0 PERSONAL PROTECTIVE EQUIPMENT 4

4.0 CONTAMINANT CONTROL, MONITORING, AND ACTION LEVELS 5
- 4.1 Airborne Contaminants
- 4.2 Contaminants in Soil, Sediment, and Groundwater

5.0 SITE CONTROL/WORK ZONES 6

6.0 DECONTAMINATION 7
- 6.1 Decontamination of Site Personnel
- 6.1 Decontamination of Site Personnel

7.0 NOISE CONTROL 8

8.0 PERSONNEL TRAINING 8

9.0 RECORDKEEPING 8

10.0 SPECIAL PRECAUTIONS AND PROCEDURES 9
- 10.1 Heat/Cold Stress
- 10.2 Heavy Equipment
- 10.3 Hazards Associated with Chemical Oxidation Activities
- 10.4 Additional Safety Practices

11.0 EMERGENCY RESPONSE 10
- 11.1 Notification of Site Emergencies
- 11.2 Responsibilities
- 11.3 Accidents and Injuries
- 11.4 Communication
- 11.5 Safe Refuge
- 11.6 Site Security and Control
- 11.7 Emergency Evacuation
- 11.8 Resuming Work
- 11.9 Fire Fighting Procedures
- 11.10 Emergency Decontamination Procedure
- 11.11 Emergency Equipment

12.0 EMERGENCY TELEPHONE NUMBERS AND MAPS TO HOSPITAL 12

TABLES AND FIGURES

Page 3 Table 1: Significant Contaminant Concentrations in Soil and Groundwater
Page 12 Table 2: Emergency Response Telephone Numbers
Page 12 Figure 1: Directions to Hospital
Page 13 Figure 2: Map to Hospital

ATTACHMENTS

A Maps
B Table 3, Hazardous Property Information for Specific Site Contaminants
C Selection and Use of Personal Protective Equipment
D NYSDOH Generic Community Air Monitoring Plan
E Templates for Daily Logs and Incident Reports

1.0 INTRODUCTION

1.1 Purpose

This Health and Safety Plan (HASP) has been developed to provide the requirements and general procedures to be followed by Ecosystems Strategies, Inc. (ESI) and designated subcontractors while performing remedial activities at the "Long Dock Beacon" Brownfields Cleanup Program (BCP) Site (Site Code: Site ID: C314112) located at Red Flynn Drive, City of Beacon, Dutchess County, New York. This document supersedes all other health and safety plans prepared by ESI for this Site.

This HASP incorporates policies, guidelines, and procedures that have the objective of protecting the public health of the community during the performance of fieldwork activities, and therefore serves as a Community Health and Safety Plan (CHASP). The objectives of the CHASP are met by establishing guidelines to minimize community exposure to hazards during fieldwork, and by planning for and responding to emergencies affecting the public.

This HASP describes the responsibilities, training requirements, protective equipment, and standard operating procedures to be utilized by all personnel while on the Site. All on-site personnel and visitors shall follow the guidelines, rules, and procedures contained in this safety plan. The Project Manager or Site Health and Safety Officer (SHSO) may impose any other procedures or prohibitions believed to be necessary for safe operations. This HASP incorporates by reference the applicable Occupational Safety and Health Administration (OSHA) requirements in 29 CFR 1910 and 29 CFR 1926.

The requirements and guidelines in this HASP are based on a review of available information and evaluation of potential on-site hazards. This HASP will be discussed with Site personnel and will be available on-site for review while work is underway. On-site personnel will report to the Site Health and Safety Officer (SHSO) in matters of health and safety. The on-site project supervisor(s) are responsible for enforcement and implementation of this HASP, which is applicable to all field personnel, including contractors and subcontractors.

This HASP is specifically intended for the conduct of activities within the defined scope of work in specified areas of the Site. Changes in site conditions and future actions that may be conducted at the Site may necessitate the modification of the requirements of the HASP. Although this HASP can be made available to interested persons for informational purposes, ESI has no responsibility over the interpretations or activities of any other persons or entities other than employees of ESI or ESI's subcontractors.

1.2 Site Location and Description

The Site as defined in this HASP is the Long Dock Beacon Site, an 8.85 acre irregular-shaped parcel situated on a peninsula on the eastern shore of the Hudson River, in the City of Beacon. The Site extends approximately 1,200 feet westwards from Red Flynn Drive and includes lands submerged in the Hudson River. A barn and a vacant single-family dwelling are located on the northeastern portions of the Site, a concrete foundation is located in the vicinity of the western shoreline, and a boathouse and two small storage sheds, utilized by the Dutchess Boat Club, are located on the southwest portion. The remaining portions of the Site consist of vacant, overgrown areas. A Site Location Map and a Proposed Site Remediation Map (illustrating the configuration of the Site as well as the areas of proposed remedial activities) are included as Attachment A of this HASP.

1.3 Work Activities

Environmental remediation activities are detailed in the Remedial Alternatives Report and Remedial Workplan (RAR/RWP) dated January 2008. The specific tasks detailed in the RAR/RWP are wholly incorporated by reference into this HASP. The RAR/RWP was prepared as a requirement of the Developers' participation in the New York State Department of Environmental Conservation (NYSDEC)

BCP, subsequent to preparation of a Remedial Investigation Report (dated November 2007), and describes tasks required to adequately remediate documented on-site environmental conditions. The Site has a long history of previous industrial use and formerly contained a major oil storage facility (MOSF). Contamination primarily consists of soils impacted by petroleum constituents (volatile organic compounds [VOCs] and semi-volatile organic compounds [SVOCs]), polychlorinated biphenyls (PCBs), and metals.

The Scope of Work includes:

- Demolition of all existing structures with exception of the barn;
- Excavation of soils containing elevated concentrations of metals, PCBs, and organic compounds using heavy equipment;
- Back-filling excavated areas utilizing certified clean fill;
- Implementation and management of an in-situ remediation treatment (chemical oxidation) to reduce petroleum contamination in the south-central portion of the Site;
- Installation of a sub-slab depressurization system (SSDS) beneath the new main structure, and collection of soil vapor and air-quality samples;
- Installation of a barrier layer of clean soil and pavement; and,
- Installation of new groundwater monitoring wells, as warranted, and sampling of existing wells.

2.0 HEALTH AND SAFETY HAZARDS

Potential health and safety hazards are summarized below and considered in detail in Sections 3.0 through 11.0.

2.1 Hazard Overview for On-site Personnel

The potential exists for the presence of elevated levels of petroleum compounds, PCBs, and metals in on-site soils and petroleum compounds in groundwater. The possibility exists for on-site personnel to have contact with contaminated soils, groundwater, and vapor during site remedial work. Contact with contaminated substances may present a skin contact, inhalation, and/or ingestion hazard. Potential exposures to these contaminants are likely to be limited to those on-site personnel directly involved in excavating/stockpiling contaminated soil, dewatering activities, well installation, and sampling. Potential exposure risks to other on-site personnel are expected to be minimal.

Additional potential hazards to on-site personnel include mechanical/physical hazards, electrical hazards from utilities, traffic hazards from fieldwork vehicles, ergonomic and thermal hazards from physical work conditions, noise impacts associated with operation of mechanical equipment, and hazards related to chemical oxidation treatments (hazards specifically related to chemical oxidation will be addressed in a separate Health and Safety Plan to be provided by the subcontractor; see Section 10.3).

2.2 Potential Hazards to the Public from Fieldwork Activities

The potential exists for the public to be exposed to contaminated soils, groundwater, and vapor, which may present a skin contact, inhalation, and/or ingestion hazard. Additional potential hazards to the public that are associated with fieldwork activities include mechanical/physical hazards, traffic hazards from fieldwork vehicles, and noise impacts associated with operation of mechanical equipment.

Impacts to public health and safety are expected to be limited to hazards that could directly affect on-site visitors and/or trespassers. These effects will be mitigated through site access and control measures (see Section 6.0, below). Specific actions taken to protect the public health are anticipated to minimize any potential off-site impacts from contaminant migration, noise, and traffic hazards.

2.3 Identified Chemical Contaminants

Contamination by PCBs, metals, and petroleum compounds has been documented at the Site. Elevated concentrations of arsenic, lead, and mercury were found near the barn and elevated concentrations of arsenic were found at several other locations (significantly elevated concentrations of arsenic are primarily found east of the barn and significant PCB contamination is limited to surface/near-surface soils). Petroleum impacts are generally restricted to the south-central portion of the Site, in the vicinity of the former MOSF facility. Low level contamination by SVOCs and metals, likely to be from poor quality fill materials or former industrial operations, is found in several Site locations. In general, contamination is generally restricted to well-defined areas at the northeastern and south-central portions of the Site.

Site groundwater has been locally impacted by low-level metal and petroleum-based contamination. No significant metal concentrations or PCBs are present in groundwater. The most significant petroleum contamination (gasoline-related VOCs) is found in monitoring well MW-5, located east of the former MOSF. Elevated concentrations of total SVOCs have also been detected in several wells.

Table 1, below, summarizes significant contaminants detected in soil and groundwater samples. Hazardous property information for specific compounds is reported in Attachment B (Table 3).

Table 1: Significant Contaminant Concentrations in Soil and Groundwater
(Values for soils reported in mg/kg [parts per million, ppm]; values for water reported in µg/L.)

Media	Compound of Concern	Peak On-Site Concentration	Soil Cleanup Objective* Unrestricted/Restricted Use
Soil	PCBs	67	0.1 / 1
	Arsenic	299	13 / 16
	Lead	4,990	63 / 1,000
	Mercury	14.8	0.18 / 2.8
	Total VOCs	2,552	10#
	Total SVOCs	9,190	500#
	TPH-DRO	22,000	n/a
Groundwater	**Compound of Concern**	**Recent Peak Concentration****	**NYSDEC Guidance Level*****
	Benzene	48	0.7
	Ethylbenzene	59	5
	Toluene	13	5
	Xylenes (total)	280	5
	Total VOCs	942	n/a
	Total SVOCs	281	n/a
	Aluminum	283	100
	Iron	12,200	300
	Manganese	1,200	300
	Selenium	14.4	10

Notes:
* NYSDEC Remedial Program, Tables 375-6.8(a) and 375-6.8(b), Soil Cleanup Objectives (SCOs) for protection of public health; Restricted category based on commercial use
** peak concentrations in most recent groundwater sampling event (2007)
*** Guidance levels based on NYSDEC TOGS 1.1.1 (June 1998) and subsequent Memoranda
# Based on TAGM 4046 (Remedial Program SCO not available)
n/a not available

3.0 PERSONAL PROTECTIVE EQUIPMENT

The levels of protection identified for the services specified in the RAR/RWP represent a best estimate of exposure potential and protective equipment needed for that exposure. Determination of levels was based on data provided by previous studies of the Site and information reviewed on current and past Site usage. The SHSO may recommend revisions to these levels based on an assessment of actual exposures and may at any time require Site workers, supervisors, and/or visitors to use specific safety equipment.

The level of protective clothing and equipment selected for this project is Level D. Level D PPE provides minimal skin protection and no respiratory protection, and is used when the atmosphere contains no known hazard, oxygen concentrations are not less than 19.5%, and work activities exclude splashes, immersion, or the potential for unexpected inhalation or contact with hazardous levels of chemicals. Workers will wear Level D protective clothing including, but not limited to, a hard hat, steel-toed boots, nitrile gloves (when handling soils and/or groundwater), hearing protection (foam ear plugs or ear muffs, as required), and safety goggles (in areas of exposed groundwater and when decontaminating equipment). Personal protective equipment (PPE) will be worn at all times, as designated by this HASP. Disposable gloves will be changed immediately following the handling of contaminated soils, water, or equipment. Protective Tyvek suits will be worn during activities likely to excessively expose work clothing to contaminated dust or soil (chemically-resistant over garments will be required in situations where exposures could lead to penetration of clothing and direct dermal contact by contaminants).

The requirement for the use of PPE by official on-site visitors shall be determined by the SHSO, based on the most restrictive PPE requirement for a particular Work Zones (see Section 5.0 for Work Zone definitions). All on-site visitors shall, at a minimum, be required to wear an approved hardhat and be provided with appropriate hearing protection as necessary.

The need for an upgrade in PPE will be determined based upon encountered Site conditions, including measurements taken in the breathing zone of the work area using a photo-ionization detector (PID). An upgrade to a higher level of protection (Level C) will begin when specific action levels are reached (see Section 5.0, below), or as otherwise required by the SHSO. Level C PPE includes a full-face or half-mask air-purifying respirator (NIOSH approved for the compound[s] of concern), hooded chemical-resistant clothing, outer and inner chemical-resistant gloves, and (as needed) coveralls, outer boots/boot covers, escape mask, and face shield. Level C PPE may be used only when: oxygen concentrations are not less than 19.5%; contaminant contact will not adversely affect any exposed skin; types of air contaminants have been identified, concentrations measured, and a cartridge or canister is available that can remove the contaminant; atmospheric contaminant concentrations do not exceed immediately dangerous to life or health (IDLH) levels; and job functions do not require self-contained breathing apparatus (SCBAs).

The need for Level A or Level B PPE is not anticipated for the planned remedial activities at this Site and ESI personnel and ESI's subcontractors will not engage in activities requiring Level A or Level B PPE. The selection and use of personal protective equipment, including a description of PPE levels, is summarized in Attachment C.

If any equipment fails and/or any employee experiences a failure or other alteration of their protective equipment that may affect its protective ability, that person will immediately leave the work area. The Project Manager and the SHSO will be notified and, after reviewing the situation, determine the effect of the failure on the continuation of on-going operations. If the failure affects the safety of personnel, the work site, or the surrounding environment, personnel will be evacuated until appropriate corrective actions have been taken.

4.0 CONTAMINANT CONTROL, MONITORING, AND ACTION LEVELS

This HASP specifies requirements and protocols designed to prevent exposure to contaminants and prevent contaminant migration. These goals will be achieved through establishment of Site Work Zones (Section 5.0) and work practices specified in relevant sections of this HASP. The SHSO will implement any necessary actions to prevent exposure to contaminants and prevent releases of contaminated media (including cessation of Site construction) and will maintain relevant logs regarding any such activities.

4.1 Airborne Contaminants

Precautions will be taken during dry weather to avoid generating and breathing dust-generated from soils. Engineering controls will be used to control airborne contamination. Dust releases will be controlled by wetting soils with water and the placement of plastic sheeting over exposed soil and stockpiles. Continuous air monitoring will be conducted for VOCs and dust during all ground intrusive activities (including soil/waste excavation and handling, test pitting/trenching, and installation of soil borings or monitoring wells) and during the demolition of any structure known or suspected to be contaminated. Concentrations of petroleum compounds and metals in the air are expected to be below OSHA Permissible Exposure Limits (PELs). Periodic monitoring for VOCs will be conducted during non-intrusive activities such as the collection of soil or groundwater samples (continuous monitoring may be conducted based on the proximity of potential sensitive receptors). Protocols for these monitoring activities are specified in the NYSDOH generic Community Air Monitoring Plan (CAMP), provided as Attachment D

Air monitoring will be performed using equipment appropriate to measure the types of contaminants known or suspected to be present. At this time it is anticipated that a PID and digital dust indicator (or equivalent equipment) will be used to monitor potential contaminant levels at the Site. All monitoring equipment will be calibrated at least daily for the contaminant(s) of concern or for an appropriate surrogate. All 15-minute and instantaneous readings (as appropriate) will be recorded and be available for review by NYSDEC and NYSDOH personnel.

PID readings consistently in excess of 5 ppm, and dust levels in excess of 150 ug/m^3, will be used as an indication of the need to initiate personnel monitoring, increase worker protective measures, and/or modify or cease on-site operations in order to mitigate off-site community exposure (preference will be given to preventing exposures by controlling source emissions, rather than increasing the use of worker PPE). PID and/or dust readings that consistently exceed background in the breathing zone (during any of the proposed tasks) will necessitate moving away from the source or implementing a higher PPE level.

Odors from the excavation of petroleum contaminated soil may be an issue at this Site. Odor control will be accomplished by wetting soils or through the use of commercially available odor-suppressing foam, which can be sprayed directly onto exposed soils. Thresholds for the implementation of odor-suppression measures will be based on the needs of Site personnel (i.e. odors interfere with work activities or have acute health impacts) and on the presence of significant objectionable odors at Site boundaries, which could impact off-site receptor populations. Odor suppression will be conducted at anytime that odor complaints are received from neighboring properties or local regulatory authorities, or if so directed by NYSDEC personnel.

VOC Monitoring, Response Levels, and Actions

Volatile organic compounds will be monitored at the downwind perimeter of the immediate work area (i.e., the exclusion zone) on a continuous basis or as otherwise specified. Upwind concentrations will be measured at the start of each workday and periodically during the day to establish background conditions. If ambient air concentrations of organic vapors at the downwind perimeter of the work area or exclusion zone exceed 5 parts per million (ppm) above background for the 15-minute average, work activities will be temporarily halted and monitoring continued. If organic vapors readily decrease (per instantaneous readings) below 5 ppm over background, work activities can resume with continued monitoring. If organic vapors are persistently in excess of 5 ppm over background but less than 25 ppm, work activities will be

halted, the vapor source identified and corrective actions enacted, and monitoring continued. Work activities can resume provided that organic vapors 200 feet downwind of the exclusion zone or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less - but in no case less than 20 feet, is below 5 ppm over background for the 15-minute average. All work activities will stop if organic vapors are above 25 ppm at the perimeter of the work area.

Particulate Monitoring, Response Levels, and Actions

Particulate concentrations will be monitored continuously at the upwind and downwind perimeters of the exclusion zone using real-time monitoring equipment capable of measuring particulate matter less than 10 micrometers in size (PM-10) and capable of integrating over a period of 15 minutes (or less). The equipment will be equipped with an audible alarm to indicate exceedance of the action level. Fugitive dust migration will also be visually assessed during all work activities. If the downwind PM-10 particulate level is 100 micrograms per cubic meter (mcg/m^3) greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression techniques will be employed. Work may continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed 150 mcg/m^3 above the upwind level and provided that no visible dust is migrating from the work area. If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150 mcg/m^3 above the upwind level, work will be stopped and work protocols will be re-evaluated. Work can resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 mcg/m^3 of the upwind level and in preventing visible dust migration.

4.2 Contaminants in Soil and Groundwater

The implementation of activity-specific/contaminant-specific Work Zones and appropriate fieldwork protocols, as specified in relevant sections of this HASP, will prevent and/or minimize exposure and movement of contaminated soil and groundwater. Access to contaminated areas will be limited, impacted media will be properly stockpiled and stored (as warranted) to prevent contaminant migration, personnel and equipment will be decontaminated as required for specific Work Zones, and erosion and sedimentation (E&S) Controls will be implemented during execution Site development and remediation activities.

The response to fugitive releases of soil or groundwater will be based on the assumption that such material is from a contaminated source, unless shown otherwise by laboratory analysis of samples or a determination has been made in consultation with NYSDEC personnel that releases material is not likely to be contaminated.

5.0 SITE CONTROL/WORK ZONES

Site control procedures will be established to reduce the possibility of worker/visitor contact with contaminants present in Site media, to protect the public in the area surrounding the Site and to limit access to the Site to only those persons required to be in the work zone. Notices will be placed near the Site warning the public not to enter fieldwork areas and directing visitors to report to the Project Manager or SHSO. Measures will be taken to limit the entry of unauthorized personnel into the specific areas of field activity and to safely direct and control all vehicular traffic in and near the Site (e.g., placement of traffic cones and warning tape).

The following Work Zones will be established:

Construction Work Zone

The entirety of the Site will be considered the Construction Work Zone, which will be delineated and protected by a temporary construction fence. This zone is restricted to project personnel only

(development and remediation personnel and authorized visitors). All personnel in the Construction Work Zone will be properly trained for their specific tasks and will wear appropriate levels of PPE.

Exclusion Zone

An Exclusion Zone will be delineated by the SHSO for all areas where: 1) contaminated media or hazardous substances are present in surface soils at significant concentrations, or will be excavated, handled, or otherwise exposed (including excavations, stockpiling and dewatering areas); and 2) during groundwater sampling and chemical oxidation treatments.

Air-monitoring data, as well as visual observations and existing laboratory data, will be used by the SHSO when determining final boundaries. All areas where Level C respiratory protection is required for airborne contaminants (other than dust) must be delineated as Exclusion Zones (no work will be conducted in areas where PID readings in the breathing zone are greater than 30 ppm or where oxygen levels are below 19.5%).

Entry to the Exclusion Zone will be restricted by the SHSO to only necessary and required personnel, who have been properly trained and equipped with appropriate PPE. The Exclusion Zone will be delineated, as necessary, with barricade tape, cones, and/or barricades. The number and location of such zones will be determined in the field by the SHSO, in consultation with NYSDEC personnel, prior to and during fieldwork activities (the approximate location of Exclusion Zones will be provided in figures included in the final Remedial Design documentation).

Contaminant Reduction Zone

A Contaminant Reduction Zone will be established between all Exclusion Zones and the Construction Work Zone, in order to prevent spreading of contamination into clean areas and enhance worker safety. Entry to the Contaminant Reduction Zone will be restricted by the SHSO to only necessary and required personnel, who have been properly trained and equipped with appropriate PPE. All decontamination of PPE and construction equipment, and storage of discarded PPE prior to disposal, will occur within this area. The Contaminant Reduction Zone will be properly marked, with special attention paid to the delineation between this area and the Exclusion Zone.

6.0 DECONTAMINATION

Decontamination procedures will apply to all personnel and equipment that have entered exclusion zones or otherwise may have come into contact with contaminated media.

6.1 Decontamination of Site Personnel

All site personnel should minimize contact with contaminants. Personnel exiting established Exclusion Zones, or otherwise exposed to contaminated media, will undergo decontamination within the applicable Contamination Reduction Zone (at an upwind location if possible). Decontamination procedures will be determined by the SHSO based on known contamination and encountered Site conditions. All disposable PPE, or nominally non-disposal PPE that cannot be decontaminated, will be placed in secured plastic bags or drums pending off-site disposal (disposable PPE may not be re-used). At a minimum, gross removal of contaminants from the PPE, removal of the PPE, and washing of hands and face shall be required upon exiting the work area.

During emergencies the SHSO will weigh the risks of exposure against the need for a rapid response to accident or injury. The SHSO may determine that time lost or additional handling of an injured person during decontamination may cause greater harm to the individual than from potential exposure. The SHSO will maintain a record of any incidents where proper decontamination of personnel has not occurred.

A portable washing station and potable water source for Site personnel will be established in the Construction Zone. All Site personnel must wash their hands and faces prior to eating, drinking, or smoking and practice good personal hygiene.

6.2 Decontamination of Equipment

All on-site equipment will be clean prior to entering the Site and will be decontaminated and dry before leaving the Site. Decontamination may be accomplished using a NYSDEC approved cleaner, water, and/or steam. Trucks will be brushed to remove materials adhering to their surfaces (subcontractors will be responsible for decontamination of their own equipment used during field operations). Fluids generated during decontamination of grossly-contaminated equipment will be contained and stored in 55-gallon drums pending pre-disposal characterization; all other decontamination fluids will be handled as per specifications in the Remedial Design Report (RDR).

All undedicated sampling equipment and sampling instruments will be decontaminated whenever they have contacted soil or dust, or have come in contact with potentially contaminated groundwater. Sampling equipment will be segregated and, after decontamination, stored separately from splash protection equipment. Decontaminated or clean sampling equipment not in use will be covered with plastic and stored in a designated storage area.

7.0 NOISE CONTROL

All fieldwork activities will be conducted in a manner designed to reduce unnecessary noise generation, and to minimize the potential for both on-site and off-site harmful noise levels. The Project Manager and SHSO will establish noise reduction procedures (as appropriate to the Site and the work) to meet these requirements.

8.0 PERSONNEL TRAINING

All workers will be properly trained in accordance with OSHA requirements (29 CFR 1910) and will additionally receive site-specific training. Personnel will be briefed by the SHSO as to the potential hazards to be encountered, including: availability of this HASP; general site hazards and specific hazards in the work areas, including those attributable to known of suspect on-site contaminants; selection, use, testing, care, and limitations of PPE; decontamination procedures; emergency response procedures and requirements; emergency alarm systems and other forms of notification, and evacuation routes to be followed; and, methods to obtain emergency assistance and medical attention.

9.0 RECORDKEEPING

The SHSO will establish a system appropriate to the Site, the work, and the work zones that will record, at a minimum, the following information:

- Personnel on the Site, their arrival and departure times, and their destination on the Site.
- Incidents and unusual activities that occur on the Site such as, but not limited to, accidents, spills, breaches of security, injuries, equipment failures, and weather-related problems.
- Changes to the HASP.
- Daily information generated such as: changes to work and health and safety plans; work accomplished and the current Site status; and monitoring results.

Templates for daily logs and incident reports are provided as Attachment E.

10.0 SPECIAL PRECAUTIONS AND PROCEDURES

The activities associated with this investigation may involve potential risks of exposure to both chemical and physical hazards. The potential for chemical exposure to hazardous or regulated substances will be significantly reduced through the use of monitoring, personal protective clothing, engineering controls, and implementation of safe work practices.

10.1 Heat/Cold Stress

Training in prevention of heat/cold stress will be provided as part of the site-specific training. The timing of this project is such that heat/cold stress may pose a threat to the health and safety of personnel. Work/rest regimens will be employed, as necessary, so that personnel do not suffer adverse effects from heat/cold stress. Special clothing and appropriate diet and fluid intake regimens will be recommended to personnel to further reduce this temperature-related hazard. Rest periods will be recommended in the event of high/low temperatures and/or humidity to counter the negative effects of heat/cold stress.

10.2 Heavy Equipment

Working in the vicinity of heavy equipment is the primary safety hazard at the Site. Physical hazards in working near heavy construction equipment include the following: overhead hazards, slips/trip/falls, hand and foot injuries, moving part hazards, improper lifting/back injuries, and noise. All workers will be properly trained in accordance with OSHA requirements (29 CFR 1910). No workers will be permitted within any excavated areas without proper PPE, including, as warranted, any necessary Level C equipment (e.g., respirators and protective suits). Air monitoring for VOCs will be conducted in accordance with the CAMP.

10.3 Hazards Associated with Chemical Oxidation Activities

Chemical oxidation is proposed for the remediation of in-situ petroleum contaminated soils in the south-central portion of the Site. Determination of exact fieldwork methodology will occur after appropriate bench testing and pilot program. Each treatment will introduce chemical agents that can present a potential exposure risk to on-site personnel and the public. Potential hazards related to the chemical oxidation process will be addressed in a separate, technology-specific health and safety plan, which will be incorporated into this HASP).

10.4 Additional Safety Practices

The following are important safety precautions which will be enforced during all fieldwork:

- Medicine and alcohol can aggravate the effect of exposure to certain compounds. Controlled substances and alcoholic beverages will not be consumed during work activities. Consumption of prescribed drugs will only be at the discretion of a physician familiar with the person's work.
- Eating, drinking, chewing gum or tobacco, smoking, or other practices that increase the probability of hand-to-mouth transfer and ingestion of material are prohibited except in designated areas.
- Contact with potentially contaminated surfaces will be avoided whenever possible. Workers will not unnecessarily walk through puddles, mud, or other discolored surfaces; kneel on the ground; or lean, sit, or place equipment on drums, containers, vehicles, or the ground.
- Personnel and equipment in the work areas will be minimized, consistent with effective site operations.
- Unsafe equipment left unattended will be identified by a "DANGER, DO NOT OPERATE" tag.
- Work areas for various operational activities will be established.

11.0 EMERGENCY RESPONSE PROCEDURES

Note: Emergency telephone numbers and maps to the nearest hospital are provided in Section 12.0

11.1 Notification of Site Emergencies

In the event of an emergency, the SHSO will be immediately notified of the nature and extent of the emergency (the names and contact information for key site safety and management personnel, as well as other site safety contact telephone numbers, shall be posted at the Site).

Emergency Response Telephone Numbers and a map detailing the directions to the nearest hospital emergency room are provided in Section 12.0. This information will be maintained at the work Site by the SHSO. The location of the nearest telephone will be determined prior to the initiation of on-site activities. In addition to any permanent phone lines, a cellular phone will be in the possession of the SHSO, or an authorized designee, at all times.

11.2 Responsibilities

Prior to the initiation of on-site work activities, the SHSO will:

- Notify individuals, authorities, and/or health care facilities of the potentially hazardous activities and potential wastes that may develop as a result of the investigation.
- Confirm that first aid supplies and a fire extinguisher are available on-site.
- Have a working knowledge of safety equipment available.
- Confirm that a map detailing the most direct route to the hospital is prominently posted with the emergency telephone numbers.

The SHSO will be responsible for directing notification, response, and follow-up actions and for contacting outside response personnel (ambulance, fire department, or others). In the case of an evacuation, the SHSO will account for personnel. A log of individuals entering and leaving the Site will be kept so that everyone can be accounted for in an emergency. Upon notification of an exposure incident, the SHSO will contact the appropriate emergency response personnel for recommended medical diagnosis and, if necessary, treatment. The SHSO will determine whether and at what levels exposure actually occurred, the cause of such exposure, and the means to prevent similar incidents from occurring.

11.3 Accidents and Injuries

In the event of an accident or injury, measures will be taken to assist those who have been injured or exposed and to protect others from hazards. If an individual is transported to a hospital or doctor, a copy of the HASP will accompany the individual.

The SHSO will be notified and will respond according to the severity of the incident. The SHSO will perform an investigation of the incident and prepare a signed and dated report documenting the investigation. An exposure-incident report will also be completed by the SHSO and the exposed individual. The form will be filed with the employee's medical and safety records to serve as documentation of the incident and the actions taken.

11.4 Communication

No special hand signals will be utilized within the work zone. Field personnel will utilize standard hand signals during the operation of heavy equipment.

11.5 Safe Refuge

Vehicles and on-site structures will serve as the immediate place of refuge in the event of an emergency. If evacuation from the area is necessary, project vehicles will be used to transport on-site personnel to safety.

11.6 Site Security and Control

Site security and control during emergencies, accidents, and incidents will be monitored by the SHSO. The SHSO is responsible for limiting access to the Site to authorized personnel and for oversight of reaction activities.

11.7 Emergency Evacuation

In case of an emergency, personnel will evacuate to the safe refuge identified by the SHSO, both for their personal safety and to prevent the hampering of response/rescue efforts.

11.8 Resuming Work

A determination that it is safe to return to work will be made by the SHSO and/or any personnel assisting in the emergency, e.g., fire department, police department, utility company, etc. No personnel will be allowed to return to the work areas until a full determination has been made by the above-identified personnel that all field activities can continue unobstructed. Such a determination will depend upon the nature of the emergency (e.g., downed power lines -- removal of all lines from the property; fire -- extinguished fire; injury -- safe transport of the injured party to a medical facility with either assurance of acceptable medical care present or completion of medical care; etc.).

Before on-site work is resumed following an emergency, necessary emergency equipment will be recharged, refilled, or replaced. Government agencies will be notified as appropriate. An Incident Report Form will be filed.

11.9 Fire Fighting Procedures

A fire extinguisher will be available in the Construction Work Zone during all on-site activities. This extinguisher is intended for small fires. When a fire cannot be controlled with the extinguisher, the area will be evacuated immediately. The SHSO will be responsible for directing notification, response, and follow-up actions and for contacting ambulance and fire department personnel.

11.10 Emergency Decontamination Procedure

The extent of emergency decontamination depends on the severity of the injury or illness and the nature of the contamination. Whenever possible, minimum decontamination will consist of washing, rinsing, and/or removal of contaminated outer clothing and equipment. If time does not permit decontamination, the person will be given first aid treatment and then wrapped in plastic or a blanket prior to transport.

11.11 Emergency Equipment

The following on-site equipment for safety and emergency response will be maintained in the on-site vehicle of the SHSO: fire extinguisher; first-aid kit; and, extra copy of this Health and Safety Plan.

12.0 EMERGENCY TELEPHONE NUMBERS AND MAPS TO HOSPITAL

Table 2: Emergency Response Telephone Numbers

Emergency Agencies	Phone Numbers
EMERGENCY	**911**
St. Luke's Hospital 70 Dubois Street, Newburgh	**(845) 568-2305 - Emergency Room** (845) 561-4400 - Main Information
Beacon Police Department	**(845) 831-4111 or 911**
Beacon Fire Department	**(845) 831-2121 or 911**
Beacon City Hall	(845) 838-5000
City of Beacon Sewer/Water Department	(845) 831-3136

Figure 1: Directions to Hospital

Exit the Site using **Ferry Street/Long Dock Road**

Turn Right (Southeast) onto **Red Flynn Drive**.

Turn Left (Northeast) onto **Beekman Street**.

Turn Left (North) onto **Route 9D**.

Turn Left (West) to merge onto **Interstate 84**.

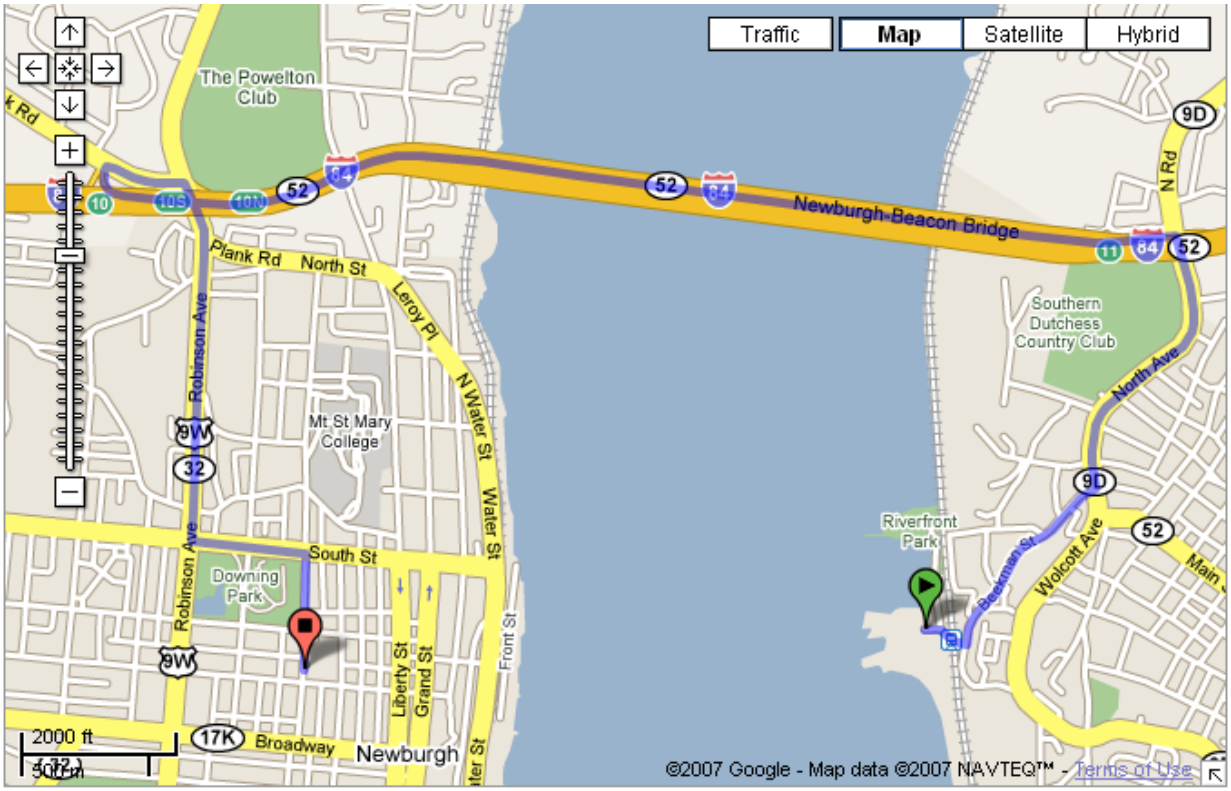
Take Exit 10S towards **Newburgh**.

Merge onto **North Plank Road/Route 32/Route 9W.** Continue to follow **Route 32/Route 9W** (South).

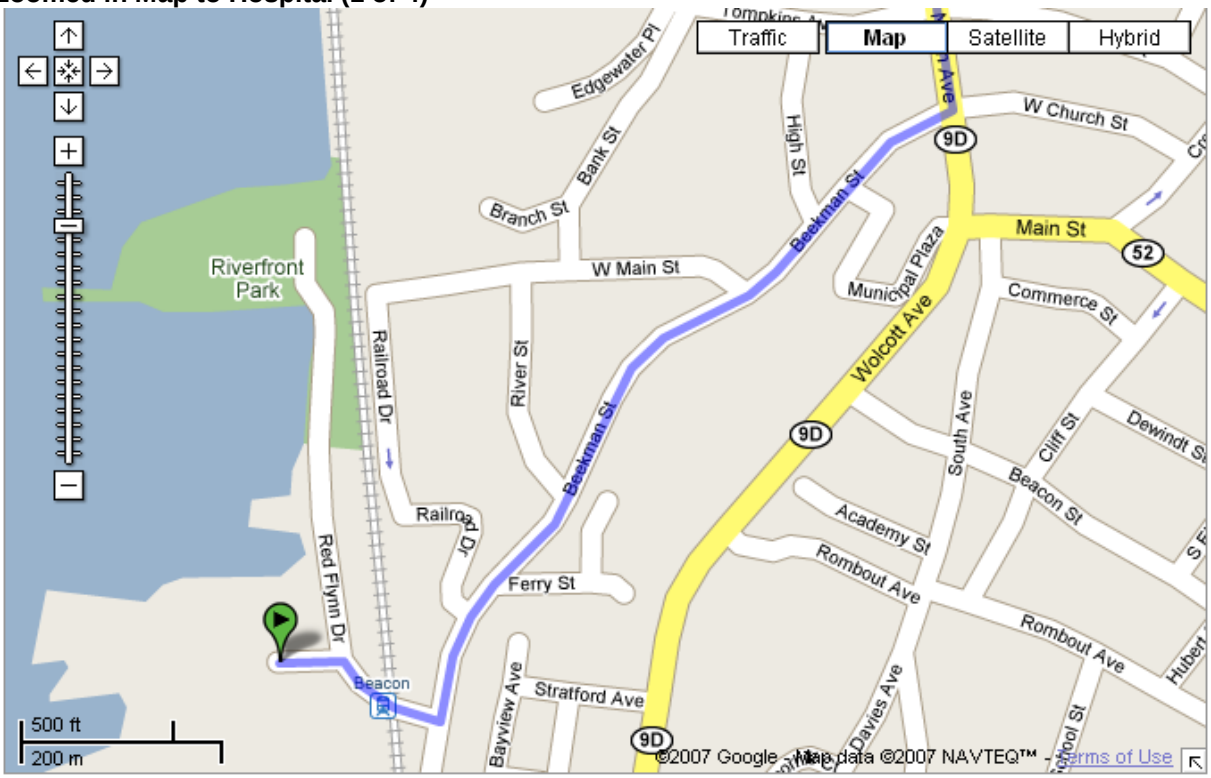
Turn Left (East) onto **South Street**.

Turn Right (South) onto **Dubois Street**; **Hospital is on Left at 70 Dubois Street** (see Map, below).

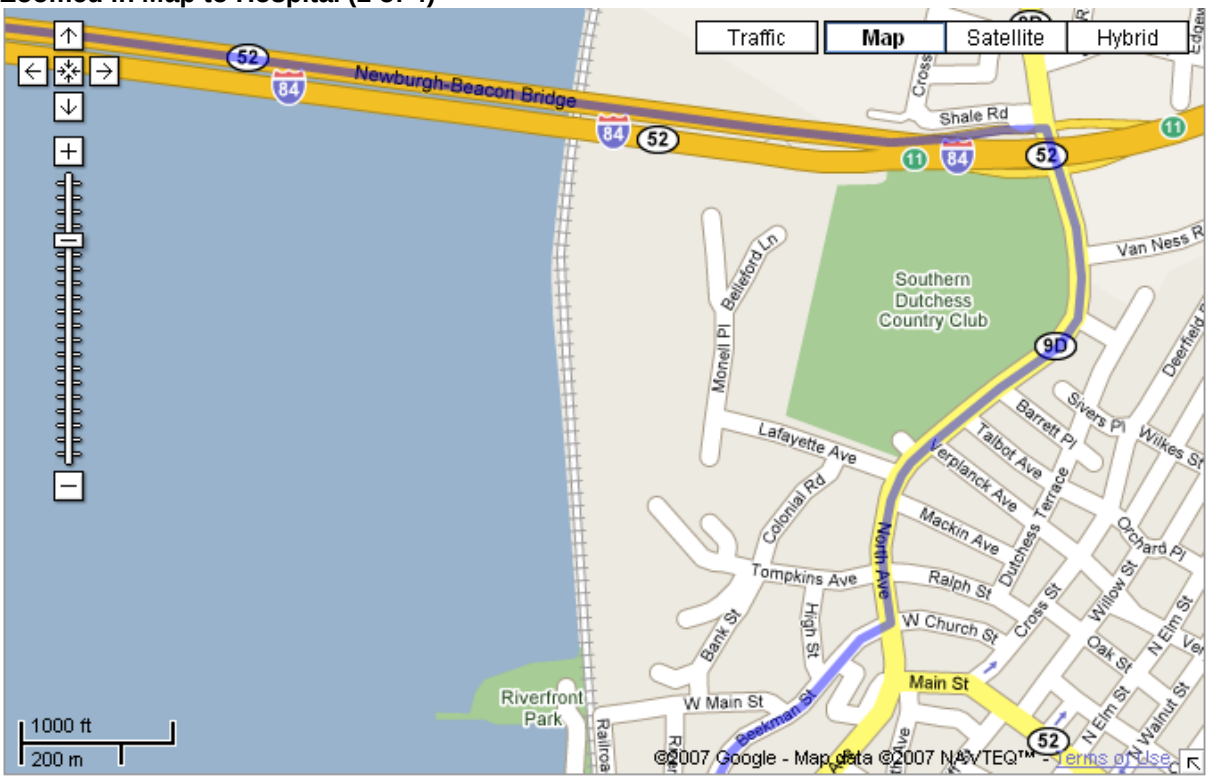
Figure 2: Map to Hospital (overview)



Zoomed in Map to Hospital (1 of 4)

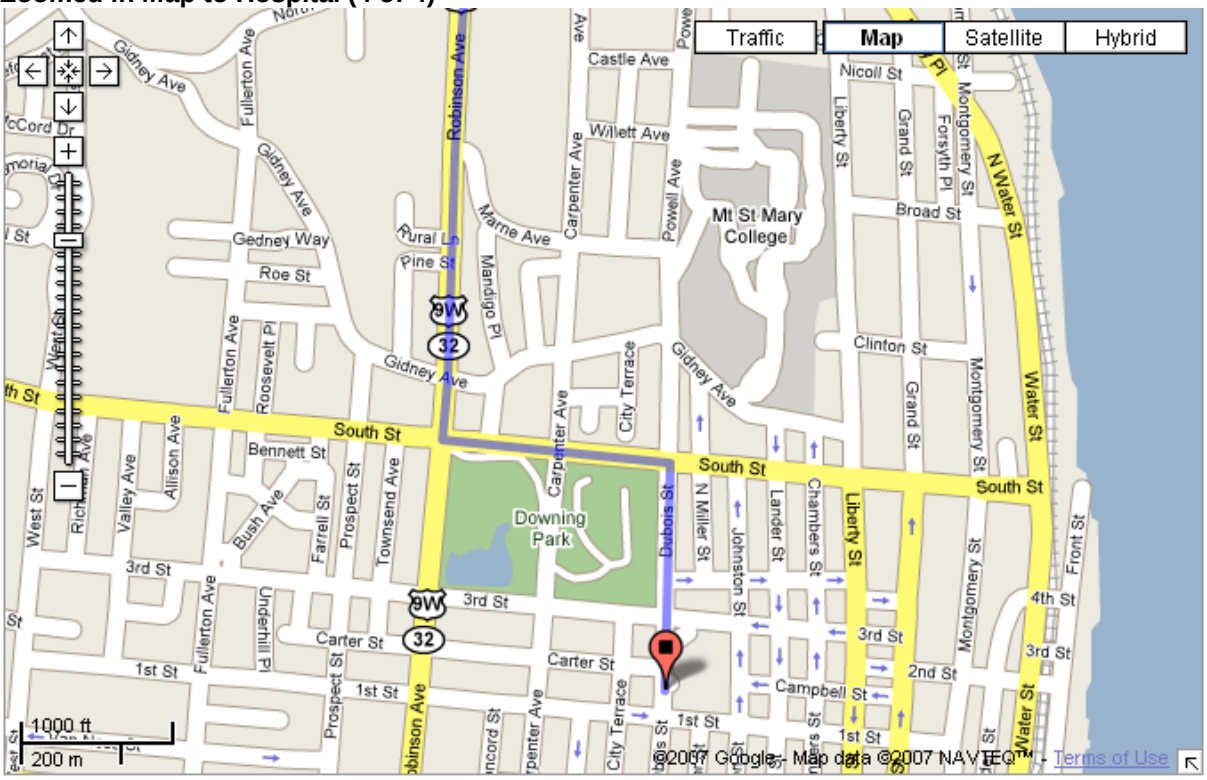


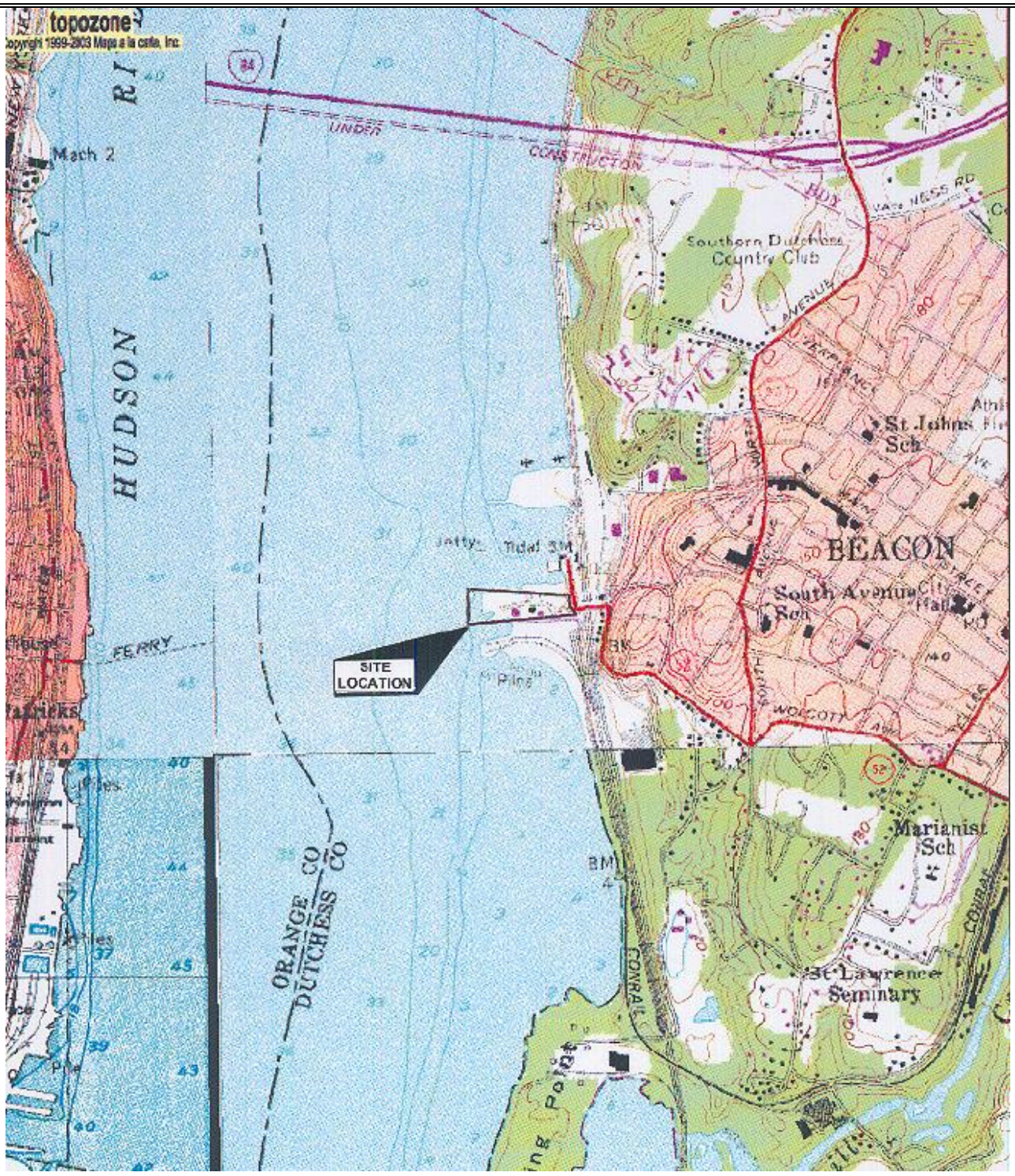
Zoomed in Map to Hospital (2 of 4)



Zoomed in Map to Hospital (3 of 4)

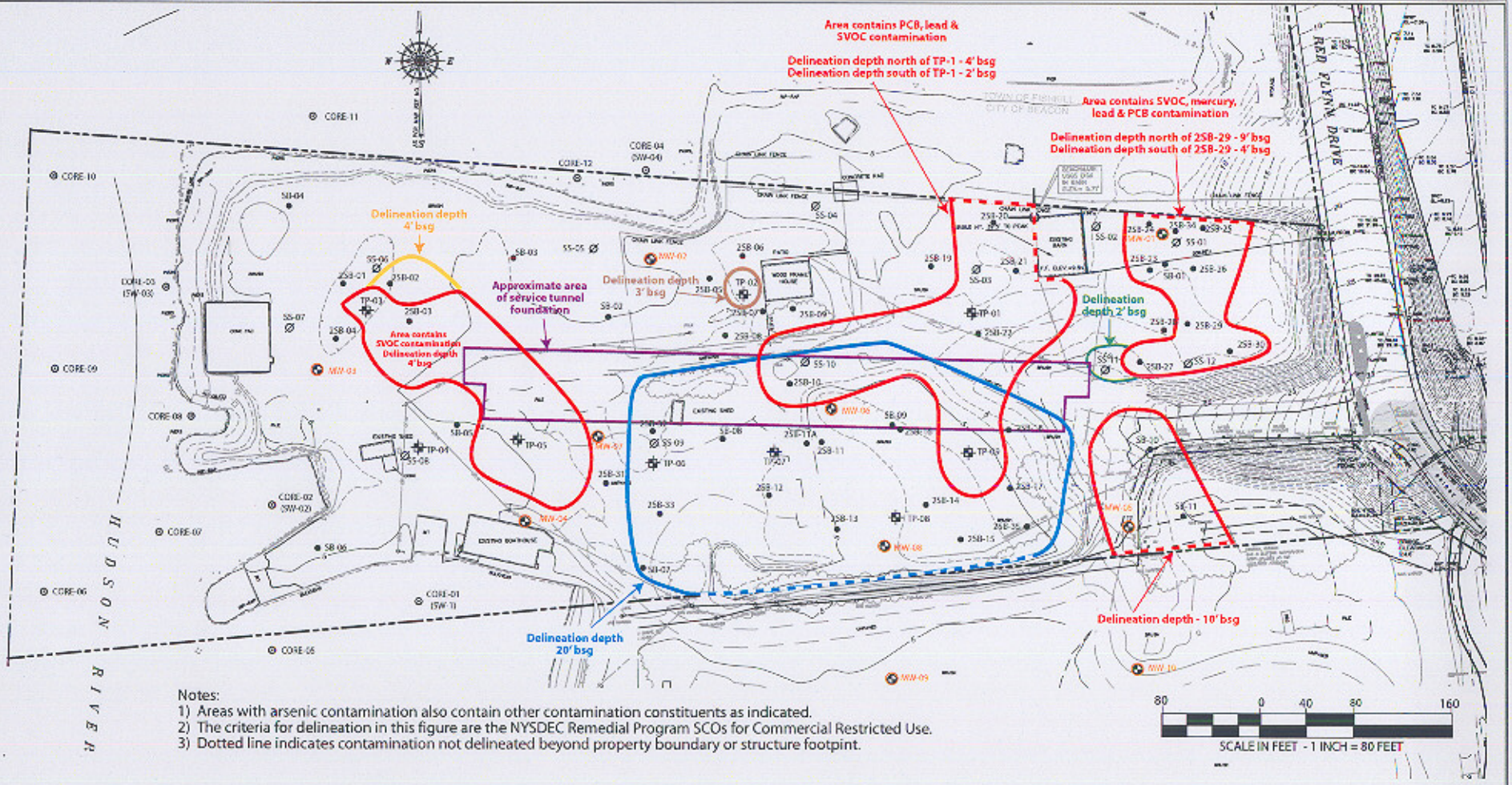
Zoomed in Map to Hospital (4 of 4)





Source: USGS Topographic Map of Wappingers Falls, New York Quadrangle, dated 1981, digital image provided by Maps a la carte, Inc. (Topozone.com)

Site Location Map (Scale: 1:50,000) Long Dock Beacon Red Flynn Drive, City of Beacon Dutchess County, New York	N	ESI File: SG96152.52 January 2008 Attachment A



Notes:
1) Areas with arsenic contamination also contain other contamination constituents as indicated.
2) The criteria for delineation in this figure are the NYSDEC Remedial Program SCOs for Commercial Restricted Use.
3) Dotted line indicates contamination not delineated beyond property boundary or structure footpint.

Proposed Site Remediation

Long Dock Beacon
Red Flynn Drive
City of Beacon
Dutchess County, New York

Legend:

- Soil Boring
- Test Pit
- Surface Sample
- Sediment Sample
- Monitoring Well
- Area of former MOSF and proposed in-situ remediation (VOC, SVOC and TPH-DRO contamination)
- Boundary of areas with arsenic contamination
- Site Boundary
- Boundary of area with lead contamination and no arsenic contamination
- Boundary of area with PCB contamination and no arsenic contamination
- Boundary of area with significant SVOC contamination and no arsenic contamination

ESI File: SG96152.52

January 2008

Scale as shown

Attachment A

Table 3: Hazardous Property Information for Specific Site Contaminants

(ppm = parts per million)

Compound of Concern	PEL-TWA# ---------- IDLH Level	Odor Threshold or Warning Concentration (ppm)	Hazard Property	Dermal Toxicity	Acute Exposure Symptoms
Arsenic	0.010 mg/m^3 5 mg/m^3	---	CEG	CJG	ACDGJMOQR
Aluminum	5 mg/m^3 not specified	---	B	---	---
Lead	50 mg/m^3 100 mg/m^3	---	C	---	ACDFGKOQR
Manganese	0.2 mg/m^3 500 mg/m3	---	B	---	ALM
Mercury	0.1 mg/m^3 10 mg/m^3	---	C	---	AGLMNQ
Selenium	0.2 mg/m^3 1 mg/m^3		B	---	FGIJKLMNQR
Benzene	1 ppm 500 ppm	61-97	BCGO	CIG	BCDFHIKLMNOQR
Ethylbenzene	100 ppm 800 ppm	---	BCD	CIF	ABFHIKLMNPQR
Toluene	200 ppm 500 ppm	1.6	BC	BHE	DEFHIKLMNOPQ
Xylenes	100 ppm 900 ppm	0.62-40	BCD	H	ABFHIKLMNPQ
Diesel Fuel	not specified not specified	0.08	BC	ABC	IN
Gasoline	300 ppm not specified	0.005-10	CD	AB	IN
PCBs (generic)	0.5 mg/m^3 5 mg/m^3	---	CG	---	CHLPQ

Notes:

OSHA Time-weighted Average (TWA) Permissible Exposure Limits (PELs); PCB value defined by Relative Exposure Limit (REL-TWA) recommended by NIOSH.

Hazard Properties

A - corrosive
B - flammable
C - toxic
D - volatile
E - reactive
F - radioactive
G - carcinogen
H - infections

Dermal Hazards

Skin Penetration
- A - negligible penetration
- B - slight penetration
- C - moderate penetration
- D - high penetration

Systemic Potency
- E - slight hazard
- F - moderate hazard
- G - extreme hazard

Local Potency
- H - slight - reddening of skin
- I - moderate - irritation/inflammation of skin
- J - extreme - tissue destruction/necrosis

Acute Exposure Symptoms

A - abdominal pain
B - central nervous system depression
C - comatose
D - convulsions
E - confusion
F - dizziness
G - diarrhea
H - drowsiness
I - eye irritation
J - fever
K - headache
L - nausea
M - respiratory system irritation
N - skin irritation
O - tremors
P - unconsciousness
Q - vomiting
R - weakness

Selection and Use of OSHA-Required Personal Protection Equipment (PPE)

The selection of appropriate protective gear is based on both known and potential hazards. A general description of types of PPE components is presented below and a summary of USEPA "Levels of Protection" is presented on the following page.

Types of PPE

Head/Face Protection	Hardhats and face shields must meet ANSI specifications (Z89.1 1989 and Z87.1-1989) for protection. Face shields that attach to hardhats provide added protection; a combination that leaves no gap between the shield and the brim of the hardhat prevents overhead splashes from running down inside the face shield.
Eye Protection	Safety glasses must meet ANSI specifications (Z87.1-1989) for protection. They should be standard safety gear when the respiratory protection is a half-face mask with no face shield. Both safety glasses/goggles and a face shield are advisable as long as they do not impair visibility. Safety glasses should be of the type that incorporates face shields.
Ear Protection	Ear plugs or muffs should be worn when noise may be a problem, such as around heavy machinery and impact tools.
Foot Protection	Footwear worn during site activities (including leather work boots and rubber boots) must meet the ANSI specifications (Z41-1991) for protection. Protection against liquid hazardous chemicals requires a chemical resistant boot (neoprene, PVC, etc). Boots are available as pullover and shoe-boot; pullovers may be inexpensive enough to be considered disposable, otherwise they must be completely decontaminated. Wear pants outside/over chemical resistant boots to prevent liquids from entering.
Hand Protection	Gloves must resist puncturing/tearing and provide necessary chemical resistance. Heavy leather gloves may be worn over chemical protective gloves but must be discarded if they become contaminated. Jacket cuffs should be worn over glove cuffs to prevent entry of liquids. If hands are elevated above the head during work, the gloves should be sealed with tape to the coveralls or splash-suit. Two pair of gloves provides extra protection if the outer glove is torn/permeated and protect the hands when removing other PPE.
Body Protection	Clothing to protect the body against hazardous liquids, gases, or vapors is available in a variety of styles and materials: disposable Tyvek or durable Nomex coveralls when hazards are known to be minor or simply a nuisance, and splash suits made of PVC, neoprene or butyl-rubber when enhanced protection is needed. Toxic vapor/gases require the most complete protection (e.g., fully encapsulating suits).
Respiratory Protection	A respirator is designed as an enclosure that covers the nose and mouth or the entire face or head, and provides protection either by removing contaminants from the air before they are inhaled or by supplying an independent source of breathable air. Air purifying respirator types are: particulate removing, vapor and gas removing, and combination. Elements that remove particulates are called filters, while vapor and gas removing elements are called either chemical cartridges or canisters. Filters and canisters/cartridges can generally be removed and replaced once their effective life has expired. Combination cartridges and canisters are available to protect against particulates, as well as vapors and gases. Respirators can only provide adequate protection if they are: properly selected for the task; fitted to the wearer; consistently donned and worn properly; and properly maintained. Not all workers can wear respirators; an adequate fit and other considerations are important factors. Atmosphere-supplying respirators (devices that provide clean breathing air from an uncontaminated source) will not be used at this Site.

USEPA Levels of Protection

Personal protective equipment is designed to prevent/reduce skin and eye contact as well as inhalation or ingestion of the chemical substance. Protective equipment to protect the body against contact with known or anticipated chemical hazards has been divided into four categories. Note: Levels A and B are not anticipated to be utilized by Site personnel.

LEVEL A: Highest level of respiratory, skin, eye and mucous membrane protection.
Personal Protective Equipment:

- Positive pressure, SCBA, or positive-pressure supplied air respirator with escape SCBA.
- Fully encapsulating chemical protective suit.
- Gloves, outer and inner, chemical resistant.
- Safety boots, chemical resistant.
- Underwear, cotton, long-john type (optional).
- Hard hat (under suit, optional).
- Coveralls (under suit, optional).
- Two-way radio communications (intrinsically safe/non-sparking, optional.

LEVEL B: Highest level of respiratory protection, but a lesser level of skin and eye protection.
Personal Protective Equipment:

- Positive-pressure SCBA, or positive-pressure supplied air respirator with escape SCBA.
- Chemical resistant clothing.
- Coveralls (under splash suit, optional).
- Gloves, outer and inner, chemical resistant.
- Safety boots, chemical resistant.
- Boot-covers, chemical resistant (disposable, optional).
- Two-way radio communications (intrinsically safe, optional).
- Hard hat and face shield (optional).

LEVEL C: Type of airborne substance known, concentration measured, criteria for using air-purifying respirators met, and skin/eye exposure is unlikely. Periodic air monitoring necessary.
Personal Protective Equipment:

- Full-face or half-mask, air-purifying respirator.
- Chemical resistant clothing.
- Gloves, outer and inner, chemical resistant.
- Safety boots, chemical resistant.
- Boot-covers, chemical resistant (optional).
- Coveralls (protective clothing optional).
- Two-way radio communications (intrinsically safe, optional).
- Hard hat (optional).
- Escape mask (optional).
- Face shield (optional).

LEVEL D: Primarily a work uniform used for nuisance contamination only (not worn where respiratory or skin hazards exist). Optional equipment based on Site conditions.
Personal Protective Equipment:

- Work coveralls
- Safety shoes/boots
- Chemical resistant clothing (optional).
- Gloves, chemical resistant (optional).
- Boot-covers, chemical resistant (optional).
- Two-way radio communications (intrinsically safe, optional).
- Hard hat (optional).
- Escape mask (optional).
- Face shield (optional).

Reasons to upgrade to a higher level of PPE (D is lowest, A is highest):
Known or suspected presence of dermal hazards, occurrence or likely occurrence of gas or vapor emission, change in work task that will increase contact or potential contact with hazardous materials, request of the individual performing the task.

Reasons to downgrade to a lower level of PPE:
New information indicating that the situation is less hazardous than was originally thought, change in site conditions that decreases the hazard, change in work task that will reduce contact with hazardous materials.

New York State Department of Health
Generic Community Air Monitoring Plan

A Community Air Monitoring Plan (CAMP) requires real-time monitoring for volatile organic compounds (VOCs) and particulates (i.e., dust) at the downwind perimeter of each designated work area when certain activities are in progress at contaminated sites. The CAMP is not intended for use in establishing action levels for worker respiratory protection. Rather, its intent is to provide a measure of protection for the downwind community (i.e., off-site receptors including residences and businesses and on-site workers not directly involved with the subject work activities) from potential airborne contaminant releases as a direct result of investigative and remedial work activities. The action levels specified herein require increased monitoring, corrective actions to abate emissions, and/or work shutdown. Additionally, the CAMP helps to confirm that work activities did not spread contamination off-site through the air.

The generic CAMP presented below will be sufficient to cover many, if not most, sites. Specific requirements should be reviewed for each situation in consultation with NYSDOH to ensure proper applicability. In some cases, a separate site-specific CAMP or supplement may be required. Depending upon the nature of contamination, chemical- specific monitoring with appropriately-sensitive methods may be required. Depending upon the proximity of potentially exposed individuals, more stringent monitoring or response levels than those presented below may be required. Special requirements will be necessary for work within 20 feet of potentially exposed individuals or structures and for indoor work with co-located residences or facilities. These requirements should be determined in consultation with NYSDOH.

Reliance on the CAMP should not preclude simple, common-sense measures to keep VOCs, dust, and odors at a minimum around the work areas.

Community Air Monitoring Plan

Depending upon the nature of known or potential contaminants at each site, real-time air monitoring for volatile organic compounds (VOCs) and/or particulate levels at the perimeter of the exclusion zone or work area will be necessary. Most sites will involve VOC and particulate monitoring; sites known to be contaminated with heavy metals alone may only require particulate monitoring. If radiological contamination is a concern, additional monitoring requirements may be necessary per consultation with appropriate NYSDEC/NYSDOH staff.

Continuous monitoring will be required for all ground intrusive activities and during the demolition of contaminated or potentially contaminated structures. Ground intrusive activities include, but are not limited to, soil/waste excavation and handling, test pitting or trenching, and the installation of soil borings or monitoring wells.

Periodic monitoring for VOCs will be required during non-intrusive activities such as the collection of soil and sediment samples or the collection of groundwater samples from existing monitoring wells. "Periodic" monitoring during sample collection might reasonably consist of taking a reading upon arrival at a sample location, monitoring while opening a well cap or overturning soil, monitoring during well baling/purging, and taking a reading prior to leaving a sample location. In some instances, depending upon the proximity of potentially exposed individuals, continuous monitoring may be required during sampling activities. Examples of such situations include groundwater sampling at wells on the curb of a busy urban street, in the midst of a public park, or adjacent to a school or residence.

VOC Monitoring, Response Levels, and Actions

Volatile organic compounds (VOCs) must be monitored at the downwind perimeter of the immediate work area (i.e., the exclusion zone) on a continuous basis or as otherwise specified. Upwind concentrations should be measured at the start of each workday and periodically thereafter to establish background conditions. The monitoring work should be performed using equipment appropriate to measure the types of contaminants known or suspected to be present. The equipment should be calibrated at least daily for the contaminant(s) of concern or for an appropriate surrogate. The equipment should be capable of calculating 15-minute running average concentrations, which will be compared to the levels specified below.

- If the ambient air concentration of total organic vapors at the downwind perimeter of the work area or exclusion zone exceeds 5 parts per million (ppm) above background for the 15-minute average, work activities must be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities can resume with continued monitoring.
- If total organic vapor levels at the downwind perimeter of the work area or exclusion zone persist at levels in excess of 5 ppm over background but less than 25 ppm, work activities must be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities can resume provided that the total organic vapor level 200 feet downwind of the exclusion zone or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less - but in no case less than 20 feet, is below 5 ppm over background for the 15-minute average.
- If the organic vapor level is above 25 ppm at the perimeter of the work area, activities must be shutdown.

All 15-minute readings must be recorded and be available for State (DEC and DOH) personnel to review. Instantaneous readings, if any, used for decision purposes should also be recorded.

Particulate Monitoring, Response Levels, and Actions

Particulate concentrations should be monitored **continuously** at the upwind and downwind perimeters of the exclusion zone at temporary particulate monitoring stations. The particulate monitoring should be performed using real-time monitoring equipment capable of measuring particulate matter less than 10 micrometers in size (PM-10) and capable of integrating over a period of 15 minutes (or less) for comparison to the airborne particulate action level. The equipment must be equipped with an audible alarm to indicate exceedance of the action level. In addition, fugitive dust migration should be visually assessed during all work activities.

- If the downwind PM-10 particulate level is 100 micrograms per cubic meter (mcg/m^3) greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression techniques must be employed. Work may continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed 150 mcg/m^3 above the upwind level and provided that no visible dust is migrating from the work area.
- If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150 mcg/m^3 above the upwind level, work must be stopped and a re-evaluation of activities initiated. Work can resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 mcg/m^3 of the upwind level and in preventing visible dust migration.

All readings must be recorded and be available for State (DEC and DOH) personnel to review.

DAILY FIELD LOG

Site_____ESI File_____Date_____

Weather Conditions:

Site Personnel and Visitors

Name	Company/Affiliation	Site Assignment or Destination	Arrival	Departure

Fieldwork Activities

Environmental Fieldwork	Equipment/Operator	PPE Level
Construction / Remediation Activities	**Equipment/Operator**	**PPE Level**

NOTES

(Note non-compliance with HASP, changes to HASP/Workplan, exposure incidents, accidents, etc)

SUPERVISOR'S INCIDENT REPORT

(Injuries/Exposures or Significant Releases)

Site_____ESI File_____Date_____

Injuries and/or Exposures

1) Name, Age, Sex	
2) Date and Time of Accident	
3) Location of Accident	
4) Accident Details (actions occurring, tools/equipment in use, etc.)	
5) Description of Injuries	
6) Date and Time Reported to Supervisor	**7) Date and Time First Aid Received**
8) Supervisor's Comments	
9) Supervisor Name	**10) Supervisor Signature / Date**

Significant Releases

11) Nature of Release (media and potential compounds of concern)	
12) Date and Time of Release	
13) Location of Release	
14) Details (what occurred and how, exposures/impacts, notifications, corrective actions)	
☐**(continued on back)**	
15) Supervisor Name	**16) Supervisor Signature / Date**

APPENDIX F

Resumes of Key Environmental Personnel

ROBERT M. CAPOWSKI, P.E.
Project Manager

EDUCATION B.S. Mechanical Engineering, 1982
Georgia Institute of Technology
Atlanta, Georgia

PROFESSIONAL LICENSES/ REGISTRATIONS:: New York State Professional Engineer, January 2004

EXPERIENCE
Mr. Capowski joined Dewkett Engineering in 1999 with several years of previous consulting experience. He has since been responsible for land development designs and reviews, site designs, stormwater management system designs, utility mapping, H.V.A.C. and design of onsite sewage disposal systems. Mr. Capowski has also been involved with the design preparation of roadway design plans per New York State Department of Transportation (NYSDOT) standards including horizontal and vertical alignment, pavement design, roadside design, maintenance and protection of traffic plans, guiderail design, and construction cost estimating.

RECENT PROJECT EXPERIENCE
Pharmacy Site Plan, Hyde Park, NY – Project Manager Developed the site plan for the pharmacy and associated parking lot. Analyzed the stormwater drainage patterns and prepared the internal parking lot drainage system. Prepared the design and plans for additional features such as new onsite sewage disposal system, parking lot layout, parking lot stripping, access drives, sidewalks, grading plans, parking lot lighting and water line relocations. Negotiated with NYS Department of Transportation for a new entrance with turning lane. Final construction documents included final plans and details. Services during construction included construction management, periodic site visits during construction, answering RFI's from contractors and review of shop drawings.

Credit Union Site Plan, Pleasant Valley, NY – Project Manager Developed the site plan for the credit union and associated parking lot. Analyzed the stormwater drainage patterns and prepared the internal parking lot drainage system. Prepared the design and plans for additional features such as new onsite sewage disposal system, parking lot layout, parking lot stripping, access drives, sidewalks, grading plans, parking lot lighting and water line relocations. Negotiated with Dutchess County Department of Public Works for a new entrance with turning lane. Final construction documents included final plans and details. Services during construction included construction management, periodic site visits during construction, answering RFI's from contractors and review of shop drawings.

Traffic Study and Site Plan Review of Gas Station, Walkill, NY – Project Manager Duties included: review of plans and traffic study prepared by developer for proposed gas station. Determined site plan layout was not sufficient for safe operation of the proposed facility.

Lucas Avenue Subdivision – Senior Engineer Duties included: Stormwater management design for a 4 acre subdivision including piping system and retention pond designs. Initial analyses included TR55 analysis, soils investigations and investigations of existing municipal stormwater sewer through property. Other design suited included: municipal code review for subdivision regulations, utility easements and street regulations. Investigated

preliminary roadway alignment for required lot frontages, researched stormwater issues for municipal compliance, noted grading issues that will affect subdivision design and storm sewer realignment for greater lot usage.

Deer Hill Subdivision – Senior Engineer Currently overseeing stormwater management design of 30 acre subdivision. Duties include TR-55 analysis of existing and proposed conditions, examination of existing soils data, design of piping system and NYSDEC regulated stormwater retentions system. The system design meets the current stormwater regulations and will allow the owner to file the Notice of Intent when appropriate.

Northern Dutchess Hospital Modernization and Expansion – Stormwater Design As part of the design team performed detailed drainage analysis for the project. Develop drainage system design to meet the requirements for stormwater pollution prevention imposed by the NYS Department of Environmental Conservation.

Poughkeepsie Dutchess County Transportation Council, Various locations in Dutchess County, NY – Project Engineer Responsible for overseeing the manual traffic counts including pedestrian counts and vehicular classifications. His duties included arranging the personnel for the counts, downloading the data, checking the data, collating the data and transmitting the data to other team members for analysis. He also provided any answers to the team members regarding the data. His responsibilities for additional projects included overseeing the collection of manual traffic counts and a license plate survey at various locations.

Vineyard Hills Subdivision - Project Manager Duties included: Stormwater management design for a 22-acre subdivision including open channels, piping system and retention pond designs. Initial analyses included TR55 analysis and soils investigations. Other design suited included: municipal code review for subdivision regulations, and street regulations. Investigated preliminary roadway alignment for required lot frontages, researched stormwater issues for municipal compliance, noted grading issues that will affect subdivision design and storm sewer realignment for greater lot usage.

Emery Lawson
Project Manager

PROFESSIONAL EXPERIENCE

Project Manager, Ecosystems Strategies, Inc., Poughkeepsie, NY *2007 - present*

- Conducts Environmental Site Investigations and prepares final site assessment reports.
- Investigates site histories.
- Conducts facility inspections.
- Reviews regulatory agency records.
- Documents facility compliance with relevant State and Federal regulations.
- Conducts Phase II Technical Environmental Investigations and prepares technical reports.
- Researches field and regulatory information.
- Coordinates subcontractors.
- Oversees fieldwork and handles collection of material, soil and water samples.

Environmental Engineer, Terracon Consultants, Inc., Bettendorf, IA *2006 - 2007*

- Conducted Environmental Site Investigations and prepares final site assessment reports.
- Conducted Phase II Technical Environmental Investigations and prepares technical reports.
- Conducted Industrial Permitting and Auditing Projects.

Complex Environmental Manager, Tyson Foods, Inc., Waldron, AR *2002- 2005*

- Management of all environmental permits and programs to ensure compliance with Federal, State and local environmental laws and regulations.
- Oversight of the wastewater treatment plant.
- Conducted plant-wide environmental training.
- Member of the plant hazmat response team.

Field Engineer, Arkansas Highway Transportation Department, Waldron, AR *2001- 2002*

- Oversight of highway construction projects to ensure that projects were built to plans and specifications.

Engineer in Training, Water Resources Department, PBS&J, Austin, TX *1999- 2001*

- Hydrology and Hydraulics design for projects including: FEMA floodplain investigations, TxDOT roadway projects, and residential projects.

EDUCATION

Masters of Science in Civil Engineering, Texas A&M University *1999*
Bachelors of Science in Environmental Science, Oklahoma State University *1997*

PROFESSIONAL CERTIFICATIONS

- 29 CRF 1910.120 (e) – 40 Hour Hazwoper

Paul H. Ciminello, CEM, CAQS
PRESIDENT

EDUCATION

Master of Environmental Management, 1986
School of the Environment, Duke University, Durham, North Carolina

Master of Arts in Public Policy Sciences, 1986
Institute of Policy Sciences and Public Affairs, Duke University, Durham, North Carolina

Bachelor of Arts, 1980
Tufts University, Medford, Massachusetts

CERTIFICATIONS AND TRAINING

Certified Environmental Manager, Environmental Assessment Association, 2006
Certified Air Quality Specialist, Environmental Assessment Association, 2007
NJ Dept. of Environmental Protection Licensed Subsurface Evaluator (License Number: 0014686)
NYS Dept. of Labor Certified Asbestos Building Inspector (Cert. Number: AH92-14884)
Connecticut Department of Environmental Protection Interim Environmental Professional
NYS Department of State, Division of Licensing Services, Real Estate Instructor
In compliance with OSHA Hazardous Materials Safety (29 CFR 1910) requirements

PROFESSIONAL EXPERIENCE

President, Ecosystems Strategies, Inc., Poughkeepsie, New York *1992 to present*

Coordinates corporate strategic planning, financial management and marketing activities. Oversees corporate work on state and federal superfund sites and manages education/training services. Responsible for technical services in areas of pollution prevention, contaminant delineation and site remediation. Twenty years experience in the investigation and remediation of petroleum contamination at commercial and residential properties. Major recent projects of relevance include:

- Irvington Waterfront Park (Irvington, NY): Project Manager for site investigation and remedial design of abandoned industrial riverfront properties. Documented soil and groundwater contamination and designed remediation including soil removal and site capping. Project completed in 2000; project awarded the 2000 Gold Metal Award by Consulting Engineers Council of New York State, Inc.

- Greyston Bakery Site (Yonkers, NY): Project Manager for site investigation and remedial design of former manufactured gas plant site for future use as a bakery. Documented soil, groundwater and soil gas contamination. Remedial systems included installations of a DNAPL collection system, a barrier layer, a subslab depressurization system under the building, and groundwater monitoring. Project completed in 2004.

- 400 Block Redevelopment (Poughkeepsie, NY): Project Manager for site investigation and remedial design of multi-use industrial development property (boiler repair, clothing manufacturer, auto repair) for future retail/residential use. Documented soil (petroleum, PCBs, metals) and groundwater (petroleum) contamination. Remedial systems include: soil (and tank) removal, installation of a barrier, and groundwater monitoring. Project completed in 2006.

- Parkview Commons Site (Bronx, NY): Project Manager for site investigation and remedial design of former gas station/auto repair facility for future use as a residential/commercial building. Remedial investigation and design is currently on-going. Project completed in 2006.

Senior Hazardous Waste Specialist, U.S. Hydrogeologic, Inc., Poughkeepsie, New York 1986 to 1992

Supervisor for corporate hazardous and solid waste investigatory and remedial services. Major projects included:

- Coordination of subsurface investigations at a New York State Superfund site (former industrial facility); project manager in charge of site reclassification (delisted as of January, 1991).
- Coordination of petroleum storage tank management plan for Dutchess County (NY) Department of Public Works, including an assessment of regulatory compliance, product utilization and physical conditions of more than 100 tanks at over 20 facilities.
- Environmental compliance Audit of 42,000-square foot printing facility with specific remediations for solvent handling/disposal, inks storage and metal recovery processes.

Adjunct Professor, (various institutions) *1991 to Present*

Dutchess Community College, Poughkeepsie, New York
Marist College, Poughkeepsie, New York
Vassar College, Poughkeepsie, New York

Courses: Macroeconomics, Environmental Economics (DCC)
Introduction to Environmental Issues (Marist)
Environmental Geology (Vassar)

Policy Intern, Southern Growth Policies Board, North Carolina *1985*

Prepared several in-depth and short analyses of environmental and economic issues, with specific concern for their impact on Southern state policies. Analyses included: hazardous waste facility setting policies and environmental impacts of "high tech" industries on host communities.

Research Assistant, University of Oregon, Eugene, Oregon *1983*

Analyzed (with Dr. John Baldwin, Chairman of the Department of Planning, Public Policy and Management, U. of Oregon) the "Oregon Riparian Tax Incentive Program". Designed survey, conducted interviews and analyzed data. Summary paper with programmatic recommendations, was presented at the Annual Conference of the National Association of Environmental Educators.

RELATED EXPERIENCE

Research Assistant, School of the Environment, Duke University, North Carolina *1986*

Assisted in the design and evaluation of risk assessment models to estimate the impact of landfill leachate on human health. Monte Carlo simulation and pollutant transport models used in the analyses.

Research Assistant, USDA Forest Service, Duke University, North Carolina *1985*

Collected economic data and assisted in statistical analyses for a study isolating research as a variable in timber production functions.

Research Assistant, School of the Environment, Duke University, North Carolina *1984*

Preliminary research on the use of mathematical models by water resource administrators.

Teacher, Eugene, Oregon *1980-1983*

PRESENTATIONS

- "Environmental Risks in Lending" Training Session for Pawling Savings Bank employees, December 18 and 19, 1989; and July 1, 1993.
- "Identifying Environmental Concerns in Appraisals", Workshops for Lakewood Appraisal Corporation, October, and November, 1989 and April, 1990.
- "State and Local Groundwater Protection Strategies", Annual meeting of the New York State Association of Towns, February, 1990.
- "Environmental Audits on Orchards and Agricultural Properties", Resource Education Institute, Inc., Real Estate Site Assessment and Environmental Audits Conference, December 4, 1990.
- "Environmental Audits on Orchards and Agricultural Properties", National Water Well Association Annual Conference, July 29-31, 1991.
- "Principles of Environmental Economics for Ground Water Professionals", National Groundwater Association Outdoor Action Conference, May 27, 1993.
- "Impact of Environmental Liabilities on Real Estate Transactions", a NYS Department of Education approved course for licensed real estate professionals, March 1995; April 1995; May 1995; October 1995.
- "Brownfields Redevelopment in New York: A Discussion of Two Case Studies", New England Environmental Conference 1996, March, 1996.
- "Quantifying Environmental Liabilities", a NYS Department of Education approved course for licensed real estate professionals, March 1997.
- "Environmental Assessments in Urban Settings", Vassar College, Fall 1999 and Fall 2000.
- "Navigating Property Contaminant Problems", Land Trust Alliance Rally 2001, Oct 2001

ARTICLES

Ciminello, P. 1993. A Primer on Petroleum Bulk Storage Tanks and Petroleum Contamination of Property, ASHI Technical Journal, Volume 3, No. 1

Ciminello, P. 1991. Environmental Audits on Orchard and Other Agricultural Properties, Proceedings of the National Water Well Association Annual Conference

Ciminello, P. 1991. Property Managers Should Carefully Examine Current Fuel Storage Practices, NYS Real Estate Journal, Vol. 3, No. 9

Ciminello, P. 1991. New DEC Regulations Affect Development of Agricultural Lands, NYS Real Estate Journal, Vol. 3, No. 6

Ciminello, P., Hodges-Copple, J. 1986. Managing Toxic Risks From High Tech Manufacturing, Growth and Environmental Management Series (Southern Growth Policies Board)

Ciminello, P. 1986. State Assistance in Financing Water Treatment Facilities, Growth and Environmental Management Series (Southern Growth Policies Board)

Ciminello, P. 1985. Plants Amid Plantings: The Future Role of Environmental Factors in Business Climate, Ratings, Southern Growth ALERT (Southern Growth Policies Board)

Ciminello, P., J. Baldwin, N. Duhnkrack,1984, An Incentive Approach to Riparian Lands Conservation, Monographs in Environmental Education and Environmental Studies (North American Association of Environmental Educators)

PROFESSIONAL AFFILIATIONS

American Water Resources Association
National Groundwater Association
Hazardous Materials Control Research Institute
Environmental Assessment Association

ADDITIONAL INFORMATION

Member, Dutchess County (NY) Youth Board (1987-1992); Chairman, 1992
Member, City of Poughkeepsie (NY) School District Ad Hoc Committee on Teen Parents and Pregnancy Prevention (1991)
Member, City of Poughkeepsie School District Budget Advisory Committee (1994 to 2000)
Member, City of Poughkeepsie PTA and Middle School Building Level Team

Scott Spitzer
Senior Project Manager
scott@ecosystemsstrategies.com

PROFESSIONAL EXPERIENCE

Project Manager, Ecosystems Strategies, Inc., Poughkeepsie, NY *2001 - present*

- Conducts Environmental Site Investigations and prepares final site assessment reports. Over 300 Investigations and Final Reports completed to date.
- Investigates site histories.
- Conducts facility inspections.
- Reviews regulatory agency records.
- Documents facility compliance with relevant State and Federal regulations.
- Conducts Phase II Technical Environmental Investigations and prepares technical reports.
- Researches field and regulatory information.
- Manages tank removals.
- Coordinates subcontractors.
- Oversees fieldwork and handles collection of material, soil and water samples.

Independent Science Writer *1992 - 2001*

- Writings in applied science and biology for a variety of science and trade publications.

EDUCATION

Bachelor of Science from Department of Biology with honors in Environmental Science, SUNY at Stony Brook, Stony Brook, New York *May 1992*

PROFESSIONAL ORGANIZATIONS AND CERTIFICATIONS

- OSHA Hazardous Waste Site Operations
- OSHA Emergency Response Training
- 29 CRF 1910.120 (e) – 40 Hour Hazwoper

Rosaura Andújar-McNeil
Project Manager
rosaura@ecosystemsstrategies.com

PROFESSIONAL EXPERIENCE

Project Manager, *Ecosystems Strategies, Inc., Poughkeepsie, New York*

2006 to present

Performs Environmental Site Assessments, prepares technical environmental reports, reviews regulatory agency records and historical maps and documents to identify potential environmental concerns on properties of interest.

Engineer I, Metcalf and Eddy of New York, New York, New York

2002 – 2004

Performed environmental assessments for water and wastewater treatment facilities, including the *Environmental Impact Statement* for the Croton Water Treatment Plant and developed graphics for environmental reports.

EDUCATION

Bachelor of Science in Environmental Engineering, 2002
Rensselaer Polytechnic Institute, Troy, New York

PROFESSIONAL CERTIFICATIONS

- Engineer in Training

APPENDIX G

Quality Assurance / Quality Control Plan

QUALITY ASSURANCE/QUALITY CONTROL PLAN

FOR

SITE REMEDIATION

LONG DOCK BEACON SITE

RED FLYNN DRIVE, CITY OF BEACON
DUTCHESS COUNTY, NEW YORK

NYSDEC Brownfields Cleanup Program Site: C314112

January 2008

ESI File: SG96152.52

Appendix G of the Remedial Alternatives Report/Remedial Workplan

Prepared By

ECOSYSTEMS STRATEGIES, INC.
24 Davis Avenue
Poughkeepsie, New York 12603
(845) 452-1658

QUALITY ASSURANCE/QUALITY CONTROL PLAN

FOR

SITE REMEDIATION

LONG DOCK BEACON SITE

RED FLYNN DRIVE, CITY OF BEACON
DUTCHESS COUNTY, NEW YORK

January 2008

Prepared By:

Ecosystems Strategies, Inc.
24 Davis Avenue
Poughkeepsie, New York 12603

Dewkett Engineering, P.C.
187 E. Market Street
Rhinebeck, NY 12572

Prepared For:

The Scenic Hudson Land Trust, Inc.
Civic Center Plaza
Poughkeepsie, New York 12601

Foss Group Beacon, LLC
163 Delaware Avenue
Delmar, New York 12045

The undersigned has reviewed this Quality Assurance/Quality Control Workplan and certifies to Scenic Hudson Land Trust, Inc. and Foss Group Beacon, LLC that the information provided in this document is accurate as of the date of issuance by this office.

Any and all questions or comments, including requests for additional information, should be submitted to the undersigned.

_____

Paul H. Ciminello
President

TABLE OF CONTENTS

1.0 PROJECT MANAGEMENT 1
- 1.1 Project/Task Organization
- 1.2 Principal Data Users
- 1.3 Problem Definition/Background
- 1.4 Project/Task Description
- 1.5 Quality Objectives and Criteria
- 1.6 Documents and Records

2.0 DATA GENERATION AND AQUISITION 3
- 2.1 Sampling Methods
- 2.2 Sample Handling and Custody
- 2.3 Analytical Methods
- 2.4 Quality Control
- 2.5 Instrument/Equipment Testing, Inspection, and Maintenance
- 2.6 Inspection/Acceptance of Supplies and Consumables
- 2.7 Data Management

3.0 DATA VALIDATION AND USABILITY 6
- 3.1 Data Review, Verification, and Validation
  - 3.1.1 Field Measurements
  - 3.1.2 Laboratory Analysis
- 3.2 Verification and Validation Methods
  - 3.2.1 Verification Method
  - 3.2.2 Authority for Verification
  - 3.2.3 Transmittal to Users
  - 3.2.4 Calculations

1.0 PROJECT MANAGEMENT

1.1 Project/Task Organization

The following individuals are major participants in the project.

William Bennett	NYSDEC
Robert Capowski P.E.	Dewkett Engineering, P.E.
Paul Ciminello	President, Ecosystems Strategies, Inc. (ESI)
Scott Spitzer	On-Site Coordinator (OSC), ESI

1.2 Principal Data Users

The principal users of the generated data in this project are listed below.

a. Residents of the City of Beacon, especially those residing in the vicinity of the Site

b. Scenic Hudson Land Trust, Inc. and Foss Group Beacon, LLC

c. NYSDEC

1.3 Problem Definition/Background

The primary objective of the proposed sampling is to generate data of sufficient quality and quantity to represent surface and subsurface conditions at the Site during and following remedial activities with a view to generating a Final Remediation Services Engineering Report (Final Report).

This Final Report will include, at a minimum, results of any laboratory analyses generated during activities described in the Remedial Workplan (RWP), waste transport/disposal manifests from all soil excavation and disposal activities, proof of implementation and effectiveness of in-situ chemical oxidation treatment (e.g., sampling data, photographs, field notes), proof of vapor barrier and Sub-Slab Depressurization System (SSDS) installation (e.g., photographs, field notes) and documentation of SSDS effectiveness, and maps illustrating Site closure activities.

1.4 Project Task/Description

The project will meet its objective by collecting:

- soil samples in areas of soil removal (waste characterization and confirmatory sampling) and areas of in-situ chemical oxidation treatment for petroleum contamination;
- groundwater samples utilizing existing monitoring wells and anynew monitoring wells at the Site, and;
- air/vapor samples in the area of the former Major Oil Storage Facility (MOSF).

Confirmatory soil samples will be collected and analyzed for specific constituents of concern for a particular excavation/treatment area. Excavation areas and constituents of concern have been identified in the RWP. Constituents of concern include: arsenic, lead, mercury, polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons (PAHs), and petroleum compounds (semi-volatile organic compounds [SVOCs], volatile organic compounds [VOCs] and total petroleum

hydrocarbons – diesel range organics [TPH-DROs]). Soil samples for waste characterization purposes will be collected and analyzed according to repository analytical requirements.

Groundwater samples will be collected and analyzed for TAL metals, VOCs, and SVOCs. Air/soil vapor samples will be collected and analyzed for VOCs.

1.5 Quality Objectives and Criteria

The data collected in this project will be used for two purposes:

1. To document the effectiveness of remedial actions; and

2. To inform and educate the public about potential impacts to human health.

1.6 Documents and Records

Electronic and paper copies of all measurements will be retained by ESI. Paper copies will also be included in the Final Report to be generated at the conclusion of remediation activities.

2.0 Data Generation and Acquisition

2.1 Sampling Methods

- Soil samples will be collected in appropriately-sized glass jars provided by the laboratory, in the manner outlined in the Remedial Design Report (RDR), expected release date April 2008. During the sampling procedure, samples will be stored in a cooler prior to transport to the approved laboratory.

- Water samples will be collected in laboratory provided vessels of a type and capacity specific to the required analyses, in the manner outlined in the RDR. During the sampling procedure, samples will be stored in a cooler prior to transport to the approved laboratory.

- Soil vapor, sub-slab soil vapor, and indoor/outdoor air samples will be collected in accordance with sampling collection criteria outlined in the Guidance for Evaluating Soil Vapor Intrusion in the State of New York, prepared by New York State Department of Health (NYSDOH) [dated October 2006]. All vapor samples will be collected into laboratory provided, stainless steel Summa canisters equipped with flow regulators (as appropriate for the type of sample).

2.2 Sample Handling and Custody

Samples will be handled by the OSC. After each soil and groundwater sample is collected, it will be placed in a sample cooler that is maintained at approximately 4°C. For each sampling day, sampling personnel will be required to complete a sampling custody worksheet indicating all pertinent information about the samples collected, handling methods, name of the collector, and chain of custody. Upon the completion of each day of sample collection activities, all samples will be shipped via either courier or overnight delivery (per laboratory requirements) to a NYSDOH ELAP approved laboratory. Laboratory personnel will record the cooler temperature (approximately 4°C) upon receipt and analyze the samples prior to the expiration of the following hold times:

VOCs (soil and groundwater):	14 Days
VOCs (air/vapor):	28 Days
SVOCs:	14 Days
TPH-DRO:	14 Days
Metals:	6 Months
PCBs:	14 Days

2.3 Analytical Methods

- Soil samples will be analyzed for Target Compound List (TCL) VOCs + 10 Tentatively Identified Compounds [TICs] (USEPA Method 8260), TCL SVOCs + 20 TICs (USEPA Method 8270), TPH-DRO (USEPA Method 8015), Target Analyte List (TAL) metals (USEPA Method 6010 and 7471), and PCBs (USEPA Method 8082). Only samples collected in the area of in-situ treatment will be analyzed for VOCs and TPH-DRO and only samples in the vicinity of the barn will be analyzed for PCBs.

- Monitoring well samples will be analyzed for TCL VOCs + 10 TICs (USEPA Method 8260), TCL SVOCs + 20 TICs (USEPA Method 8260), and TAL metals (USEPA Method 6010 and 7471).

- Soil vapor, sub-slab soil vapor, and indoor/outdoor air samples will be analyzed for VOCs

(USEPA Method TO-15).

2.4 Quality Control

Accuracy and precision will be determined by repeated analysis of laboratory standards, and matrix effects and recovery will be determined through use of spiked samples. With each sample run, standards, blanks, and spiked samples will be run.

One QA/QC sample for every 20 samples per medium (soil, groundwater and air/vapor) will be duplicated by ESI. One in 20 samples per medium (soil and groundwater only) will also be submitted for Matrix spike (MS) and Matrix Spike Duplicate (MSD) analysis. One rinse blank will be prepared for each given piece of sampling equipment for every 20 analytical samples collected using that piece of equipment. For each day of sampling, a trip blank will be included with each sample cooler.

Quality assurance procedures during air/vapor sampling will be conducted in accordance with the NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York. Helium will be used as a tracer gas when collecting any soil vapor or sub-slab soil vapor samples. The tracer gas will serve as a quality control measure to ensure the integrity of the vapor probe seal at each sample collection point.

2.5 Instrument/Equipment Testing, Inspection, and Maintenance

Field measurements will be collected using a MiniRAE 3000 (Model PGM 7320) photo-ionization detector (PID) during all sampling and a Horiba® U-22 multi-parameter instrument during monitoring well sampling. During the collection of soil and sub-slab soil vapor samples, a dielectric helium detector (Model MGD-2002) will be used to establish appropriate levels of tracer gas, and a constant flow air sampling pump (Model Gil-Air 3 R) will be used to purge all sample tubing. All field instruments will be stored at ESI offices when not in use. These instruments will be calibrated each day in accordance with the manufacturer's instructions. Instrument malfunction is normally apparent during calibration. In the event of malfunction, equipment will be cleaned and tested. Equipment testing, inspection, and maintenance will be the responsibility of the Quality Assurance (QA) manager for the project.

2.6 Inspection/Acceptance of Supplies and Consumables

The following supplies and consumables will be used:

- One 8-oz (for SVOCs, PCBs, and TAL Metals) and one 2-oz (for VOCs) clear glass jar will be used for each soil sample. Duplicate soil samples will each require one additional sample volume. MS/MSD soil samples will each require two additional sample volumes.

- One 1-L amber jar (for SVOCs), one 500-ml plastic jar with HNO_3 preservative (for TAL Metals), and two 40-ml vials with HCl preservative (for VOCs) will be used for each water sample. Each duplicate water sample will require one additional sample volume. Each MS/MSD water sample will require two additional sample volumes.

- One 6-L stainless steel summa canister will be used for each air/vapor sample. Duplicate air/vapor samples will each require one additional sample volume.

- Disposable gloves (nitrile or equivalent).

- Distilled water (for decontamination and the preparation of rinse blanks for soil and groundwater sampling).

All supplies and consumables will be inspected and tested (if necessary) by the QA manager upon receipt.

2.7 Data Management

For the purpose of data management, the data can be divided into field and laboratory data. Field data will be recorded at the time of measurement on written field logs.

3.0 Data Validation and Usability

3.1 Data Review, Verification, and Validation

Data generated by this project will be reviewed, verified and validated as follows:

3.1.1 Field measurements:

If field instruments are determined to be functioning properly through calibration and measurements of standards, and if there are no inconsistencies between written records and data recorded in the meters, the data will be assumed to be valid and will be accepted as an indication of field conditions. If instruments malfunction prior to field measurement, they will be restored to proper function prior to use. If they malfunction immediately after field measurements are taken, the measurements will be retaken as soon as possible. Inconsistencies between written records and meter data will be resolved as described above. In addition all field data will be reviewed for consistency and plausibility.

3.1.2 Laboratory Analysis

As a NYSDOH ELAP-certified certified laboratory, the approved laboratory will follow standard procedures regarding data validation and verification.

3.2 Verification and Validation Methods

3.2.1 Verification Method

Once collected, all data will go to the QA manager for review and verification. Review will involve determining that all data has been collected at the proper locations by the proper persons and that all field and laboratory logs are complete. Complete laboratory data packages will be provided to an independent, third-party data validator for the completion of Data Usability Summary Reports (DUSRs).

3.2.2 Authority for Verification

Authority for verification, validation, and resolution of data issues will be distributed among the investigators. Authority to resolve issues regarding verification of field measurements will rest with the QA manager.

3.2.3 Transmittal to Users

Following review, validation, and verification, all data will be conveyed to users via the Final Report.

3.2.4 Calculations

There are no project specific calculations required.